1

Introduction

ECI Telecom's Optical Transport Elements

Network Element (NE) is the term used for the network transport products that can be managed by the LightSoft® NMS. The various types of NEs are described in the following sections.

SYNCOM

The SYNCOM family of high-quality SDH multiplexing equipment is ECI Telecom's field-proven SDH network solution, which forms the powerful yet flexible SDH transmission network infrastructure needed for today's fast-evolving telecommunications services market. SYNCOM network solutions provide maximized advantages and benefits at the access, trunk and backbone network levels.

The SYNCOM family of products consists of:

- SDM-1 – the SDM-1 is an STM-1 level multiplexer that supports terminal multiplexing (TM) and add/drop multiplexing (ADM) configurations. It provides bidirectional service, full connectivity and advanced self-healing traffic protection. In dual ring topologies, it provides path level redundancy and a distributed protection scheme that enables flexible protection switching. Its flexibility allows easy expansion of network size and services.
- SDM-4 – the SDM-4 is ideal for regional ECI Er metropolitan networks, especially local rings, depending on population density and traffic levels. It can be deployed as a TM or an ADM, and offers bidirectional service, additional redundancy, tributary interface capacity and signal regeneration.

- SDM-16 – the SDM-16-series multiplexers provide transport at the 2.5 Gbps STM-16 rate. These modular, expandable single-shelf systems support TM or ADM configurations. The high capacity of their tributary interfaces is supported by a single card cage.
- SDM-1C – the SDM-1C compact multiplexer is optimized for the deployment of SDH-based optical access networks to the access cabinet, which may be located at the curbside or in the building. The SDM-1C is configurable either as a TM or as an ADM with full cross-connect and PDH interfaces.

BroadGate

ECI Telecom's BroadGate family extends the SDH access network to small and medium enterprises by combining SDH transmission units with service delivery units, data and channel service units, Ethernet switches and bridges, and primary multiplexers.

The EMS-SYNCOM can manage the µSDM™-1, which is the BroadGate product that provides the ideal STM-1 network termination unit for both optical and SDH networks. The µSDM-1 can be configured either as a TM or as an ADM. It supports all major topologies, including point-to-point, chain, ring and mesh, and enables protected distribution of E1, E3, DS3, and PDH signals to the customer's premises.

What is the EMS-SYNCOM?

The EMS-SYNCOM is ECI Telecom's powerful, state-of-the-art and field-proven Element Management System for ECI Telecom's SDH transmission networks.

The EMS-SYNCOM runs under the UNIX operating system on a SUN workstation.

The EMS-SYNCOM operates at the Element Management Level of the TMN model, working with SYNCOM and µSDM-1 network elements. It does so by providing all facets of element management from a single platform: configuration, fault detection, performance management, administrative procedures, maintenance operations, and security control.

At the core of the EMS-SYNCOM system is a detailed network database, which is updated in real time. This object-oriented information model incorporates features of the Q3 platform, anticipating full support of emerging ITU-T and ETSI guidelines for TMN interoperability.

ECI Telecom has designed the EMS-SYNCOM to support the emerging TMF-MTNM standard for transferring data between itself and diverse EMSs/TNMs. MTNM (Multi-Technology Network Management) is an open-architecture environment that brings together ATM, Ethernet, MPLS, DWDM and SDH/SONET into one management interface. The MTNM protocol is a cooperative effort by member companies of the TeleManagement Forum, a non-profit global organization that provides leadership, strategic guidance and practical solutions to improve the management and operation of communications services.

ECI Telecom uses MTNM as its northbound interface, enabling the EMS-SYNCOM to be managed by ECI Telecom's LightSoft™ Network Management System, as well as by other TMN systems.

The EMS-SYNCOM working environment combines practicality and ease of use. Its man-machine interface is completely graphical, enabling users to fully learn and operate the system with a minimum of training.

The EMS-SYNCOM provides you with a centralized control station to manage your SYNCOM network elements (NEs).

The EMS-SYNCOM database is based on an information model.

With the EMS-SYNCOM, you can access each NE and its equipment components, obtain information about them and manage them. The EMS-SYNCOM contains generic SDH management functions defined by ITU-T, and additional functions added by ECI Telecom provide superior network administration.

For more information about LightSoft, please refer to the *LightSoft General Description* and the *LightSoft User's Manual*.

Changes in EMS-Syncom 2.0

Trail management in EMS-Syncom 2.0 refers to the trails within an NE. Therefore, references to a trail, in this document or the UI, are usually referring to a cross-connect within a network element.

Major Functions

The EMS-SYNCOM provides the following management functions:

- Alarm and Fault Management
- Performance Monitoring (PM)
- Configuration Management
- Trail Management
- Maintenance Operations
- Security Management
- System Administration Functions.

Alarm and Fault Management

The EMS-SYNCOM supports the following fault management functions:

- Display current network alarms
- Set the severity levels for all possible failures in the network
- Display and manipulate an Alarms log
- Set options for audible alarms and reminders
- Export Log function.

Performance Monitoring (PM)

The EMS-SYNCOM provides all performance indicators defined in ITU-T standards. This includes the following performance management functions:

- Retrieve and display current performance data for each NE (in 15-minute or 24-hour intervals)
- Retrieve and display historical performance data for each NE, by stored time/date and by interval (15-minute or 24-hour intervals)
- Reset performance monitoring counters manually or automatically (every 15 minutes or 24 hours)
- Set performance thresholds
- Display performance data for a specific client trail end point
- View PM logs for client trail end points and for Multiplexer Section (MS) transmission objects

Configuration Management

You can update the expected configuration of each NE. The EMS-SYNCOM provides information about the current configuration of each NE. You can also use the EMS-SYNCOM for the following expected configuration management tasks:

- Add and remove network elements to/from the network
- Create and edit NE groups
- Create trails within NEs
- Configure attributes of various objects, for example, cards, TUs, VCs, etc.
- Select TG (Timing Generator) sources
- Set NE clocks
- Edit IP routing table
- Configure equipment protection with the Tributary Protection Matrix (TPM) unit
- Configure Optical Power Booster (OPB) card connections

Trail Management

- Manual building of trails through full control of system resources down to the TU level
- Edit trail properties (trail name, customer name, etc.)
- Various types of trail protection
- Traffic reconfiguration
- View a list of trails

Maintenance Operations

You can use the EMS-SYNCOM to perform routine maintenance work on your network. Many of these operations may affect traffic; on-screen warnings alert you when necessary. The maintenance functions are:

- Operate and release loopbacks
- Send an AIS
- Send an RDI
- Reset plug-in cards
- Protection lockout
- Select a protection network (manual switch to a protection network)
- Enforce the timing source
- View a list of maintenance operations per NE
- Switch tributary traffic to a protection tributary card through the Tributary Protection Matrix (TPM) unit

Security Management

Security Management restricts the access of EMS-SYNCOM users to information and limits the actions they may take. You can use the EMS-SYNCOM for the following security management tasks:

- Set passwords
- Manage user groups
- Assign capabilities to user groups
- Lock your EMS-SYNCOM workstation
- Assigns access rights and priorities for changing NE configuration using the multiconfigurator feature
- View the Users List window, which displays a list of the users currently logged in to the system.

System Administration Functions

System functions are used for various purposes regarding EMS-SYNCOM operations, such as:

- Backup of historical data
- Unix system operations
- Change, remote download and activate/deactivate software versions in the network and in individual NEs
- Upload NE data
- Ping any SYNCOM NE from the EMS-SYNCOM
- Bulletin board
- Notepad
- Login History
- Customize icon toolbar in EMS-SYNCOM Main window
- View a wide range of information regarding the managed NEs in the Inventory window
- Logout from EMS-SYNCOM
- Change the EMS-SYNCOM mode between Master and Monitor.

User Options

Multinetwork Capabilities

The EMS-SYNCOM can monitor and manage the operation of more than one network. These may be either interconnected or separate networks.

Connections between the NEs of a network are established via the SDH interface cards of the respective elements (ASF, ATR, or TRS). An appendage can be connected via an interface card (on the network) to an interface card on the appendage. A protection path can also be defined between the network and the appendage (protected appendage).

Interconnected networks are two or more networks in the larger topology which are interconnected via the TRS cards on two interconnected NEs, one in either network. Two subnetworks can also be interconnected by an Ethernet LAN or via any DCN (Data Communications Network) that supports the IP addressing scheme.

To manage interconnected networks, the EMS-SYNCOM is connected via Ethernet to one gateway NE only. Communication with the other network (or networks) is via the DCC (Data Communication Channel) over the interconnecting link. The DCC enables management of the SDH network through a communications channel embedded in the SDH overhead bytes.

It is possible to establish a trail connecting two Termination Points (TPs) on single, interconnected networks. Various protection schemes are supported for such trails.

2

Getting Started

Connecting the EMS-SYNCOM to the Network

The procedures detailed in this section should only be performed by qualified personnel. Users should start reading from Working with Windows on page 2-6.

Connection to the SDH Network

The EMS-SYNCOM is connected to the gateway NE via an Ethernet cable, using the EMS-SYNCOM interface on the Central Connection Panel (CCP). The other NEs communicate with the EMS-SYNCOM via the network's optical or electrical link using the DCC (the Data Communications Channel defined in the SDH standard). The following figures show the EMS-SYNCOM rear panel connections. HW RAID is connected to the server with the SCSI interface available on U45 and N440 servers.

NOTE: Not all available connectors are shown.

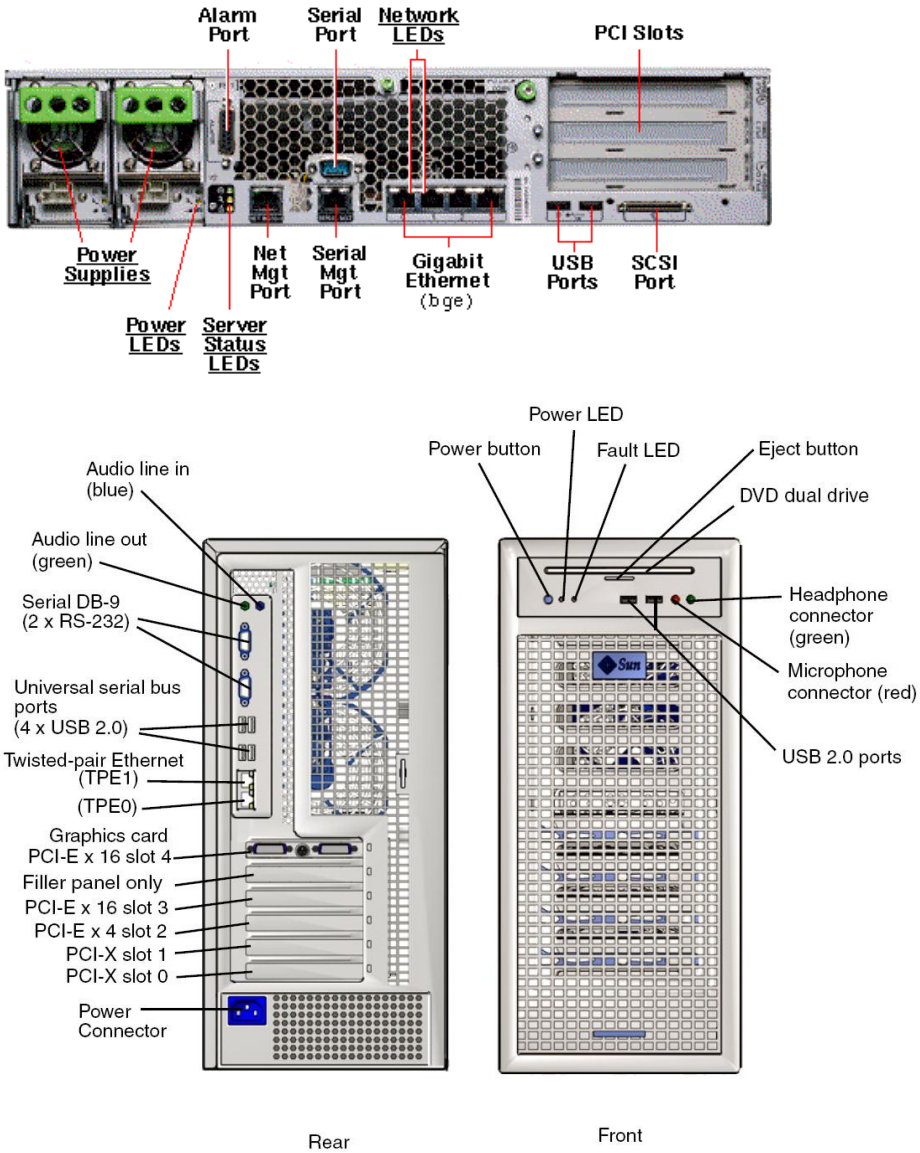


Figure 2-1. EMS-SYNCOM Connections (connector locations may vary)

The UPS is connected to the EMS-SYNCOM Sun computer, the terminal and the RAID. Figure 2-2 is a block diagram which shows the UPS connections.

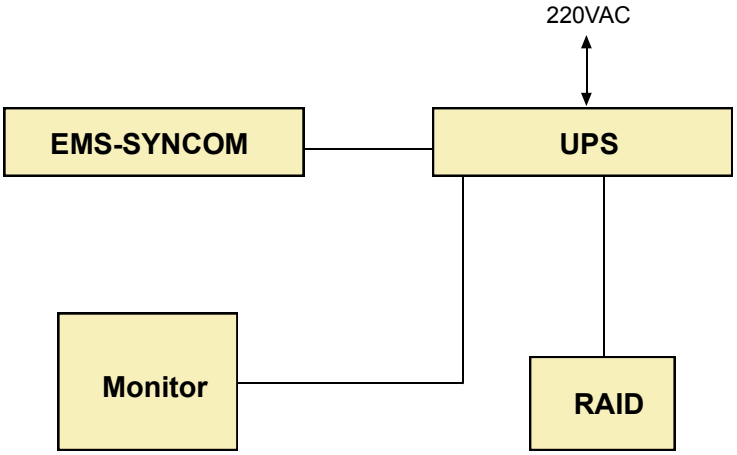


Figure 2-2. UPS Connection

To connect the EMS-SYNCOM to the NE subrack:

1. Install T-type BNC connectors on the MICRO-MAU adapters (both on the computer and on the NE). Refer to MAU Transceiver Installation on page 2-5 for instructions on installing the MICRO-MAU adapters.
2. Install 50 ohm terminators on one end of each T-type connector (see Connect a coaxial cable between the CCP and the EMS-SYNCOM.
3. Turn on the EMS-SYNCOM and allow a few minutes for the EMS-SYNCOM to establish a communication link with the gateway NE. (Refer to Starting EMS-SYNCOM on page 2-11 for instructions on starting the EMS-SYNCOM application.)

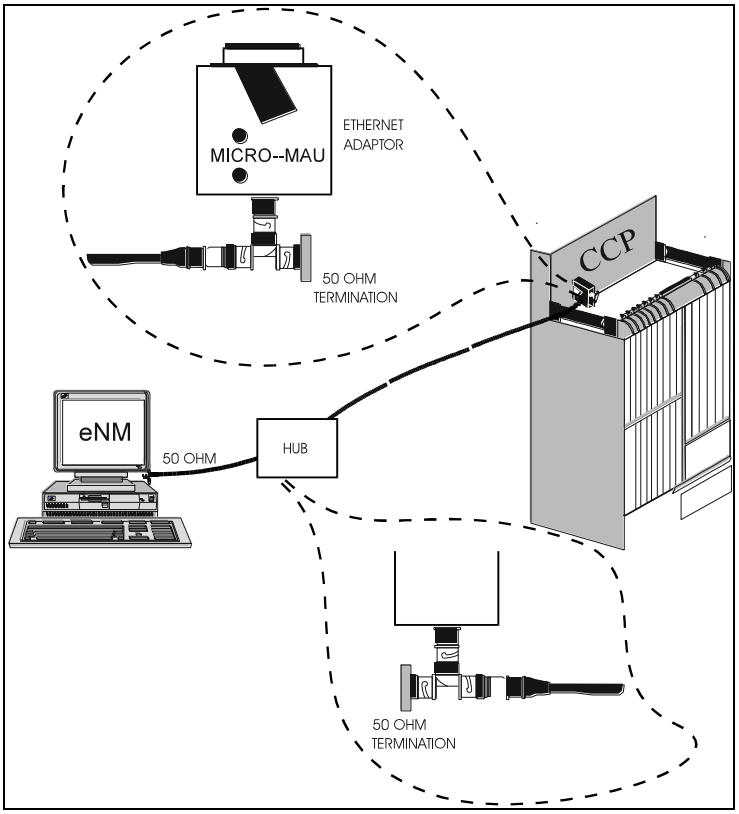


Figure 2-3. EMS-SYNCOM to Gateway NE Connection

4. Open the EMS-SYNCOM Shelf View for the gateway NE (refer to Accessing the NE Shelf on page 6-1 for instructions) and check that all the cards appear in the view. Open the Alarm Severities table for each tributary line, and adjust the severities, as necessary (refer to Setting Alarm Severity on page 4-20 for instructions).

5. Wait 20 minutes, and verify that no alarms appear in the Alarm Log.

6. Perform a cold reset on one of the tributary cards through the EMS-SYNCOM (see Cards Maintenance on page 7-15) and check that the red FAIL indicator on the specific card is momentarily lit, followed by a LED blinking during the software download. Check that the operation is acknowledged by the EMS-SYNCOM.

MAU Transceiver Installation

The MAU transceiver is installed only on gateway NEs (connected to the EMS-SYNCOM through an Ethernet channel).

To install the MAU transceiver:

1. Remove the four Philips screws securing the bracket located on the CCP connector F-I/F, remove the covering plate.
2. Install four spacers (2) in the four places of the screws removed in step 1 (refer to Figure 2-4.)
3. Remove the central Philips screw located on the MAU front cover (14).
4. Remove the two Philips screws securing the MAU back cover (13); remove the back cover.
5. Install the two pin guides (9) on the new back cover (10) using two Philips screws (12).
6. Attach the back cover (10) to the MAU (1) by means of two Philips screws (11).
7. Install the new bracket (4) on the MAU by means of a Philips screw (8); secure with LOCTITE 222.
8. Connect the MAU to connector F-IF on the CCP.
9. Verify that the POWER LED located on the front cover is illuminated.
10. Secure with four Philips screws (8), flat washers (5) and spring washers (6).

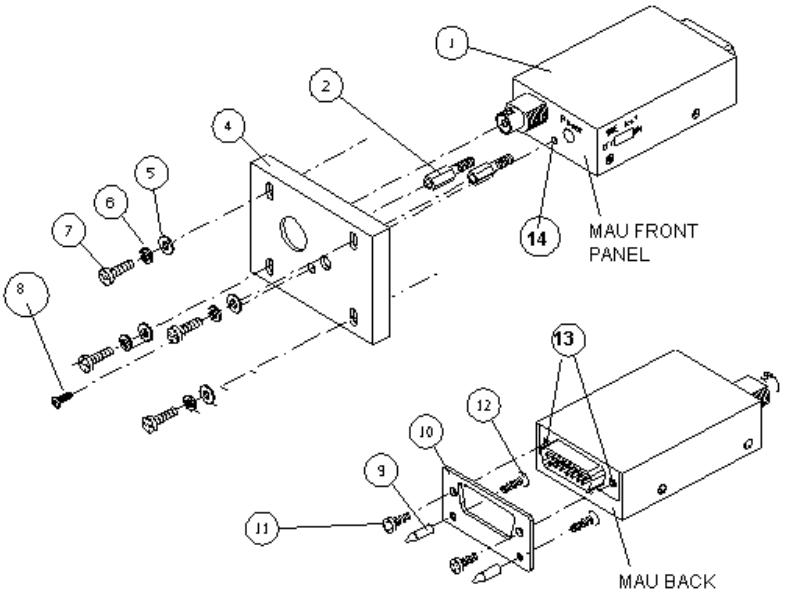


Figure 2-4. MAU Transceiver Installation

Working with Windows

This section explains some of the Windows-related commands required to work with the EMS-SYNCOM software. This includes descriptions of the basic components of the software and the typical operating procedure associated with each component.

The GUI

The EMS-SYNCOM software is implemented using a GUI (Graphical User Interface). The software uses various windows, displayed in graphical format on the computer monitor. Due to the large size and high resolution of the computer monitor, you can keep several windows opened simultaneously for increased productivity and convenience.

Activating EMS-SYNCOM via the Keyboard

If the mouse becomes unavailable, most of the EMS-SYNCOM functions can be operated via the keyboard, in UNIX systems. Table 2-1 lists how to activate various EMS-SYNCOM functions via the keyboard.

Table 2-1. UNIX Advanced Keys

Key Combination	Function
F10	Moves the cursor between pulldown menus and the Main window.
Space bar	Selects option.
Alt+F3	Switches to another window.
Alt+F5	Restores a window.
Alt+F7	Moves a window using arrow keys.
Alt+F8	Resizes a window using arrow keys.
Alt+F9	Minimizes a window
Alt+F10	Maximizes a window
Shift+Esc OR Alt + Space bar	Activates the window control menu.
Alt + Tab	Switches between windows.
Alt + Shift Tab	Switches between windows in reverse order.
Ctrl + Space bar	Makes multiple selection
Alt + F6	Switches between menu
Ctrl+E	Displays the ECI Telecom window, which provides information regarding the company; this include customer support phone numbers and addresses.

Key Combination	Function
Ctrl+I	Displays the Info window for the selected object.
Ctrl+O	Opens a view of the selected object (resulting view depends on the type of object selected).
Shift-U	Zooms-Out
Shift-Z	Zooms-In

Window Menus and Elements

Some windows have a menu bar with all available functions and operations pertaining to the selected object.

Windows contain data entry and display fields which are used to input parameter values.

Control buttons in windows allow you to perform operations using either the mouse or the keyboard.

Pull-Down Menus

Pull-down menus, which are displayed at the top of windows, provide the means of selecting various operating functions and options. Each menu includes a number of category headings that group together several options or functions related to the heading.

To select an option from a pull-down menu:

1. *Drag method*: point to a pull-down menu heading. Click and hold down the left-mouse button and drag the pointer to highlight the desired function. Release the mouse button.
2. *Click method*: point to a pull-down menu. The options listed under the headings are displayed. Click the select button once to display the menu, point to the desired function and click.
3. To exit a pull-down menu without activating any of its options, place the pointer anywhere away from the menu and release or click the button.

Context Sensitive Menus

The EMS-SYNCOM provides context sensitive menus, in several windows, as an alternative to using the pulldown menus described previously in Pull-Down Menus on page 2-7.

To use a context sensitive menu:

1. Click the right-mouse button. The context sensitive menu is displayed.
2. Point and click on the desired menu option.

Options that do not apply are grayed out in the context sensitive menus.

The context sensitive menu that is displayed depends on which window you are in and where you are pointing the mouse when right-clicking. Table 2-2 summarizes the EMS-SYNCOM context sensitive menus.

Table 2-2. EMS-SYNCOM Context Sensitive Menus

Point here	Context Sensitive Menu Name	Options
In the Main window main display (topology) area, away from any NE icons.	General	Current Alarms, Move Elements, Navigator, View, Collapse All, Expand All, Lock EMS-SYNCOM, Logout
In the Main window main display (topology) area, on NE icons.	Element	Open, Info, Collapse, Show Group, Attributes, Timing, Routing Table, Maintenance Info, OPB Connections, Ping, Upload NE Data
In the Main window main display (topology) area, on Group icons.	Group	Expand, List of Elements, Attributes
In the Main window main display (topology) area, on optical icons.	Optical	Open, Info, Attributes
In the Current Alarm window	Alarm	Open, Info, Acknowledge, Trails, Server Trails
In Shelf View	Equipment	Open, Info, Attributes, Severity, Slot Assignment, Server Trails, Trails, Collect PM Data
In Internal Objects View	Internals	Info, Open, Attributes, Severity, Server Trails, Trails

Point here	Context Sensitive Menu Name	Options
In Create/Edit Server Trails *and* Create/Edit Client Trails window, away from any NE icons.		Collapse All, Expand All
In Create/Edit Server Trails *and* Create/Edit Client Trails window, on NE or NE group icons.		Collapse, Expand

Cascade Menus

Cascade menus are submenus that contain a list of choices pertaining to a specific menu item. For example, if the **Element** option is selected from the **Configuration** option in the Main Menu, the cascade menu displays a list of options (**Create**, **Delete**, etc.). When a cascade menu is available for a menu option, it is indicated by an arrow which appears next to the function name.

To display a cascade menu:

1. Click the menu option. The cascade menu is displayed.
2. Select an option by clicking it.

Using Multi-Select

To select a number of items from a list box, use the multi-select function.

To select a range of items that appear consecutively in the list:

- Select the first item in the range, press the **Shift** key and click on the last item in the range. The entire range is highlighted for selection.

OR

- Click the first item in the range, and while keeping the mouse button pressed, move the mouse to the last item in the range.

You can also select multiple items not in sequence by holding down the **CTRL** key and clicking each item.

Buttons

Certain buttons are specific in nature, and only appear in selected windows. Other buttons are common to most windows, as shopwn in the following table:

Table 2-3. EMS-SYNCOM Control Buttons

Button	Function
Open	Opens and zooms in on selected objects, giving you information on their contents and status.
Help	Provides useful information about the window you are currently working in and related features.
Info	Opens a window that gives you administrative and technical information on the objects you select.
OK	Usually displayed in response to an action that requires User confirmation, such as deletion of a record. Click OK to confirm.
Close	Closes the current window without saving any changes that were made. It also returns you to the previous window, if applicable.
Cancel	Closes a window without saving changes or cancels an action that requires User confirmation.

Radio Buttons

Radio buttons are used for settings that allow only one selection at a time. Radio buttons are usually displayed as small diamond-shaped buttons.

To activate the option indicated by the radio button:

Click inside a diamond-shaped area. When selected, the box appears indented; when deselected it appears embossed.

Starting EMS-SYNCOM

To turn on the workstation system, press the ON switches on the back of the workstation computer and on the monitor.

The cabling connections within the EMS-SYNCOM workstation and between the EMS-SYNCOM and the gateway NE are described in the appropriate system Installation Manuals (SDM–1, SDM–4, SDM-16, etc.).

EMS-SYNCOM Modes (Master Mode and Monitor Mode)

There are two operating modes in EMS-SYNCOM: Master mode and Monitor mode. Each of these modes can be assigned to any EMS-SYNCOM workstation.

Master mode provides full access to all of the EMS-SYNCOM features, with the following exception. Master mode does not allow the user to import SDH trails (see Section Import SDH Trails on page 13-3). The EMS-SYNCOM must be in Monitor mode to do this.

In Monitor mode, the EMS-SYNCOM:

- When attempting Trail reconstruction, accepts all trails found on the network without attempting to modify them, even those that are obviously incorrect
- Cannot create or edit trails.

Logging In to EMS-SYNCOM

To log in to EMS-SYNCOM:

1. After turning on the workstation, the screen turns white and the Common Desktop Environment (CDE) startup panel is displayed.
2. Click the **Options** button and select the operating language from the **Language** cascade menu. The language selection determines the language in which the EMS-SYNCOM GUI is displayed (default language is English).
3. Enter the User Name and then enter the password.

The Startup Screen

After logging into the EMS-SYNCOM, the following window opens:

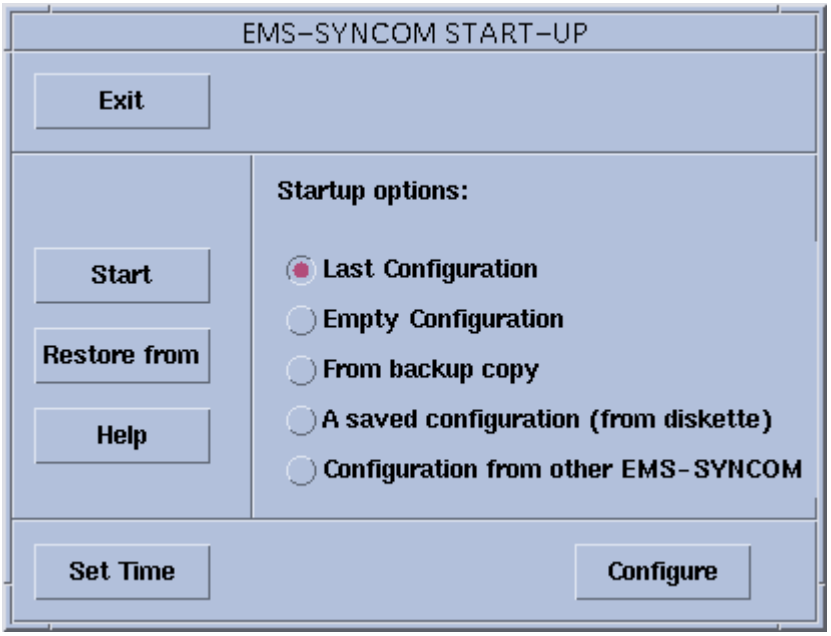


Figure 2-5. The Startup Window

1. You can start EMS-SYNCOM from any of the following startup options:
   - **Last Configuration:** This option loads the network configuration used during the previous EMS-SYNCOM session.
   - **Empty Configuration:** Selecting this command erases the configuration currently stored in the EMS-SYNCOM and starts with a blank database. To choose this option, click the **Restore from** button and then click the **Set DB** radio button. When EMS-SYNCOM is ready, click the **Start EMS-SYNCOM** button.
   - **From Backup Copy:** This option presents a list of available files for reconfiguration. Select a file to load into the EMS-SYNCOM configuration database. This erases the current configuration. To choose this option, click the **Restore from** button and then click the *Set DB* radio button. When EMS-SYNCOM is ready, click the **Start EMS-SYNCOM** button.
   - **A Saved Configuration (from Diskette):** This option allows you to restore a previously saved configuration from a floppy disk.
   - **Configuration from other EMS-SYNCOM:** This option allows you to copy the configuration files from a remote EMS-SYNCOM. Refer to Starting from a Remote EMS-SYNCOM on page 2-20 for instructions.

NOTE: Unless impossible, it is recommended to start EMS-SYNCOM from *Last Configuration*.

2. Click **Set Time** to verify the EMS-SYNCOM date and time. While the EMS-SYNCOM is running, it will not be possible to adjust the time again.
3. Click **Start EMS-SYNCOM**. Wait a few minutes while the system makes the final configuration adjustments.
4. EMS-SYNCOM is now ready for operation and the Main Window (Topology View) opens. Continue using EMS-SYNCOM from the Main Window as described in Chapter 3 Operating EMS-SYNCOM.

Startup Configuration Options

To change the configuration, click Configure in the Startup window (Figure 2-5). The following window opens.

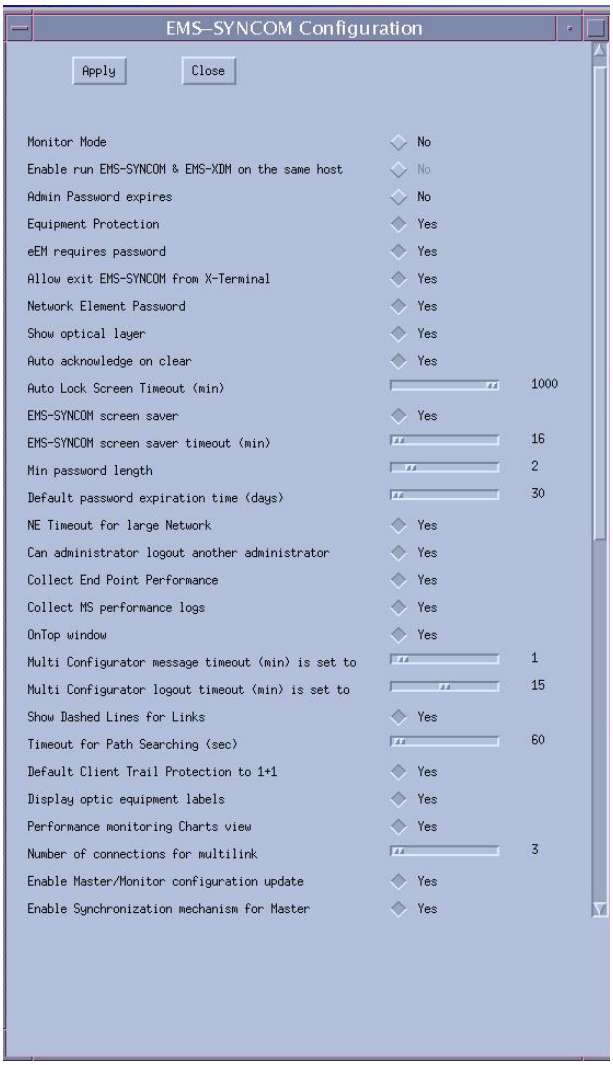


Figure 2-6. EMS-SYNCOM Startup Configuration Options

Enter the following data in this window:

Monitor Mode	Set to **Yes** to run the station in Monitor mode; **No** to run in Master mode. The mode can be changed after the EMS-SYNCOM starts up, at any time, as described in Section Changing the EMS-SYNCOM Mode on page 13-17.
Enable run EMS-SYNCOM and EMS-XDM on the same host	Set to **Yes** if you wish the EMS-SYNCOM application to automatically start the EMS-XDM® application in cases where they are running on the same host.
Admin password expires	By default, passwords set for administrators expire after a user-defined time period (see Default password expiration time parameter below). Set to **No** to disable the password expiration feature.
Equipment Protection	Set to **Yes** if the TPM (Tributary Protection Matrix) subsystem, described in Tributary Protection Matrix (TPM) on page 10-31, is installed.
EMS-SYNCOM requires password	If you set to **Yes**, EMS-SYNCOM stations connected to NEs managed by this station will require a password to access the NE database.
Network Element Password	If you set to **Yes**, enables the NE password feature described in Setting the NE Password on page 13-11.
Auto acknowledge on clear	If you set to **Yes**, cleared alarms are removed from the Current Alarms list as soon as they are cleared and acknowledged by the User. Refer to Chapter 4 Alarms Management for further information.
Auto lock screen timer	The automatic screen lock feature is enabled if the operator doesn't use the EMS-SYNCOM station for a User-specified time period (in minutes, as entered here). For example, if you enter 20 minutes, the screen locks if no actions are performed on the EMS-SYNCOM station for 20 minutes. Afterwards, the User must enter their password to unlock the system.
EMS-SYNCOM screen saver	If you set to **Yes**, the screen saver will be enabled.
EMS-SYNCOM screen saver timeout	The screen saver (if you set the previous parameter to **Yes**) will be turned on if the EMS-SYNCOM station is inactive for the time period you enter here. The default value of this parameter is one minute greater than the Automatic Screen Lock parameter setting (e.g., if the Automatic Screen Lock was set to 15 minutes, the default Screen Saver Time Out is 16 minutes).
Min password length	The number you enter here specifies the minimum password length allowed by the system, in characters. For example, if you enter a value of **10**, the administrator won't be able to define user passwords of nine characters or less.

Default password expiration time (days)	This is intended as a security feature; after a user-defined number of days has elapsed since a password has been defined (expiration period), the administrator needs to define a new password; refer to Adding a New User on page 11-2 for a description of this feature. Enter the maximum expiration period. The number entered here also serves as the default expiration period, if the administrator does not specify an expiration date for a newly defined user.
NE timeout for large networks	Set to **Yes** when your network has over 150 NEs; set to No when your network has less than this amount.
Can administrator logout another administrator	Set to **Yes** to allow an Administrator to log in while another Administrator is logged in at another station.
Collect end-point performance	If you set to **Yes**, the PM logs feature (see Section Trail Performance (PM) Logs, MS Logs and TC Logs on page 10-26) will be available for use.
Collect MS performance logs	If you set to **Yes**, the MS logs feature (see Section Trail Performance (PM) Logs, MS Logs and TC Logs on page 10-26) will be available for use.
On-top window	Set to **Yes** to display the EMS-SYNCOM Status window, described in The Status Window on page 3-7.
Multi-Configurator message timeout	This sets the message timeout value, as described in Administrator Login on page 11-12.
Multi-Configurator logout timeout	This sets the logout timeout value, as described in Section Administrator Login on page 11-12.
Show dashed lines for links	Set to **Yes** to display TRS to TRS connections as dotted lines in the Main window topology map.
Timeout for Path Searching (sec)	Enter the timeout that limits the amount of time that the EMS-SYNCOM spends on choosing the route and resources to be used when selecting automatic route completion for trails. If no suitable route/resources are found and the timeout has expired, the EMS-SYNCOM displays a message informing as such.
Default Client Trail Protection to 1+1	If you set to **Yes**, whenever you define a new client trail it is automatically created as a 1+1 protected trail. Refer to Creating a Client Trail on page 10-10 for a description of the create new client trail procedure.
Display optic equipment labels	If you set to **Yes**, the element name of optical equipment is displayed underneath the optical equipment icon, the main topology window.
Performance monitoring charts view	If you set to **Yes**, the PM Charts option described in Displaying Performance Charts on page 8-20 can be used.

Number of connections for multilink	In the EMS-SYNCOM main topology window, multiple connections between two NEs can be indicated by a thin line with the icon superimposed over the line. This allows space economy on the EMS-SYNCOM desktop, as it avoids displaying multiple connections as a series of lines which cannot be distinguished from each other. The icon will be displayed for multiple connections when the number of connections equals or exceeds the value specified here. For example, if you enter a value of **3**, the icon is displayed when the number of connections is three and higher.
Enable Master/Monitor Configuration update **Enable synchronization mechanism for Master**	The synchronization mechanism, in the Master station, automatically updates the EMS-SYNCOM configuration file stored on hard disk whenever there are changes in the file, according to user-defined parameters. Set to **Yes** to enable automatic backup.
Master/Monitor Polling Period	This parameter defines the synchronization mechanism polling interval for both Master and Monitor stations. The Master station checks the accuracy of the configuration file (by comparing it with the actual network data) every *n* seconds, according to the polling period value you enter. The polling period also defines how often the Monitor station checks the configuration file stored on the Master station, if the synchronization mechanism was enabled for it.
Master/Monitor Stability Period	If the synchronization mechanism is enabled, the Master station only updates the configuration file if it is unchanged for the amount of time entered here (in seconds).
Current Master host name for Monitor	Enter the name of the Master station that is the host of the Monitor station, for the purpose of the synchronization mechanism.
Define this EMS-SYNCOM as clock Master	If you set to **Yes**, this EMS-SYNCOM will function as the master clock, updating all NEs with the time of day every 30 seconds.
Collect TCM performance logs	*Not Relevant*. (Set to No.)
Disable audio alarm	If you set to **Yes**, the audio alarm function (see Audio Alarms Deactivation on page 4-42) is not automatically enabled at startup.
Disable audio alarm reminder	If you set to **Yes**, the alarm reminder function (see The Reminder Function on page 4-43) is not automatically enabled at startup.

Audio alarms for EINM mode	Set to **Yes** if you want audible alarms to be enabled when either is true – EMS-SYNCOM is integrated under LightSoft and no user has opened an EMS-SYNCOM window, or EMS-SYNCOM is running in standalone mode and no user is currently logged in.
Audio alarm repetition	Specify the frequency of alarm beeps, sounded when the audible alarm option is activated (see Audible Alarms on page 4-42).
Audio alarm duration	Specify the duration of the alarm beep, sounded when the audible alarm option is activated (see Audible Alarms on page 4-42).
Show event time of current alarms	If you set to **Yes**, alarms reported in the Current Alarms window are stamped with the time of occurrence.
MTNM Northbound Interface	Click **Yes** to connect to the NMS identified in Naming Server Host and Naming Server Port.
EMS Number in NS	When EMS-SYNCOM is integrated with an upper-level management system via the MTNM interface, enter a unique EMS number identifier.
Display optical objects alarm state	Click **Yes** for optical objects in the topology window to display color-coded according to the alarm state of the object.
Naming Server Parameters	Type in the location(s) of all CORBA Northbound Interface Naming Service instance(s) in the format <host>:<port>[","<host>:<port>]* **Where**: <host> = host name or host IP where the northbound CORBA Naming Service is installed <port> = the port identifier where the northbound CORBA Naming Service can be found For example "ariel:8888, saturn:7777".
Naming Server Port	Enter the TCP/IP address of the port on the NMS station you want to connect to.
Map is set to	A graphic map image can be displayed as a backdrop to the main topology view. If graphic map images are available, select the map or `None` (to not use a map). If there are no maps available, this question is skipped. To create graphic map images, save images files in ilv format and place them in the **~enm/MAPS** directory (be sure that the files are saved with the file suffix in lower case characters). Save files to be used as map images with the following size (in pixels): 286 (width) by 188 (height). Try to save images as close as possible to this ratio, otherwise the image display may be distorted.

Save EMS-SYNCOM configuration after each trail change	Click **No** in order not to save the EMS-SYNCOM configuration after each time a trail is created, edited, or deleted. This saves time when creating trails in large networks. Be sure to save the configuration manually or no configuration changes will be backed up. By default, **Yes** is selected.
Update original cleared alarms entries in the Alarm Log	Click **No** to have Syncom cleared alarms appear only once in the EMS-SYNCOM Event Log instead of both the original alarm and the clear event being registered. This improves EMS-SYNCOM performance when recovering from an alarm avalanche. By default, both the original alarm and the clear event are registered.
Manage Java windows by EMS-SYNCOM Main Window	Click **Yes** to have Java windows on the same display minimize/maximize with the EMS-SYNCOM windows. This setting is recommended for use with the Broadgate EMS. This is the default setting. When not selected, Java windows operate independently from the EMS-SYNCOM windows. This setting is recommended for use when running EMS-SYNCOM X-sessions in multi-application terminals.
Disable DNI behavior for XDM hubs	This parameter is not relevant in the current EMS-SYNCOM release.
Enable GUI for EMS	When set to **No**, the presentation module (display) is not opened for this EMS.

After you specify the configuration options in this window, click **Apply**. The message `Checking the EMS-SYNCOM database` is displayed. This action might take a few minutes. When finished, a logo is displayed while EMS-SYNCOM sets up the database.

Afterwards, EMS-SYNCOM displays the Login window. Enter your name and password and click **OK**. If you do not know your password, ask your system administrator.

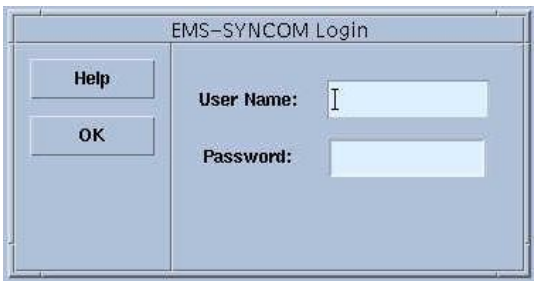


Figure 2-7. The Login Window

NOTE: If another User at the administrator level is presently logged in, and you attempt to log in as an administrator, a message is displayed on the Login window: admin already active in host *host_name*. Only one User at the administrator level can be logged in at one time.

Starting from a Remote EMS-SYNCOM

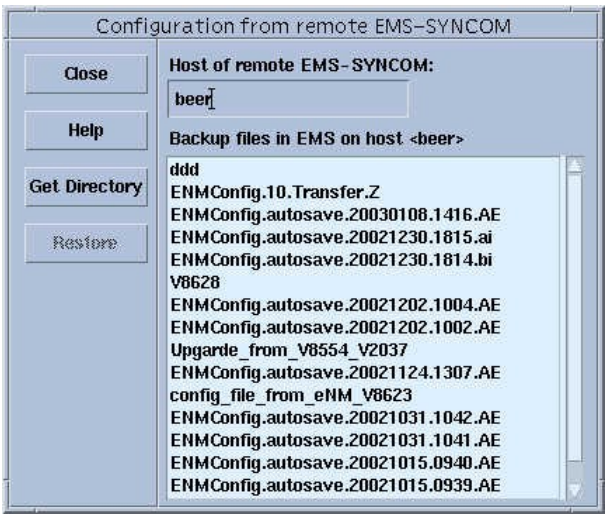


Figure 2-8. Configuration from Remote EMS-SYNCOM

This window enables you to retrieve a saved configuration file (i.e., backup copy) from a remote EMS-SYNCOM and import all server and client trails from it into your EMS-SYNCOM database.

To obtain a list of all saved configuration files at the remote station:

1. Enter the name of the EMS-SYNCOM station or its IP address in the **Host of remote EMS-SYNCOM** field.
2. Press **Enter** or click the **Get Directory** button.

The local station will contact the remote EMS-SYNCOM, retrieve a directory listing of all saved configuration backup files and display them in the list.

During the above process, an in-progress indicator window opens which enables you to abort the process if desired.

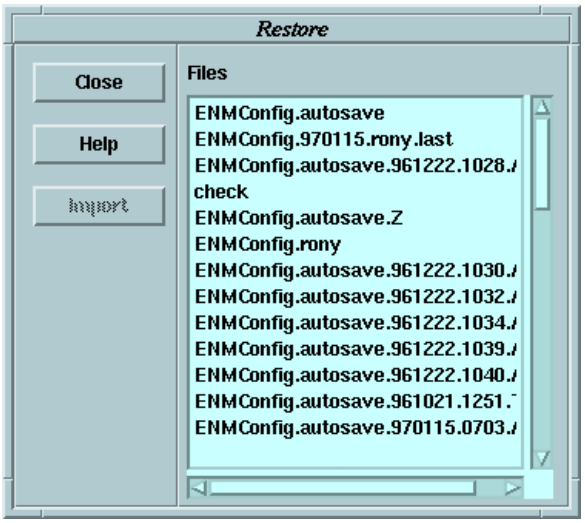


Figure 2-9. The Restore Window

In order to obtain a file and import trails from it, select a file from the list and click the Import button or double click on the file.

The local station again contacts the remote EMS-SYNCOM, copies the selected files into the local station's configuration files directory and starts importing trails from the file(s).

During this process, the same in-progress indicator window described previously opens.

3

Operating EMS-SYNCOM

Overview

This chapter explains the basic operating features of the EMS-SYNCOM. This includes basic navigation techniques, finding your way around the Main Window, using Info windows to obtain basic information and how to use On-line help.

The EMS-SYNCOM was designed as an open system in compliance with the open CORBA standard, functioning as an Element Management System (EMS) in the TMN scheme. It can operate as a standalone application or be integrated under a Network Management System (NMS) such as ECI Telecom's Optical Network Division's LightSoft. In some integrations, the user may only have access to the NE Shelf View by double-clicking the NE icon displayed in the upper-level management system. This is sometimes referred to as "GUI cut-through", or GCT. In other integrations (for example, under LightSoft), and in standalone mode, the user can access the EMS-SYNCOM Main window as well. For this reason, all menu items available from the Main window are duplicated in the NE Shelf View or Card Internals windows as well. Throughout this manual, reference to menu items is always made in parallel with respect to the EMS-SYNCOM Main window and the relevant Shelf View or Card Internals window.

The Main Window

The following figure shows EMS-SYNCOM's Main window, which is accessed after successfully logging in. This window is always displayed on the screen when the EMS-SYNCOM application is active and not minimized, either as a background for other windows or as the active window.

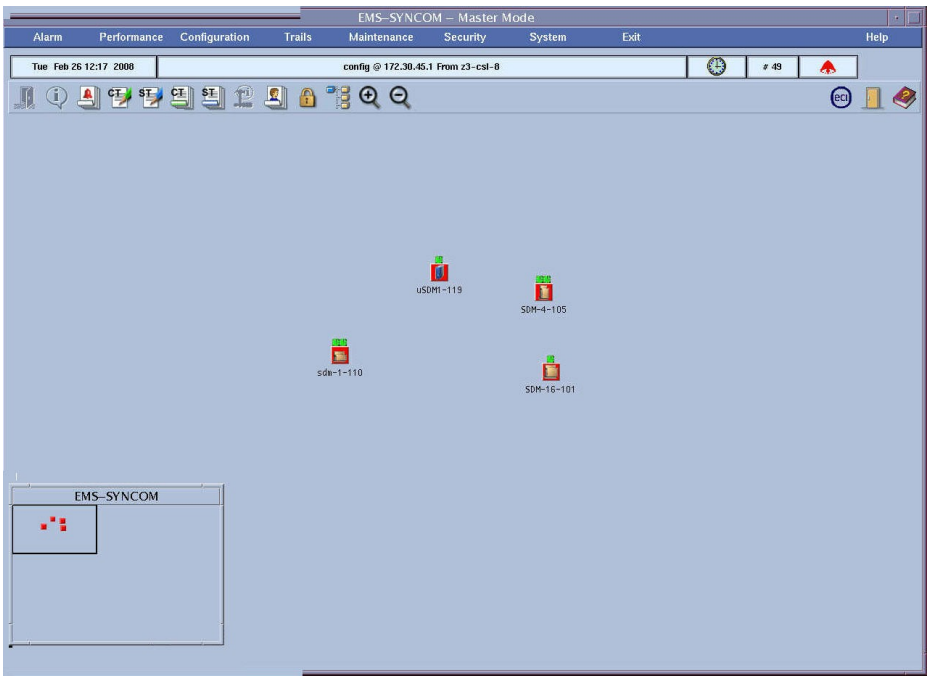


Figure 3-1. The EMS-SYNCOM Main Window

Some of the Main window's functions may not be available to all users, depending on their User access level.

Once configured, this window displays the SDH network topology, e.g. the NE's and the interconnections between them.

The Main window is comprised of various elements, described in detail in the following subsections.

The Title Bar

The top line of the window shows the EMS-SYNCOM title and the operation mode: *Master* or *Monitor*. The significance of each mode and the differences between them are outlined in EMS-SYNCOM Modes (Master Mode and Monitor Mode) on page 2-11.

The Main Menu

The main menu is displayed underneath the title bar. The main menu provides pull-down operations as described in Pull-Down Menus on page 2-7.

The Information Bar

This bar shows, from left to right:

- The current day, date and time
- The name of the current EMS-SYNCOM User and the system name
- The clock master icon (if the EMS-SYNCOM is defined as a clock master; see Startup Configuration Options on page 2-14).
- The total number of unacknowledged alarms
- A bell icon, which provides an indication as to the highest alarm severity that exists in the network, as follows: the bell is displayed in red when Critical or Major alarms exist; the bell is displayed in yellow when Minor or Warning type events exist. The bell is displayed as transparent (border lines only) when no unacknowledged alarms exist. If at least one unacknowledged alarms exists, the bell is displayed as a solid icon. Click the bell icon to open the Network Current Alarms window displayed in Figure 4-1. Alarm severities are explained in Chapter 4 Alarms Management.

The Toolbar

The toolbar can be used for activation of various functions, as a shortcut to activating them through the pull down menus. Note that the toolbar icons are context sensitive, and some of them are only active in specific situations. Active icons are displayed in color; non active icons are displayed grayed out. To display a tool tip regarding the function of a toolbar icon, point the mouse on the icon.

The toolbar set depends on the user level. Table 3-1 lists all toolbar icons and their respective functions.

Table 3-1. Main Toolbar Icons

Icon	Function	Menu Equivalent	See Section
	Open. Opens Shelf View of selected NE. Only active when a single NE is selected.	**Element ➔ Open** (context sensitive)	Accessing the NE Shelf on page 6-1
	Info. Opens the information window, displaying information regarding the selected NE. Only active when a single NE or segment is selected.	**Equipment ➔ Info** (context sensitive)	Info Windows on page 3-15
	Alarm Log. Opens the alarm log window, displaying the list of alarms. Always active.	**Alarms ➔ Alarms Log**	The Alarm Log on page 4-31
	Create/Edit Trail. Opens the Edit Trails window for creation/editing of client trails. Always active.	**Trails ➔ Create Trail**	Creating a Client Trail on page 10-10
	Create/Edit Server Trails. Opens the Edit Server Trails window, for creation/editing of server trails. Always active.	**Trails ➔ Edit Server Trail**	Creating a Server Trail on page 10-2
	Trails List. Opens the Trails List, which displays the client trails in the system. Always active.	**Trails ➔ Trails List**	The Client Trails List on page 10-14
	Server Trails List. Opens the Server Trails List, which displays the server trails in the system. Always active.	**Trails ➔ Server Trails List**	Server Trails List on page 10-6

Icon	Function	Menu Equivalent	See Section
	Maintenance Info. Opens the Maintenance Info window, which can be used to view the maintenance actions performed on a transmission object. Only active when an NE or NEs are selected.	**Maintenance ➔ Maintenance Info**	Viewing Maintenance Operations on page 8-11
	Users List. Opens the Users List window, which displays a list of the Users currently logged in to the system. Always active.	**Security ➔ Users List**	Viewing the Current Users List on page 11-14
	Lock EMS-SYNCOM. Always active.	**Security ➔ Lock EMS-SYNCOM**	Locking EMS-SYNCOM on page 12-2
	Inventory. Displays an Inventory window with information regarding the selected NE(s).	**System ➔ Inventory Window**	The Inventory Window on page 13-23
	Zoom In. Enlarges the objects displayed in the main window.		The Zoom In/Zoom Out Functions on page 3-9
	Zoom Out. Makes the objects displayed in the main window smaller.		The Zoom In/Zoom Out Functions on page 3-9
	Help. Displays the on-line help window. Always active.	**Help ➔ Content**	On-line Help on page 3-20
	ECI Telecom. Displays the ECI Telecom window, which provides information regarding the company, including customer support phone numbers and addresses.	**Help ➔ ECI Logo**	Customer Support Information on page 3-21

The Navigator

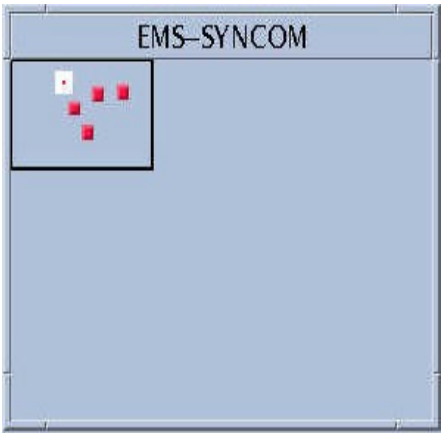


Figure 3-2. The Navigator

NOTE: The Navigator can be hidden from view by right clicking anywhere in the Main window (away from any NE icons) and disabling the **Navigator** option; when disabled, the mini-button next to the option appears pushed-out. The **Navigator** option toggles the Navigator display mode between ON and OFF.

The Navigator provides a view of the entire network topology and is used for navigating to different areas of the topology. Each NE in the network is represented, in the Navigator, by a small square. Alarmed NEs are indicated with the same color-coding as in the Main window, as described in NE LED Color-coding on page 3-16.

A black rectangle displayed inside the Navigator indicates the active display area of the Main window. The view displayed in the Main window reflects the position of the black rectangle inside the Navigator. To view different portions of the network topology, middle-click the black rectangle and move it to the desired location. The Main window display is refreshed with the requested view. When you use the Zoom and Unzoom functions (described in The Zoom In/Zoom Out Functions on page 3-9), the black rectangle changes size to indicate the viewed area.

The Navigator can be resized and moved around the desktop.

All NE-level operations can be performed from the Navigator using context sensitive menus (e.g., you can double click an NE in the Navigator to open its Shelf View). Selections made in the navigator are simultaneously selected in the Main window and vice versa. Changes in the network view (e.g., when moving an NE) are reflected simultaneously on the Navigator. Additionally, the selected NE is displayed with a white border line just as in the Main window.

When the Main window is selected, the Navigator is not. Additionally, when the Main window is selected you can use the arrow keys to navigate (scroll) the topology view. As you press the arrow keys, the black rectangle in the Navigator moves to reflect the portion you are viewing.

The Status Window

Figure 3-3. The EMS-SYNCOM Status Window

The Status window, shown in Figure 3-3, displays the number of unacknowledged alarms in the network, the alarm bell (described in Alarm Bell on page 3-17). The Status window is identical to the right-hand side of the Information bar.

The Status window is an optional feature, which must be requested during the system login sequence described in Startup Configuration Options on page 2-14.

If the relevant option was enabled during the EMS-SYNCOM startup (see Startup Configuration Options on page 2-14), this window is always displayed on top, so that network operators can view these important indications at all times, even if the EMS-SYNCOM application is minimized. The Status window cannot be minimized, but it can be moved around the desktop.

If the EMS-SYNCOM application is minimized, you can click the Status window to maximize the EMS-SYNCOM application.

To move the Status window:

1. Click the number of alarms field of the Status window to make it the active window.
2. Press **Alt+F7**.
3. The Status window turns into an outline; drag the outline to the new screen location.

NE Type Icons

The display area shows the topology of the SDH network. It displays icons representing the NEs managed by the EMS-SYNCOM and interconnecting lines to indicate the physical connections between NEs.

The EMS-SYNCOM differentiates between the various types of network elements in your topology. The following icons indicate the physical type of equipment:

µSDM-1/E

SDM-1

SDM-4

SDM-16

NE Group

The background color of each NE icon represents the alarm severity related to that object. See NE LED Color-coding on page 3-16 for the color-coding legend.

NE Attribute Icons

The following icons indicate the NE configuration, when applicable.

	Regenerator NE
	Gateway NE
	Terminal Multiplexer
	One of the NE's synchronization units is configured as an External, Internal or non SDH tributary timing source, as described in Clock Icon on page 3-18.
	The NE has a maintenance operation active (e.g., loopback). You can view a list of the maintenance operations performed on the NE by doing the following: Selecting **Maintenance ➔ Maintenance Info** from the Shelf View or Card Internals View, OR Selecting the NE and then selecting **Maintenance ➔ Maintenance Info** from the main menu. Refer to Viewing Maintenance Operations on page 8-11 for further information.

Navigating in EMS-SYNCOM

EMS-SYNCOM provides an object-oriented working environment. Objects on which the User may perform operations are shown on the window as icons representing network elements, transmission cards, etc. These objects include:

- Equipment elements (NEs, cards, etc.)
- Transmission elements (TP, TU, VC, etc.)
- Timing-related objects (timing sources, etc.)

EMS-SYNCOM makes network management easier and straightforward by presenting a set of functions which is applied to objects. You first select an object by clicking on its icon. The selected object changes color and the functions that can be applied to it are displayed in black in a menu option list. The menu options that are not available appear in gray – they cannot be executed at the time.

The EMS-SYNCOM depicts the network it manages in three levels:

The topology level: This is displayed in the Main window and is the background for all other EMS-SYNCOM windows (see Figure 3-1).

The Shelf View of network elements: This view shows the physical layout of NEs, i.e. the various cards installed in their racks. SDM–1 NEs have one row of cards, SDM-4 and SDM-16 shelves have two. The names of cards are also displayed (see Figure 3-4 and Figure 3-5).

Card Internals View: Opening a card's icon shows the various transmission objects within the card. These can be physical objects, such as interfaces, or virtual objects such as VCs (virtual containers); see Figure 3-7.

The Zoom In/Zoom Out Functions

You can use the Zoom function to enlarge the objects displayed in the Main window. Zoom out makes the objects smaller. To use Zoom In/Zoom Out in the Main window:

- **Shift-Z** to Zoom in
- **Shift-U** to Zoom out.

NE Shelf View

To display a Shelf View: select an NE by clicking on its icon and click the **Open** button. Alternately, double click the **NE** icon. A Shelf View of that NE is displayed in a separate window. The Shelf View contains its own set of menus for performing functions at the shelf level. For more information, refer to Appendix B.

Figure 3-4 and Figure 3-5 show typical SDM–1 and SDM–4/SDM-16 shelves, respectively. Figure 3-6 shows the Shelf View for a µSDM-1E NE.

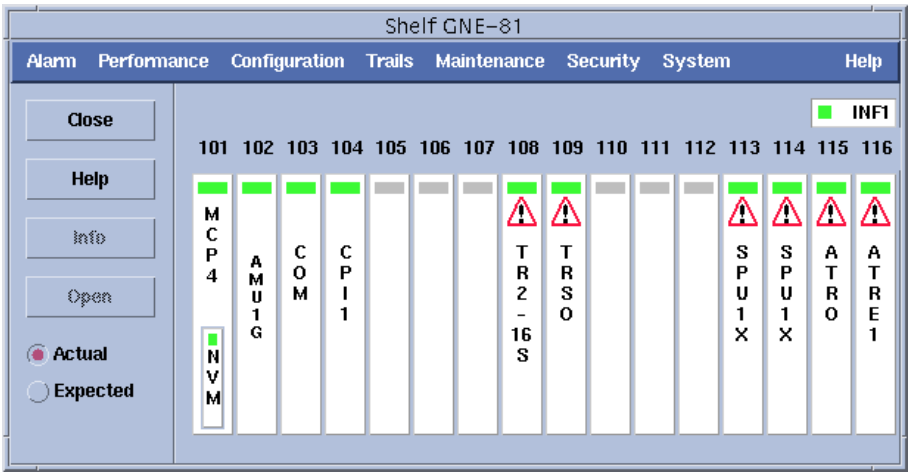


Figure 3-4. Typical SDM–1 Shelf View

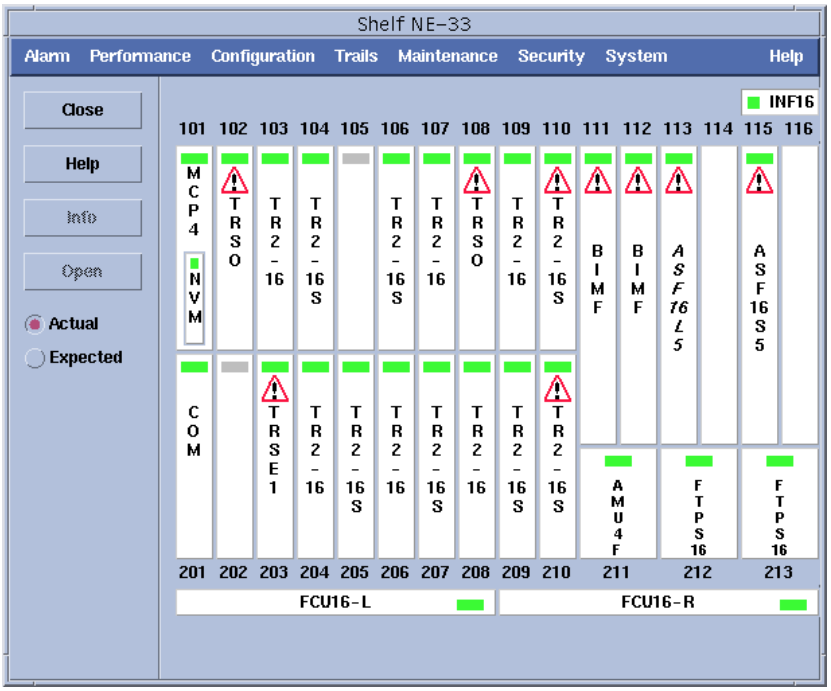


Figure 3-5. Typical SDM–4 and SDM-16 Shelf View

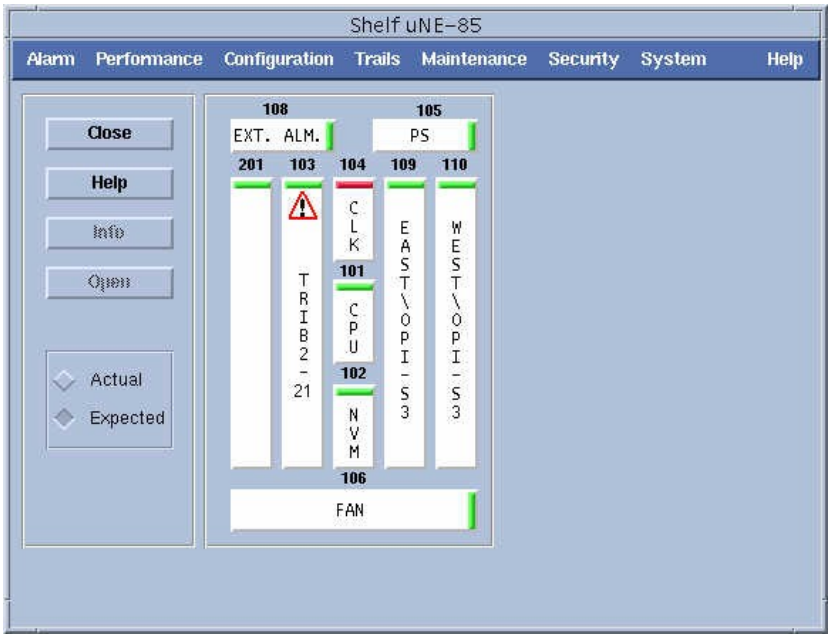


Figure 3-6. Typical µSDM–1E Shelf View

The following information is provided for each card:

The type of card found in the slot. If there is no card inserted in the slot, the corresponding slot is marked gray. For a summary of the cards that can be installed in SDM–1, SDM–4 and SDM-16 NEs, refer to Chapter 7 Managed Network Cards Level.

Alarm indications are shown as color bars on top of cards that can cause alarms. See Card Indications Color-coding on page 3-17 for a summary of the color-coding used.

NOTE: The physical architecture of the µSDM-1 is different than that of the SYNCOM NEs (SDM-1, SDM-4 and SDM-16). The µSDM-1 is not mounted in a shelf, but in an enclosure, which cannot be opened in the field. It contains permanent or virtual equipment, which does not physically exist as a separate entity. For reasons of consistency of the documentation, the terms card and slot are used for the µSDM-1 despite that they do not exist in a physical sense.

Card Internal Objects

The card internal objects (components) view shows an SDH-oriented view of transmission information. You access this view by selecting the relevant card in the Shelf View and clicking the **Open** button, or alternatively, by double clicking the relevant card.

Figure 3-7 shows a typical view of an open card with its objects. Figure 3-8 shows a typical view of a µSDM-1 tributary card.

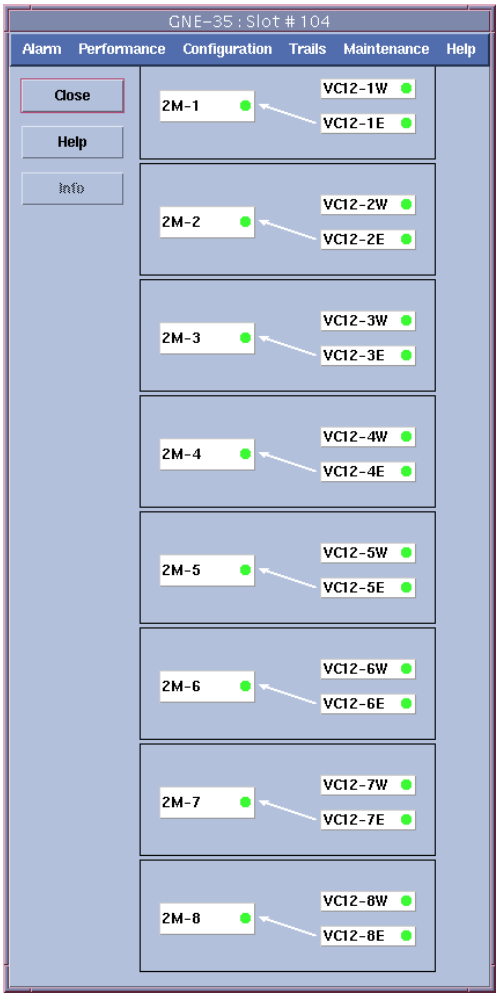


Figure 3-7. Typical View of Card Internal Objects-SYNCOM

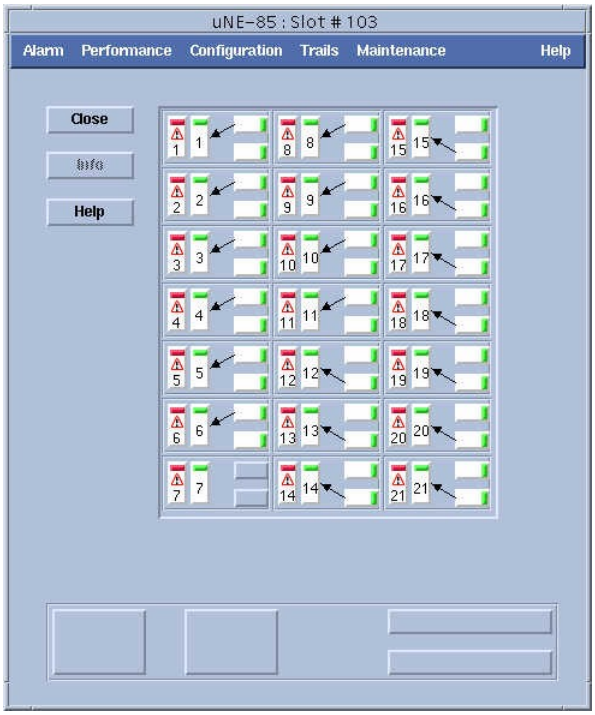


Figure 3-8. Typical View of Card Internal Objects-µSDM-1

Many card windows contain their own set of menus for performing functions at this level. For more information, refer to Appendix B.

Info Windows

When the visual data related to objects is insufficient, you can open an **Info** window to get additional information. A typical Info window is shown in Figure 3-9.

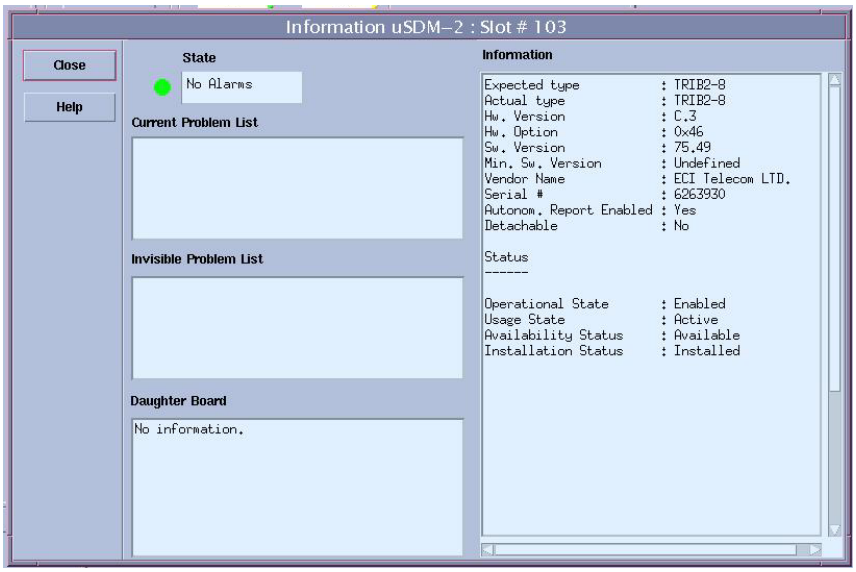


Figure 3-9. Typical Info Window

Info windows offer information on the objects or alarms you select. Most entries contained in these windows are self-explanatory.

The **Utilization** field is displayed when requesting information on NEs and segments, to provide an indication as to the spare capacity of resources.

For NEs, the **Utilization** field displays the number of utilized physical resources (i.e., the number of end points on trails in the NE).

For segments, the **Utilization** field displays the number of trails used, per trail rate, out of the total number of trails in each category.

LEDs and Icons on EMS-SYNCOM Objects

The significance of alarm LED indications varies from object to object. The following subsections summarize the color-coding of the indications and the significance of each.

NE LED Color-coding

In the network topology view (in the Main Window), the color-coding of NE icons is as follows:

- *Gray* – there is no communication between the EMS-SYNCOM and the NE
- *Blue* – initial establishment of communication with the NE, or the NE is uploading its database to the EMS-SYNCOM
- *Green* – communications status is OK and there are currently no alarms
- *Yellow* – there is at least one *Minor* or *Warning* alarm, but no *Major* or *Critical* alarms
- *Red* – there is at least one *Major* or *Critical* alarm in the NE
- *Flashes* (red) - EMS-SYNCOM has detected a Conflict state, where the EMS-SYNCOM database does not reflect the actual hardware configuration of the NE (e.g., conflicting software version, conflicting configuration parameters or slot assignments). To determine the source of the conflict, open the Info window or the Network Current Alarm window (see The Network Current Alarms Window on page 4-12). In the Conflict state, the NE is not uploaded.

The **Open** and **Info** buttons are grayed out (not available) in the Blue and Gray states; since there is no communication, the EMS-SYNCOM has no information on these NEs.

The color-coding for NE Group icons is according to the most severe alarm present in the NEs belonging to the group. The severity ranking (from highest to lowest) is as follows: red, yellow, blue, gray, green. For example, if one of the NEs has a Major or Critical alarm, the NE group icon's background color will be displayed in red.

Card Indications Color-coding

When viewing a shelf, the colored indications refer to equipment alarms associated with that card. To view information of equipment alarms, select the card and click the **Info** button. The color-coding is as follows:

- Red – There is at least one Major or Critical alarm
- Yellow – There is at least one Minor or Warning alarm
- Green –The card status is OK
- Gray – The EMS-SYNCOM has lost connection to the corresponding card.

Transmission Objects Color-coding

To view the transmission alarm state associated with a card, click the **Open** button in the selected card view to access the Card Internals View. The color-coding is as follows:

- Red – There is at least one Major or Critical transmission alarm
- Yellow – There is at least one Minor or Warning transmission alarm
- Green – There may be an Event; but the object is functional

Alarm Bell

Bell icons provide an indication of the current alarms in the network, as follows: the bell is displayed in red when Critical or Major alarms are present; the bell is displayed in yellow when only Minor or Warning type events are present. Alarm severities are described in Chapter 4 Alarms Management. Additionally, the bell is displayed transparent (border lines only) when no unacknowledged alarms are present. If at least one unacknowledged alarms exists, the bell is displayed as a solid icon.

Click the bell icon to open the Network Current Alarms window, described in The Network Current Alarms Window on page 4-12.

Traffic Usage Triangle

A triangle is displayed in the Shelf view on relevant card slots. It indicates that a server or client trail may be carrying live traffic through this card.

Maintenance

This icon can appear above an NE icon in the Main window. It indicates that there is currently a maintenance operation (such as a loopback or force AIS) within the object. When this icon is displayed, you can access the Maintenance List to determine the specifics maintenance status of the object.

Clock Icon

A clock icon appearing above an NE icon in the Main window indicates that the NE is directly connected to a network reference timing source. Specifically, the clock icon indicates that the NE's TG (Timing Generator) is connected to an *External*, *Internal* or *PDH Tributary* source– see Chapter 9 Timing. An NE without a clock icon is connected to *Line, SDH Tributary* or *Other* timing source. In this manner, in a network where a single NE in a network/chain is connected to an external timing source and all other NEs are connected to *Line Timing*, only that single NE will show a clock icon.

If the clock icon is displayed in red, this indicates a holdover situation. A clock enters "Holdover" mode when uses its own generator, because it either does not have any reference available, or the ones available do not offer the performance required. In this case, the system remembers the previous valid reference.

NOTE: A dual ring network has a timing source associated with each network (A and B), and the same NE may have two clock icons (one for each ring network).

Hidden Information

The icon can appear superimposed on an NE icon in the Main window. It indicates that the graphical representation of the connecting segment contains information icons which are hidden from view (e.g., optical association icons). This icon can appear when moving NE icons close to each other, and the connecting line is too short to contain all the icons. To reveal the hidden icons, stretch the interconnecting line by moving one of the NE icons as described in Moving an NE on page 5-5.

Printing from EMS-SYNCOM

The following information can be printed in EMS-SYNCOM`:

- You can print alarms from the Alarm Log (see The Alarm Log on page 4-31)
- You can print Trail Lists from the Trails List window (see Chapter 10 Trail Functions)
- You can print Performance Monitoring data from the Performance History window (see Viewing Performance History on page 8-18)
- You can print alarm log files from the Log Export Browse window (see Exporting Alarm Logs on page 4-38)

In addition, EMS-SYNCOM can send the contents of a window directly to the printer (see Appendix A for further information).

After selecting the **Print** option from any of the above-mentioned windows, the following Print window opens.

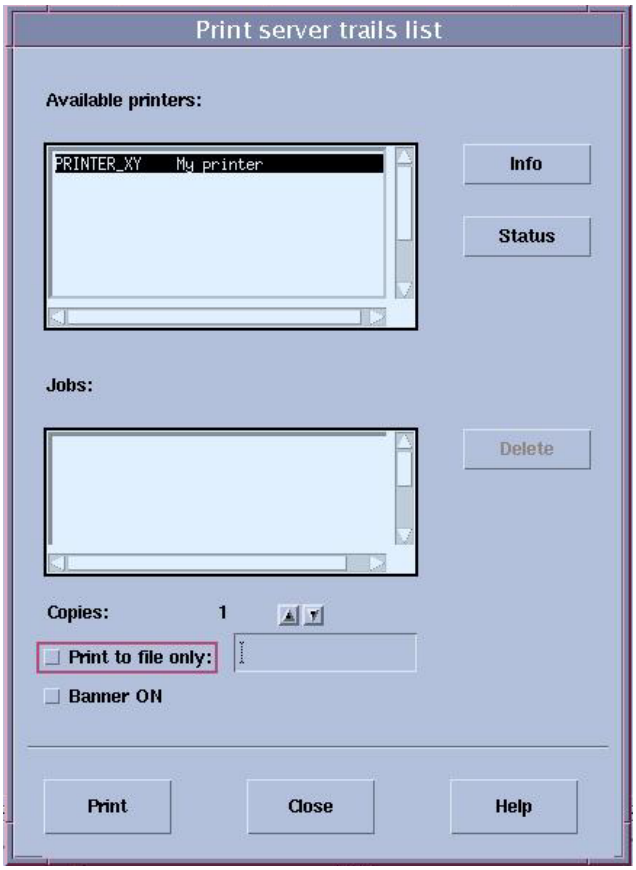


Figure 3-10. Print Window

1. If multiple printers are connected to the system, select a printer from the **Available printers** field.
2. The **Jobs list** displays the list of jobs waiting to print. To delete a print job, select it and click the **Delete** button.
3. If you wish to print to an ASCII file, click **Print to File Only** and enter the file name. To increase or decrease the number of copies, use the arrows.
4. The **Banner Off** button inhibits printing of headings in print jobs.
5. To find out more about a printer, click the **Info** button to open a window showing details about the printer currently selected. A Status window can also be called up (by clicking the **Status** button) to show the status of the print job currently being processed.

On-line Help

The EMS-SYNCOM comes complete with a context-sensitive, web-based On-Line Help. The on-line help is accessed by:

Clicking the Help button (available in most EMS-SYNCOM windows),

OR

Clicking the Help toolbar icon,

OR

By selecting **Help ➔ Contents** from either the Shelf View or the main menu.

The Help displays different information depending on the active window.

The Help system runs in HotJava, an HTML browser that runs on the SUN workstation; it is similar in operation to Netscape. The Table of Contents frame appears, in all Help windows, on the left-hand side of the window. Click any of the topics in the TOC frame to display its contents in the right-hand frame.

Customer Support Information

You can obtain customer support phone numbers, the addresses of ECI Telecom locations worldwide, Internet addresses and other valuable information via the ECI Telecom window, shown in the following figure. Click the ECI Telecom icon to access this window.

You can also access the ECI Telecom window by selecting **Help ➔ ECI Logo** from the main menu.

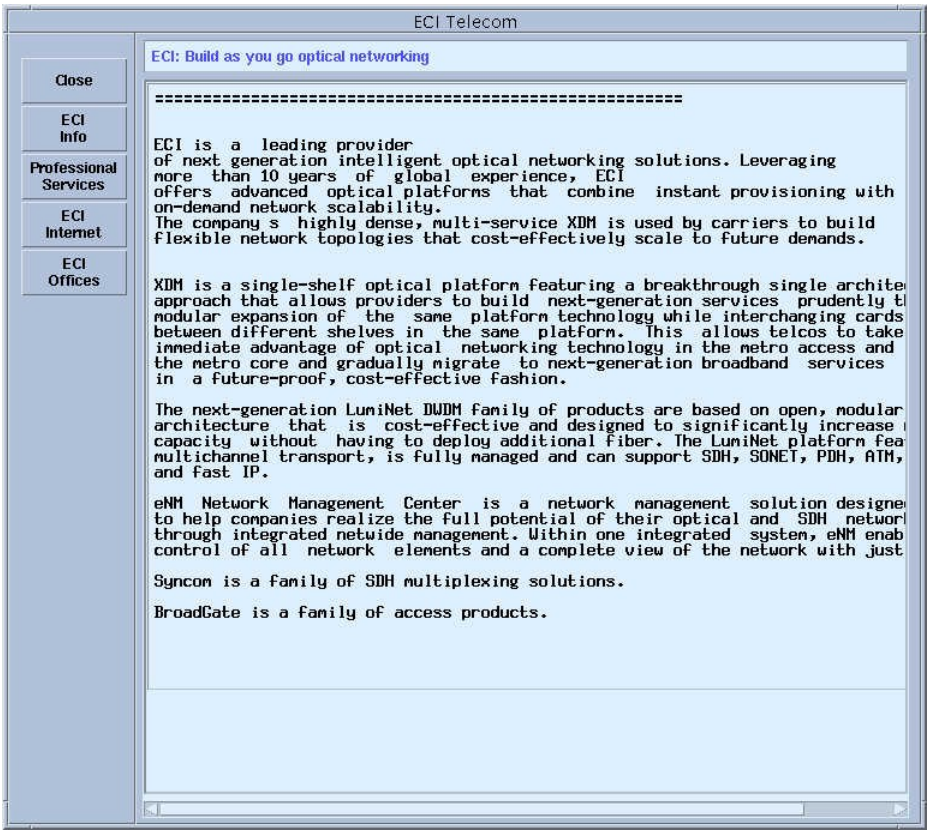


Figure 3-11. ECI Telecom Window

The About Window

The About window, shown in the following figure, displays information regarding the EMS-SYNCOM version which is currently running on your station, and the limitations of the license purchased from ECI Telecom.

To access the About window:

- Select **Help** ➔ **About** from the Shelf View or main menu.

Figure 3-12. About window

Terminating EMS-SYNCOM

Terminating During Regular Use

As opposed to logging out of the system, which closes the current User's session while leaving EMS-SYNCOM running, the **Exit** feature shuts down the EMS-SYNCOM system (i.e., closes the application) and ends all monitoring activities.

To shut down EMS-SYNCOM:

1. From the Shelf View, select **Exit ➔ EMS-SYNCOM**,

   OR

   From the main menu, select **Exit ➔ EMS-SYNCOM**.

2. Confirm by clicking **Yes** when prompted `Do You Really Want to Exit`.

3. A logo is displayed for several minutes, during which the system shuts down. After shutting down EMS-SYNCOM, the computer displays a Login window.

NOTE: Only the administrator can use this function and it cannot be assigned to other users.

4

Alarms Management

Overview

SYNCOM equipment provides local alarm display and configuration access facilities in the event of a failure on the primary management path and for maintenance purposes. These displays include LEDs on the front panel of the Alarm and Maintenance Unit (AMU1) in the SDM–1 and the UCP in the SDM-4 and SDM-16, which correspond to visual LED indicators on the EMS-SYNCOM screen.

µSDM-1 and µSDM-1E NEs provide alarm display and configuration facilities that are similar to those of SYNCOM™ NEs. In addition, µSDM-1 and µSDM-1E NEs provide external dry contact relays which can be used for a wide range of alarm reporting applications.

The EMS-SYNCOM provides exceptionally powerful tools for viewing and analyzing alarms, enabling the network operator to optimize alarms processing operations.

SDH NEs provide several types of alarms:

Hardware alarms: These alarms indicate system-related problems detected on SDM cards.

Transmission alarms: These alarms indicate problems with one of the transmission streams. These alarms are explicitly defined in SDH and PDH standards.

Quality of Service alarms: These alarms indicate that one of the counters used to evaluate transmission quality has crossed its preset threshold.

Timing alarms: These alarms indicate problems with a timing source used by a particular timing generator.

Service alarms: These alarms alert the User whenever service has been degraded or lost altogether at the tributary end point level.

Alarm Indications and Alarm States

The following sections describe the various alarms that are reported to EMS-SYNCOM for each of the alarm types.

Equipment Alarms

Attenuator Fail	
BIM CLU Clock Failure	
Card Failure	Reported during card initialization (either after power up or after reset) if it does not succeed in initializing or if a problem is discovered during the Start-Up BIT (built-in test).
Card Out	The MCP does not detect any card presence in the slot, or the card is not properly plugged into its slot or a reset is in progress. The alarm ceases after a reset or when the card is inserted properly in its slot. (Note - all other alarms on the affected card and its related objects are deactivated when the card is removed or during a reset.)
Communication Failure	There is no communication between the affected card and the MCP.
Data Fault	The NVM (non-volatile memory) contains the system configuration data. This alarm occurs when this data is corrupted.
Door Open	The door of the laser unit is open (in relevant cards).
East/West Bundle LOS	These alarms are caused by a LOP (Loss of Pointer) alarm on one of the four VC-4s in the TRS1-4 card.
External Alarm 1 -5	Appears for µSDM-1/E NEs only; indicates that one of the dry contact relays has activated, indicating an alarm situation. The names of the alarms are User-defined, as described in Configuring µSDM-1/E External Alarms on page 4-41.
Internal Timing Failure	The CLU does not generate the correct timing signal.
Laser Bias Current High	The laser must be replaced.

Laser Bias Current Low	The laser is not reaching the required threshold and is stuck in the LED state.
Laser Input Power High	The input power to the laser unit (present in optical cards) is high.
Laser Input Power Low	The input power to the laser unit (present in optical cards) is low.
Laser Power High	The laser output power is high and can pose dangers to technical personnel.
Laser Power Low	The laser output power is low and cannot reach the power required for transmission range.
Laser Temperature High	As required by the ITU G958 requirement, the transmitter temperature control circuitry has detected a high temperate on the laser unit.
Laser Temperature Low	The transmitter temperature control circuitry has detected a low temperate on the laser unit.
LOP East	Loss of Pointer alarm (East).
LOP West	Loss of Pointer alarm (West).
Minor Equipment Problem	
NE-NVM is not consistent	
NE-NVM Write Protected	The NVM of the NE is write-protected; the data on the NVM cannot be changed/updated.
PLL Unlock Resynchronization	Loss of synchronization due to SDH CLU problems.
Power Failure	The supply voltage is not within the required range.
Processor Failure	
Programming Fault	A problem with the card-specific software or while updating the card database.
Protection Switch Fail	
Switch Failure	
Temperature High	
TG Processor Fault	A problem in the communication between the CLU and the processor of the card.
Time Source Invalid - East side	
Time Source Invalid - West side	
Timing Input Failure	
TPU Input Voltage Warning	

TPU Input Voltage Fail	
TPU Output Voltage Failure	
Transmitter Failure	
Type Mismatch	The card in the slot is not the predefined type expected.
VDD Failure (Switching Module)	

Transmission Alarms

Transmission alarms are fully defined in SDH and PDH standards. EMS-SYNCOM uses the following transmission alarms:

Active Side is Protect

Add Loss of Signal

AIS (Alarm Indication Signal)

Bias High

Buffer Underflow

CRC Alarm

Delay Buffer Overflow

Drop In Loss of Signal

Drop Main Loss of Signal

Drop Out Loss of Signal

EBER (Excessive Bit Error Rate)

EBIT Alarm

Frequency Mismatch

Input Power High

Input Power Low

K1/K2 Mismatch

LOF (Loss of Frame)

LOM

LOP (Loss of Pointer)

LOS (Loss of Signal)

Output Power High

Output Power Low

Path Trace ID Mismatch

Primary Timing Source not active

RAI (Remote Alarm Indication)

RDI (Remote Defect Indication)

RS Loss of Signal

rx Clock Deviation (Receive Clock Deviation)

rx Data Deviation (Receive Data Deviation)

SD (Signal Degraded)

Server Signal Failure - East

Server Signal Failure - West

Server Signal Monitor

Signal Label Mismatch

SSMA (Signal Server Monitor Alarm)

T4 Output source Squelched

TC Loss of Tandem Connection

TC Outgoing Defect Indication

TC Remote Defect Indication

TC Signal Degrade

TC Trace Identifier Mismatch

TC Unequipped

Temperature High

Transmitter Frequency High

tx Data Deviation (Transmit Data Deviation)

UID Alarm

Unequipped Signal Label

Unknown Cause

VC AIS

Transmission Service alarms are present at the tributary end point level, to alert the User whenever service has been degraded or lost altogether. As opposed to other alarms, these alarms are reported only if the actual signal is not being sent correctly to the service user. When the service is unaffected due to protection switching, this alarm is not reported. This feature is particularly important for specific tributary points which need to be closely monitored. The service alarms are:

Service Degraded

Service Failure

Performance Monitoring (PM) Alarms

The technique used to evaluate the level of system performance is to count the number of error events and increment the respective counter each time an event occurs. A PM alarm occurs whenever the threshold value of the event counter is crossed. Table 4-1 lists the default thresholds for each PM alarm type.

Thresholds and counters are maintained for 15-minute and 24 hour periods. EMS-SYNCOM monitors the following events, as defined in SDH and PDH standards:

Background Block Error FarEnd

Background Block Error NearEnd

CVFE Threshold crossed – Code Violation Far End

CVNE Threshold crossed – Code Violation Near End

ESFE Threshold crossed – Errored Seconds Far End

ESNE Threshold crossed – Errored Seconds Near End

OFS Threshold crossed – Out of Frame Seconds. The system enters this state when several consecutive SDH frames are received with errored framing patterns.

PJ Threshold crossed – Pointer Justification

PJ Underflow Threshold Crossed

PS Threshold crossed

SESFE Threshold crossed – Severely Errored Seconds Far End

SESNE Threshold crossed – Severely Errored Seconds Near End

TC BBEFE Threshold Crossed

TC BBENE Threshold Crossed

TC BBEOFE Threshold Crossed

TC BBEONE Threshold Crossed

TC ESFE Threshold Crossed

TC ESNE Threshold Crossed

TC ESOFE Threshold Crossed

TC ESONE Threshold Crossed

TC SESFE Threshold Crossed

TC SESNE Threshold Crossed

TC SESOFE Threshold Crossed

TC SESONE Threshold Crossed

TC UASFE Threshold Crossed

TC UASNE Threshold Crossed

TC UASOFE Threshold Crossed

TC UASONE Threshold Crossed

UASFE Threshold crossed – Unavailable Seconds Far End

UASNE Threshold crossed – Unavailable Seconds Near End

Table 4-1. PM Alarms Default Thresholds

Alarm	RS	MS	VC4	VC3	VC12	2M, 34M, 140M PIs
CVNE		10/10				9000/90000
CVFE						
ESNE	86/864	86/864	86/864	86/864	86/864	86/864
ESFE			86/864	86/864	86/864	
SESNE	1/4	1/4	1/4	1/4	1/4	1/4
SESFE			1/4	1/4	1/4	
UASNE	10/10	10/10	10/10	10/10	10/10	10/10
UASFE			10/10	10/10	10/10	
PJ			10/10	10/10	10/10	
OOF	2/17					
BBEFE			7/691	7/691	2/173	
BBENE	7/691	7/691	7/691	7/691	2/173	

Timing Alarms

EMS-SYNCOM reports the following timing-related alarms:

Current T4 Timing Source Failure	When the NE is used as a clock source via its T4 output, and the clock source failed.
Drop Through Switch Fail	
FIFO Alarm	Re-synchronization ability alarm for TR2-8/16T NEs; overflow of delay buffer. Loss of bits.
Primary Timing Source LOS	A Loss of Signal on the primary clock source.
Primary Timing Source Not Active	The primary clock failed.
Primary Timing Source Out of Range	The frequency of the primary clock source has moved out of the allowed range.
Primary Timing Source Phase Hits	The frequency or phase of the clock source has temporarily moved out of the allowed range.

Secondary Timing Source Out of Range	The frequency of the secondary clock source has moved out of the allowed range.
Secondary Timing Source Fault	The secondary clock failed.
TG Processor Fault	
Timing Input Failure	All clock sources defined for the NE have failed.
Timing Source Out of Range	The frequency of the primary clock source has moved out of the allowed range. A DSP checks the operation of the clock source and detects any failure.
Transient Timing State	

Processing Alarms

Software Error

Out of memory

Version Mismatch

NE-NVM is write protected

Internal EMS-SYNCOM Alarms

Access denied by NE

Acknowledge alarms action failed

Alarm cut-off action failed

Allocation failed. Not enough free memory on NE-NVM

Automatic Operation

Change Alarm Master Mask failed

Change BCP Mask failed

Change service state action failed

Change Severity Action failed

Change VC AIS failed

Communication events loss

Connect action failed

Create Server Trail Failed

Create Server Trail failed. Id: "Server Trail Id"

Create Trail failed

Create Trail failed. Id: "Trail Id"

Database upload aborted - NE information was not uploaded; this is usually because there is no communication between the EMS-SYNCOM and the NE.

Define Server Usage State Failed

Delete Server Trail Failed

Delete Server Trail failed. Id: "Server Trail Id"

Delete Trail failed

Delete Trail failed. Id: "Trail Id"

Disconnect action failed

Erasing Version failed

Establish communication failed

Establishing of data connection to NE failed

FTP closed connection to NE

Get Trail End Point PM Counters failed

Get window PM cnt. action failed

GET-request failed

GET-request rejected

Incomplete NE install

Init session failed - the EMS-SYNCOM cannot establish a communications session with the NE

Init Trail End Point PM Counters failed

Init Trail End Point PM Counters failed

Initialize PM Counters Action failed

Invalid Ne Type. Was: "NE type" Now: "NE type"

Lockout Protection Action failed

Managed Element Alarm

NE disconnected - the connection between the EMS-SYNCOM and the NE has been lost.

NE parameter update not supported

NE-NVM memory allocation failed

NE-NVM missing

NE-NVM write protected

Not enough free memory on NE-NVM

Operate Equipment Protection-Lock Failed

Operate Equipment-Protection Switch Failed

Operate Loopback Action failed

Protect Equipment Failed

Release Equipment Protection-Lock Failed

Release Equipment-Protection Switch Failed

Release Loopback Action failed

Restart Processor Action failed

Send Upstream AIS action failed

Sending of AIS failed

Sending of RDI failed

SET-request failed

SET-request rejected

Slot assignment failed

Slot unassignment failed

Subequipment assignment failed

Switch to Protection failed

Timing Source Priority Table Change failed

Unprotect Equipment Failed

User Request

Incompatible E/W Configuration

Incompatible NE Software Version: "Version. Release"

Incompatible Regenerator State

Incompatible SDH Topology

NE Configuration Conflict

Wrong card. Slot#"Slot number" Was "Card type" Now "Card Type"

Wrong NE Type. Was: "NE type" Now: "NE type"

These alarms are registered after reconnection, when there is an inconsistency between the NE data in the NE and in the EMS-SYNCOM.

Cannot erase old database

Command syntax error

Current SW-version on different NEs differ

Illegal File Name

NE disconnected - Timeout

No database on NE-NVM

No such version on NVM

SW/DB-version on EMS-SYNCOM is missing for NE

SW-version on NE is incomplete

SW-versions currently not used differ

SW-versions for next planned activation differ

Transfer failed

Updating of activation parameters failed

Version already exists on NE

Wrong file name

These alarms are associated with the software download process.

Audit AVC Lost

Equipment/Communication Alarm Lost

Laser State Change Notification Lost

Protection Switch Notification Lost

Quality of Service Alarm Lost

SSM AVC Lost

State Change Notification Lost

Timing Alarm/AVC Lost

Timing Marker Quality AVC Lost

These alarms are registered when alarms/events have been lost and will not be recorded in the Alarm Log.

Current Alarms

The alarms in the network are represented on the screen as LEDs on each NE. The LED's color corresponds to the most severe alarm affecting it. The color codes were reviewed in LEDs and Icons on EMS-SYNCOM Objects on page 3-16.

The Network Current Alarms Window

To view all current alarms in the network:

- From the Shelf View or Card Internals View, select **Alarm ➔ Current**,
  OR
  Click the bell icon in the EMS-SYNCOM Main window,
  OR
  From the main menu, select **Alarm ➔ Current**.

The Network Current Alarms window opens.

To view the current alarms in a specific NE:

- From the Shelf View, select **Alarm ➔ Current**,
  OR
  Select the NE with the alarm and then select **Alarm ➔ Current** from the main menu.

The Network Current Alarms window opens.

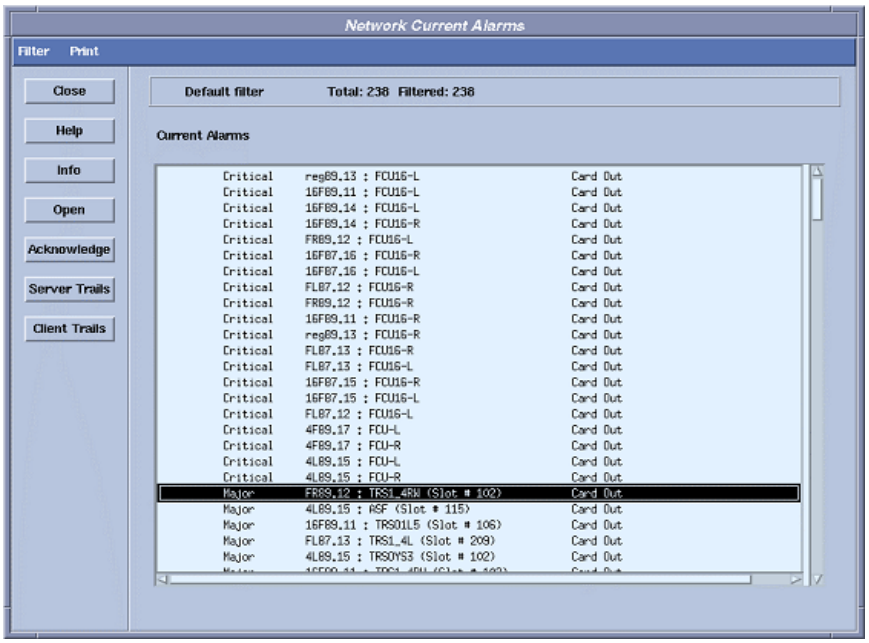


Figure 4-1. Network Current Alarms Window

NOTE: The window has an additional Section (*Cleared Alarms*) if the **Auto acknowledge on clear** startup parameter was set to **NO** (Startup Configuration Options on page 2-14).

Alarms are stamped with the time of their occurrence if the **Show event time of current alarms** startup parameter was set to **YES** (Startup Configuration Options on page 2-14).

The Network Current Alarms window is divided into two parts: the top part of the window (*Current Alarms*) lists the objects with alarms currently in the network (or for the objects specified in the User-defined filter). At the top of the window, the total number of current alarms is displayed, together with the number of filtered alarms (i.e., alarms shown after filtering). Alarm information is listed in a table, with the following data listed for each alarm (from left to right):

- ACK (if the alarm has been acknowledged); if the alarm has not been acknowledged, nothing appears.
- The severity of the alarm.
- The object affected by the alarm together with the NE that the object belongs to.
- The reason for the alarm.

The type of filter set by the User is displayed at the top left-hand side of the current alarm window. The types of filters are:

- *None* - no alarms are filtered and all alarms are displayed.
- *Default filter* - if the default filter is set. When the default filter is applied, alarms with the ACK status are removed automatically from the Current Alarm List. This includes alarms acknowledged by the User and alarms that were acknowledged automatically by the system (if the problem was resolved).
- If a *User-defined filter* is set, this is indicated by a yellow icon. Filtering Current Alarms on page 4-16 explains how to set User-defined filters for the Current Alarm window.

The bottom portion displays alarms that were acknowledged by the user when they are cleared. The user is then informed that the acknowledged problem has been physically resolved. However, if the **Auto acknowledge on clear** parameter was set to **YES** during the system startup procedure (see Startup Configuration Options on page 2-14), the Network Current Alarms window opens without the Cleared Alarms list.

NOTE: In addition to viewing the Network Current Alarms window, the User should view the Alarms Log window (see Viewing the Alarm Log on page 4-32) to check for events related to Quality of Service. These events, which are not reported in the Network Current Alarms window can cause problems in the PDH system.

Alarm Time Stamp

Alarms are stamped with the time of their occurrence if the **Show event time of current alarms startup** parameter was set to **YES** (see Startup Configuration Options on page 2-14).

An asterisk (*) can appear next to the time stamp. When an asterisk is displayed, this means that the time registered in the Network Current Alarms window is not the alarm's time of occurrence, but rather the time that the alarm was registered at the EMS-SYNCOM station. This can occur, for example, when uploading data from an NE (in which case the alarm data is not uploaded with the time stamp).

The asterisk can also appear in Info windows in the Event Time field. The significance of this asterisk is identical.

Determining the Cause of an Alarm

Once an alarm appears in the current alarm list, there are several things you can do to find out more about a specific alarm. Proceed as follows:

1. Select the specific alarm by clicking on it; the line listing the alarm is highlighted.
2. Click the **Open** button. This action automatically calls up the Shelf View or the Card Internals View, depending on the type of object affected by the alarm. Here you can select the object and open the Information window to see further details.

Alternately, click the **Info** button in the Current Alarm window to open an Information window regarding the object with the alarm. Note that the Info option does not display a window if there is no further information to display.

In addition, it is possible to determine whether or not a certain alarm is affecting a trail defined in the network. Click the **Server Trails** or **Trails** buttons to display a window similar to the following.

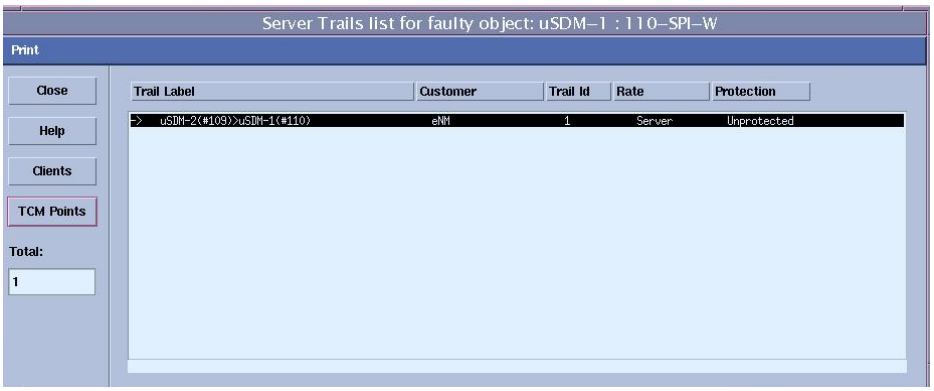


Figure 4-2. Trails List for Faulty Object Window

This window displays the trails that are affected by the faulty object, together with information regarding the trail. Refer to Chapter 10 Trail Functions for a description of trails.

You can sort this window by clicking one of the column headers.

Filtering Current Alarms

It is possible to set alarm filters to show only specific types of alarms in the Network Current Alarms window.

If no filter is required, select the **None** option in the **Filter** menu. All current alarms are displayed when this option is selected.

To select the default filter, select the **Default** option from the **Filter** menu. All current alarms that have not been acknowledged are displayed when this option is selected.

To set a User-defined alarms filter:

1. Select **Set Filter** in the **Filter** menu. The **Network Current Alarms Filter** window opens.

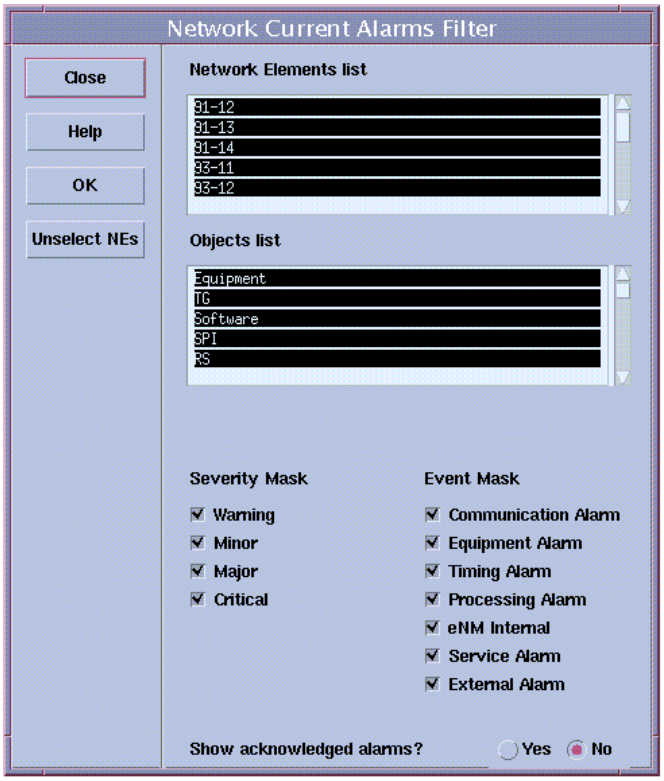


Figure 4-3. The Network Current Alarms Filter Window

2. Select the network elements to be included in the Network Current Alarms window from the **Network Element** list box. Select each NE by clicking on it (the NE is highlighted). To deselect an NE, click a selected NE (the highlight is removed). Select multiple NEs by clicking each one. The Network Current Alarms window displays alarms of selected NEs only.

   It is also possible to select NEs or NE groups to be included in the Network Current Alarms window from the main topology view, and then open the window.

3. It is possible to deselect all NEs at once by clicking the **Unselect NEs** button.

4. Select the types of objects to include in the alarms list from the **Objects List**. By default, all objects are selected. If you deselect an object, all alarms for that type of object are filtered from the alarms list. For example, if you deselect the VC12, all alarms related to VC12 objects in the network (or the selected NE) are not displayed.

5. Determine additional filtering criteria by selecting or deselecting the desired options, as described in Table 4-2.

Table 4-2. Current Alarm Filtering Options

Severity Mask	Alarm severity: Critical, Major, Minor, Warning. Will filter out all alarms at this level.
Show acknowledged alarms	Defines whether or not alarms with the ACK status are displayed in the list.
Alarms	Communication, Equipment and Timing.
Processing Alarm	Alarms related to software or memory, such as: software error, incorrect software version, no memory in NVM or NVM write protect.
EMS-SYNCOM Internal	Alarms detected by EMS-SYNCOM (e.g. disconnection of an NE, failure of an EMS-SYNCOM operation).

6. When ready, click **OK**.

The filtering operation starts, and its progress is displayed in a separate window. At the end of the filtering operation, the Current Alarms list reflects the new filter settings.

Acknowledging Alarms

Acknowledging an alarm means that you are aware of the alarm and will eventually take the necessary steps to deal with it. Alarms can be acknowledged one-by-one or in groups. Acknowledged alarms appear in the current alarm list with the word ACK displayed to the left of the respective line.

To acknowledge a single alarm:

1. Click on the relevant alarm in the Current Alarm window. The alarm is highlighted.
2. Click the **Acknowledge** button.

To acknowledge a group of alarms:

1. Select alarms from the list, using multi-select if desired (refer to Using Multi-Select on page 2-9).
2. Click the **Acknowledge** button.

EMS-SYNCOM automatically acknowledges alarms that have been cleared (not internal alarms). Internal alarms should be acknowledged in order to be cleared.

After acknowledging, the system freezes for several seconds while deleting the alarms from the current alarms list; it then displays a window with a message confirming that the alarm(s) was/were acknowledged.

After an alarm has been acknowledged and after the problem has been physically cleared, the alarm is displayed in the **Cleared Alarms** portion of the Network Current Alarms window.

Once an alarm (or alarms) appear(s) in the cleared alarms list, acknowledge the alarm as described previously to remove it from the Cleared Alarms list and the Network Current Alarms window.

NOTE: If the **Auto acknowledge on clear** parameter was set to **YES** during the system startup procedure (see Startup Configuration Options on page 2-14), the Network Current Alarms window opens without the Cleared Alarms list. Cleared alarms are removed from the Current Alarms list as soon as they are cleared and acknowledged by the User. Alarms that are acknowledged from the Network Current Alarms window are removed from the entire system (i.e., also from other EMS-SYNCOM stations in a Multi-User network).

Setting Alarm Severity

Alarm severities can be set for three object types: *Equipment*, *Transmission* and *Timing*. The severity of **Quality of Service** alarms (QoS – part of *Transmission* alarms) is always **Event** and only QoS alarms may be assigned the **Event** severity. You can optionally assign the **Non-Report (NRp)** attribute to any alarm or event. The following severity categories are available:

- Critical
- Major
- Minor
- Warning
- Event – this severity cannot be assigned by the User.

Each type of alarm is assigned a default severity; this is the severity that is applied until changed by the operator. The default severities are reviewed in Default Severities on page 4-24.

Severity Assignment

Alarm severities can be set for a single object (such as a PDH end-point), and can also be propagated (duplicated) to all objects of the same type in the specific NE.

All alarm severity indicators are affected by these severity settings, including:

- Severity LED indicators on the AMU1 or UCP
- Alarm relays to the external signaling lines
- Colored LEDs appearing in EMS-SYNCOM windows

This means that the colors of the LEDs appearing in EMS-SYNCOM windows (Shelf View and Card Internals View) are affected by the above settings. The physical LEDs on the hardware are affected as follows:

- The four LEDs on the AMU1 card and UCP indicate the severity of alarms existing on the NE, corresponding to the configured severity assignment. The applicable relays are activated (unless the alarm was set to **Non-Report**).
- The FAIL LED on a specific card lights whenever an equipment alarm occurs in that card. This cannot be masked using the EMS-SYNCOM; even if an alarm is set by the User (using EMS-SYNCOM) to Non-Report, the LED on the card still lights.

NOTE: Severities can only be set for one NE at a time.

To set severities:

1. From the Shelf View or Card Internals View, select **Alarm ➔ Severity**,
   OR
   Select the object and then from the main menu, select **Alarm ➔ Severity**.

   The following type of window opens, depending on the type of object selected.

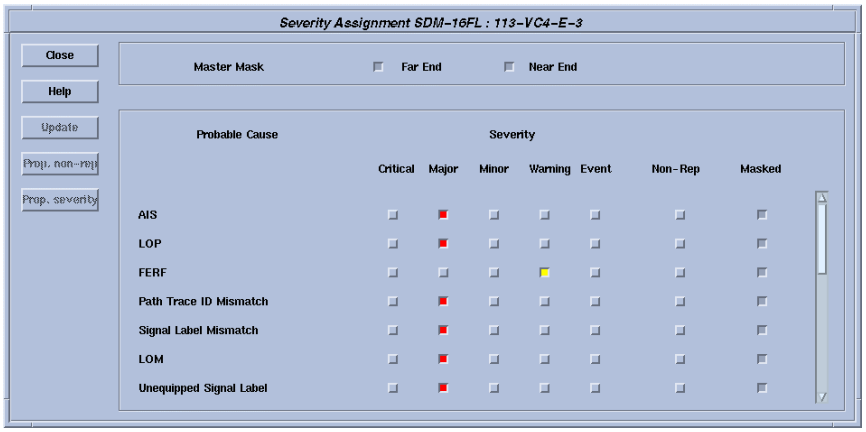


Figure 4-4. Setting Alarm Severities

The window provides several options in table format.

The main part of the window shows a matrix of alarm severity (columns) vs. probable alarm cause (rows). The last column is non-reported (**Non-Rep**). This is not a severity, but a feature each alarm can be assigned. If the non-report feature is assigned to a certain alarm, it does not appear in the alarm log and will not trigger any of the effects usually caused by the alarm. It is added, however, to the invisible problem list in the Info window.

The **Prop non-rep** (propagate non-report status) button can be used as a shortcut to copy the non-report status set for the alarms in this window to all other objects of the same type in the same card type in the NE.

The **Prop Severity** (propagate severity) button can be used to as a shortcut to copy the alarm severity set for the alarms in this window to all other objects of the same type in the same card type in the NE.

2. Click the appropriate buttons next to the option rows to set the desired severities for each alarm. The selected severity buttons are displayed in the color of the alarm severity, according to the color-coding described in Card Indications Color-coding on page 3-17.

3. After selecting severity options, click the **Update** button to make your changes effective and close the window.
   OR
   Click the **Prop. non-rep** (Propagate non-report status) button to copy the non-report status set for the alarms in this window to all other objects of the same type in the same NE. Confirm when prompted.

   Example: You can propagate the non-report characteristic to all TR2AB cards by setting only one card of that type to this attribute.
   OR
   Click the **Prop. Severity** (Propagate Severity) button to copy the alarm severity set for the alarms in this window to all other objects of the same type in the same NE. Confirm when prompted.

   Example: You can propagate the severity settings to all TR2AB cards by setting only one card of that type to this attribute.

Non-Reported Alarms (NRp)

This attribute can be applied by the User to any alarm. In this case, the occurrence of the alarm is ignored by the system and no indication of it is displayed. The only place where an *NRp* alarm appears is in the **Invisible Problem List** field in the Information window of the object reporting the alarm.

Changing the Master Mask Default

The Severity Settings windows for Tributary Termination Points (TTPs) (2M, VC-12, VC-3, 34M, 45M, 140M) have a **Master Mask** setting at the top of the window and an additional **Master** column on the right-hand side. These settings are used to mask any alarms reported at a TTP with no transmission passing through it (i.e., not involved in an active trail).

By default, the **Master Mask** at the top is activated (i.e., the buttons are set) for any TTP without live traffic. Whenever a trail is activated, this **Master Mask** is automatically deactivated by default (allowing the reporting of alarms) for all TTP trail segments. Additionally, when the trail is disconnected it is reactivated for the same segments.

You can also turn the **Master Mask** on or off manually (regardless of whether or not the TTP carries live traffic). This includes two options:

- Near-End – for all near-end related alarms and events
- Far-End – for all far-end related alarms (e.g. RDI) and events

To change a Master Mask setting manually:

1. Click the appropriate button (**Near-End** or **Far-End**).
2. Click the **Update** button.

The settings in the **Master** column on the right-hand side change automatically, reflecting the manual change you made in the **Master Mask**.

NOTE: The **Master** column on the right-hand side cannot be set; it merely reflects the settings effected in the **Master Mask**..

Default Severities

The following tables list the default severities for each type of alarm. Refer to Sections Equipment Alarms, Transmission Alarms, Performance Monitoring (PM) Alarms, and Timing Alarms for descriptions of the alarms.

Table 4-3. Default Severities for Equipment Alarms

Equipment	Equipment Alarms	Default Severity
AMU, COM	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
TR2, TRM	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
	PLL unlock Resynchronization	Major
ASF	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Power Failure	Major
	Programming Fault	Major
	Internal Timing Failure	Major
	Timing Generator Processor Fault	Major
	Laser Bias High	Major
	Laser Bias Low	Major
	Laser Power High	Major
	Laser Power Low	Major
	Laser Temperature High	Major
	Laser Temperature Low	Major

Equipment	Equipment Alarms	Default Severity
ASF16F	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Power Failure	Major
	Programming Fault	Major
	Internal Timing Failure	Major
	Timing Generator Processor Fault	Major
	Laser Bias High	Major
	Laser Output Power High	Major
	Laser Output Power Low	Major
	Laser Input Power High	Major
	Laser Input Power Low	Major
	Laser Temperature High	Major
	Laser Temperature Low	Major
BIMF/BIMTL	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
	BIM-CLU Clock Failure	Major
SPU	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
	Internal Timing Failure	Major
	Timing Gen Processor Fault	Major
	LOS	Major

Equipment	Equipment Alarms	Default Severity
ATRO, TRSO	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Power Failure	Major
	Programming Fault	Major
	Laser Bias High	Major
	Laser Bias Low	Major
	Laser Power High	Major
	Laser Power Low	Major
ATRE, TRSE	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Power Failure	Major
	Programming Fault	Major
TR34, TR45, TR140	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
OPB	Card Failure	Major
	Card Out	Major
	Card Type Mismatch	Major
	Communication Failure	Major
	Programming Fault	Major
	Laser Bias High	Major
	Laser Power High	Major
	Laser Power Low	Major
	Laser Temperature High	Major
	Laser Temperature Low	Major
	Laser Input Power High	Major
	Laser Input Power Low	Major
FCU, FCU-16	Card Failure	Critical
	Card Out	Critical
	Card Mismatch	Critical
	Power Failure	Critical

Equipment	Equipment Alarms	Default Severity
FTPS, FTPS-16	Card Out	Major
	Card Type Mismatch	Major
	Power Failure	Major
CPI	Power Failure	Major
INF	Card Out	Minor
	Card Mismatch	Minor
	Card Failure	Minor
	Power Failure	Minor
	INF-1 Failure	Minor
	INF-2 Failure	Minor
NVM	Card Failure	Minor
	Card Mismatch	Major
	Card Out	Major
	Power Failure	Major
µSDM-1/E CPU (CDB)	Card Out	Major
	Card Mismatch	Major
	Card Failure	Major
	Power Failure	Major
µSDM-1/E Tributary Card	Card Out	Major
	Card Mismatch	Major
	Card Failure	Major
	Power Failure	Major
	Temperature High	Major
	Temperature Sensor Failure	Major
µSDM-1/E Transceiver Card	Card Out	Major
	Card Mismatch	Major
	Card Failure	Major
	Power Failure	Major
	Laser Output Power High	Major
	Laser Output Power Low	Major
	Laser Bias High	Major
	Laser Bias Low	Major
	Laser Temperature High	Major

Equipment	Equipment Alarms	Default Severity
TEX2-42	Card Out	Major
	Card Mismatch	Major
	Card Failure	Major
	Power Failure	Major
CLK (TMU)	Card Out	Major
	Card Mismatch	Major
	Card Failure	Major
	Power Failure	Major

Table 4-4. Default Severities for Transmission Alarms

Monitor Point and Supporting Equipment	Transmission Alarms	Default Severity
SPI	LOS (Loss of Signal)	Major
	Rx Data Deviation	Major
	Tx Data Deviation	Major
	Rx Clock Deviation	Major
ATRO, ATRE	Tx High Freq (ATRE only)	Major
SPI	LOS	Major
ASF, TRSO, TRSE,OPB	Tx Data Deviation (TRSE only)	Major
RS ASF, TRS, SPU	LOF (Loss of Frame)	Major
MS	AIS (Alarm Indicator Signal: all 1s)	Major
	EXC (EBER: Excessive Bit Error Rate)	Major
ASF, SPU, TRS	RDI (Remote Defect Indication)	Warning
	SD (Signal Degraded)	Minor
VC4	AIS	Major
	LOM (Loss of Multiframe)	Major
	UNEQ (UNEQUIPPED Signal Label)	Major
	TIM (Trace ID Mismatch)	Major
	SLM (Signal Label Mismatch)	Major
ASF, SPU, TRS	VC4_AIS	Major
	RDI	Warning

Monitor Point and Supporting Equipment	Transmission Alarms	Default Severity
VC4	AIS	Major
	LOM	Major
	LOP	Major
	UNEQ	Major
	TIM	Major
	SLM	Major
	SD	Minor
	EBER	Major
	VC4_AIS	Major
ASF16F	RDI	Warning
VC4	VC4_AIS (*was AIS)	Major
	LOP	Major
	EBER (*was EXC)	Major
	SD	Minor
	UNEQ	Major
	TIM	Major
	SLM	Major
TR140	RDI	Warning
TRM PDH section	AIS	Major
	LOM	Major
	EXC	Major
	SD	Minor
	UNEQ	Major
	TIM	Major
	SLM	Major
TRM	RDI	Warning
VC3	AIS	Major
	EXC	Major
	SD	Minor
	UNEQ	Major
	TIM	Major
	SLM	Major
TR34, TR45	RDI	Warning

Monitor Point and Supporting Equipment	Transmission Alarms	Default Severity
VC12	AIS	Major
	EXC	Major
	SD	Minor
	UNEQ	Major
	SLM	Major
TR2	RDI	Warning
	TIM	Major
34M PI TR34	LOS	Major
45M PI TR45	AIS	Major
DVB	EXC	Major
	SD	Minor
2M PI	LOS	Major
	AIS	Major
	EXC (EBER)	Major
TR2	SD	Minor
MPI	LOS	Major
	AIS	Major
	EXC	Major
	SD	Minor
TRM	LOF	Major
TG (Timing Generator)	Timing Input Fault	Major
	Primary Timing Source Out of Range	Major
	Transient Timing State	Warning
	Primary Timing Source Not Active	Warning
	Current T4 Source Failure	Major
	Current T4 Squelch	Major
	Primary Timing Source LOS	Major
	Primary Timing Source Phase Hits	Major
	Secondary Timing Source Failure	Minor
AU4 Monitor	AU4-LOP	Major
	AU4-AIS	Major
	EBER	Major
	SD	Major
	UNEQ	Major
	TIM	Major
	RDI	Major

Monitor Point and Supporting Equipment	Transmission Alarms	Default Severity
TU3 Monitor	LOP	Minor
	AIS	Minor
	EBER	Minor
	SD	Warning
	UNEQ	Minor
	TIM	Minor
	RDI	Warning
TU12 Monitor	LOP	Minor
	AIS	Minor
	EBER	Minor
	SD	Warning
	UNEQ	Minor
	TIM	Minor
	RDI	Warning

The Alarm Log

To display the Alarm Log window:

- Select Alarm ➔ Alarm Log from the Shelf View,
  OR
  Click the toolbar icon,
  OR
  Select **Alarm ➔ Alarm Log** from the main menu.

The Alarm Log window can be accessed from any of the EMS-SYNCOM windows currently displayed. It contains a list of all significant events that occurred in the network, including events other than alarms.

NOTE: The terms *Alarm* and *Event* are used interchangeably in this manual, i.e. the alarms list is really an events list.

Viewing the Alarm Log

When a new event enters EMS-SYNCOM, it is recorded at the top of the alarm log. Therefore, when opening the alarm log window, you always see the most recent events first. At the top of the window, the total number of current alarms is displayed, together with the number of filtered alarms (i.e., are not shown due to the filter setting).

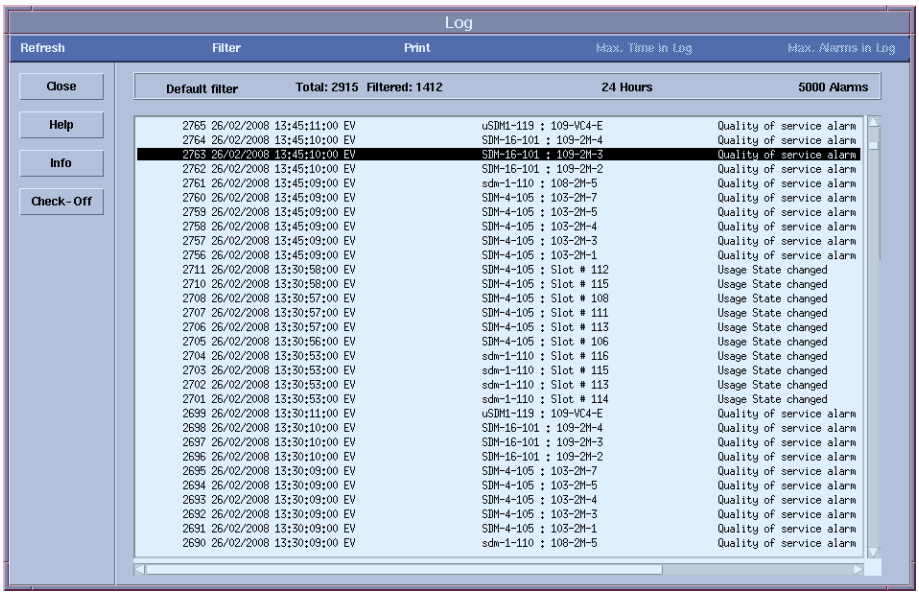


Figure 4-5. Example of an Alarm Log Window

Events included in the alarm log are periodically exported to a binary file. You can export this file in ASCII format on a floppy disk (see Exporting Alarm Logs on page 4-38).

Alarm Log Menu

The menu in the Alarm Log window offers the following options:

Refresh: This menu item is used to update the log to reflect the latest alarms. Selecting **Manual** updates the window immediately. The **Periodic** option causes the window to update automatically every 15 minutes.

NOTE: When using the **Periodic** option, heavy load is put on EMS-SYNCOM resources. Take into account that every time you open this window, the contents are refreshed anyway.

Filter: You can use this menu item to select the type of filter to be applied: **No Filter** (all alarms listed), **Default Filter** (list unacknowledged alarms only), or **Set Filter** (see also Filtering Alarms on page 4-36).

Print: You can print all alarms or selected (highlighted) ones. Bear in mind that if you print the entire log, the printed report may be very long. It is recommended that you use the **Filter** option to limit the entries to the information required before printing the log.

Max. Time in Log: Defines the maximum amount of time that the alarm/event appears in the Alarm Log before it is deleted automatically. Possible values are: 1, 6, 12, 24, 48 and 72 hours. The maximum time setting is displayed at the top of the alarm log window.

Max. Alarms in Log: Defines the maximum number of alarms that can appear in the Alarm Log. When the number of alarms exceeds this amount, alarms are deleted on a FIFO (first-in-first-out) basis. Possible values are: five hundred, one thousand, two thousand, three thousand, four thousand and five thousand alarms. The maximum alarms setting is displayed at the top of the alarm log window.

NOTE: When the Max. Time or Max. number is reached (whichever comes first) some alarms may be deleted. The deleted alarms can be seen in the Export Log Files (see Exporting Alarm Logs on page4-38).

Status Bar

The status bar underneath the menu bar in the **Log** window shows the filter currently active (**No Filter, Default Filter, or User Defined Filter**), the total number of alarms in the log, the number of non-filtered alarms in the log, the maximum time and maximum alarms in the log.

Alarms List

This is the main area of the Log window, displaying the actual alarms. Each new alarm is added to the top of this list. Each list entry provides the following information, from left to right:

=> – This sign at the left of the alarm entry indicates that the alarm was checked off.

NOTE: Checked off alarms are not shown when the default filter is active.

ID number – a consecutive number related to each alarm, incremented with each incoming alarm

Date and *time* – when the alarm was recorded

Severity of alarm (e.g. **Major**) or **Cleared**, if the situation causing the alarm has been corrected

Location – The NE and the object affected by the alarm.

The alarm/event type

Descriptive text (probable cause)

Checking-Off Alarms

The *Alarm Log* window can be used to check-off alarms or events. This operation is similar to the **Acknowledge** operation described in Acknowledging Alarms on page 4-19 for current alarms. The major difference between the Acknowledge and Check-Off operations is that once you acknowledge an alarm in the Network Current Alarms window, the acknowledgment is sent to the NE; the other EMS-SYNCOM stations (in multi-station systems) will then receive notification. A checked-off event (from the Alarm Log) is only removed from the local station and does not affect other stations.

When acknowledging an alarm in the Network Current Alarms window, it will be automatically checked off in the Alarm Log window if it appears in both places.

To check-off a single alarm:

1. Select the relevant alarm in the Alarm Log window. The alarm is highlighted. If you have changed your mind after selecting an alarm, click it again to deselect it.
2. Click the **Check-Off** button.

To check-off a group of alarms:

- Use multi-select (described in Using Multi-Select on page 2-9) to select a group of alarms/events and then click **Check-Off**.

After checking-off, the system freezes for several seconds while updating the status of alarms; it then displays a window with the message: `Alarms checked-off`.

Filtering Alarms

You can filter the displayed alarms log list to reduce it to only the alarms meeting certain criteria. This helps you concentrate on specific alarms.

To filter alarms:

1. Select one of the options (**Default Filter, No Filter or Set Filter**) from the Filter heading in the Alarm Log window menu.
2. Selecting the **Set Filter** option opens the Log Filter window.

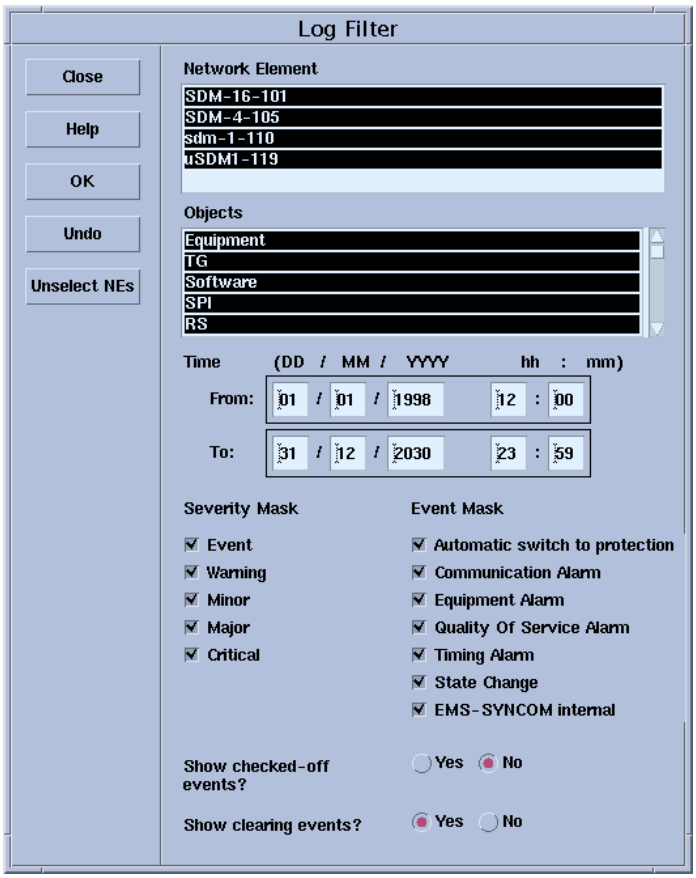


Figure 4-6. The Log Filter Window

3. Select the network elements you wish to include in the alarms log window from the **Network Element** list box. Select each NE by clicking on it (NE is highlighted). To deselect the NEs, click **Unselect NEs**. Select multiple NEs by clicking each one. When an NE is not selected, all alarms concerning it are filtered (i.e., not shown) in the alarms log.

4. Select the types of objects you wish to include in the alarms log window from the **Objects** list box. Select each object by clicking on it (object is highlighted). Select multiple objects by clicking each one. When an object is not selected, all alarms concerning it are filtered (i.e., not shown) in the alarms log.

5. Determine additional filtering criteria by checking the Severity Mask and Event Mask boxes. Table 4-3 describes the filtering criteria available in the Log Filter window:

Table 4-3. Log Filtering Options

From and To	A specific time period defined by time and date. This filters out the alarms defined by this time period.
Severity Mask	Alarm severity: Critical, Major, Minor, Warning, Event. Will filter out all alarms at this level. For example, if you select major it filters out major alarms.
Show checked-off events	Defines whether or not checked-off (acknowledged) events are displayed in the list.
Show clearing events	Defines whether or not events that have been cleared are displayed in the list.
Event Mask	Event types as described below.
Events that can be masked (using the Event Mask Option) include:	
Alarms	Communication, Equipment, Quality of Service, and Timing.
Automatic Switch to Protection	All path protection switching performed automatically by the system are normally logged in EMS-SYNCOM.
State Change	Notification of various states that items pass through when connected to the network (generally not significant for the User).
EMS-SYNCOM Internal	Alarms detected by EMS-SYNCOM (e.g. disconnection of an NE, failure of an EMS-SYNCOM operation).

6. When ready, click **OK**.

The filtering operation starts and its progress is displayed in a scale graph in a separate window.

If you have made changes to the filtering criteria and then change your mind, click the **Undo** button. This removes all changes and reverts to the original settings.

Restraining the Alarm Log Size

To reduce the number of alarms that appear in the Alarm Log window, reduce the **Max. Time in Log** parameter (from the Alarm Log window menu). For example if you select a value of **1** hour, all alarms that are more than one hour old (from the time received) are erased from the alarm log window. This keeps the Alarm Log at a reasonable size.

Exporting Alarm Logs

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

This function copies alarm log files to a floppy disk. EMS-SYNCOM keeps track of events by storing them in log files. These files are automatically saved to the EMS-SYNCOM hard disk periodically or whenever they reach a certain size (whichever occurs first). The file name has a *ah<yyyy><mm><dd>.<n>* format, where n designates the number of the log file saved on date YYYYMMDD. *ah* stands for Alarm History.

Log files have to be exported from time to time, otherwise the EMS-SYNCOM disk gets full. Once the free disk capacity is down to 2%, the log files are deleted automatically.

The system displays a warning message and prompt for log files to be exported when 95% of the disk capacity is used. When this occurs, the following message is displayed:

```
ATTENTION: DISK ALMOST FULL
Change alarm log parameters
Delete unnecessary export, configuration and NE s/w
files
```

Click **Close** to close the message window and perform the file export operation.

When 98% of the disk capacity is used, the system automatically deletes unnecessary export, configuration and NE software files.

To activate the Export Log function:

1. Insert a floppy disk into the disk drive.
2. From the Shelf View, select **Alarm ➔ Export Log**,
   OR
   From the main menu, select **Alarm ➔ Export Log**.

   The following window opens:

Figure 4-7. The Log Export Window

3. Select the file to export.
4. If you want to check the file's contents first, click the **Browser** button to open it.
5. You can filter the log file from the Browser window by selecting **Filter ➔ User Filter** from the window's menu. A window similar to the one shown in Figure 4-6 opens, allowing you to filter the alarms in the file. When a filter is applied, only the alarms displayed in the Browser window are exported. Select **Filter ➔ No Filter** from the window's menu to remove a filter.
6. To export the selected file to the floppy disk, click the **Export** button.
7. To delete the file you export, click the **Yes** button in the **Delete exported File?** field. Otherwise, leave the **No** default.

Export Alarm Via Communications

NOTE: This feature is a cost option which must be ordered from ECI Telecom's Optical Network Division.

The Current Alarms list can be sent from the EMS-SYNCOM to external systems or applications. This feature was designed to solve the requirement to frequently report the current status of the network to central alarm centers that collect alarms from a variety of sources. This feature supports exporting alarms to multiple destinations.

To use this feature, a dedicated Ethernet port must be installed at the EMS-SYNCOM Sun workstation. This port must be installed in addition to the Ethernet segment used between the EMS-SYNCOM and the gateway NE, in order to prevent congestion on that segment.

The main features of this function are:

- Information is transferred every two minutes.
- FTP (file transfer) is used to transfer the information over TCP/IP.

The Export Alarms function only transfers changes to the Current Alarms list (i.e., new records) since the last successful information transfer.

Alarm information includes: a header record (with current time and reported fields). Each alarm is reported with: the event time, the identity of the failed object and an alarm description.

Every two minutes, all new alarms recorded in the Current Alarm list are appended to a file.

The file is assigned a name of up to 8 characters according to the EMS-SYNCOM station name and is placed in the directory of the FTP user on the remote machine. The file receives the *dat* suffix.

Configuring µSDM-1/E External Alarms

Users can define names for the µSDM1 NE external alarm relays, to reflect the alarm application (e.g., Door alarm, Fire alarm). The User-defined names will appear in the relevant Info and Alarm windows when the external alarm relay is activated. To configure the external alarms, right click the External Alarms box in the µSDM1 Shelf View (shown in Figure 3-6) and select **Attributes** from the context sensitive menu. The following window opens.

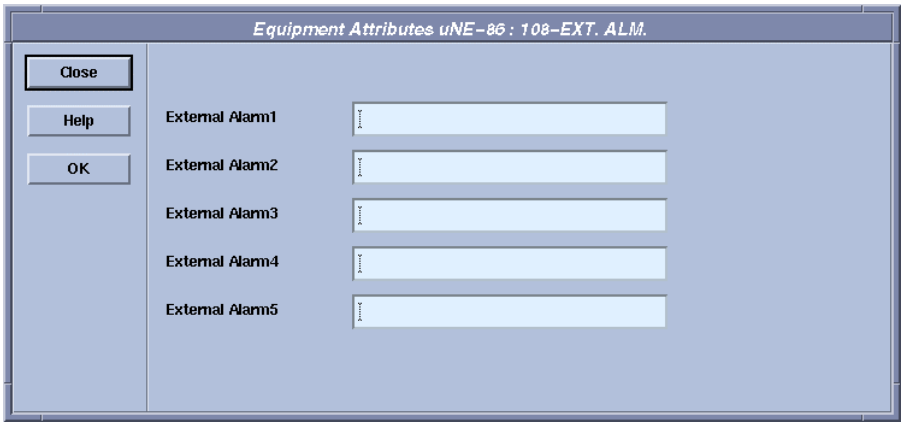


Figure 4-8. µSDM-1/E External Alarms Configuration

Enter free text names for the external alarms.

NOTE: The names entered here are not stored in the NE and therefore, are local to this EMS-SYNCOM station only. The names will not appear on other EMS-SYNCOM stations.

Audible Alarms

The EMS-SYNCOM provides two types of audible alarms, the *Audible Alarm* and the *Reminder* function.

To activate/deactivate audible alarms:

- From the Shelf View, select **Alarm ➔ Audio Alarm**,
  OR
  From the main menu, select **Alarm ➔ Audio Alarm**.

When activated, an audible alarm is emitted whenever an alarm or event enters the EMS-SYNCOM alarms log. No sound is emitted, however, for alarms set as **Non-Report** type. The duration of the alarm beep and the frequency between beeps are configurable startup options (see Startup Configuration Options on page 2-14).

By default, the audible alarm is the standard computer "beep." It is possible to specify an *.AU audio file as the audible alarm, in addition to the beep.

To specify an audio file as the audible alarm:

1. Copy the *.AU audio file to diskette.
2. Open a UNIX window (from the Root menu) and run the *SetSoundAlarm* script.
3. Follow the computer prompts.

Audio Alarms Deactivation

It is up to the administrator to allow other users to turn the audible alarms on and off using the **Audio Alarm Deactivation** option from the **Alarms** heading in the Shelf View or main menu. Two options are available:

- By Any User – This option allows other users (other than the administrator) to turn audible alarms on or off.
- By Admin Only – This option prevents any User, other than the administrator, to turn audible alarms on or off.

The default value of this parameter can be configured during startup, as described in Startup Configuration Options on page 2-14.

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

The Reminder Function

The second audible alarm type is the *Reminder* function. It differs from the audio alarm in that it sounds, at a preset time interval, when there are any unacknowledged alarms present in the system. The default value of this parameter (**Yes** or **No**) can be configured during startup, as described in Startup Configuration Options on page 2-14.

To use this alarm type:

- From the Shelf View, select **Alarm ➔ Reminder**,
  OR
  From the main menu, select **Alarm ➔ Reminder**.

NOTE: Only administrators can control this function in their personal EMS-SYNCOM sessions. It cannot be controlled by other users.

5

The Network Topology Level

This chapter describes the functions available to the user for defining network elements (NEs) and changing the network topology managed by the EMS-SYNCOM station. This includes creating, moving, inserting and deleting NEs.

Viewing Network Element Information

To access data regarding a specific NE:

- Right click the NE and select **Info** from the context sensitive menu,
  OR
  Select **Configuration ➔ Element ➔ Info** from the Shelf View,
  OR
  Select the NE in the main window and click the toolbar icon,
  OR
  Select the NE in the main window and then select **Configuration ➔ Element ➔ Info** from the main menu.

If all of the data in the Info window does not fit in the window, use the scroll bars. The information fields that can be displayed in the NE Info windows include:

Table 5-1. NE Information Fields

Info Field	Description
Network Element Type	Displays the NE type (i.e., SDM-1E , SDM-16FL, etc.).
Main IP Address	The IP address of the NE, assigned when the NE is installed. This cannot be edited by the EMS-SYNCOM user. It can be edited using the Element Manager (EM).
Main IP Subnet Mask	The subnet mask of the NE, assigned when the NE is installed.
Gateway IP Address	The IP address of the gateway.
Gateway IP Subnet Mask	The subnet mask of the gateway.
Gateway Mode	The gateway mode; see Setting NE Attributes on page 6-5 for the relevant settings.
IP Interface Configuration	Displays the type of element that this NE is interfaced with.
Secondary Name	This field can be used to specify an optional, second name for the NE. This label, if entered, appears in various EMS SYNCOM windows and reports.
System Location	Displays the user-assigned location name of the NE.
Vendor Name	Displays ECI Telecom.
SDH Topology	Displays the topology type, which can be terminal, bidirectional, chain, dual ring, uni-ring, etc.
Regenerator Node	Denotes whether or not the NE is a regenerator.
East-West Configuration	Displays Yes when the NE is installed in an East-West configuration (bidirectional); displays No when the NE is not in an East West configuration.
NE Install State	If the installation was completed successfully or not.
Backplane Serial Number/Version	Displays the serial number and version of the backplane installed in the NE.
CCP Serial Number/Version	Displays the serial number and version of the Central Connection Panel (CCP) installed in the NE.
T4 Output/Threshold Quality	Displays the T4 Quality setting as defined in Chapter 9 Timing.
T4 Squelch Status	Displays whether or not the T4 output is squelched, based on the T4 quality threshold.

Info Field	Description
RS/MS DCC Default Mode	Indicates which of the SDH overhead bytes are used by the NE as the DCC. When the NE uses the Regenerator Section bytes, the RS Default mode is ON; when the NE uses the Multiplexer Section bytes the MS Default mode is ON.
DCC Time to Live	The number of jumps that a TCP/IP packet can make before being dropped. The default is 40 jumps.
Fault Stabilize Time	Displays the Fault Stability Time parameter as defined in Attributes (see Setting NE Attributes on page 6-5).
Holdoff Time default	Displays the amount of time to wait between deciding that a switch to protection is needed and actually performing the switch. The switch will not be performed if the need for the switch does not persist for the entire holdoff time.
Wait to Switch	Displays the wait to switch (WTS) settings. This state is defined as follows: if there are *a* switch events within *b* seconds, the SNC CP (which executes the switch to protection) enters the WTS state for *c* minutes. At the end of the WTS period, a switch can take place if called for. A manual switch to protection (using one of the commands described in Switching to a Trail Protection Path on page 10-30) overrides and clears the WTS timer. The WTS timer is also cleared if the SNC CP becomes unprotected or disconnected
Operational State	The operational state can be either: *Enabled* – operating properly. *Disabled* – not operating due to, for example, card reset, or power supply failure on a card.
Usage State	Can display *Busy* or *Idle*.
Availability Status	This field provides information on the object when the *Operational State* is *Disabled*: *Dependency* – the object is disabled because its status depends on that of another object. For example, the state of a tributary point depends on that of a tributary card. *Failed* – the object has a problem which makes it non-operational.
Alarm State	This field displays the highest severity of alarms related to the object. These alarm severities are defined by the user.
Comment	This field is used by the EMS-SYNCOM user to add special comments.

Info Field	Description
Current Problem List	Displays a short description of the type of problems currently present.
Invisible Problem List	Displays current problems that do not appear in the Network Current Alarms window (see The Network Current Alarms Window on page 4-12). This can be one of the following: alarms whose severity has been set to **Non-Reported**, alarms for which the Master Mask was set, or if the system did not report the alarm due to the presence of a higher severity alarm (Alarm Correlation feature).
Utilization Info	Displays the number of utilized physical resources (i.e., the number of end points on trails in the NE).

Creating an NE

Creating a network element adds a new element to the EMS-SYNCOM database and to the topology map displayed in the main window.

To create a network element:

1. From the Shelf View, select **Configuration ➔ Element**,
   OR
   From the main menu, select **Configuration ➔ Element**.
2. Select the **Create** option in the displayed cascade menu.

   The following window opens:

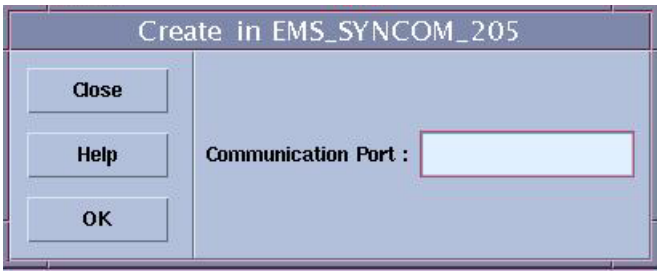


Figure 5-1. The Create Element Window

3. Enter the number of the communication port to be used (TCP/IP address).
4. Click the **OK** button to accept your entry.
5. A rectangle representing the NE outline is displayed with a hand icon inside it.

6. Drag the outline to a new position on the topology map and click the mouse button to set the new NE in the window.

7. Wait a few seconds for the EMS-SYNCOM to update its database.

Upon successful completion, a message window informs you that the network element has been created.

Initially, the EMS-SYNCOM status LED is displayed in gray (no communication). While the NE data is being loaded into the EMS-SYNCOM, the LED color changes to blue (database upload). If you are adding an NE while the system is uploading a different NE, the process may take longer.

NOTE: Correct address for the NE causes all communication between the NE and EMS-SYNCOM to cease. To restore communication, you must delete the NE and create it again. If this does not work, the problem may be due to a mismatch of the address you stated and the NE software address. In this case, connect an Element Manager (EM) to the NE to find out the correct TCP/IP address.

Moving an NE

In many cases, you may want to move a network element to a different location on the screen. You can rearrange the display of network elements to better suit your needs.

To move a network element:

1. Verify that the Move mode is enabled, by right clicking anywhere in the main window (away from any NE icons) and enabling the **Move Elements** option; when enabled, the mini-button next to the option appears pushed-in.

2. Drag the object to the desired location on the screen; as you drag the object an outline of the object is displayed and moves with the mouse movement. After reaching the desired location, click the mouse button. The object is inserted in that location.

The interconnecting lines representing the physical connection (optical fiber or coax cable) are rearranged automatically to reflect the new position.

Deleting an NE

You can delete a network element from the managed configuration database, provided that none of the following conditions exist.

- It is not possible to delete an NE of any type which contains client trail end-points.
- It is not possible to delete an NE which has an empty user-defined server trail (i.e., with no client trails going through it).
- If the NE has server trails going through it that cannot be deleted.
- It is not possible to delete EME/External NEs that are connected to another NE.

To delete a network element:

1. Select the network element you want to delete.
2. From the Shelf View, select **Configuration ➔ Element ➔ Delete**,
   OR
   From the main menu, select **Configuration ➔ Element ➔ Delete**.
3. A warning window prompts you to confirm that you really want to delete the NE.
4. Click the **Yes** button if you are sure you want to delete the selected network element.
   OR
   Click the **No** button to abort the process.

The deletion process may take a few minutes while the EMS-SYNCOM is updating its database. During that time, the cursor takes the shape of a wrist watch. Upon successful completion, a message window informs you that the network element was deleted.

Setting IP Routing for a SYNCOM NE

General

The EMS-SYNCOM uses TCP/IP communications to send datagrams (or data packets) to SDH network elements. Using TCP/IP, the datagrams can be routed over separate Local Area Networks (LANs).

The EMS-SYNCOM supports user-defined IP routing. The IP routing, which defines how datagrams are routed between LANs, is defined using the Set Route function which is accessed from the Root Menu (see Appendix A).

The NE Routing Table defines the destination subnets that an NE communicates with on the IP network. The NE Routing Table allows system configurations where an NE is used to route datagrams to other LAN segments; this type of NE is referred to as a Gateway.

All NEs have a default routing table, which includes the destination (typically the EMS-SYNCOM) and the gateway NE used to route the datagrams.

The IP Address Scheme

The following is general background information on IP communications.

Each IP network is assigned a unique network ID. Each host on an IP network is assigned a unique 32-bit hardware independent address.

An IP address looks like this:

102.54.94.97

This is referred to as dotted decimal notation, with each eight bits of an IP address (called an octet) separated from the next eight bits by a period.

The 32-bit address has two parts: the prefix identifies the IP network to which the host belongs. The remaining bits form the Host ID, which uniquely identifies the host within the network. All hosts on the IP network have the same network ID.

Each host on the network uses the network ID and the host ID to determine which datagrams it should receive or ignore, and to determine the scope of its transmissions.

IP Address Classes

In IP addressing, the value of the first octet determines the number of host ID bits available in the IP address. The relevant classes are displayed in the following table.

Table 5-2. IP Address Classes

Network Class	Range of first Octet	Network Address Bits	Available Networks	Available hosts per network
A	1-126	8	126	16,777,214
B	128-191	16	16,384	65,534
C	192-223	24	2,097,151	254

As can be seen in this table, Class A IP networks supports the largest number of host addresses, while Class C supports the least.

The IP routing in EMS-SYNCOM provides full support of Class A, B and C.

NOTE: An additional two Classes (D and E) supported in the IP standard are not relevant to EMS-SYNCOM's IP routing feature.

IP Addressing Conventions

An IP address with all host ID bits set to zero (e.g., 147.234.0.0) is the Network Address, which refers to all hosts in the network identified by the network ID prefix.

An IP address with all host ID bits set to 1 (e.g., 147.234.255.255) is a Directed Broadcast to all the hosts in the network identified by the Network ID prefix.

To send a datagram from a Source host to a Destination host:

If the source and destination hosts have the same network ID prefix in their IP addresses, then they both belong to the same logical IP network. Therefore, the source host can transmit the datagram over the LAN and assume that the destination host will receive it.

If the source and destination hosts have different Network ID prefixes in their IP addresses, then they do not belong to the same IP network. Since the source host cannot communicate with the destination host directly, it must send the datagram to a Router or Gateway which forwards it to another IP network.

IP Routing Features

Gateway NEs support user-defined routes towards Ethernet LANs. This information is entered in the NE Routing Table (described in The NE Routing Table on page 5-11).

Subnet Masks

Subnet masks can be used to divide a subnet into several subnets, with fewer hosts per subnet. This is of special importance when planning an IP network with few hosts, that does not require an entire Class C address range (254 hosts).

A subnet mask (a 32-bit number) is used to determine the number of bits used for the subnet and host portions of the address. In the subnet mask number, 1's determine a subnet division.

Let's look at some examples.

Subnet Mask Example A

Here we have a Class B address of 191.70.55.130 and apply some different subnet masks. A logical AND operation is performed between the IP address and the subnet mask as shown:

In this example, we use a mask that retains the default 16 network and host bits for a Class B address (i.e., the default mask is 255.255.0.0):

IP Octets	191	70	55	130
IP Address	1011 1111	0100 0110	0011 0111	1000 0010
Subnet Mask	1111 1111	1111 1111	0000 0000	0000 0000
Result	1011 1111	1000 0110	0000 0000	0000 0000

In the above example, the network ID is 191.70.0.0 and the host ID is 55.130.

Subnet Mask Example B

In the next example, we employ a mask that divides the host portion into a subnet and host that are each eight bits wide (i.e., the mask is 255.255.255.0):

IP Octets	192	70	55	130
IP Address	1011 1111	0100 0110	0011 0111	1000 0010
Subnet Mask	1111 1111	1111 1111	1111 1111	0000 0000
Result	1011 1111	1000 0110	0011 0111	0000 0000

This division allows 256 reserved subnets, each with 254 hosts.

This division on a byte boundary makes it easy to determine the subnet and host from the dotted-decimal IP address. However, the subnet-host boundary can be at any bit position in the host portion of the IP address.

NE Network Interfaces

Every NE has the following network interfaces:

- Ethernet interface.
- DCC LAN interface.

NEs can be installed in one of the following configurations:

Gateway NE This NE is connected to the EMS-SYNCOM via Ethernet and communicates with additional NEs via its DCC LAN interface; the EMS-SYNCOM uses the GNE as the router to send datagrams to the NEs on the DCC subnet.

Ethernet Only NE The NE communicates with the manager via Ethernet only.

DCC Only NE The NE only communicates on its DCC subnetwork, and is not connected directly to a manager.

Gateway NEs and DCC only NEs have a default entry in their routing table which includes the destination (typically the manager) and the gateway NE used to route the datagrams.

The NE Routing Table (described in The NE Routing Table on page 5-11) allows Users to insert additional entries to the routing table, allowing system configurations where an NE is used to route datagrams to other LAN segments.

The NE Routing Table

To access the routing table for a specific NE:

- From the Shelf View, select **Configuration ➔ Routing Table**,
  OR
  Right click the NE icon in the main window and select the context sensitive menu option,
  OR
  Select the NE in the main window and then select **Configuration ➔ Routing Table** from the main menu. The following window opens.

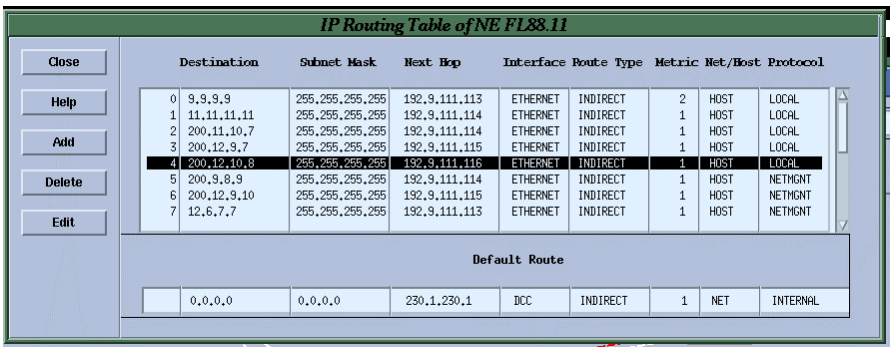


Figure 5-2. The IP Routing Window

This window displays the following read only fields:

Destination	The destination IP address.
Subnet Mask	A subnet mask is used to determine the number of bits used for the subnet and host portions of the address. The mask is a 32-bit value that uses one-bits for the network and subnet portions and zero-bits for the host portion.
Next Hop	Displays the IP address of the next hop gateway.
Interface	Displays the type of LAN interface used by the NE; possible values are Ethernet or DCC.
Route Type	Direct or indirect.
Metric	For future use; currently displays 1.
Net/Host	If the destination is a LAN, this field displays Net; if the destination is a host (e.g. manager), this field displays Host.
Protocol	Displays the routing protocol on the NE LAN interface.

Editing IP Routes

Click **Add** or select an IP route from the IP Routing window and click **Edit** to add a new IP route or edit an exiting one, respectively. The following type of window opens.

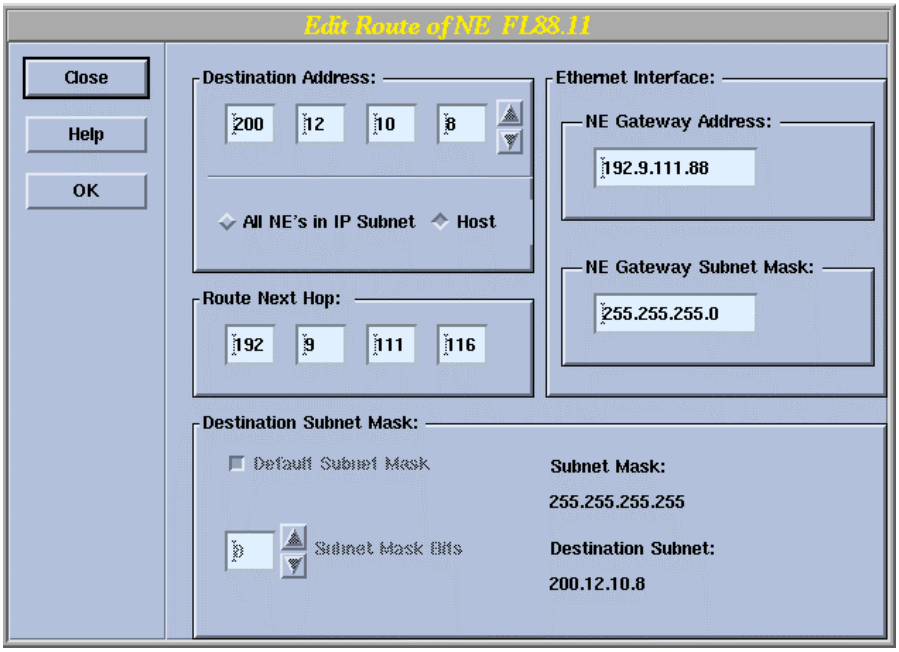


Figure 5-3. The IP Routing Edit Window

The IP address and Subnet mask of the NE's Ethernet interface is displayed in the **Ethernet Interface** read-only field. Note that the IP address of the Next Hop must be on the same IP subnet as the NE's Ethernet interface.

1. If the destination you are adding is a subnetwork (e.g., DCC subnet), click the **All NEs in IP Subnet** button; if you are adding a host NE (e.g. manager) click the **Host** button.

2. In the **Destination Address** field, enter the destination IP address or the IP address of the host. A validation routine in the software only allows you to enter a legal IP address, based on the address class. For example, if the value of the first octet you entered corresponds to a Class A address, the next three octets are grayed out.

3. In the **Route Next Hop** field, enter the IP address of the Ethernet interface of the Gateway/Router which is connected to this NE. Note that this IP address must be on the same IP subnet as the NE's Ethernet interface (as displayed in the **Gateway IP Address** read only field).

4. If the destination subnet includes a subnet mask (as described previously), specify the number of **Subnet Mask Bits** to use.

   The number of subnet mask bits that can be selected depends on the class of the destination IP address (e.g., for Class C IP addresses, up to 6 subnet mask bits can be specified). Use the spin buttons to set the number of subnet mask bits; the software implements a validation procedure that only allows you to enter legal values, based on the class of the destination IP address. The value of the 32-bit subnet mask number is displayed in the read only **Subnet mask** field, and changes to reflect the current setting of the **Subnet Mask Bits** field.

   The IP address range of the subnet, as determined by the destination IP address and the subnet mask, is displayed in the **Destination Subnet** read only field. This field is also dynamically updated to reflect the current settings.

5. If the values you entered are valid, the **OK** button becomes active. Click this button to record the new entry in the database and to close the dialog box.

   When you click **OK**, the system performs a validation check against the routing table. If any problems are detected, the system displays messages that describe the problem.

Grouping NEs

EMS-SYNCOM allows you to combine several NEs into a single group entity, which can be displayed as a single icon on the topology map. This feature is very helpful in large networks, as it allows space economy on the EMS-SYNCOM desktop.

Once you have defined an NE group, the following functions can be performed:

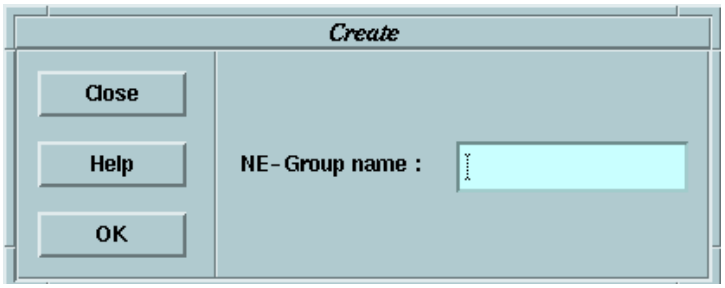
- Expand–display the individual NEs belonging to the group again
- Collapse–after expansion, display it as a single icon again
- Ungroup–cancel the group and return to individual NE icons.

Defining an NE Group

To define an NE group:

1. Select NEs to be in the group by clicking them while keeping the **Ctrl** key pressed. Selected elements appear with a white border around the NE icon.
2. From the main menu, select **Configuration ➔ Group**.
3. Select the **Create** option in the displayed cascade menu.

   The following window opens:



4. Enter the NE group name. Click **OK**.
5. A rectangle representing the NE group outline is displayed.
6. Drag the outline to a new position on the topology map and click the mouse button to set the new NE in the window.
7. Upon successful completion of the group icon, a message window informs you that the group has been created. After several moments the group icon is displayed in the topology view with the name of the group inside the icon.

Group icons can be manipulated on the desktop in the same manner as regular NE icons, as described previously in this chapter.

If any of the NEs in the group are connected to NEs outside of the group, the new group icon retains the same connecting lines as previously.

Viewing the Elements in an NE Group

After defining an NE group, and after the NE group icon is displayed in the topology view, you can obtain a list of the elements that are in the group as follows: right-click on the NE group icon and select List of Elements from the context sensitive menu.

Deleting an NE Group

To delete an NE group:

1. To permanently disconnect the group and return to the previous topology (the original NE icons), select the group icon. The selected icon appears with a white border around it.
2. From the main menu, select **Configuration ➔ Group**.
3. Select the **Ungroup** option in the displayed cascade menu.

The NE icons are returned to their previous settings and the message: `NE group deleted` is displayed.

Expanding and Collapsing NE Groups

Expanding an NE Group

To expand the group and display its elements:

1. Double click the group icon
   OR
   Select the icon (it appears with a white border around it).
2. From the main menu, select **Configuration ➔ Group**.
3. Select the **Expand** option in the displayed cascade menu. The previous NE icons are returned.

To display all group members after using the expand function, select any one of the NEs that is in the group, right click and choose Show Group. All NEs in the group are displayed with a white border around them.

NOTE: To expand all currently defined groups: right click in the Main window away from any NE icons and selecting **Expand All** from the context sensitive menu. Expand a single NE group by right clicking it and selecting **Expand**.

Collapsing an NE Group

To return to the previous group setting, after using the Expand command:

- Right-click one of the NEs in the group and select **Collapse** from the context sensitive menu.
  OR
  From the main menu, select **Configuration ➔ Group ➔ Collapse**.

The previous group icon is returned. A popup window opens with the message: **NE Group Deleted**.

NOTE: To collapse all groups that are currently expanded: right click in the Main window away from any NE icons and selecting **Collapse All** from the context sensitive menu. Collapse a single NE group by right clicking it and selecting **Collapse**.

Adding additional NEs to an Existing NE Group

1. To add additional NEs to an existing NE group, select the NE group icon and then select the NEs to add (using multi-select if adding multiple NEs).
2. From the main menu, select **Configuration ➔ Element**.
3. Select the **Add Elements to Group** option in the displayed cascade menu. NE group icon will remain in display, and the NEs that were added will be removed from display.
4. A popup window opens with the message: Changed Group Elements.

Adding Additional NEs to an existing NE Group Using Drag- and-Drop

1. Middle-click the NE icon to add to an existing group. The cursor changes shape (to that of a "running man").
2. Drag the NE into the group icon and release the middle-mouse button.
3. The NE icon disappears from the Topology View and the message `Changed Group Element` is displayed.

Removing NEs from an Existing NE Group

1. Expand the NE group.
2. Select the NE(s) to remove.
3. From the main menu, select **Configuration ➔ Element**.
4. Select the **Remove Elements from Group** option in the displayed cascade menu.

6

The Network Element Level

Accessing the NE Shelf

Using EMS-SYNCOM, you can access the Shelf View of each of the NEs displayed in the Main Window. The Shelf View displays a map of the cards installed in the NE shelf, together with information relevant to each card (such as alarms).

To display a Shelf View: select an NE from the topology view (by clicking its icon), right click and select **Open** from the context sensitive menu. Alternatively, double click on the NE icon. A Shelf View of that NE opens in a separate window.

When the configuration token for an NE is not in your possession, the Shelf View displays either the words **Monitor only** (if the token is being held by another user), or **Config Token available** (if the token is free). See The Security Token Feature on page 11-10 for details.

The following figures show typical SDM–1 and SDM–4/SDM-16 shelves, respectively.

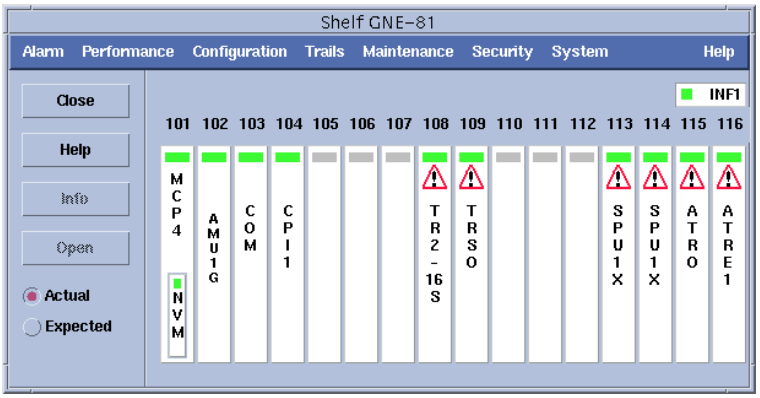


Figure 6-1. Typical SDM–1 Shelf View

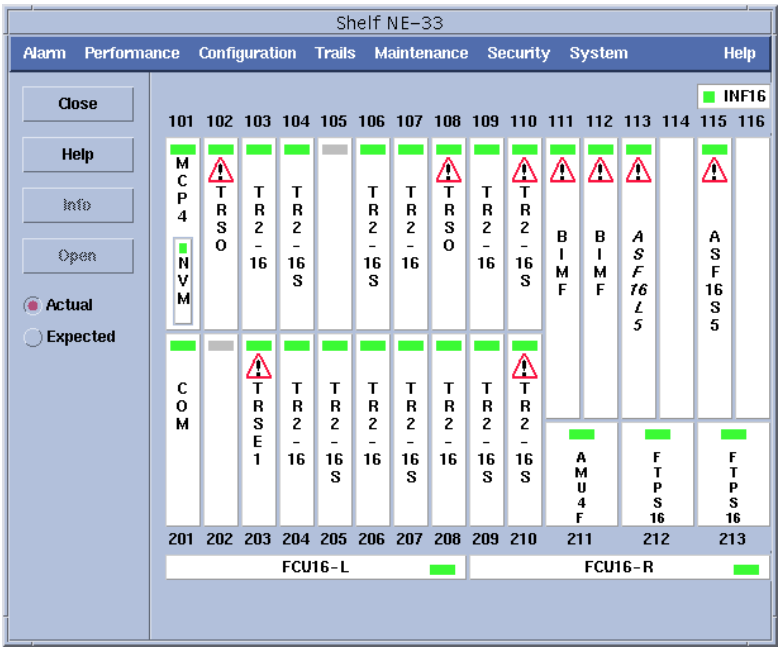


Figure 6-2. Typical SDM–4 and SDM-16 Shelf View

The following figure shows a typical µSDM-1E Shelf View.

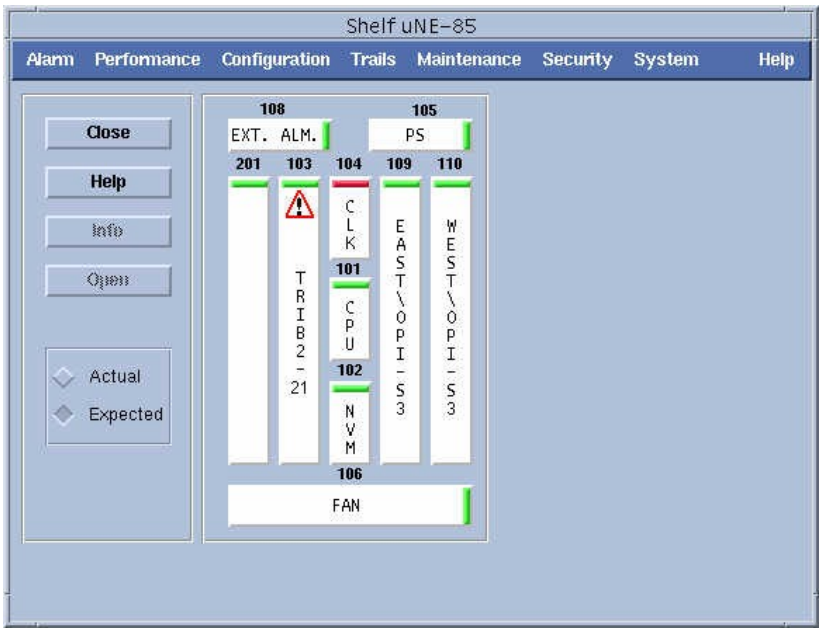


Figure 6-3. µSDM-1 Shelf View

NOTE: The physical architecture of the µSDM-1 is different than that of the SYNCOM NEs (SDM-1, SDM-4 and SDM-16). The µSDM-1 is not mounted in a shelf, but in an enclosure which cannot be opened in the field. It contains permanent or virtual equipment which does not physically exist as a separate entity. For reasons of consistency of the documentation, the terms card and slot are used for the µSDM-1 despite that they do not exist in a physical sense. For a description of the µSDM-1 architecture, refer to Naming Convention on page 6-3.

The following information about each card is provided:

- **When the Actual radio button is clicked:** the type of card found in the slot is displayed. If there is no card inserted in the slot, the corresponding slot is not marked.
- **When the Expected radio button is clicked:** the type of card that the system expects to find in the slot.
- Alarm LED indicators on cards that can cause alarms. See LEDs and Icons on EMS-SYNCOM Objects on page 3-16 for a summary of the color-coding used.

Naming Convention

The naming convention for slots in SDM–1 and SDM–4/SDM-16 racks are slightly different.

In SDM–1 racks, slots are numbered consecutively from left to right.

In SDM–4 and SDM-16 racks, slot numbers consist of three digits, where:

- The first digit is the level number – either 1 or 2 (there are two available levels on the subrack)
- The last two digits are the slot number within the same level, counting from left to right.

In µSDM-1 NEs, slot numbers consist of three digits; if a TEX card is installed, its slot number is always 201. The first digit of all other cards start with 1.

The slot numbers displayed are the following:

101 CPU (CDB)

102 NVM

103 TRIB2-8 / TRIB2-21 / TRIB2-21E (MAC-8 /21)

104 CLK (TMU)

105 PS (INF)

106 FAN

108 EXT ALARMS

109 EAST (TRANSCEIVER)

WEST (TRANSCEIVER)

X2-42 / TEX34-3 / TEX45-3 / TEX-DVBR / TEX-DVBT

NOTE: The physical architecture of the μSDM-1 is different than that of the SYNCOM NEs (SDM-1, SDM-4 and SDM-16). The μSDM-1 is not mounted in a shelf, but in a closed enclosure. Its equipment objects (i.e., cards) are permanent and can only be replaced/serviced in lab conditions. For reasons of consistency, the view for μSDM-1 and μSDM-1E NEs is referred to as the Shelf View.

The following table lists the μSDM-1 NEs modules and their functions:

Table 6-1. μSDM-1/E Modules

Module	Function
CPU (CDB)	Performs the internal NE management functions and the logical interface with the management stations.
NVM	Non-Volatile Memory card. Stores the NE software and a backup of the NE configuration.
TRIB2-8 TRIB2-21 TRIB2-21E	Tributary cards for interfacing with PDH tributary lines.
CLK (TMU)	Synchronization unit.
PS (INF)	Power Supply.
FAN	A fan cooling unit.
EXT ALARMS	Provides 5 dry contact relays for connection to a wide range of external alarm devices.
EAST (TRANSCEIVER)	Converts tributary signals to the SDH format, maps and adds to the aggregate signal for transmission to other NEs (and vice versa).

Module	Function
WEST (TRANSCEIVER)	Converts tributary signal to the SDH format, maps and adds to the aggregate signal for transmission to other NEs (and vice versa).
TEX2-42 TEX34-3 TEX45-3 TEX-DVBR TEX-DVBT	Tributary extension cards for additional tributary interfaces: 42 x 2Mbit/s, 3 x 34 Mbit/s, etc.

Setting NE Attributes

Set/change the attributes of an NE through the **Update Element** window.

To set NE attributes:

- From the Shelf View, select **Configuration ➔ Attributes**,
  OR
  Right click the NE and select **Attributes** from the context sensitive menu,
  OR

  Select the NE from the Main window (the selected NE is displayed with a white border line around the NE icon), and then select **Configuration ➔ Attributes** from the main menu.

NOTE: To open the Update Element window, only one NE may be selected. If two NEs are selected, the **Attributes** option is grayed out on the menu. To activate the option, deselect one of the NEs.

The name of the selected NE is displayed at the top of the window.

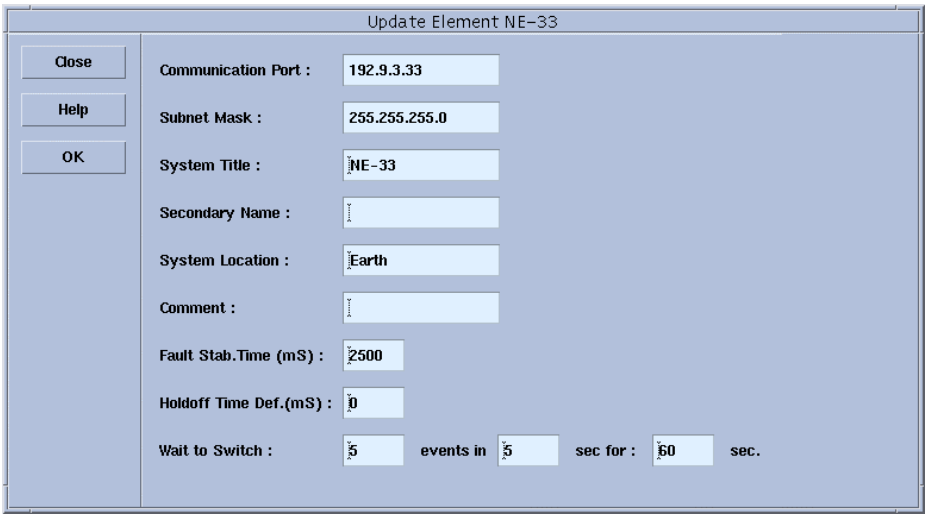


Figure 6-4. Setting NE Attributes

This window contains the following fields:

- **Communication Port:** This field specifies the internal TCP/IP address of the NE. This corresponds to the address defined when the NE hardware was installed and set up. You cannot edit this field. To change the address, you must first delete the NE, create it again and then assign the new address.
- **Subnet Mask:** This field specifies the subnet mask value of the NE. This corresponds to the setting defined when the NE hardware was installed and set up. You cannot edit this field. To change the subnet mask, you must first delete the NE, create it again and then assign the new address.
- **System Title:** This field shows the name of the element (up to 31 characters). Usually, this is the rack name and number. This label appears on the NE icon in the EMS-SYNCOM main window.

NOTE: The EMS-SYNCOM does not allow duplicate NE names in the network topology. Should you attempt to define a new NE with a name that was already assigned to another NE, an appropriate error message is displayed.

- **Secondary Name:** This field can be used to specify an optional, second name for the NE. This label, if entered, appears in various EMS-SYNCOM windows and reports.
- **System Location:** This field shows the site name (up to 31 characters).

- **Comment:** This field is used to add textual information related to this NE. You may want to enter the site phone number, names of operators working there, business hours, etc.
- **Fault stab. time (mS):** This is a time period defined globally for the NE. To be reported, an alarm entering the system must remain active for this period. Also, when an alarm has been active and the signal returns to normal, it must remain normal for this period of time for the system to report it as cleared.
- **Holdoff Time:** An amount of time to wait between deciding that a switch is needed and actually performing the switch. The switch will not be performed if the need for the switch does not persist for the entire holdoff time.
- **Wait to Switch:** Defines the wait to switch (WTS) state. This state is defined as follows: if there are a switch events within b seconds, the SNC CP (which executes the switch to protection) enters the WTS state for c minutes. At the end of the WTS period, a switch can take place if called for. A manual switch to protection (using one of the commands described in Switching to a Trail Protection Path on page 10-30) overrides and clears the WTS timer. The WTS timer is also cleared if the SNC CP becomes unprotected or disconnected.

NOTE: An additional two fields, **Gateway Subnet Mask** and **Gateway Mode**, are only displayed for the gateway NE.

- **Gateway Subnet Mask:** displays the subnet mask setting of the gateway.
- **Gateway Mode:** This field determines the restrictions on forwarding of IP datagrams through the gateway NE:
- **Host Routing Only:** no forwarding of IP datagrams from Ethernet to DCC and vice versa.
- **Local Gateway:** forwarding from Ethernet to DCC takes place only if the destination belongs to the local DCC subnet.
- **Normal Gateway:** this is the default gateway mode, in which forwarding from Ethernet to DCC and vice versa occurs whenever necessary, without any restrictions.

NOTE: If you selected Attributes when a NE group icon is selected, the Update Element window only allows you to change the name of the NE group.

Setting the NE Time

You can use the **Set NE Time** option in the **Configuration** menu to set the NE real-time clock (date and time) manually to the EMS-SYNCOM clock time, although it is updated automatically by EMS-SYNCOM every few minutes.

To set the NE time:

1. From the Shelf View, select **Configuration ➔ Set NE Time**,
   OR
   Select the desired NE and from the main menu, select **Configuration ➔ Set NE Time**.
2. The EMS-SYNCOM updates the NE time and a message window confirms if the action was successful

7

Managed Network Cards Level

Overview

This EMS-SYNCOM version can be used to manage the following NE types:

- SDM-1, SDM-1E, SDM-1C
- SDM-4, SDM-4F, SDM-4L, SDM-4R
- SDM-16FAB, SDM-16F, SDM-16FL, SDM-16FR
- µSDM-1 and µSDM-1E

The Card Info View

When the visual data related to a certain card object is insufficient, you can open an Info window to get additional information. To do so, select the card (card turns gray) and click the **Info** button.

It is also possible to obtain additional information regarding cards (such as the trails that go through a specific card) via the context sensitive menus. Refer to Context Sensitive Menus on page 2-8.

A typical card-related Info window is shown in the following figure.

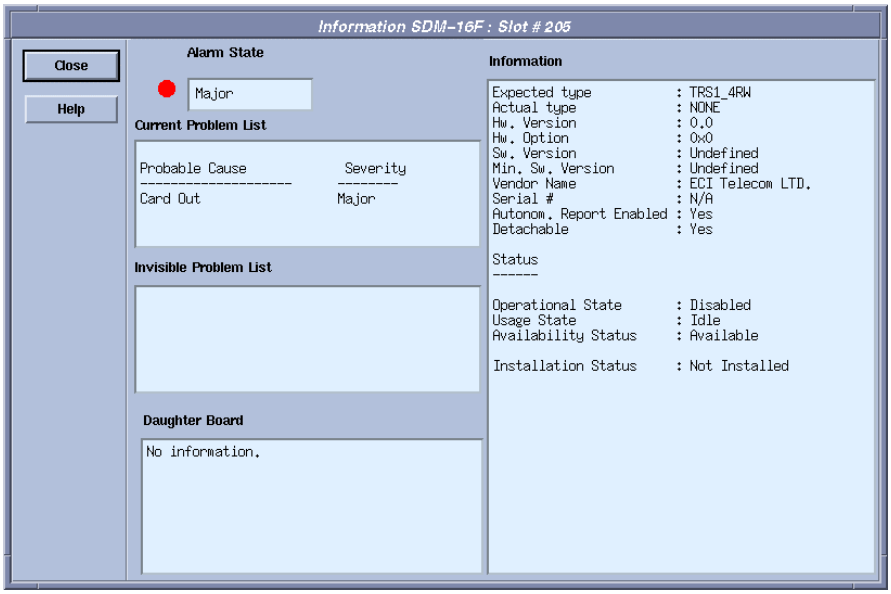


Figure 7-1. A Typical Info Window

Most entries contained in the Info windows are self-explanatory. Some of these items are explained in the following table.

If the data in the Info window does not fit in the window, use the scroll bars to view all of it.

Table 7-1. Shelf View Information Fields

Info Field	Description
Alarm State	This field displays the highest severity of alarms related to the object. These alarm severities are defined by the User and explained in more detail in Setting Alarm Severity on page 4-20.
Current Problem List	Lists the current alarms related to this card and the severity of each alarm.
Invisible Problem List	Lists all alarms that have been set to Non-Reported (see The Network Current Alarms Window on page 4-12) and that cannot be viewed anywhere else in the EMS-SYNCOM.
Daughterboard	If the card has sub-equipment daughterboards, this section lists the installed sub-equipment.
Expected Type/Actual Type	Lists the card type that the system expects to see in the card slot (as listed in the EMS-SYNCOM database) and the type actually installed. If the actual type differs from the expected type, a Card Mismatch alarm is reported.
HW Version/HW Option	Lists the hardware version and option of the card.
HW Version/SW Version	Lists the software version of the card.
Vendor Specific Information	This group of fields shows the serial number sorted in the ID ROM on each card and the product version number. 0 or 0.0 displayed in the Version field means that the card does not support this version. There may be both a hardware version number and a software version number. The Vendor Name field displays ECI Telecom.
Auton. Report Enabled	When the autonomous report feature is enabled, the EMS-SYNCOM is sent notifications when the transmission objects in the card are switched to protection.
Detachable	If a TRS1-4 card has a detachable module (DM), this field displays Yes.
Trail Name, Trail Protection	Provided for trail endpoint TTPs – lists the label of the client trail with this endpoint and notes whether or not the client trail is protected.
Operational State	The operational state can be either Enabled – operating properly. Disabled – not operating due to, for example, card reset or power supply failure on a card.
Usage State	The usage state can have any of three settings: Idle – there is no trail on the object at present. Active – there is a trail on the object at present. Busy – the trails have reached full card capacity.

Info Field	Description
Availability Status	This field provides information on the object when the Operational State is *Disabled*, as follows: Dependency – the object is disabled because its status depends on that of another object. For example, the state of a tributary point depends on that of a tributary card. Failed – the object has a problem which makes it non-operational.
Installation Status	The installation status can have any of three possible settings: Installed – normal operation. Not Installed – card is not in place. Installation Incomplete – this message appears while software is being loaded to the card. It normally appears when the NE has just been activated or after a card reset.
AIS State	Shows the state of the Alarm Indication Signal (AIS).
Comment	This field is used by the User to add special comments.

Setting Card Attributes

To set the attributes of a card:

- Right click the card slot and select **Configuration ➔ Attributes** from the Shelf View,
  OR
  Right click the card and select **Attributes** from context sensitive menu,
  OR
  Right click the card and select **Configuration ➔ Attributes** from the main menu.

The following window opens.

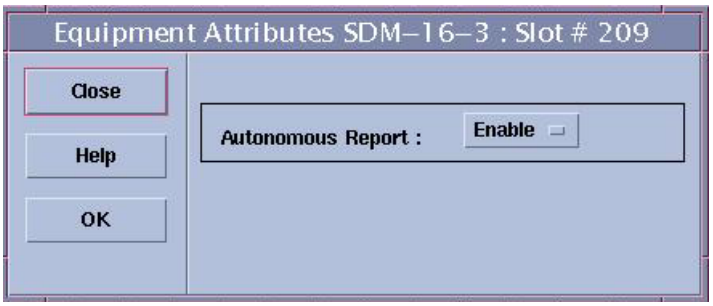


Figure 7-2. Card Attributes

When you set the Autonomous Report parameter to Enabled, the EMS-SYNCOM is sent notifications when the transmission objects in the card are switched to protection.

The Card Internals View-SYNCOM NEs

The Card Internals View shows an SDH-oriented view of transmission information for the card's internal objects. Access this view by selecting the relevant card in the Shelf View and clicking the **Open** button, or alternatively, by double clicking the relevant card.

Figure 7-3 shows a typical Card Internals View. This view shows the status of the card's internal objects according to the color-coding convention described in NE LED Color-coding on page 3-16. To perform an operation on an internal object, select the object and then choose an option via the context sensitive menu (right-click) or via the main menu. The figure shows the status of the ASF-16 card internal objects, and also shows which of the card's VC4 objects are used in server trails (see Server Trails on page 10-2 for a description of server trails). When a VC4 was selected as a server trail resource, the ASF16 Card Internals View displays which STM number the VC4 is going through and the direction (East to West or West to East) of traffic.

NOTE: The first 4 VC4s shown in this view can be terminated at the NE matrix card. The next three groups of 4 VC4s (5-8, 9-12 and 13-16) can be passed through the NE (ASF to ASF) or can be dropped via a TRS1-4 card installed in the NE (slots 209, 205 and 102 respectively), if one is installed.

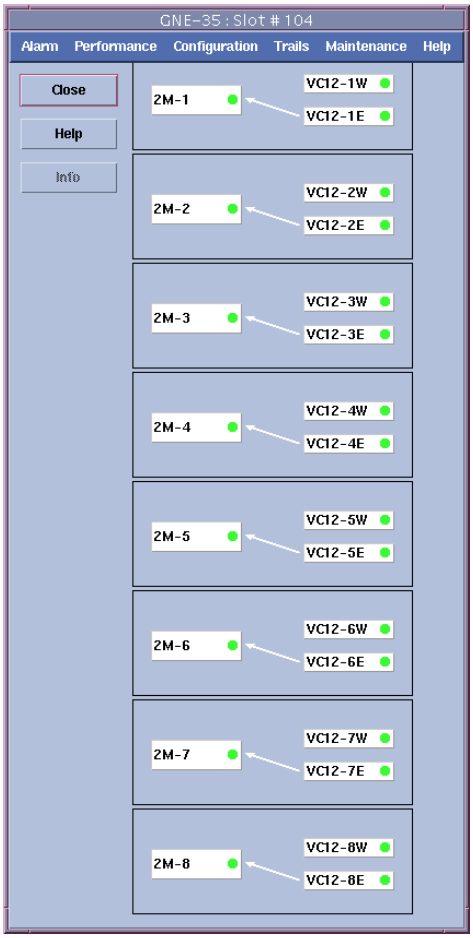
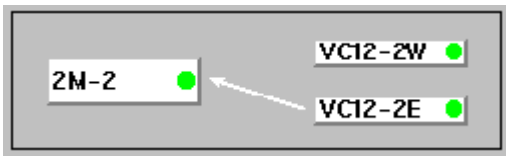


Figure 7-3. Typical View of Card Internal Objects

The Arrow Indication

The arrow symbol can appear in the Card Internals view. An arrow connecting two items and pointing at one of them indicates the drop direction of the traffic. Switching to protection changes the arrow's direction.



The Card Internals View-µSDM-1 NEs

Tributary Card Internals

The following figure shows a view of the transmission objects information for the µSDM-1 basic card, which has 21 2M tributary objects. Access this view by selecting the basic card in the µSDM-1 Shelf View and clicking the **Open** button or, by double clicking the basic card. In µSDM-1/E units that have a tributary extension card, access the Card Internals view by selecting the extension card in the µSDM-1 Shelf View and clicking the **Open** button or, by double clicking the extension card.

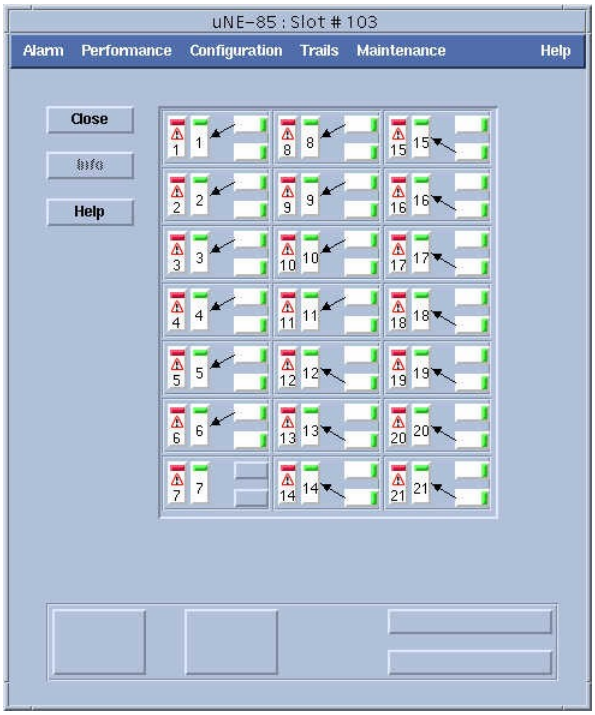


Figure 7-4. µSDM-1 Tributary Card Internals View

NOTE: In the Card Internals view of µSDM-1/E 2M tributary extension cards (TEX-42), tributaries are numbered starting from 1, unlike the numbering on the actual front panel of the TEX-42 (numbering starts from 22).

Each 2M object is connected to one VC12 which in turn connects to two TU12s. Arrows indicate, when applicable, the direction of traffic (East or West). The direction of traffic and connected objects are displayed at the bottom of the internals view for the selected object.

A tool tip is available to display information regarding each type of transmission object in the view. To activate the tool tip, place the cursor above the object.

When the management channel was defined during installation, the management channel object (VC12-22) displayed at the bottom of the internals view displays from which direction of traffic the management channel is receiving.

VC-4 Internals

Figure 7-4 shows a view of the transmission objects information for the VC-4 object, which can be found in each of the transceiver cards (West and East). To access this view, open the Card Internals View of a transceiver card and then open the VC-4 object.

This view shows the allocation of VC12 resources in the VC4. Up to 63 VC12s can be displayed in this window (21 associated with the basic card and 42 with the TEX card). Each VC12 resource that is used in a trail is displayed in this window, with an arrow indicating the direction of connection (East or West). A tool tip is available with information regarding the connection.

Assigning Slots

NOTE: The following section describes the slot assignment rules and procedure for SYNCOM NEs. The physical architecture of µSDM-1 NEs obviates the slot assignment procedure. No cards can be added/removed in the field and the equipment objects are permanent and non-removable.

Refer to Appendix C at the end of this manual for the valid card slot assignments for SDM–1, SDM–4 and SDM-16 network elements.

The Slot Assignment Procedure

To assign cards to specific slots in the NEs:

- From the Shelf View, select **Configuration ➔ Slot Assignment**,
  OR
  From the main menu, select **Configuration ➔ Slot Assignment**.

To assign a card to a slot:

1. Access the Shelf View of the NE in which you want to define a card.
2. Click on the empty slot in which to install the card.
3. From the Shelf View, select **Configuration ➔ Slot Assignment**,
   OR
   Right-click the slot and select **Slot Assignment** from the context sensitive menu,
   OR
   From the main menu, select **Configuration ➔ Slot Assignment**.

The following window opens:

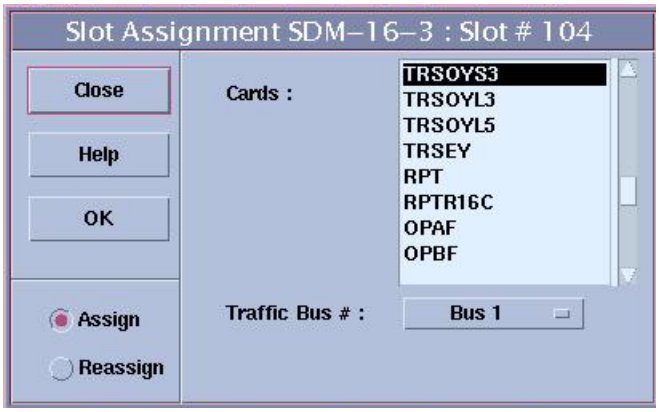


Figure 7-5. The Slot Assignment Window

NOTE: The **Is Standby for Protection** button is only displayed in the Slot Assignment window when the Equipment Protection startup configuration option was set to **YES** (see Startup Configuration Options on page 2-14).

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4. Make sure that the **Assign** button is selected and select the card type from the **Cards** list. The list of cards displayed depends on the slot number selected, according to the slot selection guidelines explained in Appendix C and on the actual hardware installed in the NE.

5. In SDM-4/16 NEs, select the communication bus on which the card is to communicate, in the **Traffic Bus #** field (Bus1 or Bus2 in the upper shelf, Bus3 or Bus4 in the lower shelf).

6. If you are assigning an EAC card (listed as EXTERNAL in the *Cards* list), an additional section appears in the window. Select the EME Slave Manager associated with the EAC card. If the EME you select is already associated with another EAC card, an error message is displayed and you will have to select another EME.

7. If this slot is assigned with a tributary card, and the TPM cost option was ordered with your system, and you wish to use this slot for tributary protection, enable the **Is Standby for Protection** button. Refer to Tributary Protection Matrix (TPM) on page 10-31 for a description of the TPM option.

   If the tributary card is not defined in the TPM wiring matrix, the following message is displayed when clicking the **Is Standby for Protection** button:

   ```
   Assignment of this card as Standby is not consistent
   with TPM wiring info. Assign Anyway?
   ```

   If you click **OK**, the slot is defined as Standby even though it is not supported as such in the TPM wiring matrix.

   When a tributary card is defined as Standby, the Sb ic300on is displayed at the bottom of the card, in the NE Shelf View.

8. Click **OK** to complete the assignment.

To unassign a card in a slot:

- Perform the assignment procedure described above, selecting **None** in the Cards pull-down menu.

Card Assignment Limitations

Observe the following restrictions when assigning cards to slots:

- The use of wide cards (indicated by a W at the end of their names, e.g. TRSEW) requires an empty slot to the right
- Do not assign TR cards to regenerator network elements

Card Unassignment Limitations

Observe the following restrictions when unassigning cards to slots. Unassigning a card in a slot is not possible in the following cases:

- The card is carrying live traffic (i.e., a tributary or aggregate).
- The card is essential to the current topology (e.g., a TRSO card in an SDM-4 which connects the NE to an SDM-1).
- An OPB card is linked to an aggregate card: both cards cannot be unassigned (see Configuring an OPB Card on page 7-14).
- One of the card's tributaries is used as a TR clock reference (refer to Chapter 9 Timing).
- The NE has Order Wire or User Channel cross connections; the AMU card, as well as any aggregate or TRS cards carrying Order Wire or User Channel cross connections cannot be unassigned.

To allow unassignment in these cases, perform the necessary trail deletion and link disconnection operations and then proceed with the unassignment procedure.

NOTE: Assigning a card to a slot with an existing card assignment involves an implicit unassignment of the existing card. Therefore, it is subject to the above limitations. However, under certain restrictions a slot may be reassigned to a similar card while disregarding these limitations. See the next section (Reassigning Slots) for details.

Reassigning Slots

A slot may be reassigned to a card type similar to the existing one, even if the existing card is carrying live traffic. The reassignable cards for each card type are listed in Appendix C.

Furthermore, if the existing card is physically replaced with a *compatible* card type, the new card will start functioning immediately without any slot assignment operation. The new card will have the same functionality as the card it replaced. Any extra functionality the new card offers is disabled (e.g., a BIMF card replacing a BIM card will not allow local cross connections). To fully enable the features of the new card, the slot must be *reassigned* to the actual card type.

When a card is physically replaced with a compatible card, the new card type appears in italic lettering in the NE Shelf View. You may click the **Expected** button in the Shelf View to see which card type is currently assigned to the slot.

NOTE: If you need to replace a card with a similar card which has inferior functionality (i.e., a reassignable but not compatible card), it is recommended to perform the reassignment before physically replacing the card. This will minimize the out-of-service time of the new card once it is inserted in the NE.

To reassign a card to a slot:

1. Access the Shelf View of the NE in which you want to define a card.
2. Click on the slot in which to reassign the card.
3. From the Shelf View, select **Configuration ➔ Slot Assignment**,
   OR
   From the main menu, select **Configuration ➔ Slot Assignment**.

   The window shown in Figure 7-5 opens.
4. Click Reassign.
5. Click on the Card pull down field and select a card from the reassignable cards list.
6. Click **OK** to complete the reassignment.

Traffic should not be affected by the reassignment operation.

NOTE: It is not possible to change traffic bus allocation during reassignment. Changing the traffic bus allocation of a card can only be done by slot assignment.

Configuring an OPB Card

An Optical Power Booster (OPB) card is used to extend the geographical distance of an optical line so that no additional regenerator is necessary to achieve this effect. An OPB card can be connected to an optical card to establish a link between the two cards.

Connecting an OPB Card

To connect an OPB card:

1. Assign an OPB card to one of the NE slots as described above in The Slot Assignment Procedure on page 7-9.
2. Access the Network Topology level (main window) and select the NE with the OPB card; select **Configuration ➔ OPB Connections** in the main menu.
3. The OPB cards are enabled and are displayed in pink.
4. The cards that can be selected for connection (TRS, ASF) to the OPB are enabled (in black); the rest are grayed out.
5. Select the card to be connected with the OPB. Click the **Connect** button; the connection is made. `OPB card successfully connected` is displayed.
6. The connected cards are displayed in brown color with a line connecting them. A small box icon is displayed on the connecting line.
7. To disconnect, click the small box; both the cards and the line turn cyan. Click the **Disconnect** button. After confirmation, the card is disconnected.

NOTE: The OPB card can be assigned to TR slots in Regenerator NEs, as opposed to regular tributary cards.

Cards Maintenance

Resetting a Card

You can reset a card that is not functioning properly, when you suspect that the problem is not caused by the card hardware.

To reset an equipment card:

1. Select the equipment card from the Shelf View or from the Topology Connections window.
2. From the Card Internals View, select **Maintenance ➔ Reset**,
   OR
   From the main menu, select **Maintenance ➔ Reset**.
3. Select the **Warm** option to reset the card by downloading its software from the MCP card. This action is not traffic-affecting.
   OR
   Select the **Cold** option if you want to reset the card by switching it off and on again.

NOTE: Cold reset is a traffic-affecting operation.

8

Transmission Objects

Overview

The bottom level in the EMS-SYNCOM object hierarchy is the transmission objects level. To access a transmission object:

1. Select a network element from the Network Topology view (Main Window) and double click to access the Shelf View.
2. Select and open the card to obtain the Card Internals View.
3. Select the transmission object.

Timing generators and their configuration options are covered in detail in Chapter 9 Timing. The following sections describe transmission objects and show you how to view and configure them.

Transmission Object Types

The following sections describe the types of transmission objects available in SDM-1, SDM-4 and SDM-16 based networks. Table 8-1 lists specific transmission objects.

The SDH Physical Interface (SPI)

In the SDM-1, one SPI is located on the ATRO/E card. In the SDM-4 and SDM-16, one SPI is located on the ASF card. When VOO (Video Over Optics) cards are installed in SDM–4 and SDM-16 NEs, one SPI is located on each VOO card (E2W or W2E). In µSDM-1/E NEs, there are two SPIs: one on the East transceiver and one on the West transceiver.

The Regenerator Section (RS)

The Regenerator Section (RS) is located on the SPU, TRS and ASF cards. There is one RS per card. In µSDM-1/E NEs, there are two RSs: one on the East transceiver and one on the West transceiver

The Multiplexer Section (MS)

The Multiplexer Section (MS) is located on the SPU, TRS and ASF cards. There is one MS per card. In µSDM-1/E NEs, there are two MSs: one on the East transceiver and one on the West transceiver.

Tributary Objects

Tributary objects are based on Plesiochronous Digital Hierarchy (PDH) technology and include 2Mbit/s, 34Mbit/s, 45Mbit/s and 140Mbit/s objects.

Virtual Containers (VC4, VC3, VC12)

Virtual containers are aggregate line objects. There are three types of virtual containers: VC4, VC3 and VC12.

VC4 virtual containers are located in SPU, ASF, TRS and TR140 cards as follows:

- There is 1 VC4 in SPU, TRS
- There are 2 VC4s in TR140 (VC4-1W and VC41-E)
- There are 4 VC4s in the TRS1-4
- There are 4 VC4s in ASF
- There are 16 VC4s in ASF–16
- In µSDM-1/E NEs, there are two VC-4s. One on each of the transceiver cards.

VC3 virtual containers are located on TR34 and TR45 cards. There are two VC3 virtual containers per card, one in the East direction and one in the West direction.

VC12 virtual containers are located on the SYNCOM TR2AB and TR2-16 cards, and on the µSDM-1/E basic card and TEX card. There are 16 VC12 virtual containers on the TR2AB card and 32 on the TR2-16 card. There are 42 on the µSDM-1 and up to 126 on the µSDM-1E.

Transmission Objects List

Table 8-1. Transmission Objects

Transmission Object	Full Name	Found on:
2MB	2 Mbit/s PDH physical interface TTP	TR2AB TR2-16 TR2-16S µSDM-1 Basic card and TEX card
34MB	34 Mbit/s PDH physical interface TTP	TR34 µSDM-1E
45MB	45 Mbit/s PDH physical interface TTP	TR45 µSDM-1E
140MB	140 Mbit/s PDH physical interface TTP	TR140, TR140W µSDM-1E
SPI	SDH physical interface TTP	ATRO ATRE TRS ASF ASFL W2E (VOO) E2W (VOO) µSDM-1/E
RS	Regenerator Section TTP	SPU1 SPU1X TRS ASF ASFL µSDM-1/E
MS	Multiplexer Section TTP	SPU1 SPU1X TRS ASF µSDM-1/E
OPI	Optical physical interface TTP	OCH OCH-P OCH-F OCH-F-P
VC4	Virtual Container-4 TTP	SPU1 SPU1X TRS TRS1-4 TR140 ASF µSDM-1 µSDM-1E

Transmission Object	Full Name	Found on:
VC3	Virtual Container-3 TTP	TR34, TR45
VC12	Virtual Container-12 TTP	TR2AB TR2-16 TR2-16S µSDM-1 µSDM-1E
DM	Detachable Module (sub-equipment)	TRS1-4
TX	Transceiver (sub-equipment)	TRS1-4
SSM	Server Signal Monitoring	TRS TRS1-4

The Naming Convention

The convention for 2 Mbit/s tributary objects in SYNCOM NEs is as follows: X-2M-Y is the Yth (Y=1,...,8) 2 Mbit/s tributary interface of the TR2AB card located in slot X. For example, 103-2M-5 is the 5th 2M tributary for the TR2AB card in slot 103.

In µSDM-1/E NEs, the naming convention for 2 Mbit/s tributary objects is 2M-n, where *n* is the sequential number of the tributary (from 1-22 on the basic module, and from 1-42 on the TEX module).

The naming convention for VC4 objects in SYNCOM is: X-VC4-Z-N is one of the four (N=1-16) VC4 streams from the ASF card on side Z (Z=E,W), located in the ASF in slot X. For instance, 113-VC4-E-1 is the first out of four VC4 streams on the east side, located in the ASF in slot 113.

In µSDM-1/E NEs, the naming convention VC-4 objects in VC4-E and VC4-W. There are only two VC4 objects in a µSDM-1/E NEs.

The arrow from the transmission object to its TTP indicates the direction currently in use. Switching to protection changes the arrow indicator.

Naming conventions for EMS-SYNCOM objects are covered in further detail in Appendix A.

Viewing a Transmission Object's General Information

You can view general information on transmission objects in SDM–1, SDM–4 and SDM-16 network elements. To view a transmission object's general information, select the object in the card-internals view and click the **Info** button. Additional information can be found in the transmission object's **Item Attributes** view.

Table 8-2. Shelf View Information Fields

Info Field	Description
General Info fields (displayed for all objects)	
Operational State	Displays the current operating condition of the card, i.e. Enabled (normal state) or Disabled.
Usage State	Displays the traffic state, which can be Idle, Active, or Busy.
Availability Status	This field displays additional information on a card when the Operational State is Disabled. This status can be Available or Dependency (object disabled because its status depends on that of another object).
Info fields for TTR and VC3, VC4 and VC12 Objects	
Loopback Status	Indicates whether or not the object is in loopback state and the type of loopback set for the object (near end or far end).
V5 Signal Label Received	The V5 signal is part of the VC12 path overhead and is used for testing purposes. This field shows the V5 signal label byte received (which should be identical with the V5 signal label byte expected). Possible signal label types: Non Specified or Asynchronous.
Bidirectional Mode	If the object is a TP in a terminated bidirectional trail, this field displays True.
Connectivity Ptrs	Connectivity Pointers, displays the addresses that the object is connected to in both east and west directions.
RDI State	Indicates whether or not RDI (Remote Data Indications) signals are passed to the object. The status is either Automatic or Forced.
AIS State	Indicates whether or not downstream AIS signals (Alarm Indication Signal) are transmitted from the object. The status is either Automatic or Forced.
Send Upstream AIS	Indicates whether or not upstream AIS signals are transmitted from the object. The setting is either Automatic or Forced.

Info Field	Description
AIS & RDI on EBER	Indicates whether an AIS and RDI is sent to other path levels when an Excessive Bit Error Rate (EBER) occurs (Allowed), or not (Inhibited).
Connected to	Displays the NE and the transmission object to which the object is connected.
Trail Name Protection Status	Indicates if a protection trail has been defined for the trail which passes through this object.
J1 Data (Path Trace Exp., Path Trace ID Sent and Path Trace ID Receive)	The J1 byte is used to repetitively transmit a 64-byte, fixed length string, and supports continuity testing between any receiving terminal along the path and the path source. Displays the J1 strings, if set for this object for testing purposes. The path string received should be identical to the path string expected.
C2 Data Signal Label Exp, Signal Label Sent, Signal Label Rec.	The C2 byte indicates the construction of the associated container by means of a label value assigned from a list of 256 possible values. Indicates the type of signal label that the NE is expected to receive. The expected and received signals should match.
Info Fields for SPI Objects	
Interface Type	Indicates the physical interface, which can be Optical or Electrical.
Auto Laser Shut Off	Enabled or Disabled
Default Laser State	ON or OFF
Actual Laser State	ON or OFF
Info Fields for TG	
Primary/Active Timing Source	Displays the primary and active timing sources, which can be Line, External, Internal or Tributary.
Info Fields for MS and RS	
RS/MS Type	This field shows the RS type used, e.g. *STM–4*.
MUX/Regen. Section Type	Displays the level of the multiplexer/regenerator section, which can be either STM-1, STM-4 or STM-16.
Timing Marker Quality	This field reflects the value of the S1 byte in the Multiplexer section overhead, which specifies the quality level of the Line timing source or the tributary reference timing source derived from a TRS card.
DCC Mode	Indicates whether the MS section overhead bytes are used, whether the RS section overhead bytes are used or both.
Info Fields for SSM	
Administrative State	For future use.

Setting Transmission Object Attributes

You can use the EMS-SYNCOM to set or change the attributes (or parameters) of various objects. In all cases, the procedure is the same. However, the windows in which the attributes are set differ, depending on the selected object.

To set attributes for an object:

1. Select the object for which you want to set attributes from the Card Internals View, and then select **Configuration ➔ Attributes** from the main menu,
   OR
   From the Card Internals View, select **Configuration ➔ Attributes**.

   This opens a window for the object you selected. An example is shown in Figure 8-1.

2. Set the attributes. When done, click the **OK** button.

NOTE: Setting an attribute for a particular object affects that particular object only. It does not affect any comparable object in the NE or network. For instance, setting the EBER value in a particular VC-12 TP will not change the EBER value in any other VC-12.

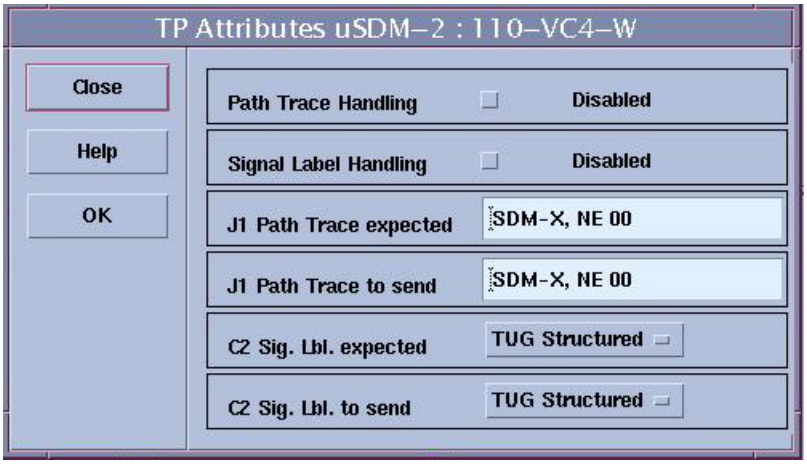


Figure 8-1. Setting Card Attributes

Table 8-3 lists the object attribute fields, a description of each field and the transmission object it can be found on.

Table 8-3. Object Attribute Fields for Transmission Objects

Object Attribute Field	Description	Found on:
EBER Threshold	This field is used to enter the EBER (Excessive Bit Error Rate) threshold. The EBER fault state is entered when the incoming frame has a bit error rate exceeding this value. The value entered is *x*, the exponent in the expression 10^{-x} (e.g. entering 3 means setting the EBER threshold to 10^{-3} -one bit in a thousand).	Tributary cards, VC12, VC4, VC3, MS
SD Threshold	This field is used to define the SD (signal degraded) threshold. The principle is the same as for EBER, but the threshold is lower. The default is 10^{-6}.	Tributary cards, VC12, VC4, VC3, MS
AIS & RDI on EBER	This parameter can be set to either Allowed or Inhibited. This setting determines whether or not AIS and RDI is sent to other path levels when an EBER occurs. **Note**: AIS and RDI are always sent automatically when a loss of signal is detected, even if this parameter is inhibited. In addition, this parameter does not inhibit a manual **Send RDI** or **Send AIS** (see sections Sending an AIS and Sending an AIS Upstream).	VC12, VC4, VC3, MS
DCC Mode	This parameters can be set to enabled or disabled to activate/block the DCC on MS/RS objects.	
Path Trace Handling	This parameter can be set to either Allowed or Inhibited. This setting determines whether or not AIS and RDI will be sent to other path levels when a J1 signal mismatch occurs.	VC3, VC4
Signal Label Handling	This parameter can be set to either Allowed or Inhibited. This setting determines whether or not AIS and RDI will be sent to other path levels when a C2 signal mismatch occurs.	VC3, VC4

Object Attribute Field	Description	Found on:
V5 Sig. Lbl sent	This field defines the V5 signal label type that the object is supposed to send, which can be either Non Specified or Asynchronous.	VC12, VC4, VC3
J1 Path Trace to Send	This field is used to enter a string you send from this local node and expect to get at the remote node. This is used mainly for system testing purposes.	VC4, VC3
J1 Path Trace Expected	This field is used to enter a string you expect to receive at the local node and expect to be sent from the remote node. This is used mainly for system testing purposes.	VC4, VC3
C2 Sig. Lbl. Expected	A signal label that the NE is expected to receive. The C2 Signal Label Received is the actual signal label received. Open the Info window to determine the received signal. The expected and received signals should match. This field indicates the STM–1 payload construction of the label, which can be TUG Structured, 140M/s or ATM.	VC3
Enable ALS?	ALS stands for Automatic Laser Shutdown. This is a safety feature and should normally be enabled.	SPI
HPOM Able	The HPOM Able parameter is disabled for TRS1-4 VC4 objects that have a trail going through it. When this parameter is disabled, you cannot do the following: read/reset the PM counters for the object (as described in Viewing Optical Parameters on page 8-16) or change the C2/J1 values for the object.	VC4
Work Side	Select the default position (Main, Protection).	VOO SPI
Switch State	Select one of the following: o Normal — switch to protection is allowed when required. o Force to Protection — force to the protection position. o Lockout — disable switching.	VOO SPI

Object Attribute Field	Description	Found on:
Revertive Mode	When enabled, the protection switch reverts to the default position when the protection switching cause is removed. This is also the position it will take after a cold reset.	VOO SPI
EDH Control	Enable insertion of EDH (Error Detection Handling) into the outgoing signal.	VOO SPI
EDH PM Source	Select the parity bytes processed by the SDH (B1, B2 or B3).	VOO SPI
Primary (Synchronization) Source	Select the primary synchronization source. Choose from one of the following: o SDI-1 o External — 2MHz synchronization signal) o SDH — the clock present on the SYNCOM shelf	VOO SPI
Secondary (Synchronization) Source	Select the secondary synchronization source, to be used when the primary synchronization source fails.	VOO SPI
Equipment Information	For VOO cards, a read only area that displays the frequency, wavelength (WDM color) and card type of the VOO card.	VOO SPI

Transmission Object Maintenance

Viewing Maintenance Operations

When a maintenance operation has been performed on an NE, the maintenance icon ( ) is displayed above the NE icon in the main topology view.

To view a list of maintenance operations:

- From the Shelf View or Card Internals View, select **Maintenance ➔ Maintenance Info**,
  OR
  Select the NE (or multiple NEs by Ctrl-clicking each NE) in the main window, and then from the main menu, select **Maintenance ➔ Maintenance Info**.

The following window opens:

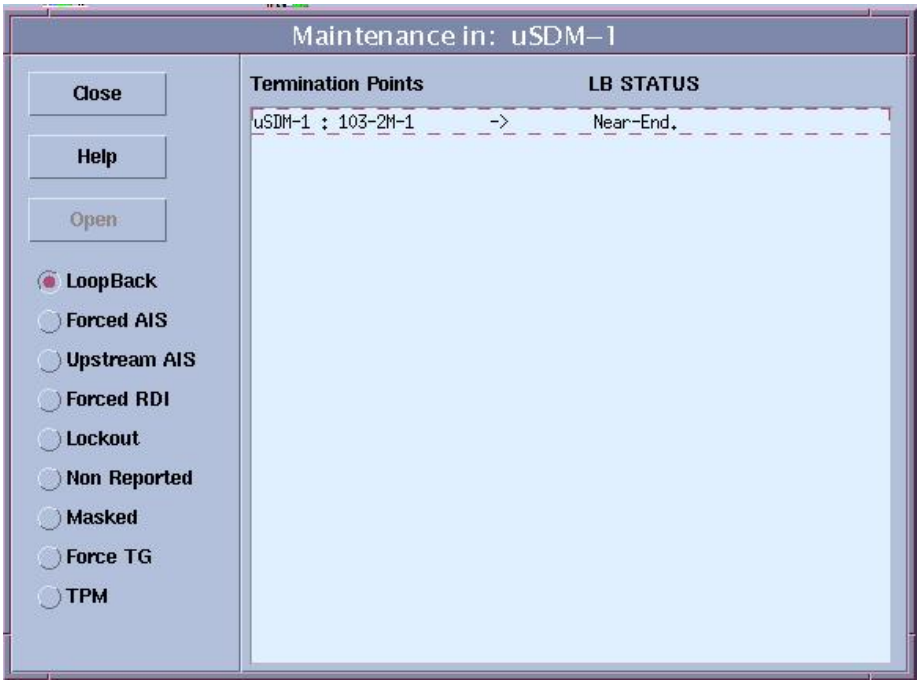


Figure 8-2. The Maintenance Information Window-SYNCOM NEs

NOTE: The list of maintenance operations listed in these windows vary, depending on the type of NE selected.

The window displays the TPs that have a maintenance operation applied to them, for each of the maintenance operations separately. To view data for a specific maintenance operation, click the appropriate radio button.

To obtain a Card Internals View showing the transmission objects affected by the maintenance operation, double click the TP or select the TP from the list and click **Open**.

If all TPs cannot fit in the list, use the scroll bars to view all files in the list. As an alternative to scrolling and to facilitate finding a specific TP quickly, enter the first character of the file; the list focus moves to the first occurrence of the first typed letter (e.g., if you start typing 1, the list tracks the first TP starting with 1). As you continue typing the name of the TP, the list focus moves to the nearest match of the typed string.

Viewing Non-Reported and Masked Alarms

To view a list of the TPs that have non-reported alarms (see Non-Reported Alarms (NRp) on page 4-22), or a list of the TPs with alarms that were masked, click the Non-Reported or Masked radio buttons in the Maintenance List Window.

Operate/Release Loopback

NOTE: This action is traffic-affecting!

You can perform and release far end or near end loopbacks. Far end loopback means that the traffic from the line is returned to the line. Near end loopback means that the traffic from the tributary is returned to the tributary.

The following figure illustrates how a loopback is performed.

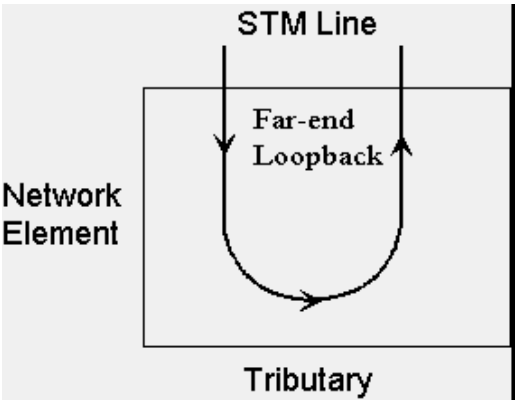


Figure 8-3. Performing a loopback

To operate a Loopback:

1. Select an NE and access the Shelf View.
2. Select the card containing the required interface point.
3. Select the tributary or VC.
4. From the Card Internals View, select **Maintenance ➔ Loopback**,
   OR
   From the main menu, select **Maintenance ➔ Loopback**.
5. Select either the **Near End** or **Far End** option.
6. Click **Activate**. Confirm your action in the displayed dialog box.

The system notifies you that the action was successfully completed.

NOTE: If you leave the Loopback List window open while you perform or release a loopback, you can see it updated in real time.

The network element you selected is now an icon above it, indicating that it has a loopback.

Sending an AIS

You can force an AIS (Alarm Signal Indication) downstream or send an AIS to the tributary line for testing purposes. For example, forcing an AIS causes AISs to be detected at the VC-4 and 2M levels in the same NE.

To force an AIS:

1. Select the required VC in the Card Internals View.
2. From the Card Internals View, select **Maintenance ➔ Force AIS**,
   OR
   From the main menu, select **Maintenance ➔ Force AIS**.
3. Select the **Forced** option from the cascade menu.
4. To cancel AIS, repeat steps 1 and 2 and select the **Automatic** option.

NOTE: AIS actions are traffic-affecting!

Sending an AIS Upstream

You can send an AIS upstream from the selected NE to the next NE connected to it. For example, selecting this option in an NE's East VC-4 object causes MS-AISs to be detected in the NEs connected to that NE's East side.

To send an AIS upstream:

1. Select the required VC in the Card Internals View.
2. From the Card Internals View, select **Maintenance ➔ Send Upstream AIS**,
   OR
   From the main menu, select **Maintenance ➔ Send Upstream AIS**.
3. Select the **Forced** option from the cascade menu.
4. To cancel AIS, repeat steps 1 and 2 and select the **Automatic** option.

NOTE: AIS actions are traffic-affecting!

Sending an RDI

You can force an RDI (Remote Data Indication) to test proper reception at a virtual container (VC) or multiplexer section (MS) level of the adjacent node in a network.

To send an RDI:

1. Select the required VC or multiplexer section.
2. From the Card Internals View, select **Maintenance ➔ Force RDI**,
   OR
   From the main menu, select **Maintenance ➔ Force RDI**.
3. Select the **Forced** option.
4. To cancel RDI, repeat steps 1 and 2 and select the **Automatic** option.

Viewing Optical Parameters

This option allows you to view the optical parameters for relevant cards (including ASF16, RPTR-16, OCH, OPAF and OPBF cards).

To view optical parameters:

1. Select the card.
2. From the Shelf View, select **Maintenance ➔ Optical Parameters**,
   OR
   From the main menu, select **Maintenance ➔ Optical Parameters**.

The following window opens.

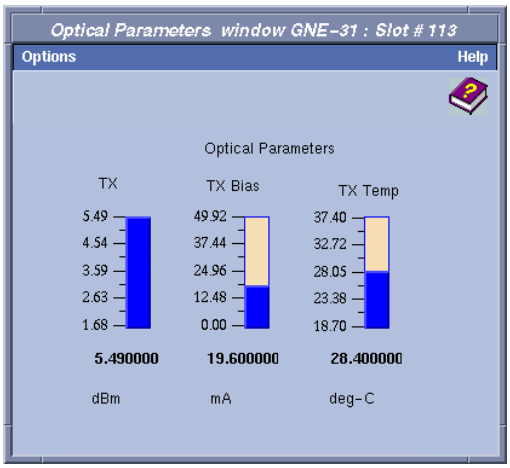


Figure 8-4. Optical Parameters

The value of each parameter is displayed in both text and histogram format.

NOTE: The number of parameters displayed in this window ranges from two to four, depending on the selected card type.

Performance Monitoring

EMS-SYNCOM offers a series of functions to help you analyze both the current and historical performance of networks and trail connections. The performance is measured by counters that monitor various parameters pertaining to the NE's quality of service. Some of these parameters can be set by the user.

Performance Monitoring data can be obtained for transmission objects (VC12, VC3, VC4, MS, RS, VOO SPI and PDH end points).

Viewing Current Performance

You can view the current performance of a transmission object for either of two time intervals (15 minutes or 24 hours).

To view current performance:

1. Select the transmission object.
2. From the Card Internals View, select **Performance ➔ Current**,
   OR
   From the main menu, select **Performance ➔ Current**.
3. Select either the **Daily** or **15 Min**. option, depending on your requirements.

The following window opens:

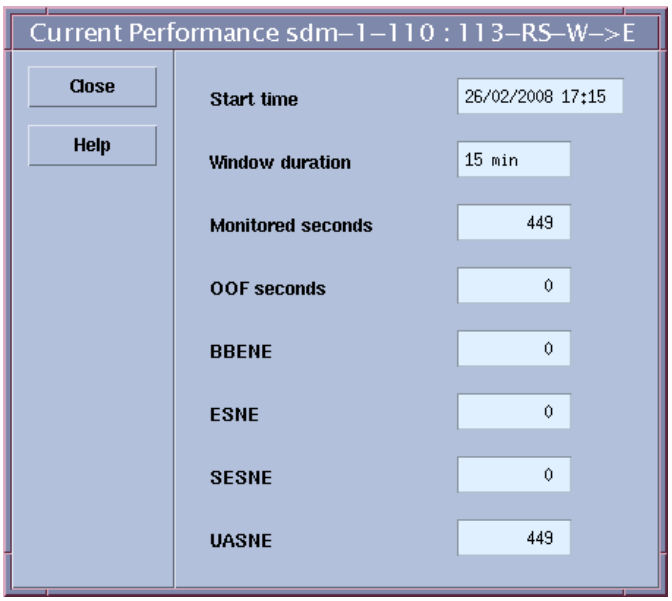


Figure 8-5. Example of a Current Performance Window

The **Start Time** and **Window Duration** fields show when the EMS-SYNCOM started collecting data (date and time) and for which time period (one day or 15 minutes).

The contents of a **Current Performance** window depend on the object you select. Performance data is collected separately for the controlled bit streams in each respective TP.

Viewing Performance History

You can view historical data on the performance of a transmission object for either of two time intervals.

To view the performance history:

1. From the Card Internals View, select **Performance ➔ History**,
   OR
   From the main menu, select **Performance ➔ History**.

2. Click either the **Daily** or **15 Min**. option, depending on your requirements.

   The following window opens.

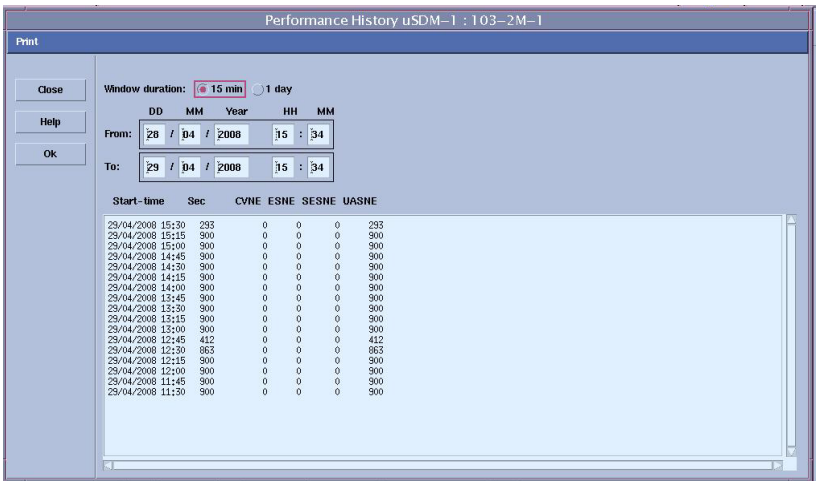


Figure 8-6. Example of a Performance History Window

3. Click either the **15min** or **1day** button in the **Window Duration** field, depending on the period you wish to analyze.

4. Use the **From – To** fields to specify the period of time for which you want to retrieve historical data. The 15 minutes or one day interval is applied to that time span.

5. Example: If you specify a period of three days in the **From** and **To** fields and select the **One Day** option in the **Window Duration** field, the data table shows three lines of PM data.

6. When you finish setting the relevant period and the window duration, click **OK** to retrieve the data. The results provide the following information:

   - **Start Time:** This column displays the date and time when counting started.
   - **Sec:** This column shows how many seconds out of the 15-minute (or 24-hour) interval have already been monitored.
   - **CVFE:** Number of Code Violations Far End accumulated.
   - **CVNE:** Number of Near End Code Violation accumulated.
   - **ESFE:** Number of Errored Seconds Far End accumulated.
   - **ESNE:** Number of Near End Errored Seconds accumulated.
   - **OFS:** Number of Out of Frame Seconds accumulated.
   - **PJ:** Number of Pointer Justifications accumulated.
   - **SESFE:** Number of Severely Errored Seconds Far End accumulated.
   - **SESNE:** Number of Near End Severely Errored Seconds accumulated.
   - **UASNE:** Number of Near End Unavailable Seconds accumulated.
   - **UASFE:** Number of Unavailable Seconds Far End accumulated.

Printing Performance History

You can print the data retrieved from the Performance History window if you need a hard copy for administrative or other reasons.

To print the performance history:

1. Click the **Print** button in the Performance History window showing the historical data you just retrieved.

2. To stop a print job, click **Cancel** in the print progress dialog box.

Displaying Performance Charts

This feature will be available only if it was selected as a startup option (see Startup Configuration Options on page 2-14). Click the **Charts** button in the Performance History window (see Figure 8-6) to display performance charts. An example is shown in the following figure.

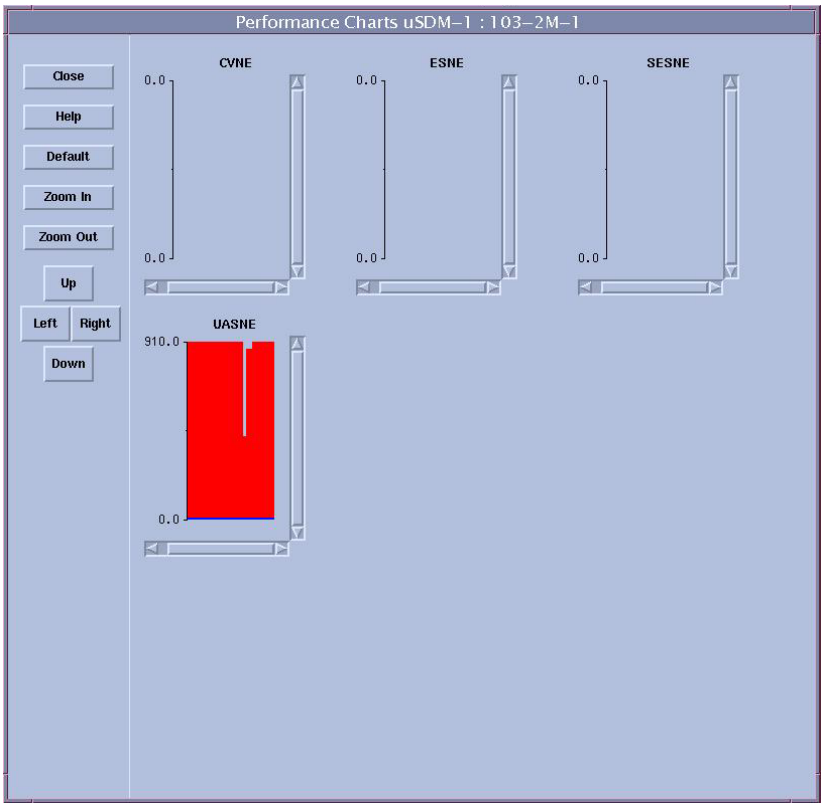


Figure 8-7. Performance Charts Window

The Performance Charts window plots, for each of the PM counters, a chart that shows how the PM values vary with time. Values that are below the threshold are displayed in blue; above threshold values are displayed in red.

You can show different portions of each individual chart by using the vertical or horizontal scroll bars.

The following buttons are available in the Performance Charts window.

Zoom In	Zoom in; magnifies the time scale for all charts in the window.
Zoom Out	Zoom out; reduces the time scale for all charts in the window.
Up	Shifts all charts in the window up.
Left	Shifts all charts in the window towards the beginning of the time frame.
Right	Shifts all charts in the window towards the end of the time frame.
Down	Shifts all charts in the window down.
Default	Resets the zoom and position of all charts to the default values.

Resetting Performance Counters

You can reset the performance counters of any transmission object whose performance is measured.

To reset performance counters:

1. Select the desired object.
2. From the Card Internals View, select **Performance ➔ Reset Counters**,
   OR
   From the main menu, select **Performance ➔ Reset Counters**.
3. Click either the **15 Min** or **Daily** button in the cascade menu.

A message window opens informing you that the action has been completed successfully.

Set Thresholds

To set some of the threshold values monitored by the performance counters:

1. Select the object for which to set performance counter thresholds in the Card Internals View.

2. From the Card Internals View, select **Performance ➔ Set Thresholds**, OR
   From the main menu, select **Performance ➔ Set Thresholds**.

   The following type of window opens. The type of window displayed varies, depending on the type of object selected.

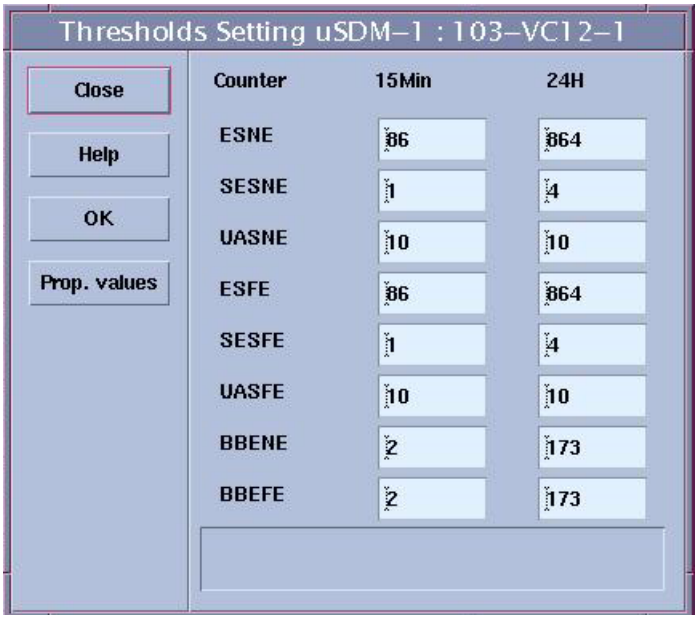


Figure 8-8. Setting Thresholds

3. Set thresholds for **15Min** and **24H** data collection. After you selected a specific PM counter, its permitted range appears in the bottom field.

> **NOTE**: A warning window opens if you exceed the admissible threshold settings.

4. Click **OK** to start the process.

5. Click the **Prop. Values** button if you want to propagate (copy) these settings to all other objects of the same category, e.g. all VC-4 TPs, within the same network element.
6. When ready, click the **Close** button to close the Thresholds Setting window.

NOTE: If you set PM alarm thresholds for a specific object, the changes will only be for that specific object and will not affect other objects of the same type. For example, if you change the thresholds for a VC3 in one NE, it will not affect other VC3s in other NEs.

The PM alarms and their default threshold settings are listed in the following table.

Table 8-4. PM Alarms Default Threshold Settings

Alarm	RS	MS	VC4	VC3	VC12	2M, 34M, 140M PIs	VOO SPI
CVNE		10/10				9000/90000	
CVFE							
ESNE	86/864	86/864	86/864	86/864	86/864	86/864	
ESFE			86/864	86/864	86/864		
SESNE	¼	1/4	1/4	1/4	1/4	1/4	
SESFE			1/4	1/4	1/4		
UASNE	10/10	10/10	10/10	10/10	10/10	10/10	
UASFE			10/10	10/10	10/10		
PJ			10/10	10/10	10/10		
OOF	2/17						
BBEFE			7/691	7/691	2/173		
BBENE	7/691	7/691	7/691	7/691	2/173		
BBE							0/22500
ES							0/900
SES							0/900
UAS							0/900

9

Timing

Overview

The timing generator and synchronization module provides a central timing source within network elements. This timing is distributed to all cards on the traffic paths. In order to pass error-free digital signals between multiplexers, or from a multiplexer to another digital system such as a switch or a digital cross-connect, all systems must be synchronized.

Synchronization is accomplished by frequency-locking the multiplexer timing generator to a signal related to a primary reference timing source. Typically, one of the multiplexers in the network receives its timing from an external clock. The remaining NEs are synchronized by the incoming line signal.

Each network element is synchronized to a selectable source during normal operating conditions. This source can be an external clock (T3 signal) through the CLK IN port on the CCP, a tributary timing reference, or an SDH line signal. The timing source can also be an internal clock.

Any NE has the ability to provide a clock signal to external equipment (T4 signal) through the CLK OUT port on the CCP.

The general rule is that one or several nodes provide the clock for all other nodes. The nodes pass a timing marker (byte S1 in the section overheard) to determine which clock within the network is most suitable.

In SYNCOM NEs, each NE can contain up to two Timing Generator (TG) sources in a dual-ring configuration: TGW (TG West) and TGE (TG East). Each TG can use any of the above-mentioned clock sources as its reference source. In µSDM-1/E NEs, each NE can only contain a single Timing Generator (TG) source.

In general, ECI Telecom recommends setting up networks so that each ring/chain has one NE connected to an external timing source, while the rest of the NEs are connected to line timing.

About the Timing Configuration Window

The Timing Configuration window allows the user to define the following parameters:

- Setting the quality of the various timing sources (see Defining the Timing Source Quality on page 9-4).
- Defining the CLK OUT (T4) signal source and its parameters (See T4 Output Port Configuration on page 9-6).
- Selecting reference tributaries for the tributary/reference clock sources.
- Access to Timing Generator Configuration windows for TG-E and TG-W in SYNCOM NEs and TG in µSDM-1/E NEs). Use the **Select TG** pull-down menu to open the desired window.

Configuring NE Level Timing

You can define the primary and secondary (standby) timing sources for each of the TGs (east/west) of the selected NE. Defining reference timing sources for an NE enables you to specify a source for the T4 output.

The following options are available for both primary and secondary sources:

- **Internal:** Timing is generated internally by the on-board clock unit (CLU) in the appropriate card: SPU for SDM-1 or ASF for SDM-4/16.
- **External:** An external timing source (e.g. an atomic clock) connected via the CLK IN port on the CCP.
- **Tributary Line Source:** You can define up to four tributary lines as clock sources in the SDM-4 and SDM-16 or up to two in the SDM-1 and µSDM-1/E.

NOTE: Only 2M and STM-1 rate tributary lines can be used as timing sources.

- **Line Timing:** The system uses the timing source on the incoming aggregate (i.e., SDH provides the reference timing source).

NOTE: The µSDM-1/E only supports a single TG.

To define timing parameters:

- From the Shelf View select **Configuration ➔ Timing**,
  OR
  In the EMS-SYNCOM main window, right click the NE and select **Timing** from the context sensitive menu,
  OR
  Select the NE, and then in the main menu, select **Configuration ➔ Timing**.

One of the windows shown in Figure 9-1 or Figure 9-2 opens (depending on the selected NE type).

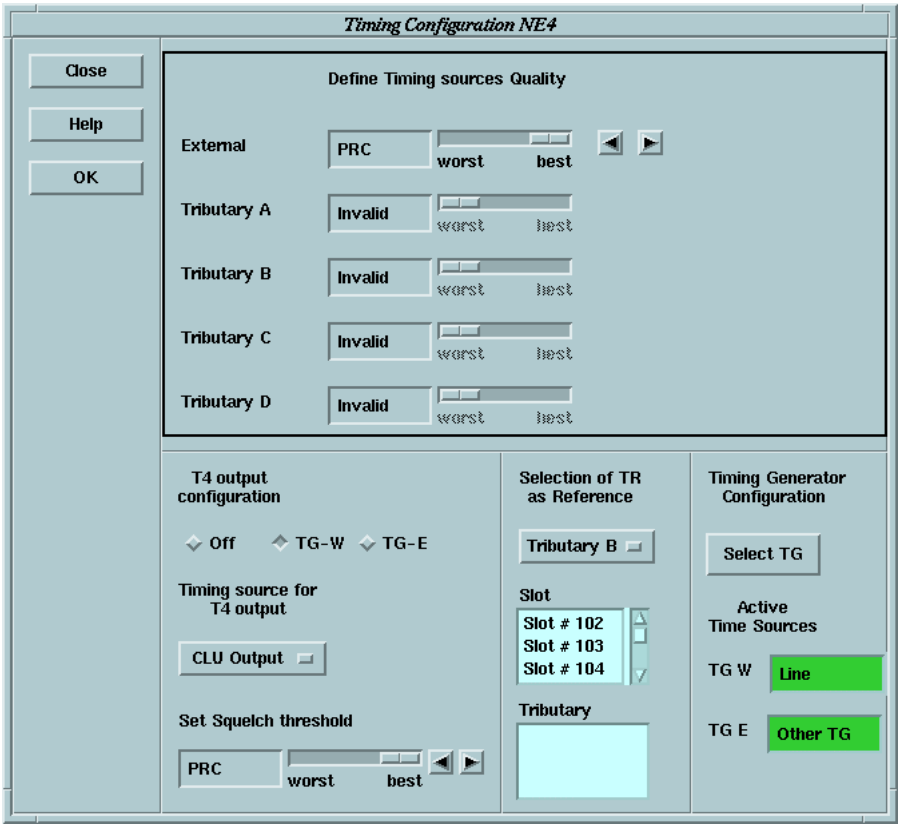


Figure 9-1. Selecting the TG Source - SYNCOM

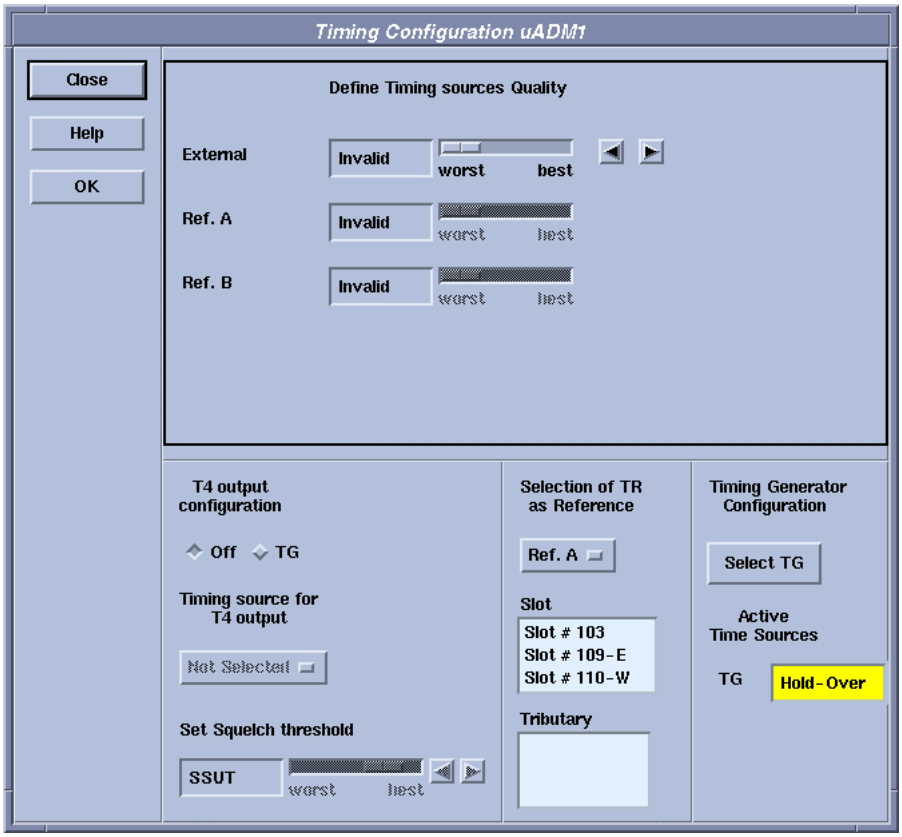


Figure 9-2. Selecting the TG Source - µSDM-1/E

The following sections describe how to set the various timing parameters.

Defining the Timing Source Quality

The quality of timing sources is used by the NE to determine the preferred source for the Timing Generators (east and west).

Available timing sources (see Configuring NE Level Timing on page 9-20) can be divided into three groups, in terms of quality definition:

- SDH signals (line or STM-1 tributary sources) contain a Synchronization Status Message - SSM (S1 byte in the section overhead), which defines the quality of the signal as a timing source.
- The External clock and 2M PDH tributaries have no indication as to their quality.
- The Internal clock of the NE has a fixed, pre-defined quality (not applicable to µSDM-1/E NEs).

For each NE which has either an external clock or 2M PDH tributary sources, the user must therefore manually assign quality values to these timing sources. Before assigning these qualities, it is the user's (or administrator's) responsibility to verify quality values with the vendor, or according to the product specifications of each timing source.

You can choose from six defined levels of timing quality:

- PRC: Primary Reference Clock (10^{-11}), e.g. atomic clock source.
- SSUT: Synchronization Source Unit - Transit (5×10^{-9})
- SSUL: Synchronization Source Unit - Local (10^{-7})
- SEC: SDH Equipment Clock (4.6×10^{-6}). The NE Internal clock is defined to be of SEC quality.
- DNU: Do Not Use
- Invalid

NOTE: The levels DNU and Invalid cannot be selected for a timing source. They can be displayed, however, if these quality levels were set in previous EMS-SYNCOM versions.

Use the arrows or the **Worst/Best** sliders to change the timing quality.

Override SSM: If an SDH tributary (such as a TRSO) is used as the timing source, you can override the Synchronization Status Messages (SSM) received on the tributary to allow operation regardless of the quality level indicated by the SSM.

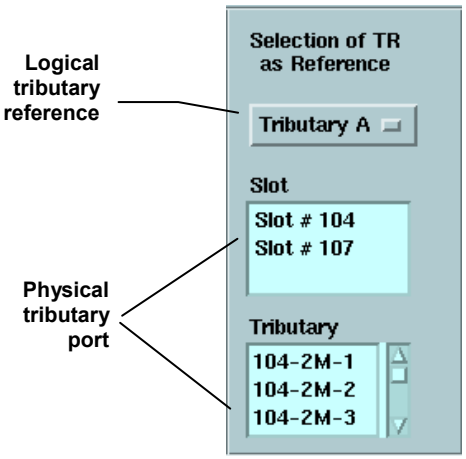
T4 Output Port Configuration

The **T4 Output Configuration** section in the Timing Configuration window is used to define the source for the timing signal that will be passed to the T4 output port. Any NE has the ability to provide a clock signal to external equipment (T4 signal) through the CLK OUT port on the CCP.

1. To inhibit any signal on the T4 port, click the **Off** radio button.
2. To enable the signal on the T4 port, click the **TG W** or **TG E** button to use the clock defined for the Timing Generator (TG).
3. Use the **Timing Source for T4 Output** pull-down list to select the desired source. The choices are: **External Clock, Tributary (A to D), Line or CLU** output.
4. When **CLU** (Clock Unit) output is selected, the T4 output is derived from the selected reference source - **TG-E** or **TG-W**.
5. Set the **Squelch Threshold**. This field defines the minimum quality of the T4 signal. If the T4 signal is degraded to a quality under this value, it is squelched automatically.

The squelch threshold is applied to any timing source, whether its quality was defined by the user, or by the SSM (S1 byte) received with the SDH signal.

Selecting a Reference Tributary Line



Use this section to assign a logical tributary reference (Tributary A, B in SDM-1/µSDM-1/E, Tributary A-D in SDM-4/16), to a physical tributary port intended to be used as a timing source. Once assigned, the TR reference may be used to synchronize one (or both) of the TGs. It is also possible to select a TRS1-4 card as a timing source. When doing so, select one of the four SPI objects on the card.

To perform the assignment:

1. Select the TR reference (Tributary A-D) from the pull-down menu.
2. Select the required slot: SDH tributary (TRS) or 2M tributary.
3. Note that if a 2M TR card is selected, the card ports (1-8 or 1-16) are listed in the **Tributary** field, and the user must select the appropriate port.
4. Click the **OK** button to apply the new settings. A message window prompts you to accept the changes.

NOTE: It may take some time for the system to qualify the new source before your changes are effected.

Configuring the Timing Generator (TG) Source

The **Timing Generator Configuration** area in the Timing Configuration window (see Figure 9-1) is used to configure a timing source for the TG.

To configure the TG:

1. Click the **Select TG** button.
2. Select the TG to configure in the cascade menu (**TG-W** or **TG-E**).

   The following window opens:

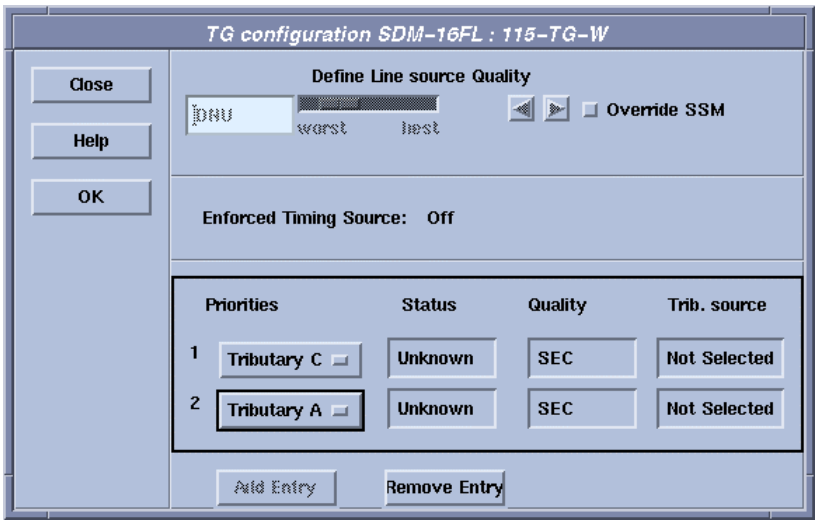


Figure 9-3. Configuring a TG

   This window displays the source(s) the TG is currently using. These settings reflect the entries in the Priority Table, maintained by the system.

3. The **Priorities** field may contain either one entry (**Primary)** or two entries (**Primary** and **Secondary**).

   Use the pull-down menus to select a timing source for either priorities. Available timing sources are those listed in Configuring NE Level Timing on page 9-2, with the addition of **Other TG,** which defines the selected TG's source to be received from the other TG.

4. The **Status** and **Quality** columns provide information about the selected timing source. If new timing sources are selected, these fields will be updated only after confirming the new selection by clicking **OK**.

   If the selected source is a TR reference, the **Trib Source** column becomes active and designates the TR slot (and, in the case of 2M TR, also the port, i.e. 103-2M-1).

5. The Secondary timing source is used as a backup for the Primary source. To define a Secondary timing source, click the **Add Entry** button and select the source from the cascade menu.

NOTE: It is not possible to define the secondary source as **Internal**.

   The Secondary source may be removed by clicking **Remove Entry**. The user must note that, as previously mentioned, the timing source selection is carried out by the TG according to signal quality values. Therefore, a secondary source, with higher quality than the primary source, will be selected as the active timing source. This situation, where the secondary source is the active one, is indicated by a yellow background in the **Active Time Source** field in the Timing Configuration window. Other color indications are: green, indicating that the primary source is active and red, indicating a “Hold Over” - none of the timing sources are available, using the Internal clock (in Hold Over mode).

6. When defining a timing source which contains an SSM byte (Line or STM-1 TR), the user may choose to ignore the quality reported by the SSM, and assign a specific quality to that source. This can be achieved by enabling the **Override** SSM toggle and using the arrows or the slider to set the desired quality (not applicable to μSDM-1/E NEs).

Forcing the Timing Source

It is possible to manually select (force) a specific timing source, even if the system has automatically made a different selection based on the quality of the sources and the priorities assigned by the User.

To force a timing source:

1. Select an NE to force by selecting the TG in the Card Internals View.
2. From the Card Internals View, select **Maintenance ➔ Enforce Timing Source**,
   OR
   From the main menu, select **Maintenance ➔ Enforce Timing Source**.
3. Click **Select** in the cascade menu. A list of the available timing sources selected in the NE priority table is displayed. Select a source.
4. If the TG Configuration window is opened (Figure 9-3), the **Enforced Timing Source** field displays ON.
5. To release the manual force and return to automatic selection based on priorities and quality, select **Maintenance ➔ Enforce Timing Source** in the Card Internals View, and then select **Release**,
   OR
   From the main menu, select **Maintenance ➔ Enforce Timing Source**, and then select **Release**.

   The status of the force timing source operation is displayed in the TG Configuration window (ON or OFF).

10

Trail Functions

Introduction

NOTE: Trail management in EMS-Syncom 2.0 refers to the trails within an NE. Therefore, references to a trail, in this document or the UI, are usually referring to a cross-connect within a network element.

The SDH standard refers to two types of trails: Low Order VC Trails (LOVC) and High Order VC Trails (HOVC). High Order VC Trails refer to traffic at the VC4 level (STM-1). Low Order VC Trails define signal traffic on a level, which is lower than VC4; LOVC trails are multiplexed into a HOVC trail or a series of HOVC trails

In EMS-SYNCOM terminology, HOVC trails are called *Server Trails*, while LOVC trails are referred to as *Client Trails*. Client trails define signal carrying channels and system resources used to interconnect two or more TPs. The server trail supplies a VC-4 bandwidth which can be used for client trail traffic.

A client trail can only be defined as residing on a server trail. Therefore, when setting up your network you will first create server trails. Afterwards, you will create client trails that go through pre-defined server trails.

NOTE: You cannot create or edit server or client trails in the *Monitor* operation mode.

Server Trails

Server trails can be defined as either bidirectional or unidirectional. The ability to define unidirectional server trails allows economical allocation of fiber resources, when a client trail only needs to go in one direction.

Creating a Server Trail

To create a new server trail:

1. Click the toolbar icon
   OR
   From the Shelf View, Card Internals View or main menu, select **Trails ➔ Create/Edit Server Trail**.

   The **Create/Edit Server Trail** window opens.

2. Enter the parameters as explained in Server Trails Parameters on page 10-5. Edit the path parameters as follows:

   a. Select the network element.

> **NOTE**: After defining the network element for the first cross-connect, you must continue to select the same network element for the rest of the cross-connects in the trail. The system will not let you select a different one.

   b. For each cross-connect to be defined, do the following:

      1. Select the **From** (Start) details.
      2. Select the **To** (End) details.
      3. Select the type of **Path** (Main / Protection / Both)
      4. Define if it is Bi-directional (Yes: Two way server trail / No: One way server trail.)

         After all the segment parameters are defined, the **Add XC** button is enabled.
      5. Click Add XC

         The segment details are listed in the Main Path and Protection Path.

3. Click **Activate**.

   The Server Trail is saved.

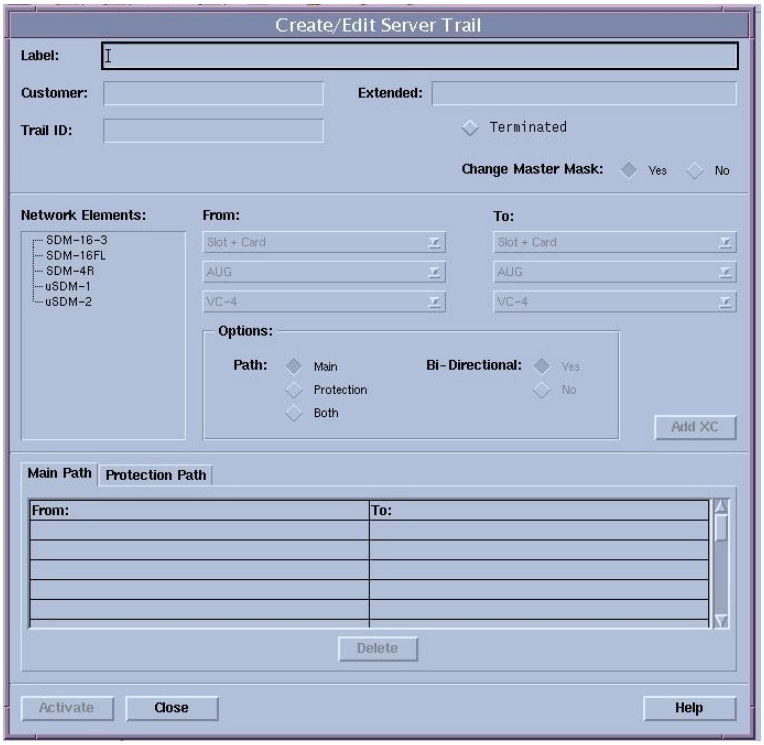


Figure 10-1. The Edit/Create Server Trail Window

Editing a Server Trail

To edit a server trail:

1. From, the **Server Trails List** (see Server Trails List on page 10-6), select a trail and click **Edit**.

   The Create/Edit Server Trail window with details of the selected server trail opens.

2. Edit the parameters as explained in Section Server Trails Parameters.
3. Edit the path parameters as follows:

   a. Select the network current trail's network element.

   NOTE: You can only select the current network element. While you can change cross-connects, you cannot change the network element.

   b. For each segment to be defined, do the following:

      1. Select the From (Start) details.
      2. Select the To (End) details.
      3. Select the type of Path (Main / Protection / Both)
      4. Define if it is Bi-directional (Yes: Two way server trail / No: One way server trail.)

         After all the segment parameters are defined, the **Add XC** button is enabled.

      5. Click Add XC.

      The segment details are listed in the Main Path and Protection Path.

4. Click **Activate**.

   The updated Server Trail is saved.

Server Trails Parameters

The parameters used for creating and editing Server Trails are similar. The following table describes the parameters

Table 10-1. Edit/Create Server Trails Window Parameters

Parameter	Explanation
Customer (optional field)	Name of the customer using the server trail.
Label (optional field)	A label, shorter than the extended label, up to 30 characters in length. This label is displayed in various places where the extended label does not fit.
Trail ID	The ID of the trail.
&ExtLbl	Extended label, which can be up to 80 characters long. This is displayed in the Server Trails List (see below).
Terminated	When selected, the **From** and **To** fields (see below) are replaced with **Select Aug**.
Change Master Mask	The Alarm Master Mask of a transmission object determines whether faults in that object generate alarm reports in EMS SYNCOM. *Yes* (default): generate alarm reports. *No*: Do not generate alarm reports.

Server Trails List

The Server Trails List window displays the server trails defined in EMS-SYNCOM. It displays the alarm state of the server trail and allows editing of various server trail parameters.

To view the server trails list:

- Click the toolbar icon
  OR
  From the Shelf View, Card Internals View or main menu, select **Trails ➔ Server Trails List**.

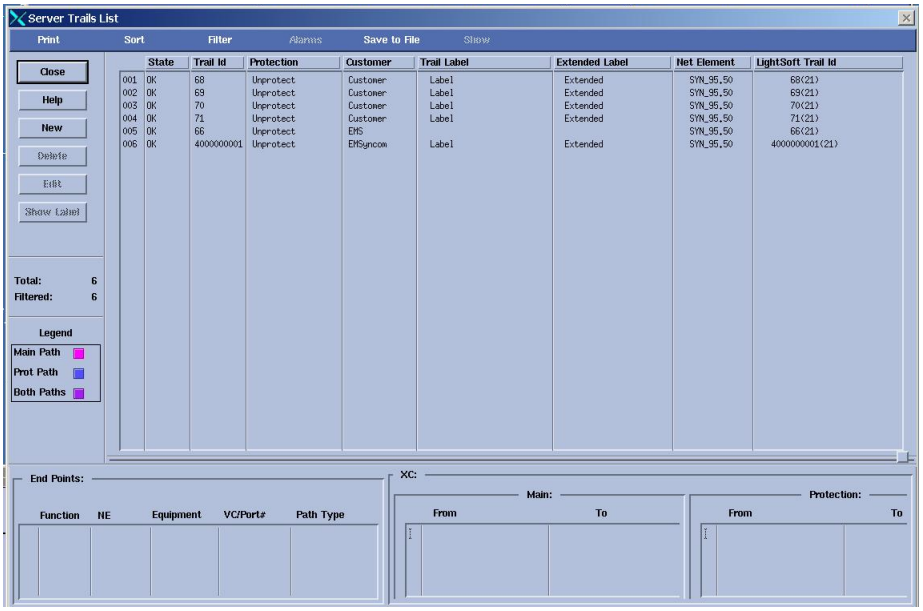


Figure 10-2. The Server Trails List Window

NOTE: HO cross connects defined via the MTNM interface from an upper-level management system, such as LightSoft, are displayed as server trails in the Server Trail List window. However, these trails may display irregular characteristics, such as missing or mismatched endpoints, missing links and so on.

Viewing a Server Trail's Cross Connects

To view the cross connects of a server trail:

- From, the **Server Trails List** (see Server Trails on page 10-2), select a trail.

  The information is displayed on the bottom of the screen

Sorting a Server Trails List

You can sort the list by clicking one of the column headers. The list is sorted in ascending order according to the selection.

You can also sort the server trails list by selecting **Sort** from the pull down menu. The following sort options are available: by **Trail State**, **Trail Creation Type**, **Trail ID, Protection Type**, **Protection Quality**, **Customer**, **Trail Label**, **Extended Label**, **Concatenation State, LightSoft Trail ID, NE Name**.

Filtering a Server Trails List

To filter the server trails list:

1. Select **Filter ➔ Set Filter** in the Server Trails List window menu. The Server Trails List Filter window opens as shown in Figure 10-3.

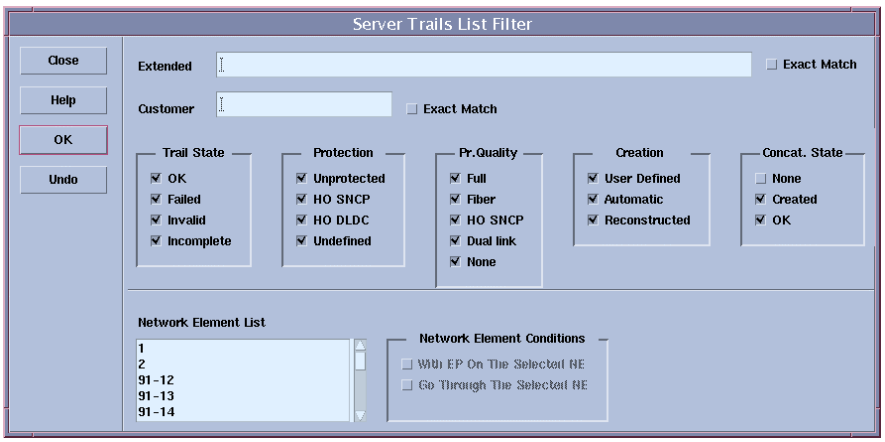


Figure 10-3. Server Trails List Filter Window

2. To find a server trail with a particular label or customer name, click the **Exact Match** button and type your search string in the **Label** or **Customer** fields.

> **NOTE**: With either of these two criteria, if you deactivate the **Exact Match** button, the system searches for a trail label or customer that contains a substring of what you entered in the respective text field. For instance, if you enter the word "trail" in the **Trail Label** text field, the match report includes trails labeled "Trail #*n*", "Endtrail", "Firsttrail", "Endtrail #*n*", etc.

3. Select additional filter criteria, as follows:
   - **Trail State:** to filter out all server trails with the specified criteria.
   - **Protection:** to filter out server trails based on the protection level defined.
   - **Pr. Quality:** to filter out server trails that have a specific protection quality level.
   - **Creation:** to filter out server trails based on their method of creation; click User Defined, Automatic or Reconstructed.
   - **Concatenation State:** to filter out server trails based on their concatenation state.

   You can also select NEs from the Network Element List and filter, using one or two conditions. If you select the **With EP On The Selected NE** box, the trail is filtered if the selected NE has an end point on one of its tributaries. If the **Go Through The Selected NE box is selected**, the selected NE is filtered out only if the end point goes through the NE. You can select both filter criteria.

4. Click **OK** to start filtering the selected trails list. At the end of this process, the list reflects the specified filter criteria.
5. Click ` **Undo** to undo all changes made in this window and revert to the default settings.

Alarms

To find out if there are alarms affecting a certain server trail, select the server trail from the Server Trails List and select **Alarms ➔ Current** from the pull down menu. A window is shown with the list of alarms (originating from SYNCOM and µSDM-1 NEs only).

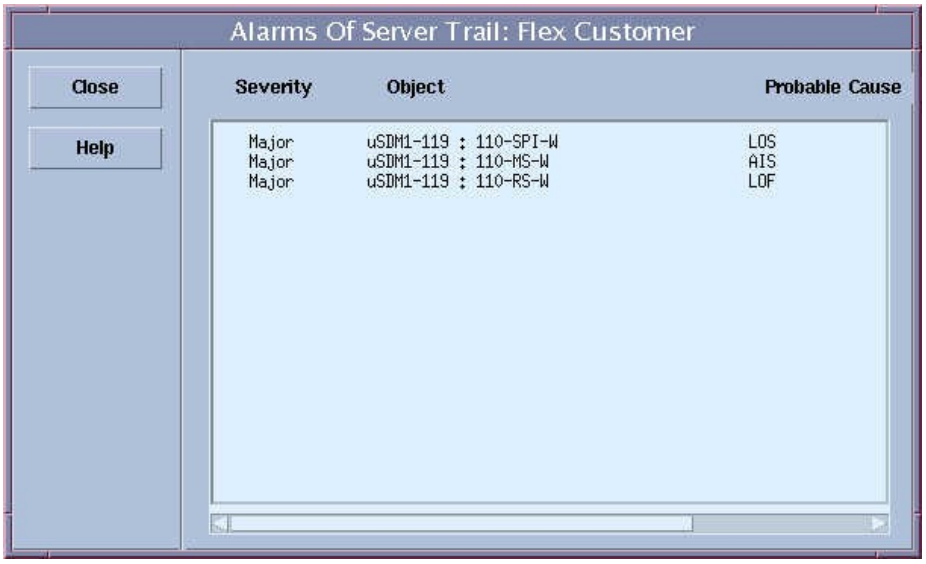


Figure 10-4. Alarms for Server Trails

Client Trails

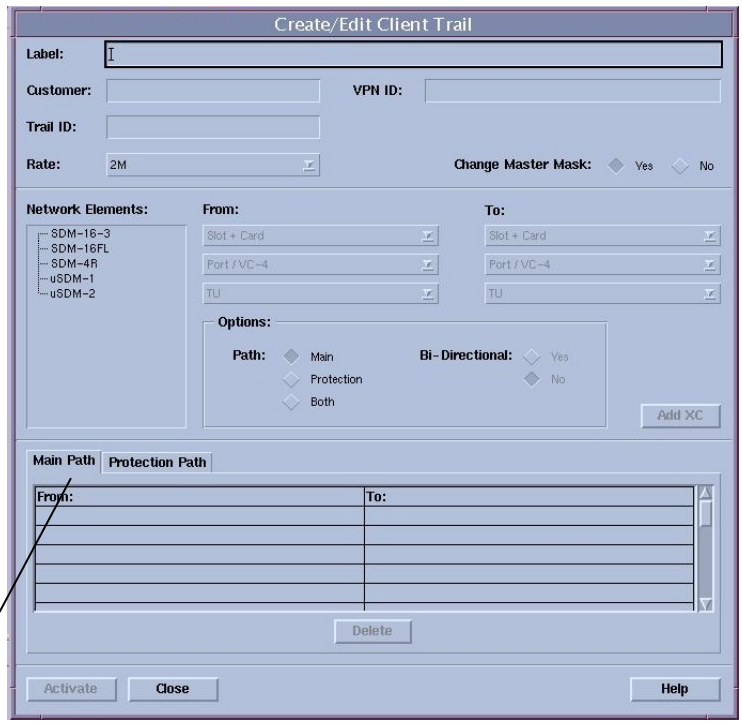
Client trails define signal carrying channels and system resources used to interconnect two or more TPs.

Creating a Client Trail

To create a new client trail:

1. Click the toolbar icon
   OR
   From the Shelf View, Card Internals View or main menu, select **Trails ➔ Create/Edit Trail**.
   OR
   From the **Trails List** window, click **New Client**.

   The **Create/Edit Client Trail** window opens.



Click tab to view cross connects in each path

Figure 10-5. Create/Edit Client Trails

2. Enter the parameters as explained in Client Trails Parameters.
3. Edit the path parameters as follows:
   a. Select the network element.

> **NOTE**: After defining the network element for the first cross-connect, you must continue to select the same network element for the rest of the cross-connects in the trail. The system will not let you select a different one.

   b. For each cross-connect to be defined, do the following:
      1. Select the **From** (Start) details.
      2. Select the To (End) details.
      3. Select the type of Path (Main / Protection / Both)
      4. Define if it is Bi-directional (Yes: Two way server trail / No: One way server trail.)

         After all the segment parameters are defined, the **Add XC** button is enabled.
      5. Click Add XC.

         The segment details are listed in the Main Path and Protection Path.
4. Click **Activate**.

   The new Client Trail is saved.

Client Trails Parameters

The parameters used for creating and editing Client Trails are similar. The following table describes the parameters

Table 10-2. Edit/Create Client Trails Window Parameters

Parameter	Explanation
Label (optional field)	The trail label.
Customer (optional field)	Name of the customer using the server trail.
Trail ID	The ID of the trail.
Rate	The trail rate.
Change Master Mask	The Alarm Master Mask of a transmission object determines whether faults in that object generate alarm reports in EMS SYNCOM. *Yes* (default): generate alarm reports. *No*: Do not generate alarm reports.

1. Enter the management related trail information in the **Label**, **Customer** and **Trail ID** fields; for Client trails, these are optional entries.
2. Select the trail **Rate** from the pulldown field; this selection is mandatory.
3. Select the Client trail orientation in the **Bidirectional** field; click **Yes** to create a 2-way Client trail; click **No** to create a one way Client trail.
4. Specify the trail path to which you are adding the cross connect by clicking one of the **Path** buttons: click **Main** to add the cross connect to the main path; click **Protection** to add the cross connect to the protection path; click **Both** to add the cross connect to the both the main and protection paths.
5. Add cross connects to the Client trail as follows:
   - Select the cross connect start point. Select the NE which serves as the start point from the Network Elements list, which lists all NEs in the EMS-SYNCOM database.
   - Select the card which serves as the start point from the first pulldown field in the **From** area. The start point of the cross connect can be either a fiber TU or a tributary. The card selection should reflect the choice for the start point object type (e.g., select a card slot with a tributary card in order to select a tributary start point; select a card slot with an ASF card in order to select a fiber TU start point).

NOTE: When selecting the card, verify that the card type contains objects that match the trail rate specified previously.

Changing the Master Mask Default

The Alarm Master Mask of a transmission object determines whether faults in that object generate alarm reports in EMS-SYNCOM. The transmission objects at the end points of a client trail (both VCs and tributary Physical Interfaces) are, by default, open to reporting alarms. Other transmission objects do not report alarms.

When creating a new trail (or editing an existing one), EMS-SYNCOM automatically updates (i.e. deactivates) the Alarm Master Mask of the transmission objects at the end points of the trail. You may prevent EMS-SYNCOM from doing so by selecting **Do Not Change** in the **Alarm Master Mask** field, located just under the **Activate** button. The default option is **Change**. The Master Mask of any transmission object can also be set manually in the Alarm Severity window (Setting Alarm Severity on page 4-20).

NOTE: By default, EMS-SYNCOM manipulates the Master Mask settings of all the transmission objects in the network to best suit the needs of most users. Be advised that changing the default might cause important alarm reports, related to live-traffic carrying trails, to be lost.

The Client Trails List

The Trails List window can be used for the following trail related functions:

- Displays the client trails defined in EMS-SYNCOM
- Access the Create/Edit Trail window (**New**/**Edit** buttons, respectively)
- Delete entire trail (or trails)

To open the Trails List window:

- Click the toolbar icon ,
  OR
  From the Shelf View, Card Internals View or main menu, select **Trails ➔ Trails List**

The **Trails List** window opens.

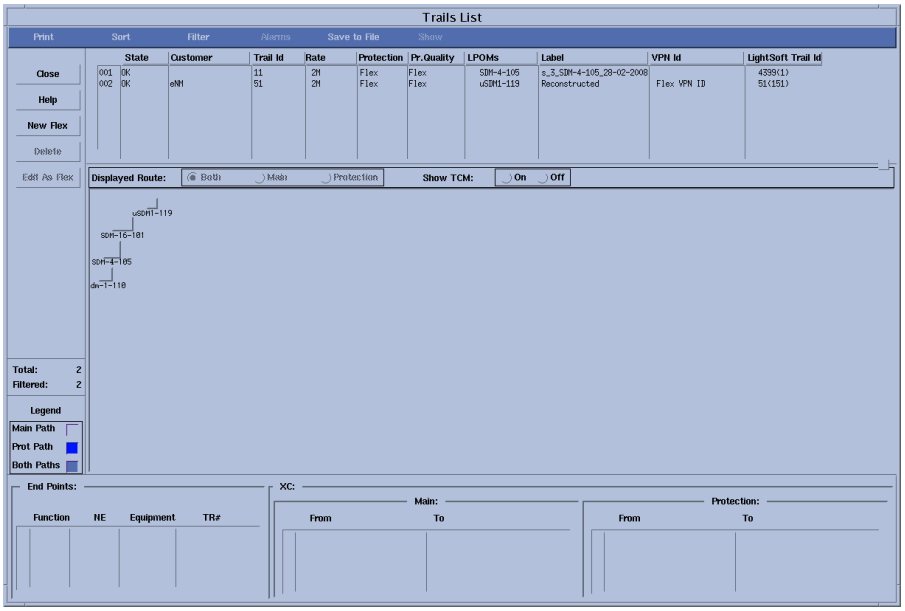


Figure 10-6. The Trails List

Client Trail Parameters

The trails table includes the following items:

- **Number*:*** Number generated and assigned automatically to each trail in the list.
- **State*:*** The creation state of the client trail. Possible values are *OK* and *Failed*. A *Failed* state indicates that the trail could not be created in the network; the database contains the trail data, but no traffic is going through it.
- **Customer:** Provides trail management information as entered by the operator in the Edit/Create Trails window.
- **Trail ID:** States a unique number generated by EMS-SYNCOM. This number is used for certain internal operations. It is displayed in the alarm log as reference to identify the client trail.
- **Rate:** Shows the trail's transmission rate as selected in the Edit/Create Trails window.
- **Protection:** Indicates the protection type on the trails.
- **Label:** Provides trail management information as entered by the user in the Edit/Create Trails window.
- **VPN ID:** The VPN ID.
- **LightSoft Trail ID:** The Lightsoft ID: 105(3) trailed (<*Manage System ID*>)

Client Trail Main/Protection Route

This area in the Trails List window shows a graphical presentation of the client trail route (main, protection or both). When you click on a specific client trail in the trails list, the color of the NEs and segments participating in the trail changes to pink and the corresponding data is displayed in the respective fields. If the entire network cannot be displayed in the Route area, the focus of the Route display shifts to display at least one NE with an end point of the selected server trail on it.

Click the **Displayed Route** radio button to display the Main or Protection route mapped against the network topology.

Buttons

In addition to the **Close** and **Help** buttons, offered in most EMS-SYNCOM windows, the Trails List window includes the following buttons:

- **New Server:** Opens the Create/Edit Server Trails window, allowing you create a new trail.
- **Delete:** Deletes the selected trail (or trails).
- **Edit as Server:** Edits an existing trail (selected in the **Trails List**, using the Edit Trail window).

Viewing a Client Trail's Cross Connects

To view the cross connects of a client trail:

- From, the **Server Trails List** (see Server Trails List on page 10-6), select a trail.

  The information is displayed on the bottom of the screen.

Sorting a Client Trails List

You can sort the list by clicking one of the column headers. The list is sorted according to the selection, in ascending order.

You can use the Sort by field to sort a trails list. The following sort options are available: by **Customer**, **Trail ID**, **Label**, **Rate**, **Protection**, **State, NE Name**.

Filtering a Client Trails List

To filter the client trails list:

1. Select **Filter ➔ Set Filter** in the Trails List window menu.

   The following window opens:

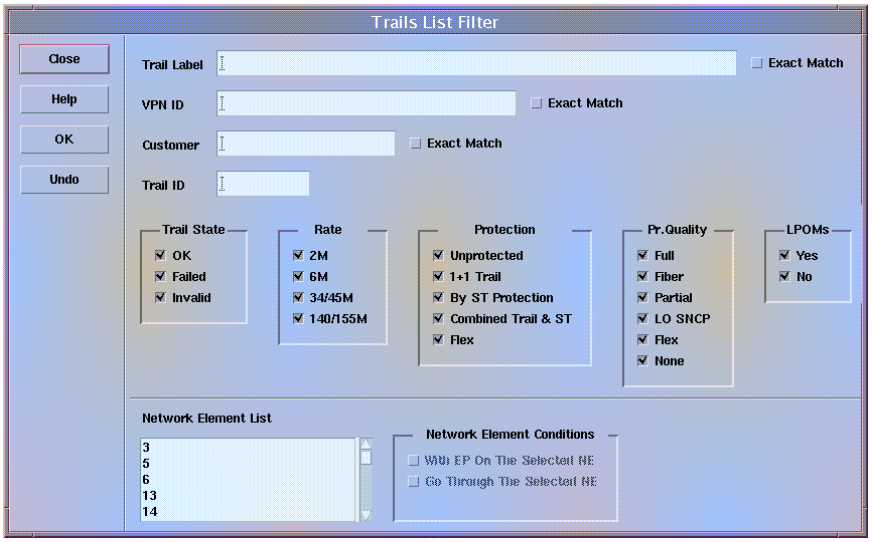


Figure 10-7. The Trails List Filter Window

2. To find a client trail with a particular label, click the **Exact Match** button next to the **Trail Label** field. Click in the **Trail Label** text field and type your search string.

3. To find all client trails of a particular customer, click the **Exact Match** next to the **Customer** text field. Click in the **Customer** text field and type your search string.

NOTE: With either of these two criteria, if the **Exact Match** button is deactivated, the system searches for a trail label or customer that contains a substring of what you entered in the respective text field and is case-insensitive. For instance, if you enter the word "trail" in the **Trail Label** text field, the match report includes trails labeled "Trail #*n*", "Endtrail", "Firsttrail", "Endtrail #*n*", etc.

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4. Select additional filter criteria, as follows:
   - **Trail State:** To filter out all client trails with the specified criteria
   - **Rate:** To filter out client trails that do not match the selected data rate
   - **Protection:** To filter the client trails according to the type of protection they have. Refer to Client Trails Parameters on page 10-12 for descriptions of the various types of protection.
   - **Protection Quality:** To filter the client trails according to the type of protection quality assigned to them. Refer to Client Trails Parameters on page 10-12 for descriptions of the various types of protection quality.

   You can also select an NE/NEs from the Network Element List and filter it, using one or two conditions. If you select the **With EP On The Selected NE** box, the trail is filtered if the selected NE has an end point on one of its tributaries. If the **Go Through The Selected NE** box is selected, the selected NE is filtered out only if the trail goes through the NE. You can select both filter criteria.

5. Click **OK** to start filtering the selected trails list. At the end of this process, the list reflects the specified filter criteria.

6. Click **Undo** to undo all changes made in this window and revert to the default settings.

Alarms

To find out if there are alarms affecting a certain trail, select the trail from the Trails List and select **Alarms ➔ Current** from the pull down menu; a window is shown with the list of alarms:

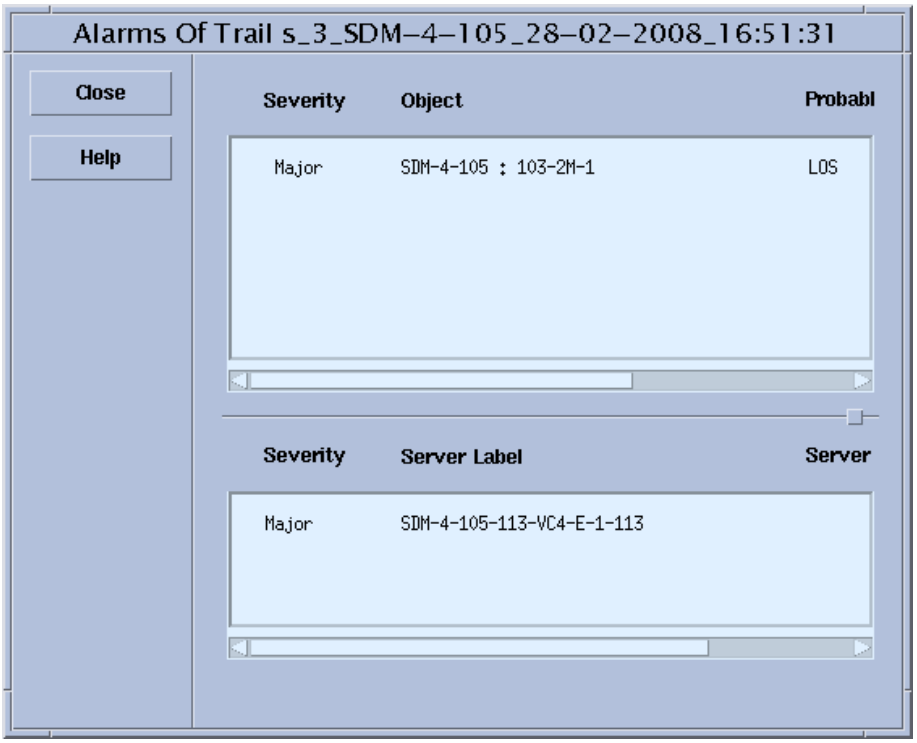

Figure 10-8. Alarms for Client Trails

Changing the Master Mask Default

Alarm Master Mask definitions of the transmission objects at the end points of a client trail may be modified by the user. Refer to Changing the Master Mask Default on page 10-23 for an explanation of Alarm Master Masks in client trails.

Use the following items in the **Alarms** menu to modify Master Mask definitions for selected (highlighted) trail:

- **Enable:** Select this item to enable alarms
- **Disable:** Select this item to disable alarms
- **Don't Change While Deleting:** Select this item to prevent EMS-SYNCOM from masking the alarms (activating the Master Mask) of VC-4 objects when the server trail they participate in is deleted. This item is a toggle: when selected, it remains in effect until it is selected again. Note that a small rectangle appears next to the menu item while it is still active.

Deleting a Client Trail

To delete an entire client trail, select the trail in the Trails List window and click **Delete**. The selected trail is removed from the Trails List and the network.

NOTE: When deleting a client trail, the Master Mask of all its related lower-order paths (VC-12, VC-3) is reset to the default (i.e., alarms are masked, see Changing the Master Mask Default on page 10-20). You can set the **Don't Change While Deleting** option from within the **Alarms** menu in the Trails List window to prevent the settings from being reset when you delete an entire client trail.

Editing a Client Trail

You can edit an existing client trail by changing either the trail itself (e.g. adding a drop end point), or the resources used in the trail.

To edit an existing client trail:

1. From, the **Client Trails List** (see The Client Trails List on page 10-14), select a trail and click **Edit as Client**.
2. The **Create/Edit Client Trail** window with details of the selected client trail opens.

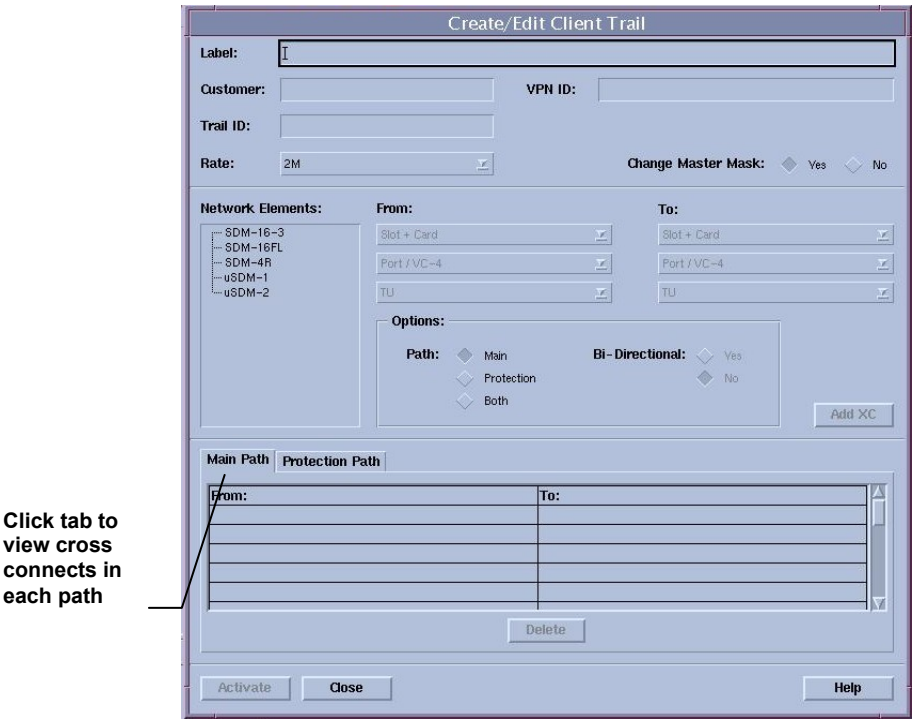

Figure 10-9. Create/Edit Client Trails

3. Enter the parameters as explained in Section
4. Edit the path parameters as follows:
   a. Select the network element.

> **NOTE**: After defining the network element for the first cross-connect, you must continue to select the same network element for the rest of the cross-connects in the trail. The system will not let you select a different one.

   b. For each cross-connect to be defined, do the following:
      1. Select the **From** (Start) details.
      2. Select the To (End) details.
      3. Select the type of Path (Main / Protection / Both)
      4. Define if it is Bi-directional (Yes: Two way server trail / No: One way server trail.)

         After all the segment parameters are defined, the **Add XC** button is enabled.
      5. Click Add XC.

         The segment details are listed in the Main Path and Protection Path.
5. Click Activate.

The Client Trail is saved.

Changing the Master Mask Default

The **Alarm Master Mask** of a transmission object determines whether faults in that object generate alarm reports in EMS-SYNCOM. The transmission objects at the end points of a client trail (both VCs and tributary Physical Interfaces) are, by default, open to reporting alarms. Other transmission objects do not report alarms.

When creating a new Client trail (or editing an existing one), EMS-SYNCOM automatically updates (i.e. deactivates) the Alarm Master Mask of the transmission objects at the cross connection end points. You may prevent EMS-SYNCOM from doing so by selecting **No** in the **Change Master Mask** field. The default option is **Yes**. The Master Mask of any transmission object can also be set manually in the Alarm Severity window (see Setting Alarm Severity).

NOTE: By default, EMS-SYNCOM manipulates the Master Mask settings of all the transmission objects in the network to best suit the needs of most users. Be advised that changing the default might cause important alarm reports, related to live-traffic carrying trails, to be lost.

Monitoring a Client Trail

It is possible to monitor an existing client trail, for maintenance purposes, by defining another Cross-Connect on the client trail. This shows the actual payload of the trail.

Viewing Trail End Points Performance

You can display performance data for a specific end point in a client trail, if the end point is located on a SYNCOM or µSDM-1 NE.

There are two options for monitoring the performance of end points in a client trail, Current and Historical.

To view this data:

1. Obtain a Shelf View of the tributary card, which is an end point in a client trail.
2. Obtain a cards internal view of the tributary card and then select the transmission object participating in the client trail.
3. From the Shelf View, Card Internals View or main menu, select **Performance ➔ For Trail Endpoints**.
4. Select either the **Current**, **History**, or **Reset Counters** option in the cascade menu.

If you select **Current**, you obtain a view of the current performance of the selected TP. An example is shown in the following figure.

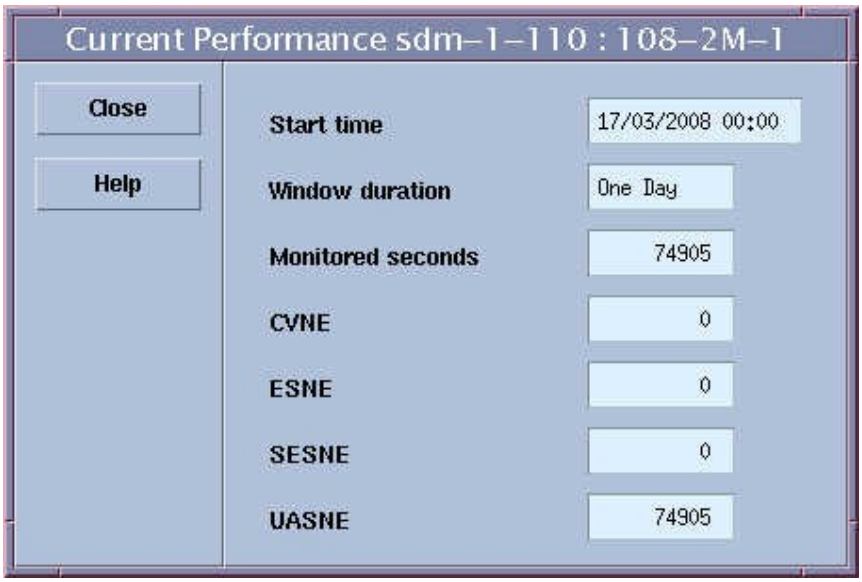

Figure 10-10. Current Performance Trail End Point Window

The data shown represents the material collected since the start time. The window duration is always one day. The information shown is:

- **Monitored Seconds** shows the amount of times in seconds of the evaluation period since the start time or the last Reset Counters operation.
- ESEP – Errored Seconds (end point)
- SESEP – Severely Errored Seconds (end point)
- UASEP – Unavailable Seconds (end point)

To manually reset the counter:

- From the Shelf View or main menu, select **Performance ➔ For Trail Endpoints ➔ Reset Counters**. After confirmation you receive a message that the reset was successfully performed.

Historical End Point Performance Monitoring

To view the historical performance trail end point window:

- From the Shelf View, Card Internals View or main menu, select **Performance ➔ For Trail Endpoints ➔ History**.

  This window summarizes the performance history for the specified time period as entered in the **From** and **To** fields.

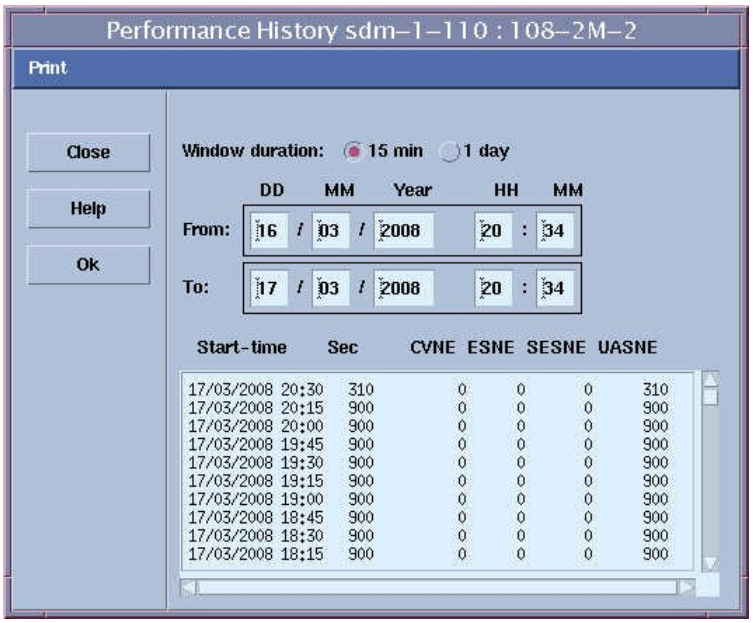

Figure 10-11. Historical Performance Trail End Point Window

The window duration is always one day.

Click **OK** and wait a few seconds while the EMS-SYNCOM gathers the information; afterwards the data is displayed in the table at the bottom of the window.

Trail Performance (PM) Logs, MS Logs and TC Logs

The EMS-SYNCOM stores a list of performance monitoring data collected for the end points of each client trail in the system, and for MS transmission objects. For a list of the relevant PM counters, refer to Viewing Performance History on page 8-18.

Performance data for a trail is saved either:

- Whenever the client trail is disconnected,

OR

- Once after 12:00 midnight for the 24-hour period ending at 12:00 midnight

MS logs are saved immediately after the PM log is saved.

NOTE: A startup configuration option (see Startup Configuration Options on page 2-14) determines whether or not PM logs are saved; an additional startup configuration option determines whether or not MS logs are saved; an additional startup configuration option determines whether or not TC logs are saved. TC and MS logs can only be requested if PM logs are specified as well.

To display this data:

1. From the Shelf View or main menu, select **Performance ➔ PM Log**. The following window opens:

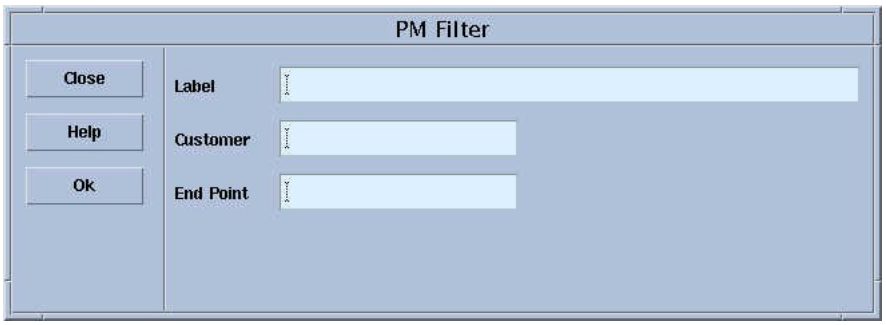

Figure 10-12. Example of a Trail Log

Each log file shows trail performance data collected for an entire day, with the title of each file identifying the day concerned, in the format *pm<yyyy><mm><dd>*. The file prefix indicates the type of file it is: PM for PM logs, MS for MS logs, and TC for TC logs.

2. To save a trail log file to a floppy disk: insert a floppy disk into the disk drive, select the file you wish to save and click the **Export** button. Daily PM logs, when exported, include an indication of masked trails, as well as the VPN ID.

3. To display the contents of a trail or MS log file (i.e., Trail PM for a single day), select the desired file and click the **Browser** button in the Trail Log window.

The following type of window opens:

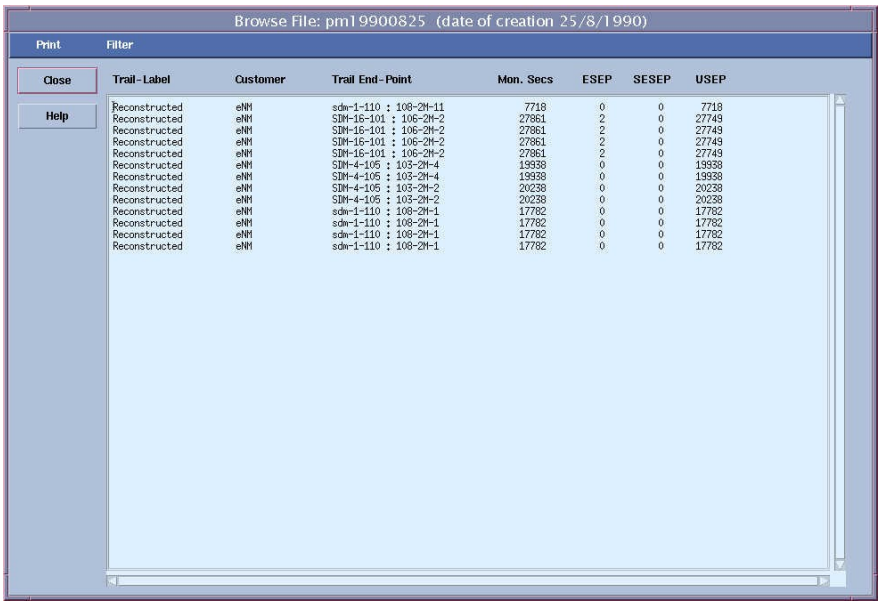

Figure 10-13. Example of a Browse File Window

4. You can filter the information displayed in the Browse File window (for PM logs only) by selecting the **Filter** menu option. The following window opens.

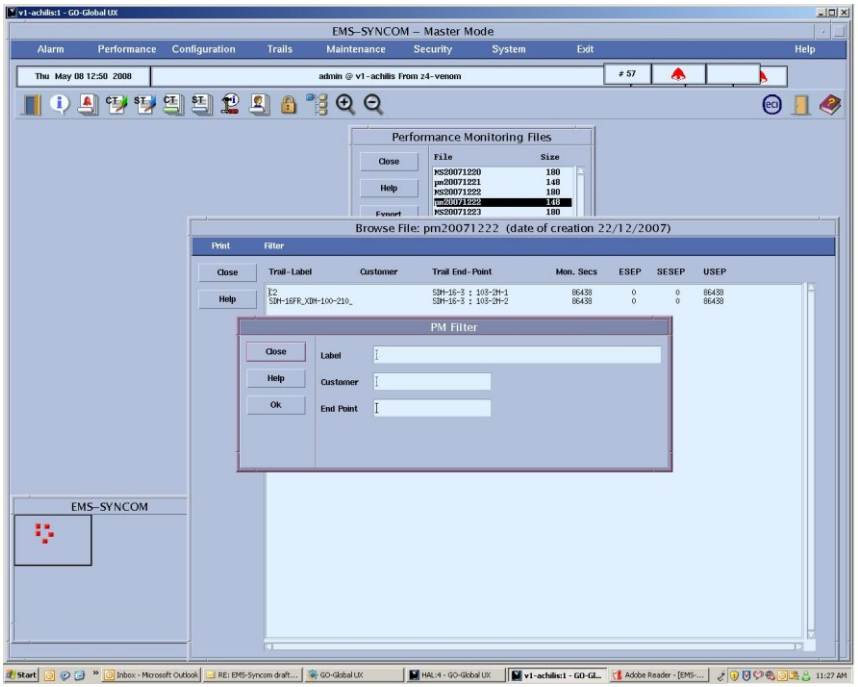

Figure 10-14. PM Filter Window

Enter one or multiple filter criteria.

The following table describes the functions of the filtering criteria available in the Log Filter window:

Table 10-3. PM/MS/TC Log Filtering Options

Label	To display information pertaining to a specific trail label only.
Customer	To display information pertaining to a specific customer only.
End Point	To display information pertaining to a specific trail end point only.

5. When ready, click **Close** to close the Browse File window.
6. To print from the browser, select **Print** in the window menu.

Collecting PM Data

In addition to the options mentioned previously (collection of PM data for a trail every 24-hours at midnight or when a trail EP is deleted), performance data for a trail can be collected manually by using the Collect EP Data command.

This command should be used in the following situations:

- Before replacing a tributary card that contains trail end points.
- Before switching to TPM equipment protection.

The Collect EP Data command collects PM data for all trail end points on the card and stores this data in the EMS-SYNCOM.

To collect PM data:

1. Open the appropriate Shelf View and select the tributary card.
2. Select **Performance ➔ Collect EP Data** from the Card Internals View or main menu.

Activating/Deactivating Protection Lockout

Client trails created with a protection path, by default, switch to the backup path if certain alarm conditions occur on the active path. You can prevent a particular tributary end point of a client trail from switching to its protection path.

To activate protection lockout:

1. Select the required end point in the Card Internals View.
2. From the Card Internals View or main menu, select **Maintenance ➔ Protection Lockout**.
3. Select **On** or **Off** in the cascade menu.

NOTE: This action may affect the traffic in the trail if a transmission problem occurs. The locked out end point will not be able to switch to the backup path as it normally would.

Switching to a Trail Protection Path

You can switch manually to the protection path of a client trail whenever necessary.

To switch to a trail protection path:

1. Select the required end point in the Card Internals View.
2. From the Card Internals View or main menu, select **Maintenance ➔ Force Switch to Protection**.
3. The cascade menu allows selection of the direction (east or west) connecting the end point to its backup path; the direction of the active path is grayed-out.
4. This action will result in a switch to the protection path even if the protection path is faulty. If you use the **Maintenance ➔ Manual Switch to Protection** option from the Card Internals View or main menu, the switch will not take place if the protection path is faulty.

NOTE: This action is traffic-affecting! Traffic on the trail will be impaired for a few milliseconds.

Tributary Protection Matrix (TPM)

NOTE: This feature is a configuration option, relevant to SYNCOM NEs only. It can be used if you set the **Equipment Protection** configuration option to **YES** (see Startup Configuration Options on page 2-14).

When an NE is connected to a TPM (Tributary Protection Matrix), the EMS-SYNCOM allows switching tributary traffic (including the client trails going through it) to a protection tributary card.

The TPM incorporates Switching Modules (SMs) that switch the traffic connections between the protected and protection tributary cards.

Tributary protection can be configured, provided that the following conditions are met:

- A TPM must be connected to the NE.
- The information in the EMS-SYNCOM must match the actual TPM wiring matrix (which defines the cabling mapping between the TPM and the NE).
- The protection tributary must be the same type, or compatible, as the primary tributary.
- The tributary used for protection cannot have trails going through it.

The operator will typically switch to the protection tributary in response to an alarm (refer to Alarm Time Stamp on page 4-15 for information on identifying current alarms) or in preparation for performing maintenance operations.

The TPM Shelf View

When an NE is connected to a TPM, an additional one or two objects are displayed at the bottom of the NE Shelf View (in SDM-1 NEs there is one TPM slot and in SDM-4/SDM-16 NEs there are two TPM slots).

To obtain a Shelf View of the TPM, if assigned, double click the TPM slot in the NE Shelf View. The following window opens.

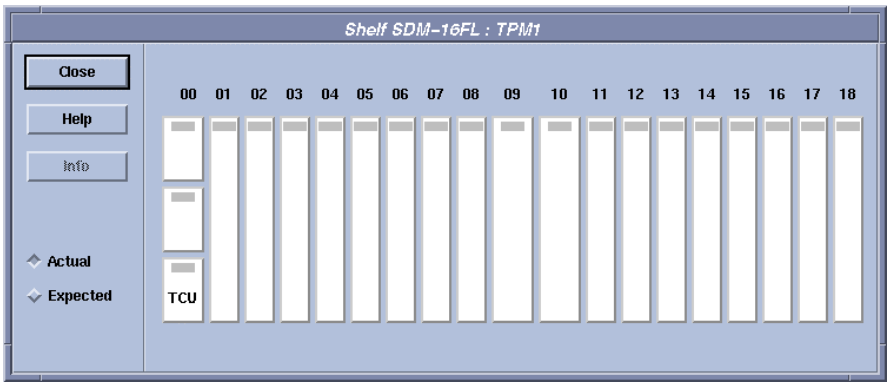

Figure 10-15. TPM Shelf View

This window displays the layout of cards in the TPM card shelf as read from the TPM shelf. Alarms are displayed on the TPM shelf slots according to the same convention as described for the Shelf View in Chapter 6 The Network Element Level. Click **Expected** to obtain a view of the cards which can be inserted in the TPM shelf.

To set alarm severity for TPM cards, right click a slot in the TPM Shelf View and select the **Severity** option. Define alarm severities as described in Setting Alarm Severity on page 4-20. You can also display an Info window for TPM cards by right clicking the slot and selecting the **Info** option.

Configuring TPM Protection

In order to use the EMS-SYNCOM for switching the tributary traffic to a protection tributary, the information in the EMS-SYNCOM must match the actual TPM wiring matrix (which defines the cabling mapping between the TPM and the NE).

The TPM configuration procedure consists of two types of operations:

- Configuring tributary cards as Standby cards (i.e., the card to which trail traffic is switched to).
- Configuring tributary cards as TPM-protected cards.

Configuring Tributary Cards as Standby

A tributary card is configured as Standby by clicking the **Is Standby for Protection** button when performing the slot assignment for the tributary card. Refer to Assigning Slots on page 7-9 for a description of the card assignment procedure.

If the tributary card is not defined in the TPM wiring matrix, the following message is displayed when clicking the **Is Standby for Protection** button:

```
Assignment of this card as Standby is not consistent
with TPM wiring info. Assign Anyway?
```

If you click **OK**, the slot is defined as Standby, even though it is not supported as such in the TPM wiring matrix.

When a tributary card is defined as Standby, the **Sb** icon is displayed at the bottom of the tributary card in the NE Shelf View.

Open the Info window for the Standby card to obtain additional information regarding which NE slots the Standby card is protecting.

NOTE: Once a tributary card is defined as a Standby card, its Card Internals view cannot be opened.

Configuring Tributary Cards as TPM-Protected

To configure tributary card for TPM protection:

- Select the desired card, and then select **Configuration ➔ Equipment Protection ➔ Protect** from the Shelf View or main menu.

  If the tributary card is not defined as protected in the TPM wiring matrix, the following message is displayed:

  `TPM wiring info does not support this protection`

  If tributary card is defined in the TPM wiring matrix, the `Perform Equipment Protection?` prompt is displayed; click **Yes**. The following message is displayed:

  `Protect Equipment Succeeded`

  In addition, the Pd icon is displayed at the bottom of the tributary card in the NE Shelf View.

To remove TPM protection from a tributary card:

1. Select the card, and then select **Configuration ➔ Equipment Protection ➔ Unprotect** from the Shelf View or main menu.
2. Open the Info window for the protected card to obtain additional information regarding TPM protection.

Switching to TPM Protection

To switch to the protection tributary:

NOTE: Switching TPM protection ON/OFF is a traffic affecting action!.

1. Access the NE Shelf View and select the tributary that was set as TPM-protected.
2. From the Shelf View or main menu, select **Maintenance ➔ Equipment Protection Switch ➔ Operate Switch**.
3. Answer **Yes** in response to the following message:

```
Switch to Standby card #XXX (may affect traffic)
```

A message is displayed informing of the switch; in addition, the Sb icon that was displayed at the bottom of the Standby card changes to display the slot number of the protected card.

If the protected card was carrying trail traffic, the icon is displayed on the Standby card.

This action switches all end points on the selected tributary card to the protection tributary.

If the Standby card defined for the switch to protection is busy, the following message is displayed and the switch to protection does not take place.

Standby card #XXX is busy (Currently switched from card #XXX)

NOTE: To view the card internals of a protected card, always double click the protected .

To revert to the primary tributary:

1. Access the NE Shelf View and select the tributary that was set as TPM-protected.
2. From the Shelf View or main menu, select Maintenance ➔ Equipment Protection Switch ➔ Release Switch.
3. Confirm when prompted.

   The slot number that was displayed at the bottom of the Standby card reverts to the **Sb** icon displayed before the switch to protection occurred.

Viewing the TPM Protection Status

You can view information regarding the status of TPM protected cards by right clicking the protected or Standby cards and selecting **Info**. Information regarding TPM protection is displayed at the bottom of the Info window, as shown in the following figure.

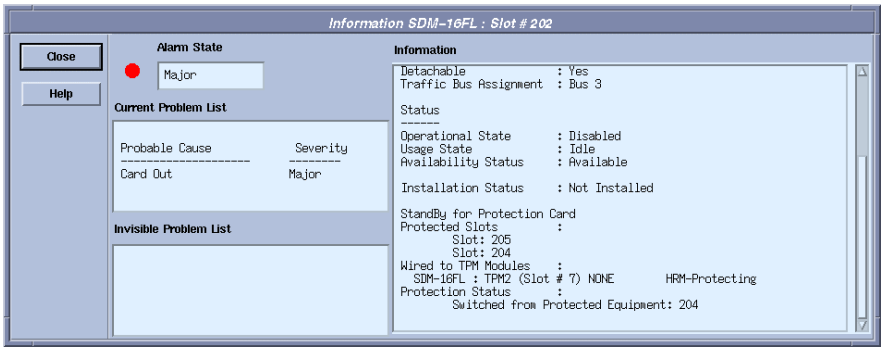

Figure 10-16. Viewing the TPM Protection Status

Traffic Reconfiguration

NOTE: The traffic reconfiguration feature is an EMS-SYNCOM cost option. If not purchased, all menu options pertaining to this feature are grayed out.

Traffic Reconfiguration (also referred to as Trail Restoration) is required when predefined traffic must be imposed on the network. In certain situations, following a network failure, existing traffic cannot be restored using the SDH protection facilities and traffic cannot be automatically redirected to different trail end points. In these types of situations, contingency plans are to be activated using traffic reconfiguration.

EMS-SYNCOM allows the following traffic reconfiguration functions:

- Exporting trail configurations to ASCII file format
- Importing trail configurations from ASCII file format.
- Editing trail configurations of an EMS-SYNCOM station off-line, in ASCII format using any text editor supported by the Unix operating system

The editing operations that can be done off-line are defining and deleting server trails, and defining and deleting client trails.

There are several instances where trail reconfiguration can prove to be very useful:

- Failure of equipment connected to a tributary (e.g. an exchange).
- Failure of the link connected to the SDH NE (e.g. a submerged cable).
- Failure of an SDH NE which represents a hub for essential traffic

Exporting Trails

To export trails (save) to ASCII format:

1. From the server trails list or trails list, select the trail (or trails, using multi-select) and choose **Save to File ➔ Selected** from the menu
   OR
   Choose **Save to File ➔ All** to export all the trails in the list.

2. The following window opens, prompting you to enter the name of the file.

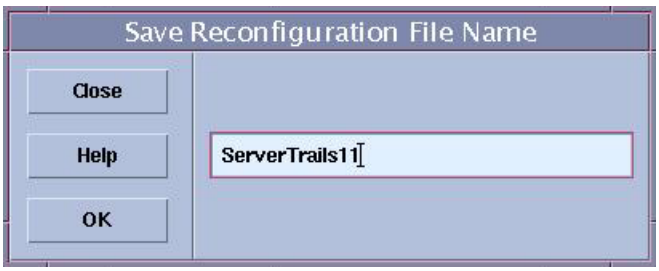

Figure 10-17. Save Reconfiguration File Name

3. After confirming, the selected trails are saved to ASCII file. Each exported trail is listed with its trail ID, to facilitate editing and handling.

Reconfiguration Files Path

Exported ASCII files are placed in the `~enm/ENMTrails` directory, unless the default directory was changed. Use the following command before starting EMS-SYNCOM to change the directory for ASCII files to be used for traffic reconfiguration.

```
setenv ENM_READ_FILES_PATH ~enm/<NEWDIRNAME>
```

You can use the Get ASCII Files and Store ASCII Files commands from the Root Menu (see Appendix A) to copy files from diskettes to this directory and vice versa.

Editing ASCII Files

The syntax to be used in traffic reconfiguration ASCII files is described in the following. The sequence of edit actions in the ASCII file can be in any order desired (e.g., you can specify creation of a server trail followed by deletion of a client trail).

Comments can be inserted in the file between trail management commands, by inserting a text line which begins with a # character. These lines are not visible at the EMS-SYNCOM and are ignored during processing of the line.

A good way to obtain detailed examples of valid ASCII files is to export a few trails to a file and display this file with any standard text editor.

Creating a Client Trail

The following is the syntax for creating a client trail.

Description	Example
Action	***New Trail***
Trail Label	Trail 1
Trail Customer	EMS-SYNCOM
VPN ID	VPN-2
Protection	NOT PROTECTED | LO PROTECTED | HO PROTECTED | LO HO PROTECTED
Bit Rate	2M | 6M | 34M | 45M | 140M
Alarm Master Mask	CHANGE
Number of EP	2
End Points	(see below)
Number of main segments	1
Segment	(see below)
Number of Protected Segments	1 (only if protected)
Segment	(see below)

Segment

NE Name	NE1
Separator	~~
Slot number	115 (not for external equipment)
NE Name	NE2
Separator	~~
Slot number	113 (not for external equipment)
STM number	3 | 0 - don't care
TU number	24 | 231 | 0 - don't care (231 for 2-3-1)

End Point

NE Name	NE1
Separator	~~
Slot number	103 (not for external equipment)
Trib Number	2 (not for external equipment)
Function	ADD | DROP | A/D
Path type	MAIN | PROT | BOTH

NOTE: In the end point list, you only need to enter the NE Name and can leave the slot number and tributary number specifications blank. When you do this, the EMS-SYNCOM places the trails automatically on any free physical interface during the trail reconfiguration process. For example, you can enter:
NE1~~000 00 ADD BOTH

As can be seen in the following example, the Segment and End Point data must be entered in one line; the components of the syntax listed above were separated to one-per-line for clarity of display. In the segment line, the syntax requires a space between the Slot number and NE Name items.

Example

The following is an example of a create client trail sequence:

```
***New Trail***
test1
TEST
VPN-2
PROTECTED
2M
CHANGE
3
NE1~~104 5 ADD BOTH
EE2~~DROP MAIN
EE3~~DROP PROT
2
NE1~~115 EE1~~2 5 7
NE1~~106 EE2~~1 5 7
2
NE1~~115 EE1~~2 5 9
NE1~~106 EE2~~1 5 9
```

Editing a Client Trail

The following is the syntax for editing a client trail.

Description	Example
Action	***Edit Trail***
Trail ID	Id 3
Trail Label	Trail 1
Trail Customer	EMS-SYNCOM
VPN ID	VPN-2
Protection	NOT PROTECTED | LO PROTECTED | HO PROTECTED | LO HO PROTECTED
Bit Rate	2M | 6M | 34M | 45M | 140M
Alarm Master Mask	CHANGE
Number of EP	2
End Points	(same as for new trail)
Number of main segments	1
Segment	(same as for new trail)
Number of Protected Segments	1 (only if protected)
Segment	(same as for new trail)

Example

The following is an example of an edit client trail sequence:

```
***Edit Trail***
Id 3
test1
TEST
VPN-1
PROTECTED
2M
CHANGE
3
NE1~~104 5 ADD BOTH
EE2~~DROP MAIN
EE3~~DROP PROT
2
NE1~~115 EE1~~2 5 7
NE1~~106 EE2~~1 5 7
2
NE1~~115 EE1~~2 5 9
NE1~~106 EE2~~1 5 9
```

Edit Trail Name

The following is the syntax for editing a trail name.

Description	Example
Action	***Edit Trail Name***
Trail Label	Trail 1
Trail Customer	EMS-SYNCOM
VPN-ID	VPN-1
Protection	NOT PROTECTED | LO PROTECTED | HO PROTECTED | LO HO PROTECTED
Bit Rate	2M | 6M | 34M | 45M | 140M
Alarm Master Mask	CHANGE
Number of EP	2
End Points	(same as for new trail)
Number of main segments	1
Segment	(same as for new trail)
Number of Protected Segments	1 (only if protected)
Segment	(same as for new trail)

NOTE: This operation cannot be used to edit the trail name when the trail runs between two external NEs.

Deleting a Client Trail

The following is the syntax for deleting a client trail.

Description	Example
Action	***Del Trail***
Trail label	Trail 1
Trail Customer	EMS-SYNCOM
VPN-ID	VPN-1

OR

Description	Example
Action	***Del Trail***
Trail ID	Id 34
VPN-ID	CPN-1

Importing Trails from ASCII Files

To apply trail creation/deletion operations specified in ASCII files:

- From the Shelf View, Card Internals View or main menu, select **Trails ➔ Traffic Reconfiguration**.

  The window shown in the following figure opens.

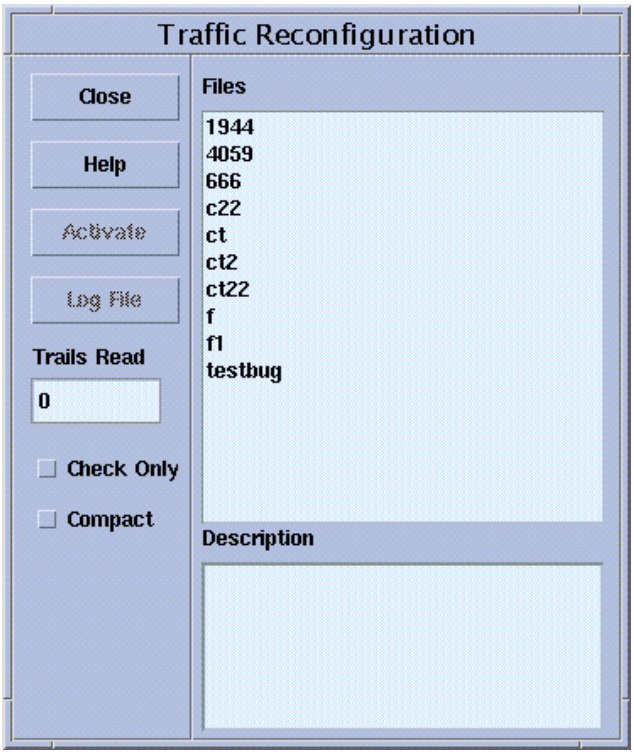

Figure 10-18. Traffic Reconfiguration Window

The ASCII files are displayed in the window. If you have created an ASCII file and it does not appear in this window, make sure that the file has been placed in the correct directory as described in Reconfiguration Files Path on page 10-38.

Use the scroll bars to view all files in the list, if all ASCII files do not fit in the list. As an alternative to scrolling and to facilitate finding a specific file quickly, enter the first letter of the file; the list focus moves to the first occurrence of the first typed letter (e.g., if you start typing P, the list tracks the first object starting with P). As you continue typing the name of the file, the list focus moves to the nearest match of the search string.

To implement a reconfiguration file:

1. Select the file from the Files list (file highlighted).
2. If you click the **Compact** button, the system will place client trails end points on occupied cards. If the **Compact** button is not selected, the system will try to place client trails end points on empty cards. Use this command to maximize the utilization of occupied cards (when selected), or to spread the trails among numerous cards in order to reduce dependence on a few cards (when unselected).

> **NOTE**: The **Compact** command only works if you did not specifically enter the end points in the ASCII file, as explained on page 10-40. If you specified an end point in the ASCII file, it will be implemented as specified regardless of the Compact command.

3. Click **Activate**.
4. Confirm when prompted.

An unsolicited summary message is displayed after the traffic reconfiguration is completed.

> **NOTE**: The execution of the entries in the ASCII file are performed one after the other, in the same sequence as they appear in the ASCII file.
> Using the traffic reconfiguration function requires the Administrator security level.

To obtain a log file of the traffic reconfiguration:

- Each time you use the traffic reconfiguration from ASCII file option, a log file is created with the reconfiguration results. The log file is stored with the same name as the ASCII file, but with the LOG extension.

  Click **Log File** to view the log file; an example is shown in the following figure.

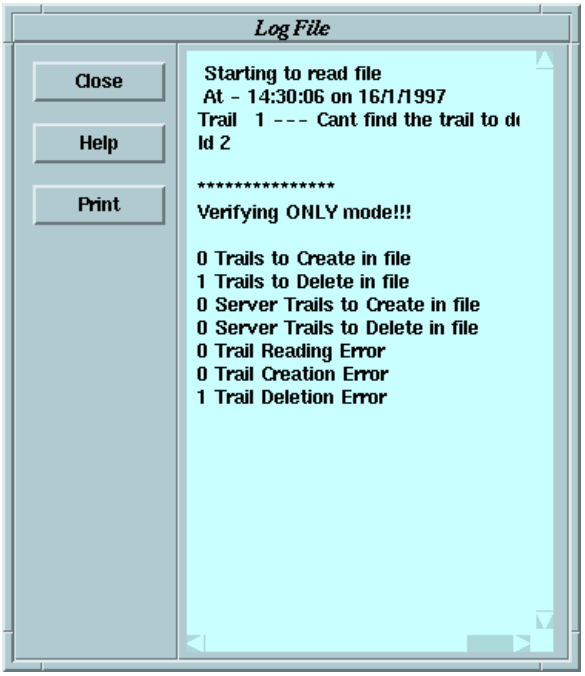

Figure 10-19. Log File Window

It is possible to test a reconfiguration ASCII file without applying the actions specified by it.

To test a reconfiguration file:

1. Select the file from the Traffic Reconfiguration window (shown in Figure 10-18.
2. Click the **Check Only** box.
3. Click **Activate**.

A message with the results is displayed; the following is as example:

```
x trails to create in file

x trails to delete in file

x Server trails to create in file

x server trails to delete in file

x trail reading error

x trail creation error

x trail deletion error
```

Reconfiguration Files Backup

You can use the Store ASCII Files command from the Root Menu (see Appendix A) to copy all traffic reconfiguration files from the `~enm/ENMTrails` directory to diskette.

11

Security Functions

Overview

EMS-SYNCOM security management is extremely flexible. The system features a non-rigid structure that allows the customer to set up a hierarchy to best serve the needs of the organization.

NOTE: All EMS-SYNCOM security functions, except changing personal passwords, can be executed only by the administrator. They cannot be assigned to other Users.

EMS-SYNCOM is supplied with four preset User groups:

- **Administrator** – This contains a single user, admin. No other user can be added to this group. **The user admin does not have a preset password.** The administrator can perform all EMS-SYNCOM security operations, while Users can only change their own passwords. This group cannot be deleted, and its name cannot be changed.
- **Maintenance, Provision, and Minimum** – The EMS-SYNCOM system is shipped with these three groups empty. The administrator can change their names, assign capabilities, and allocate Users to groups. The groups themselves cannot be deleted.

NOTE: It is strongly recommended to set a password for the administrator immediately after receiving the EMS-SYNCOM. Thereafter, change the password periodically. This standard procedure prevents unauthorized use of EMS-SYNCOM.

Managing User Access

A user in the context of this manual is someone authorized to use the EMS-SYNCOM. This is not related to whether or not they are a user of the UNIX system on which the EMS-SYNCOM application runs.

Adding a New User

The system administrator can add a new user to the EMS-SYNCOM. To add a new user.

1. From the Shelf View, select **Security ➔ Users**,
   OR
   From the main menu, select **Security ➔ Users**.

   The following window opens:

Figure 11-1. The Users Maintenance Window

2. The **User Name** field lists all Users currently defined in EMS-SYNCOM. Click the **Add** button. The following window opens:

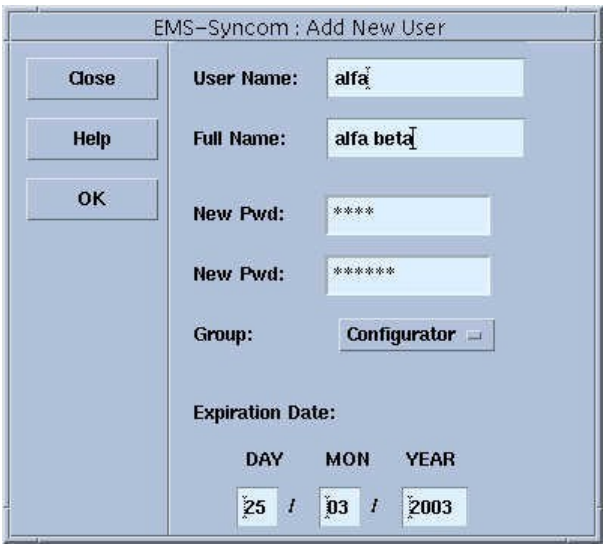

Figure 11-2. The Add New User Window

3. In the **User Name** box, type a name to be used by this user to log into the EMS-SYNCOM system (not necessarily the actual full name of the user).
4. Type the user's full (real) name in the **Full Name** box.
5. Enter a password for the new user in the first **New Pwd** box. For security reasons, the passwords you type are not displayed on the screen. You can decide whether you want to use one password, e.g. "password", for all Users, and instruct them to change their passwords immediately.
6. Enter the password again in exactly the same way in the second **New Pwd** line. If the two passwords you typed differ in any way, the text boxes are cleared and you have to repeat the procedure.
7. Click the **Group** button to assign the new user to a group. A list of available groups appears.

NOTE: A group in the context of EMS-SYNCOM is a set of Users with the same capabilities within the system. Assigning a user to a group determines the capabilities he or she is entitled to within EMS-SYNCOM.

---

8. Click on the desired group.

9. Click the **Day**, **Mon** and **Year** fields of the **Expiration Date** item to enter a password expiration date. When the expiration day comes to pass, the user will receive a window prompting them to change the password due to the default expiration time The maximum time to expiration is set when logging in the UNIX see Startup Configuration Options on page 2-14.

NOTE: If a user attempts to log into the EMS-SYNCOM system while his or her password has expired, they are given one chance to change the password. If the user does not change their password, they must go to the administrator. The administrator can then renew the password and its expiration date, using the **Edit** option in the Users Maintenance window.

---

10. When you are satisfied with your entries, click **OK** to accept the settings and close the window. If you click the **Close** button, your changes are not executed.

Deleting a User

The system administrator can delete or edit a user in the EMS-SYNCOM system.

To delete a user:

1. From the Shelf View, select **Security ➔ Users**,
   OR
   From the main menu, select **Security ➔ Users**.

   The Security-Users window opens.

2. Select the name of the user you want to delete and click **Delete**.

3. Confirm your action when prompted to do so.

Editing a User

To edit a user:

1. Select the user in the Security-Users window and click the **Edit** button. The Edit User window opens:

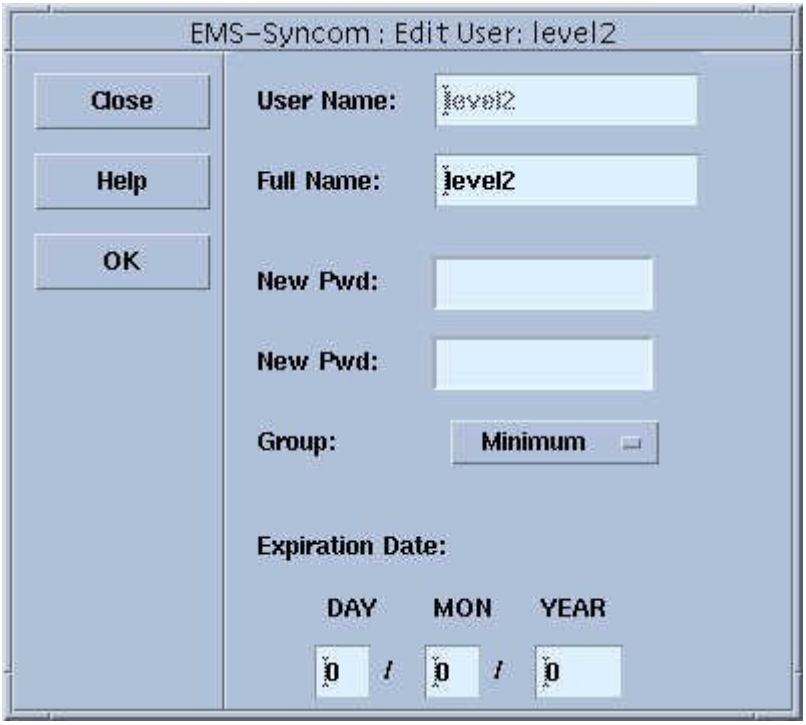

Figure 11-3. The Edit User Window

2. Make the relevant changes.
3. To accept your changes and close the window, click **OK**.

If you click the **Close** button, your changes are not executed.

Managing User Groups Access

A group is a set of Users with the same capabilities assigned to them within the EMS-SYNCOM system. The administrator can create new groups or delete groups.

Creating/Editing User Groups

To create/edit user groups:

1. From the Shelf View, select **Security ➔ Groups**,
   OR
   From the main menu, select **Security ➔ Groups**.

   The Security-Groups window opens as shown in the following figure. It displays the User groups already defined in the system.

Figure 11-4. The Security-Groups Window

2. To add a new User group click **Add**. To edit User group data, select the existing group and click **Edit**. The Add New User Group/Edit User Group window (shown in Figure 11-5) opens with the cursor positioned in the Group Name window.

3. If creating a new group, type a name for the new group.

Figure 11-5. Add/Edit User Group Window

Assigning User Group Capabilities

The administrator can use the Capabilities function to define which EMS-SYNCOM activities the members of the User group may carry out. Capabilities cannot be assigned to individual Users. The administrator cannot change the capabilities of pre-defined (default) EMS-SYNCOM groups.

NOTE: The administrator cannot change the capabilities of the pre-defined User groups supplied as default with the system. The default User groups are: Administrator, Maintenance, Provision, Minimum.

To assign group capabilities:

1. You can assign one or more of the following functions to a group, in the Add/Edit User Group window:
   - **View:** Authorizes the group to use the **Open function** to obtain the various system views.
   - **Alarm Log Function:** Authorizes the group to use alarm log and current alarm operations.
   - **Assign Severity:** Authorizes the group to set alarm severities.
   - **Performance:** Authorizes the group to use performance monitoring operations.
   - **NE Configuration:** Authorizes the group to perform add, delete and move operations on NEs.
   - **Configuration:** Authorizes the group to change object attributes, e.g. thresholds, NE names, etc.
   - **Trails:** Authorizes the group to add new trails and edit existing trails.
   - **Maintenance:** Authorizes the group to use the functions in the Maintenance menu.
2. Click the **Capabilities** radio buttons corresponding to the functions you wish to assign to the group.
3. Repeat for all functions.

4. For the Multi-Configurator feature, make the following additional selections:

   Check the **Global Access** box (located at the bottom of the window) to enable access to all NE groups.

   To limit access to a specific NE group(s), select the NE group(s) from the Element Group List and click the --> button. The NE group(s) is added to the **Accessed Element Groups** list.

   To remove an NE group(s) from the **Accessed Element Groups** (and restrict access to this group), select the NE group(s) and click the <-- button.

5. Click **OK** to update the EMS-SYNCOM database.

6. To exit this window, click the **Close** button.

7. To view the capabilities assigned to all User groups in the system, select **Security ➔ Capabilities** in the Shelf View,
   OR
   Select **Security ➔ Capabilities** from the main menu.

   The following window opens.

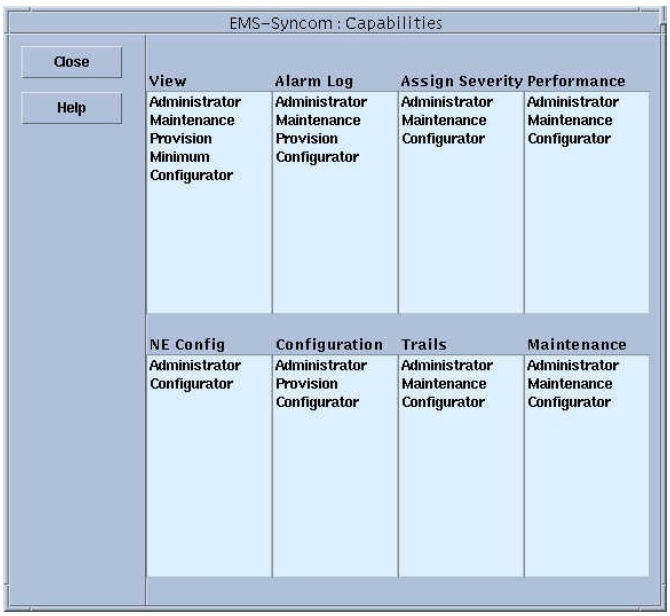

Figure 11-6. The Capabilities Window

To Edit a User Group

To edit User group data, select the User group from the Security-Groups window and click **Edit**. The Edit User Group window (shown in Figure 11-5) opens. Make changes in this window as desired.

NOTE: If you attempt to edit one of the default User groups supplied with the system, the Edit User Group window opens, however the **OK** button is disabled and you cannot make changes.

The Security Token Feature

Configuration rights for a specific SYNCOM NE can only be assigned to one User at a time. The NE's configuration rights status is referred to as the security token.

A SYNCOM NE is assigned one of the following token states:

- **FREE**: The NE currently has no 'owner' and the token is available.
- **MINE**: The NE is currently 'owned' by the current user.
- **BUSY (+ process ID)**: The NE is currently 'owned' by another user (the user's process ID is also displayed).

When a User attempts to gain configuration rights to a specific NE, and another User has acquired the security token, the Shelf View displays the words **Monitor only** next to the NE name. All relevant menu options are grayed out, preventing the User from performing any configuration operations.

To acquire the security token:

- From the Shelf View, select **Security ➔ Security Token ➔ Acquire**

NOTE: When a user opens the shelf view, the user aquires all available tokens, automatically.

If a token is being held by another user. the Shelf View displays **Monitor only.** If a token becomes available, the Shelf View displays **Config Token available.**

To release the security token:

1. From the Shelf View, do the following:
   - Select **Token Security ➔ Token Release**
     A confirmation message is displayed.
   - Confirm the message.
     The token is released.

   OR

2. From the main menu, do the following:
   - Select **Security ➔ Token List**,
     The following window opens:

Figure 11-7. The Security - Tokens Window

   - Select the **Busy** NE and click **Release**.
     A confirmation message is displayed to the *user that is holding the token*.
     If the user (holding the token) confirms, then the token is released. If the user denies permission, then the token is not released.

Administrator Login

If you are an Administrator attempting login, and another Administrator is logged in, the following message is displayed:

```
User Admin is already logged in on host host_name
Do you want to log him out?
```

If you select **Yes**, the other user will then receive the following message on his/her monitor.

```
User <user_name@station_name> requests to login. OK to
logout?
```

If the other user answers **Yes**, then you can log in.

If the other user answers **No**, or is unable to answer during an ongoing operation, your login request is rejected and an appropriate message is displayed.

After the Multi-Configurator Message Time Out elapses, the following message is displayed: `User admin @ host_name is in the middle of transaction`. The Multi-Configurator Logout Default timer starts counting, and the time remaining is displayed in the title bar of all relevant stations. These timers are among the startup options described in see Startup Configuration Options on page 2-14. After the Multi-Configurator Logout Default timer elapses, your request for configurator rights is granted, ☑ CheckBox1 and the other Administrator is forced to log out.

Changing a Password

This option allows EMS-SYNCOM Users to change their current passwords. This is a security function available to all Users.

NOTE: This function is only available for the user currently logged in to the system. You cannot change a password for other Users in this option.

To change your password:

1. From the Shelf View, select **Security ➔ Passwords**,
   OR
   From the main menu, select **Security ➔ Passwords**.

   The following window opens.

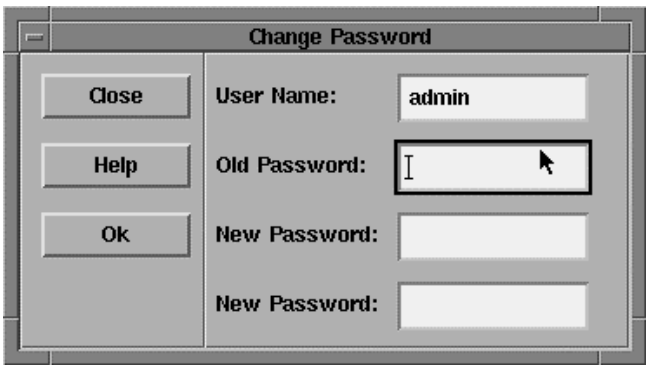

Figure 11-8. The Change Password Window

2. Click on the **Old Password** field and type in your current password. For security reasons, passwords are always as stars (***) and the screen does not display what you are typing.
3. Click consecutively on the two **New Password** text fields.
4. Type your new password twice in an identical manner. If the two passwords differ in any way, the text boxes are cleared and you have to repeat the procedure.
5. To accept your changes, click the **OK** button.

Viewing the Current Users List

NOTE: Only the administrator can access the Users List.

The Users List window displays the Users currently recognized by the EMS-SYNCOM.

To access the current Users List:

- From the Shelf View, select **Security** ➔ **Users List**,
  OR
  From the main menu, select **Security** ➔ **Users List**.

The Users List window opens.

This window allows you to send a message to EMS-SYNCOM Users. First select the Users to which to send to and the host (if applicable). Write the message into the Note Area and click **Send**.

A User Message window opens. After the message is successfully sent, use this window to send additional messages or click **Close** to exit the window.

To force a User to log out:

- First select the user to which to send to and the host (if applicable). Click the **Logout** button.

12

Logging Out

Logging Out Without Exiting EMS-SYNCOM

The Logout function should be used every time you intend to leave your station unattended. This prevents unauthorized use of your workstation under your name.

When you log out, all windows are closed, all functions are grayed out, and the EMS-SYNCOM Login window opens.

To logout from EMS-SYNCOM:

- From the Shelf View, select **System** ➔ **Logout**,
  OR
  From the main menu, select **System** ➔ **Logout**.

This logs you out from EMS-SYNCOM, but does not exit the application.

To resume work at your station, log into EMS-SYNCOM by typing your name and password.

Exiting EMS-SYNCOM

NOTE: Only the administrator can use this function. It cannot be assigned to other Users.

To exit EMS-SYNCOM:

- From the Shelf View, select **Exit ➔ Exit EMS-SYNCOM**,
  OR
  From the main menu, select **Exit ➔ Exit EMS-SYNCOM**.

Locking EMS-SYNCOM

Automatic Screen Lock

When the EMS-SYNCOM workstation is not used for a preset period of time, the system locks automatically. All options are grayed out, and the **Login** window opens. Work can only be resumed by entering the User's name and password. This is intended to prevent unauthorized use of the EMS-SYNCOM terminal during the operator's absence.

The automatic screen lock time is set during the system startup, as described in Startup Configuration Options on page 2-14 of this manual. The time is adjustable from 15 minutes to 1000 minutes.

Manually Locking an EMS-SYNCOM Workstation

To manually lock EMS-SYNCOM:

- From the Shelf View, select **Security ➔ Lock EMS-SYNCOM**,
  OR
  Click the Lock icon in the toolbar,
  OR
  From the main menu, select **Security ➔ Lock EMS-SYNCOM**.

All windows currently open are closed, all options are grayed out, and the Login window opens.

NOTE: If the User who locked the workstation logs back in again, the system resumes the previous session and returns the User to where they left off before locking the system. If it is a different User, the system returns to the set of capabilities granted to that User.
If Logout was used to end the session, it cannot be resumed even if the same User logs in.

13

System Management Functions

Overview

EMS-SYNCOM provides a series of useful functions for comprehensive system management. The following sections describe these functions in detail. Most of them can be executed only by the administrator.

Saving the Current Network and Security Configurations

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

The EMS-SYNCOM system always keeps a backup copy of the current configuration. The backup file contains the following information:

- A list of the network elements managed by EMS-SYNCOM.
- The connections between NEs.
- Trail related information
- Security information.

Any change made to the system configuration leads to an automatic backup of the configuration, if the synchronization mechanism was enabled in system startup (refer to Startup Configuration Options on page 2-14). This overwrites the configuration saved by the previous backup process.

You can save the current configuration whenever required. By saving the current configuration, you create a backup copy of the configuration manually.

To save the current configuration:

1. From the Shelf View, select System ➔ Configuration File ➔ Save to File, OR
   From the main menu, select **System ➔ Configuration File ➔ Save to File**.

   The following window opens.

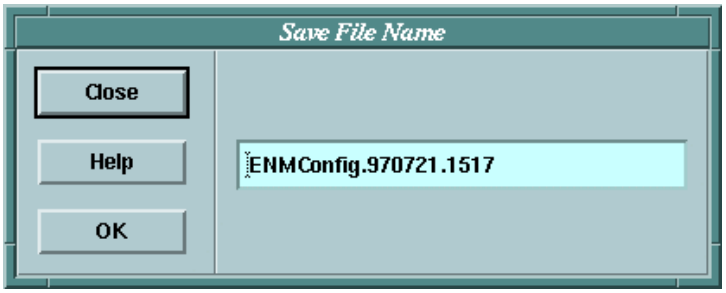

Figure 13-1. Saving a Configuration

2. Accept the default name (comprised of the date and time) suggested by the system, or enter a name for the backup file.
3. Click the **OK** button. The system saves the current configuration as a file under the name entered.
4. Confirm the operation in the displayed message box.

NOTE: The configuration files you save manually can be used later to restore a specific configuration. On the other hand, the configuration files that are saved automatically provide only the most recent configuration available. The User has the opportunity to restore a manually saved configuration during the EMS-SYNCOM startup procedure (see Starting EMS-SYNCOM on page 2-11).
For a more comprehensive backup procedure, it is recommended to accompany the Save Configuration operation with a Get DB from NE operation (see Updating all NEs in a Network on page 13-7 for details). This will allow restoring the entire network configuration, even in the event of a damaged database in the NE NVM.

Import SDH Trails

NOTE: The Import SDH Trails command can be performed in Monitor Mode only.

The Import SDH Trails command erases the database in the Monitor station and imposes a database from a backup configuration file (on the local station's hard disk) or from a configuration file on a remote EMS-SYNCOM station.

When the Import SDH Trails action is chosen, any trail which exists in the network will enter the Monitor station's database in full, including the trail customer information and trail label. Any trail which does not exist in the network is overlooked.

At the end of the Import Trail process, the EMS-SYNCOM compares the trails in the network with the trails in the database that was imported and colors the trail reconstruction flag red if there are inconsistencies. When this occurs, the operator must perform Trail Reconstruction.

The Import SDH Trails command requires that the topology map in the Monitor station match the topology of the imported configuration file. If there is a mismatch, the user will be informed. In the event that this occurs, it is required to exit the EMS-SYNCOM and restart it with the imported configuration file in order to update the topology map as well (in this case there is no need to perform the Import SDH Trails action).

Import SDH Trails from the Local Station

To import SDH trails from the local station:

1. From the Shelf View select System ➔ Configuration File ➔ Import SDH Trails ➔ From Local,
   OR
   From the main menu, select **System ➔ Configuration File ➔ Import SDH Trails ➔ From Local**.

   The following window opens.

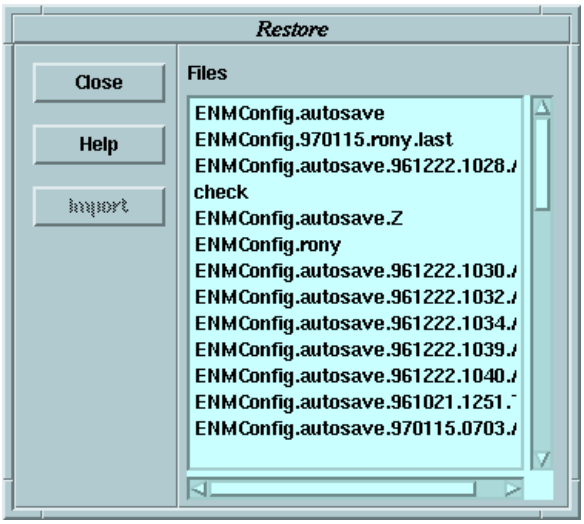

Figure 13-2. The Restore Window

2. Select the backup file to import and click the **Import** button. Confirm when prompted. A message window opens, at the end of the import process, to notify the results of the import process.

Import SDH Trails from a Remote Station

To import SDH trails from a remote station:

1. From the Shelf View, select System ➔ Configuration File ➔ Import SDH Trails ➔ From Network,
   OR
   From the main menu, select **System ➔ Configuration File ➔ Import SDH Trails ➔ From Network**.

   The following window opens.

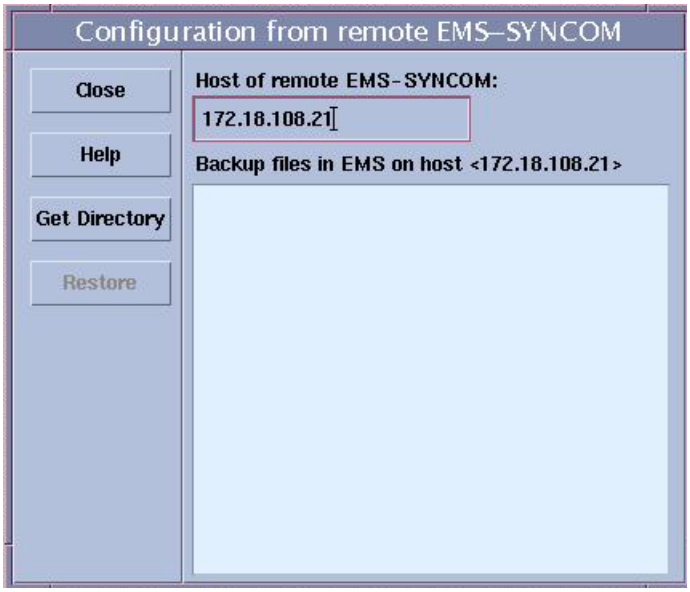

Figure 13-3. Configuration from Remote EMS-SYNCOM

2. To obtain a list of all saved configuration files at the remote station: enter the name of the EMS-SYNCOM station or its IP address in the Host of remote EMS-SYNCOM field. Press **Enter** or click the **Get Directory** button.

   The local station will contact the remote EMS-SYNCOM, retrieve a directory listing of all saved configuration backup files and display them in the list.

   During the above process, an in-progress indicator window opens which enables you to abort the process if desired.

3. In order to obtain a file and import trails from it, select a file from the list and click the Import button or double click on the file.

   The local station again contacts the remote EMS-SYNCOM, copies the selected files into the local station's configuration files directory and starts importing trails from the file(s).

   During this process, the same in-progress indicator window described previously opens.

Upgrading NE Software

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

The NE software is resident on the non-volatile memory (NVM) on the NE MCP4 card. The administrator can update the NE software via the EMS-SYNCOM, by downloading the software from the EMS-SYNCOM disk.

CAUTION: The NE software upgrade processes, should only be performed by qualified personnel. Inappropriate use of this procedure can cause damage both to the traffic and the network management. Be sure to consult ECI Telecom's customer support prior to performing the operations described in these sections!

Updating the EMS-SYNCOM Disk

To copy new NE software versions from diskettes to the EMS-SYNCOM hard disk:

- From the Shelf View, select System ➔ NE SW Change ➔ Update EMS-SYNCOM Disk ➔ From diskette,
  OR
  From the main menu, select **System ➔ NE SW Change ➔ Update EMS-SYNCOM Disk ➔ From diskette**.

Continue as instructed by EMS-SYNCOM.

To delete old NE software versions and NE DB backup files from the EMS-SYNCOM hard disk:

1. From the Shelf View, select System ➔ NE SW Change ➔ Update EMS-SYNCOM Disk ➔ Delete from Disk,
   OR
   From the main menu, select **System ➔ NE SW Change ➔ Update EMS-SYNCOM Disk ➔ Delete from Disk**.
2. Select the software version or NE DB you wish to delete and click **OK**.

Updating all NEs in a Network

To update all NEs in a network:

1. From the Shelf View, select **System ➔ NE SW Change**,
   OR
   From the main menu, select **System ➔ NE SW Change**.
2. To update the software on all NEs of the network, select the **Network** option from the cascade menu. The following window opens:

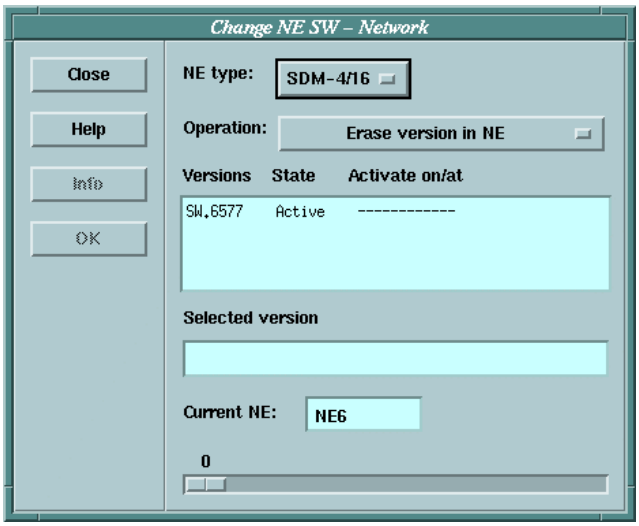

Figure 13-4. The Change NE SW – Network Window

3. Click on the **NE Type** field to select one of the supported NE types.
4. Click on the **Operation** field to select one of the following options:
   - **Load version to NE:** This loads the software from the EMS-SYNCOM to each NE.
   - **Erase version in NE:** This deletes an inactive version stored in each NE to make room for the new one.
   - **Set version activation time:** This sets the time when the new version is to become effective.
   - **Cancel planned activation:** This cancels the activation time set for a certain software version to become effective.
   - **NE version correspondence check:** This checks if all NEs of the same type store the same software version in their NVMs.
   - **Get DB from NE:** This uploads the database from the NE NVM to the EMS-SYNCOM, for backup purposes. Only one DB file may be saved per NE software version. Repeating this operation will replace the existing DB file.
   - **Load DB to NE:** This downloads a backed-up database from the EMS-SYNCOM to the NE NVM.

   The **Versions** field of this window presents a list of all software versions currently stored in the EMS-SYNCOM disk or in the NE NVM, depending on the selected operation.

   To select one of these versions, click on the desired version. The version's name appears in the **Selected Version** box.

   To get information on the selected version, click the **Info** button in the Change NE SW - Network window.

NOTE: Be sure to consult ECI Telecom's customer support prior to performing the operations described in these sections.

Updating a Selected NE

To update the software on a selected NE:

- From the Shelf View, select **System ➔ NE SW Change ➔ Selected NE**,
  OR
  From the main menu, select **System ➔ NE SW Change ➔ Selected NE**.

The window that now appears is similar to the one in Figure 13-4, but for an individual NE.

NOTE: You can perform actions involving a single NE, i.e., load a version from the EMS-SYNCOM to the NE, erase a software version in the NE NVM, or copy the database from the NE NVM to the EMS-SYNCOM.
Be sure to consult ECI Telecom's customer support prior to performing the operations described in these sections.

Using Ping to Test EMS-SYNCOM-NE Communications

The **Ping** function is used to initiate a signal from the EMS-SYNCOM to the selected NE. By comparing the signal sent with the signal received in return from the NE, the EMS-SYNCOM can evaluate the quality of its network connection to the NE.

To use the Ping function:

1. From the Shelf View select **System ➔ Ping**,
   OR
   Select the NE in the topology view, and from the main menu, select **System ➔ Ping**.

   The following window opens:

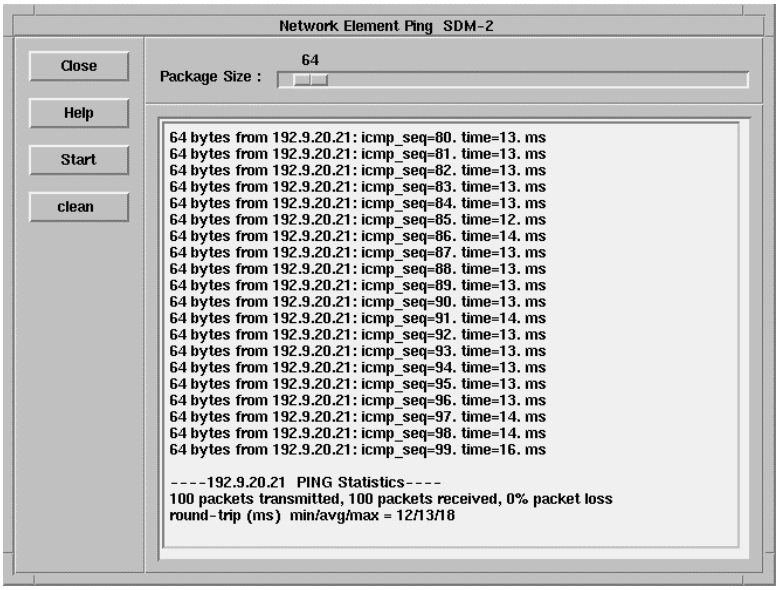

Figure 13-5. The Ping Window

2. To clear the list of results from the previous Ping session, click the **Clear** button.

3. To select the packet size in bytes, click on the slider in the **Package Size** field. The standard value is 64 bytes.

NOTE: The **Stop/Start** button toggles between **Stop** and **Start**. It is **Stop** when the window opens.

---

4. To stop transmitting packets, click the **Stop** button.

5. To resume the transmission of packets, click the **Start** button.

   The Ping summary provides the following information:

   - The addresses of specific NEs and the data bytes sent are shown at the top of the list.
   - Each line shows the number of bytes received and the approximate duration of the signal cycle.
   - The PING Statistics box at the bottom of the window summarizes the total number of pings transmitted/received, the percentage of packets lost, and the minimum, average and maximum time for the round trip to perform.

Setting the NE Password

NOTE: This feature is a configuration option. It can be used if you set the **Network Element Password** configuration option to **YES** (see Startup Configuration Options on page 2-14).

The NE Password feature is intended as a security feature that prevents unauthorized users from performing configuration changes on the NE. When an NE password is assigned, Users that attempt to perform configuration changes on the NE via ECI Telecom's Element Manager must submit the NE password prior to making the configuration change.

To set the NE password:

1. From the Shelf View, select **System ➔ NE Password**,
   OR
   Select the NE icon in the main window, and then from the main menu, select **System ➔ NE Password**.

   The following window opens.

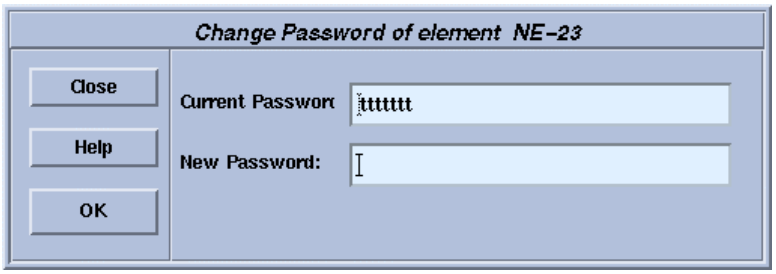

Figure 13-6. Setting the NE Password

2. Enter the NE Password in the **New Password** field and click **OK** to confirm. The Current Password is also listed in this window; should one of the network operators forget the NE password, the administrator can look it up in this window.

Uploading Network Element Configuration Data

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

When a communication problem occurs between the EMS-SYNCOM and NEs, the EMS-SYNCOM initiates a process to restore communication and upload NE data. However, the administrator can invoke this process manually for a selected NE.

To upload NE data manually:

- From the Shelf View, select **System ➔ Upload NE Data**,
  OR
  Click on the required NE, and from the main menu, select **System ➔ Upload NE Data**.

The NE LED turns blue as long as the NE data upload is in progress.

The Notepad

Every EMS-SYNCOM User has access to his or her own notepad enabling him or her to type personal notes or reminders.

To use the Notepad function:

1. From the Shelf View, select **System ➔ Note Pad**,
   OR
   From the main menu, select **System ➔ Note Pad**.

   The following window opens.

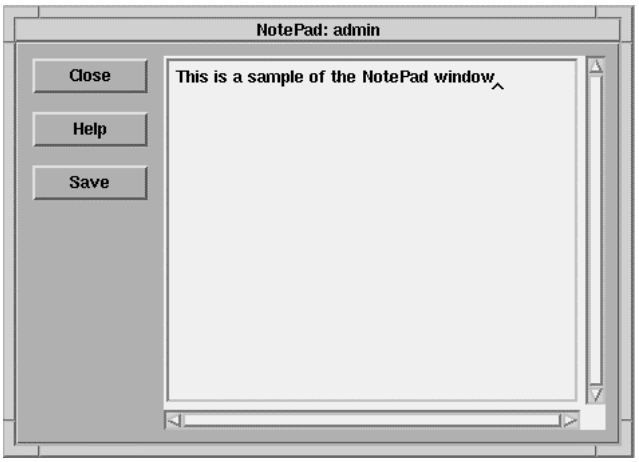

Figure 13-7. The NotePad Window

2. Click the mouse pointer in the text field and start typing your notes.
3. To save your notes, click the **Save** button.
4. To exit the window, click the **Close** button.

The Bulletin Board

The **Bulletin Board** function provides an on-screen bulletin board where each User can write and read its contents.

To use the Bulletin Board:

1. From the Shelf View, select **System ➔ Bulletin Board**,
   OR
   From the main menu, select **System ➔ Bulletin Board**. The Bulletin Board window opens.
2. You may read the contents in the Notes area and type your own notes in the **Add Note** area.
3. Click **Add** to add your note to the Notes area.
4. When ready, click the **Close** button to exit the window.

Icon Setup

The User can customize the toolbar displayed on the EMS-SYNCOM main window and determine which of the icons are displayed. The toolbar settings are saved individually for the user; after logging out, the customized toolbar is displayed the next time the user logs in to the EMS-SYNCOM.

To customize the EMS-SYNCOM toolbar:

1. From the main menu, select **System ➔ Icons Setup**.

   The icons which are currently selected to appear in the toolbar are displayed in the **Current** box, on the left-hand side of the window. The icons which are currently selected not to appear in the toolbar are displayed in the **Options** box, on the right-hand side of the window.

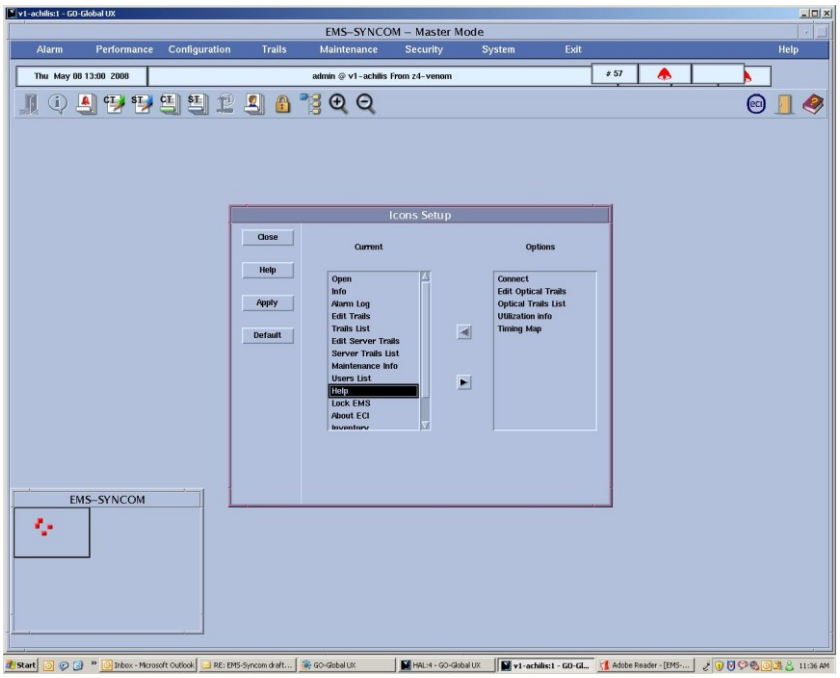

Figure 13-8. Icon Setup Window

2. To add an icon to the toolbar, select the icon in the **Options** list and click .The icon is now displayed in the **Current** box.

3. To remove an icon from the toolbar, select the icon in the **Current** list and click . The icon is now displayed in the **Options** box.

4. Click **Apply** to implement the changes immediately.
5. Click **Default** to set the toolbar to its default state, which includes all toolbar icons.

Refer to The Toolbar on page 3-4 or a description of the toolbar icons.

Accessing the Unix Window

NOTE: Only the administrator can use this function. It cannot be assigned to other users.

The administrator can switch to the Unix window at any given time, in order to perform system procedures at the operating system level.

To switch to the Unix window:

1. From the Shelf View, select **System ➔ Unix Window**,
   OR
   From the main menu, select **System ➔ Unix Window**.

   A Unix window opens with the operating system prompt inside.

2. To get back to EMS-SYNCOM, click anywhere on the EMS-SYNCOM main screen.

Changing the EMS-SYNCOM Mode

NOTE: Only the administrator can use this function. It cannot be assigned to other users. Only one EMS-SYNCOM connected to a network can operate in the **Master** mode.

This function toggles the EMS-SYNCOM mode of operation from Master to Monitor and vice-versa. The Monitor mode differs from the Master mode as follows:

- During a trail reconstruction, it does not attempt to modify any trails, even obviously incorrect ones.
- It does not allow to create or edit trails.
- Master mode does not allow the user to import a saved configuration file (see The Startup Screen on page 2-12). The EMS-SYNCOM must be in Monitor mode to do this.
- Cannot function as a clock master, updating all NEs with the time of day.

To change the EMS-SYNCOM mode:

- From the Shelf View, select **System ➔ Change Mode**,
  OR
  From the main menu, select **System ➔ Change Mode**. The mode is toggled.

NOTE: Before changing the EMS-SYNCOM mode from Monitor to Master mode, check the trail consistency flag in the main window. If it is red and the topology in the Monitor station matches that of the Master station, perform an Import SDH Trails operation (see Import SDH Trails on page 13-3) based on the Master station's latest available configuration file, before changing the EMS-SYNCOM mode.
If the flag continues to be red after this operation is performed, or if the Monitor station's topology does not match that of the Master station, you must exit the Monitor EMS-SYNCOM application and re-start it based on the Master station's latest available configuration file (see The Startup Screen on page 2-12 and Starting from a Remote EMS-SYNCOM on page 2-20, and subsequently run Trail Reconstruction while still in Monitor mode. Only then should you change to Master mode.

Viewing Login History

NOTE: Only the administrator can use this function.

It is possible to view the history of login and logout activities at the EMS-SYNCOM station.

To view the login history:

- From the Shelf View, select **System ➔ Login History**,
  OR
  From the main menu, select **System ➔ Login History**.

The following window opens, with a list of the login history files and the size of the file in bytes.

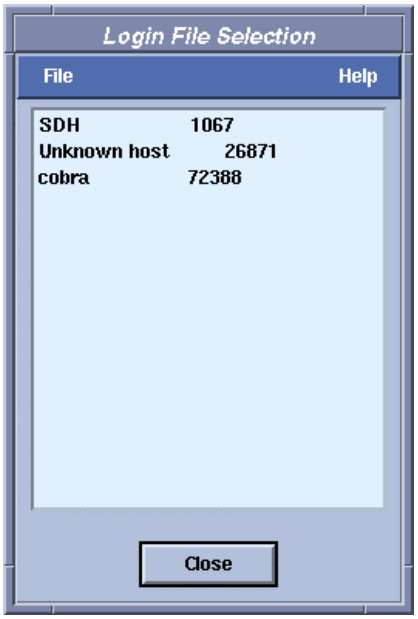

Figure 13-9. Login File Selection

By default, the file names listed in this window reflect the EMS-SYNCOM station for which the log file was generated. However, the file name can also be a name assigned by the user to a merged file.

To delete one of the login history files:

- Select the file and then **File ➔ Delete** from the Login File Selection window menu.

To merge several files into one file:

- Select the files to merge (by Shift-clicking each one), and then select **File ➔ Merge** from the Login File Selection window menu.

  Select **File ➔ Save** the Login File Selection window menu and enter the name of the new file.

To view one of the Login History files:

- Double click on one of the files in the Login File Selection window, or select a file and then **File ➔ Browse** from the Login File Selection window menu.

  The following type of window opens.

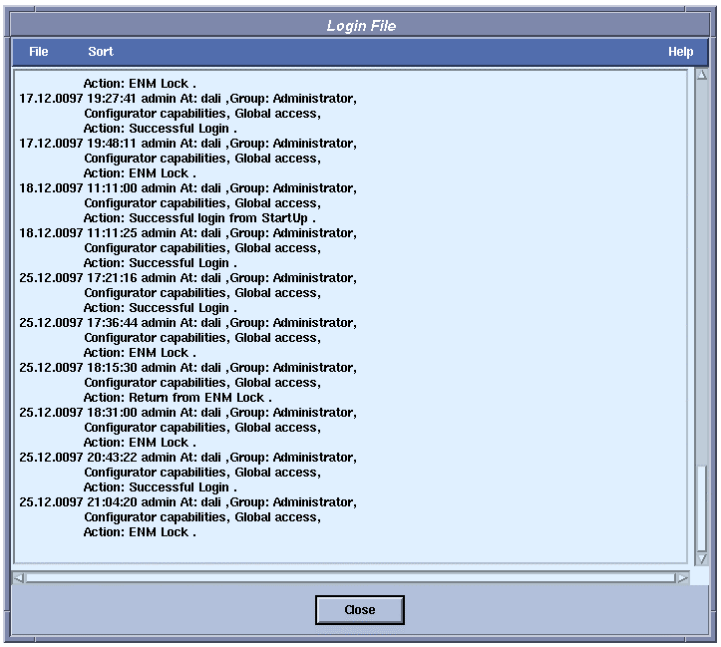

Figure 13-10. Login File Window

This window displays the user who logged in/out, the time and date of the login, and the result of the log attempt.

To sort the Login File Window:

You can sort the Login History window, according to one of the following sort orders, by selecting an option from the Sort menu.

The following sort orders are available:

- **By User** Sorts the window in alphabetical order, according to the user name who registered the log activity.
- **By Host** Sorts the window in alphabetical order, according to the name of the host at which log activity was registered.
- **By Time** Sorts the window according to the time and date on which log activity was registered, with the most recent log actions first.

Viewing Log Actions

It is possible to view the history of a wide range of actions performed from the EMS-SYNCOM in an ASCII text file. Each of the actions in the log file are listed together with the time The action log file shows the date and time of occurrence and the user who performed the action. The following actions are logged in the action log file:

- Exit
- Close
- Create/delete/edit/reconnect/force reconnect client trails/server trails
- Join and Split operations
- Trail reconstruction
- Save configuration
- Import
- Traffic reconfiguration
- Change EMS-SYNCOM mode
- Init PM/TC/EP counters
- Send AIS, Upstream AIS, RDI
- Send TC actions
- Loopback

- Reset
- Protection Lockout
- Switch protection
- Slot assignment
- Delete NE
- Create NE/NE group
- Change NE attributes/Card/TP

Once the file becomes larger than a preset value (pre-determined and non-adjustable), the actionlog file is copied to a new file and a new actionlog file is created. Once the second actionlog file becomes larger than the preset value, the first file is erased and the new backup file is saved with that name.

To view the action log file:

1. From the Shelf View, select **System ➔ Action Log**,
   OR
   From the main menu, select **System ➔ Action Log**.

   The following window opens.

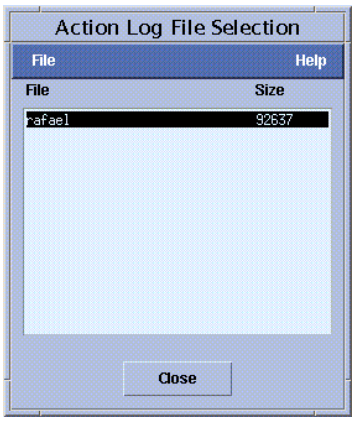

Figure 13-11. Action Log File Selection

2. Select the file from the list and select **File ➔ Browse** from the Action Log File Selection window.

   The following type of window opens with the contents of the action log file.

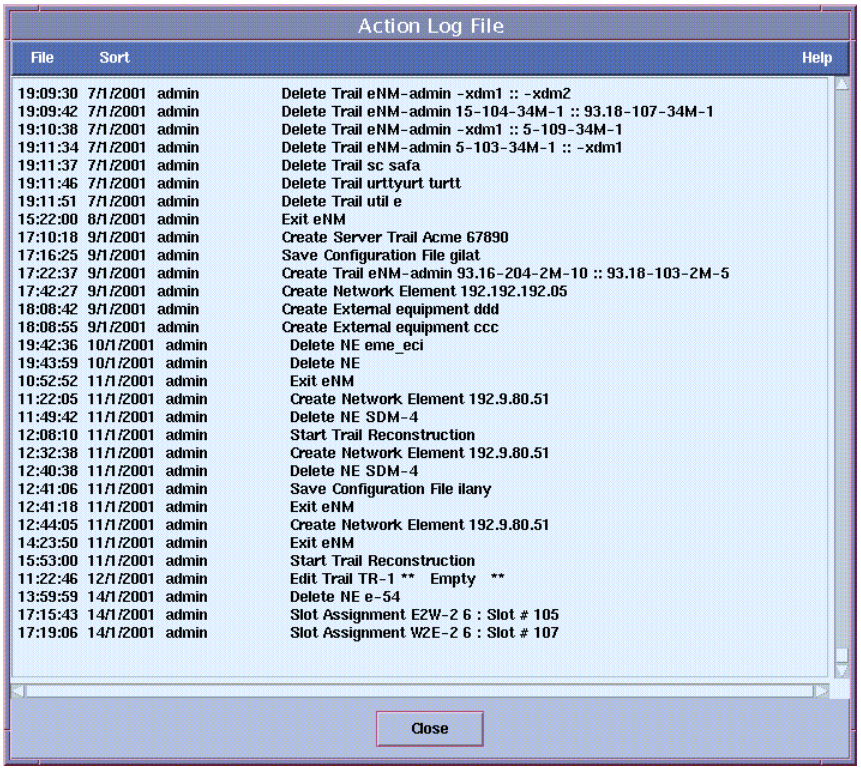

Figure 13-12. Action Log View

The Inventory Window

The Inventory window allows you to obtain a wide range of information regarding the network elements managed by the EMS-SYNCOM.

To display the Inventory window:

- Click the main toolbar icon,
  OR
  From the Shelf View, select **System ➔ Inventory Window**,
  OR
  From the main menu, select **System ➔ Inventory Window**.

The following type of window opens.

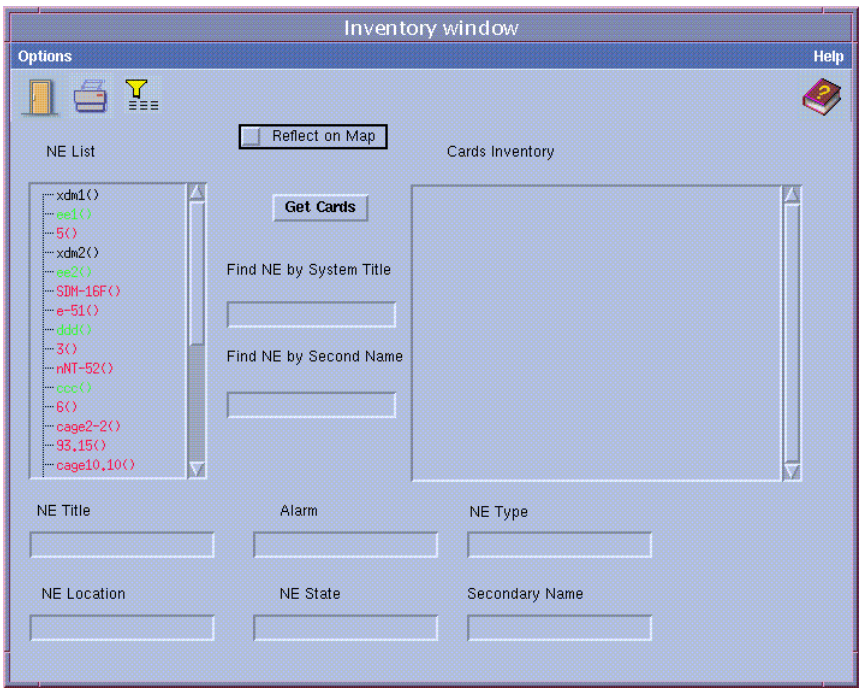

Figure 13-13. The Inventory Window

The NE List displays a list of all the network elements in the managed network; the name that appears in parenthesis is the NE secondary name (if one was defined). NEs are color coded according to alarm severity. NE groups are indicated by a plus sign (+) next to the group. Click the plus sign to expand the group; a minus sign (-) is displayed next to the group when the NEs that belong to it are shown (expanded). Click the minus sign to collapse the group. You can also right click (anywhere in the NE List) and select **Expand All** to reveal all NEs in the list. All selections made in the NE List are reflected in the main topology window (i.e., when you select an NE in the list, it is automatically selected in the topology map).

You can double click an NE in the Inventory window to open the NE Shelf View.

A number of read only fields display general information regarding the NE selected in the list view. This includes the NE title, alarm status, type, location and state.

Use the scroll bars to view all NEs if they do not all fit in the list. As an alternative to scrolling and to facilitate finding a specific NE quickly, you can search for an NE by name (title) or by secondary name. Enter the first letter of the NE title or secondary name in the **Find NE by System Title** or **Find NE by Second Name** fields; the list focus moves to the first occurrence of the first typed digit (e.g., if you start typing 1, the list tracks the first object starting with 1). As you continue typing the name of the NE, the list focus moves to the nearest match of the search string.

To obtain a list of cards in a single NE, double click the NE in the list. The Cards Inventory list displays the slot number, card type and version of the NE cards.

To obtain a list of cards in multiple NEs, select the NE from the NE list (or multi-select, for multiple NEs) and click Get Cards. The list of cards is displayed in the Cards Inventory list, on the right-hand side of the Inventory window, sorted by slot. The serial number of each card and the Combus associated with each card is also displayed in the Cards Inventory list. At the top of the list, a summary of the card inventory is displayed.

If you check the **Reflect on Map** box, all group expand and collapse actions made in the List View of the Inventory window are reflected in the main topology view (and vice versa).

The following icons are displayed at the top of the Inventory window.

To close the Inventory window.

To obtain a printout of the NE list.

To open the optional filter section of the Inventory window for applying filters to the cards list. Click this icon and select the card types to display by clicking the radio buttons at the bottom of the window. The cards list only displays the cards that match your selections.

To obtain a printout of the cards list, select **Option ➔ Print Cards** from the Inventory window menu or click the appropriate icon at the top of the Inventory window.

To obtain a printout of the NE list, select **Option ➔ Print NE List** from the Inventory window menu or right click anywhere in the NE list and select **Print** from the context sensitive menu.

Using SQL

NOTE: SQL is a cost option which must be ordered from ECI Telecom.

The EMS-SYNCOM SQL interface allows you to perform queries on the EMS-SYNCOM database. It is based on Raima's db_Query database query system.

SQL incorporates commands that let you define and display a relational view of the EMS-SYNCOM database. These commands allow conditional selection, sorting and reporting of database data.

To use SQL:

1. From the Shelf View, select **System ➔ Unix Window**,
   OR
   From the main menu, select **System ➔ Unix Window**.

   A UNIX window opens.

2. Type `sql.sh`.

   The following is displayed inside the Unix window:

```
db_Query Version 2.21 September 14, 1998
for use with Raima Data Manager V3.21
Copyright (c) 1986-1991 by Raima Corporation

Enter ? for list of interface commands
```

SQL Commands

The following commands are used to retrieve data from the database tables, described in Database Tables on page 13-36. Each command is described, with examples provided where relevant.

The Select Command

Retrieves selected data from the database tables.

Syntax

```
select [all | distinct] {*| expression [unique] ["att_hdg"]
[,expression [unique] ["alt_hdg"]]..}
[from viewname]
[where cond_expr]
[group by colref[,colref]..[having cond_expr]];
[order by colref [asc | desc] [,colref [asc | desc]]..];
```

Description

The select statement retrieves selected data from an EMS-SYNCOM database table. Output from a select consists of columns and rows from the record, set, or view; each column contains the result of an expression of data fields from that row.

The data to be retrieved is specified in a comma-separated list of columns following the select or select distinct clause. Each column (expression) can specify the name of a data field, and alias, or an expression involving data fields from the view being processed. The maximum number of columns that can be specified in a select is, by default, 48. To select all of the data fields in the view enter an asterisk (*) in place of the list of columns.

As each row is displayed, the values of each column are displayed, unless the column was specified as unique. The values of a unique column will be displayed only when the current value is different from the value in the preceding row.

The Distinct Clause

Following the select keyword, distinct can be specified to indicate that duplicate rows will only be reported once. The default is to report all rows. The presence of distinct may result in a much longer processing time for the query because a sort is performed in order to detect the duplicate rows. The distinct keyword can also be used in calculation functions but it must appear only once in any select statement.

The From Clause

The from clause specifies the name of the view (viewname) from which the date is to be retrieved. As used here, a view is one of the database tables.

The output from a select statement is paginated based upon the current set length value. The page header consists of a page number followed by column headings. Headings consist of either the specified expressions, or an alternate heading string for the column (alt_hdg), if specified. The display width of each field is the maximum field definition.

An example of the Select command using the From clause:

```
select neid , netype , ne_topology from netable;
```

The Where Clause

The where clause specifies a condition that must be satisfied (i.e., evaluated to TRUE) for a candidate row from the view to be reported. The conditional expression (cond_expre) involving comparisons of data fields and constants is formulated. If the select statement includes a group by clause, only those rows that satisfy the where clause participate in the grouping calculations. Key fields declared in the root record type of the view's path that are referenced in the conditional expression, can be used to speed retrieval of the root records.

An example of the Select command using the From and Where clauses:

To retrieve a list of PDH tributary cards installed in an NE and their slot locations:

```
select NELabel, ActualCard, Slot from EquipmentTable where
ActualCard is ("TR2-AB", "TR2-8", "TR2-8T", "TR2-16",
"TR2-16S", "TR2-16T", "TR2-16TS", "TR34", "TR45",
"TR140", "TR140W");
```

An additional example:

```
select equipid , slot , expectedcard from equipmenttable
where expectedcard = "TR2AB";
```

The Group by Clause

The group by clause defines a set of aggregate rows upon which computations are to be made. An aggregate consists of those rows that have identical values in the column references (col_ref) listed in the group by specification. The other selected columns should either have a constant value within each aggregate or be a computation involving use of one or more calculation functions. Only one row is reported for each aggregate resulting from the selection. A column reference can be either the number of the ordinal position of the column in the list, or the field or alias name (if a single field or alias is specified in the column). A column reference can also be a string matching a specified alternate heading.

The Having Clause

The having clause is similar to the where clause because it is used to conditionally select which resultant rows will be reported. The having conditional expression, however, is not evaluated until after the group by processing has been performed. The conditional expression is formed and will typically include comparisons that involve the calculation functions specified in the select column list.

The Order by Clause

The resultant rows of a select statement can be sorted using the order by clause (or the sorted by clause) to specify the columns on which the sort is to be performed, and to specify if those columns are sorted in ascending (default) or descending order. The column references (col_ref) are specified as in the group by clause. The first column listed will be the major sort column, the values in the second column will be sorted within each of the major column's values, and so on. Any key fields declared in the root record type that can produce the desired order will be scanned, thus avoiding the extra processing required to perform an external sort.

The Report Command

Defines a query report.

Syntax

```
report select
         [calculate colcalc[,colcalc]..]
         [into{terminal | printer |
               [ascii | dif] file filename | null}]
   [rep_format | using repform];

colcalc =
   [{sum | avg | min | max | count}
   (colref[,colref]..)
               ["row label"]]
   break on {(colref[,colref]..) | report}
               [{skip | page} [n]]

rep_format =
         [title as "report title"]
         [date as {today | "date string"}]
         [length = num]
         [width = num]
```

Description

The Report statement creates a report from the results of a select statement. Its clauses specify column calculations, column break actions, output of the report to other devices and formats, and the use of user-defined report forms.

An example of the Report command:

```
report select distinct segid, size from segmenttable into
terminal title as "Segment List Example " date as today;
```

Column Calculations

The calculate clause specifies calculations and report actions and includes them in the report. (Report actions are those performed on the values in columns resulting from a given select statement.) The calculations that can occur are:

- Sum of all aggregate column values
- Average of all aggregate column values
- Maximum of all aggregate column values
- Minimum of all aggregate column values
- Count of rows in aggregate

A calculation is specified by a calculation function name followed by a parenthesized list of column references (colref) on which the calculation is performed. The colref is either the column's ordinal position in the select column list, or the field name (e.g. "sum (3, 4)"). A report can have any number of calculations each separated by a comma. They are reported one line at a time in the same order listed in the statement.

The aggregate over which the calculation will be made is defined by the break on clause. The break on clause specifies a parenthesized list of select statement column references, where the aggregate is complete when any of the values of the listed columns change. Alternatively, the break on clause can specify report, which defines the aggregate as all column values for the entire report.

A break action can also be given to skip some specified number of lines or pages after the calculation results for that break are printed. The skip [n] clause skips n lines, or a single line if n is not supplied. Similarly, the page [n] clause ejects n pages, or a single page if n is not supplied.

If the break on clause lists colrefs (rather than report), the select statement should be sorted by the columns listed.

The break on clause can be specified even if there are no calculations to be made so that some lines or pages can be skipped when the values or the listed columns change.

When a specified column break occurs, a line of break separator characters is printed, followed by the results of the aggregate calculation. The name of the function is printed at the right hand side of the row. However, an alternate row label can be printed instead if it is specified immediately following the function specification in the statement. The break separator character can be modified using the set break separator command. If no calculations have been specified for a particular break, the row for break separator characters is not printed.

Output Alternate Devices and Formats

The into clause specifies an alternate output device and format. The possible devices are terminal, printer, file, or null. Normally all output is directed to the device assigned by the most recently invoked set output statement (terminal by default). The into clause overrides the current output device for the duration of the report.

Refer to the set output statement description for detailed information about the operation of each output device.

Formatting a Report

Four report formatting clauses allow you to define page headings and sizing of the standard report output. Note that theses clauses cannot be used with the using clause.

The title as clause specifies a report title centered at the top of each page of the report output. The centering point is based on the report width. Multiple-line titles can be defined by inserting a slash (/) between the lines of the title. The date as clause prints either the current date (date as today) for the specified string (which can be any text) on the left side of the first line of each report page. The current date is printed in the format “MON DD, YYYY” (e.g., “Jan 12, 1988”).

The length clause temporarily overrides the current set length value. It specifies the number of lines per page. If the output device is terminal, SQL displays the following prompt and requests that the user to enter either <RETURN> to display the next page of output or q<RETURN> to terminate the report.

Press <RETURN> to continue or q<RETURN> to quit.

To with clause temporarily overrides the current set width value. It specifies the width of the report page in columns. Output lines that are longer that the specified width are truncated. Report titles are centered based on the specified value, and default page numbering is right justified.

Using Report Forms

The using clause identifies a text file containing a report form that specifies how report results will be formatted.

Report forms consist of a group of sections separated by lines beginning with ‘%%’. The first section, the header section is output at the beginning of each new page of output. The next section is the detail section, which formats each row of the results of the select statement. To support column calculations, the form must also contain a break summary section for each break on clause specified in the report statement. The break summary sections must be defined in the order in which the break on clauses appear in the report statement. A footer section can be specified after all the required sections. The footer text is output at the bottom of each report page.

Column values are referenced either by the column (field) name or by their ordinal position in the select column list. They are prefixed by the symbol ‘@’, such as “@sale_id” or “@3”. The select statement column values can be referenced in the header of detail sections. The values referenced in the header are those current at the time the header is output. The values referenced in the detail section are output for each resultant row of the select statement. Column references in the break summary sections should match the column references specified in the calculation function used in the break clause. The break summary section is output when its associated break on occurs. The skip or page actions are taken after the section has been output.

Two special functions are provided for use in report forms. A %date reference can be specified in any of the report form sections to output the current date in the same format as date as today (i.e. "MON DD, YYYY"). A %page reference prints a page number; it can be specified in the header or footer sections.

The Set Printer Command

Set standard printer device.

Syntax

```
set printer = device;
```

Description

The set printer statement defines the standard printer device. The specified device would be used whenever a `set output = printer or a report … into printer` statement is processed.

For those systems that treat the printer device like a file, the set printer statement can be used to specify an alternate printer device name (or even a standard file) as the db_QUERY system printer.

On Unix systems, the printer device is the name of a program to which the output is piped. The default is the line printer spooler program, lp. The set printer statement can be used to specify any program into which you want to pipe SQL output. To print directly to the line printer without going through the spooler, issue a `set output = file "/dev/1p"` command.

Set Output Command

Set output device and format.

Syntax

```
set output = |terminal | printer |
    [ascii | dif] file filename | null);
```

Description

The set output statement specifies the output device and the format into which the output will be directed. The possible devices are terminal, printer, file, or null.

The terminal device is the standard video output device, typically the computer monitor. This is the output device that is current when the database is first opened.

The printer device is a system printer. How it operates depends upon the operating system, as described below in the set printer statement.

Output to a file can be written in three formats. The standard format (e.g., set output = file “query.rep”) sends output to the specified file just as it would appear on the screen. The screen displays data in fixed length columns with headings and pagination.

SQL provides two other formats that facilitate the export of data to other software packages (packages such as spreadsheets, word processors, or end-user database systems) The ASCII file format (set output = ascii file “query.asc”) outputs the data without headings or pagination and with one text line per row of output. The output shows column values written in comma separated fields with quoted strings. The dif file format (set output = dif file “query.dif”) outputs the data in DIF format.

The null device should only be used from within a C application.

Set Width Command

Sets width of output page.

Syntax

```
set width = columns;
```

Description

The set width statement specifies the width of the output page in columns. Output lines longer than the specified value are truncated. Report titles are centered, and page numbers are right justified based on the defined width The default width is
80 columns.

Show All Command

Show all operational parameters

Syntax

```
show all;
```

Description

The show all command displays to the terminal device all of the current settings for the SQL operational parameters specified using the set command. The output is always displayed on the terminal device regardless of the current output device setting.

The Help Command

Displays information about identifier.

Syntax

```
help {identifier | string} ;
```

Description

The help statement displays whether the specified identifier or string is the name of a field, record, set, alias, path/view, or macro (sting only). It lists any text associated with the identifier through a describe as clause. Once the type is known, you can use the appropriate show statement to display complete information about the item.

The End Command

Ends db_QUERY session.

Syntax

```
end;
```

Description

The end statement terminates the session.

Database Tables

The following are the EMS-SYNCOM database tables on which query operations can be performed using db_Query.

NE Table

Table name: NeTable

Field	Values	Comments
NEId	word integer	
NELabel	char[32]	Label on icon is the first 8 characters.
NESecLabel	char[32]	Secondary name of the NE/
Location	char[64]	System location in NE attributes.
Comment	char[128]	Comment field in NE attributes.
IPAddress	char[20]	IP address in “dot” notation.
Gateway	char[20]	NE’s gateway address using “dot” notation.
NEMode	{0,1,2}	0 = ADM 1 = regenerator 2 = terminal
NEType	char enum type	See below.
X_pos	int	X coordinate of the NE’s icon on the map.
Y_pos	int	Y coordinate of the NE’s icon on the map.
Group_name	Char[32]	
Serial_num	char[20]	Backplane serial number.
OpticalInstall	char[12]	LUMINET-S, LUMINET-L, NONE
CCP_Serial_number	char[20]	

Network Element Types Supported

- Unknown
- SDM1
- SDM1C
- SDM1E
- SDM-4
- SDM-4F
- SDM-4L
- SDM-4R
- SDM-16FAB
- SDM-16F
- SDM-16FR
- SDM-16FL
- µSDM-1

External Equipment Table

Table name: EETable

Field	Values	Comments
EEId	word integer	
EELabel	char[32]	Label on icon is the first 8 characters.
EESecLabel	char[32]	External equipment secondary label.
EELocation	char[64]	System location in EE attributes.
EEComment	char[128]	Comment field in EE attributes.
EEIPAddress	char[20]	IP address in dot notation.
Vendor	char[32]	Vendor's name.
EEX_pos	int	X coordinate of the EE's icon on the map.
EEY_pos	int	Y coordinate of the EE's icon on the map.

External Managed Element Table

Table name: EMETable

Field	Values	Comments
EMEIntId	int	The internal ID of the EME.
SlaveMngId	int	ID of the Slave Manager.
SlaveMngType	char[20]	Slave Manager type.
SlaveMngLabel	char [32]	The slave manager's name.
SlaveMngAddress	char[20]	Slave Manager's registry.
EMEId	int	EME network ID.
EMEType	char [32]	EME type.
EMEUserName	char [32]	Name given to the EME by the user upon creation.
EMELabel	char [32]	System EME name.
EMESecLabel	char [32]	EME secondary name.
EMELocation	char [64]	EME location.
EMEComment	char [128]	EME comment.
EMEVendor	char [32]	EME Vendor.
EMEAddress	char [20]	EME IP address.

Equipment Table (per NE slot)

Table name: EquipmentTable

Field	Values	Comments
EquipId	word integer	
NELabel	char[32]	NE label on icon is the first 8 characters.
Slot	int	Slot number in NE (e.g. 101, 102). Slot numbers 401 and 402 refer to TPM-1 and TPM-2 slots.
ActualCard	char enum type	Actual card type; see Appendix C.
ExpectedCard	char enum type	Expected card type; see Appendix C.
TrafficBus	{0,1,2,3,4}	1-4 - ID of Traffic Bus (Combus) used; 0 - if Traffic Bus is not assigned
Hardware	version.revision	
CardSupInterface	char[10]	Shows the type of the supported card interface: PDH, SDH, NONE.
CardSupRate	char[10]	Shows the rate supported by the card: VC12, VC3, VC4.
CardIntNum	char[5]	Shows the number of supported PDH/SDH interfaces.
Software	version.revision	
Eq_serial_num	char[20]	Serial number of equipment.

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

Subequipment Table

Table name: SubequipmentTable

Field	Values	Comments
SubequipId	word integer	
SuperEqSlot	int	Slot number in NE
SubLocation	(1-4)	Transceiver ID for TRS1_4
ActualSub	char enum type	Actual card type; see Appendix C.
ExpectedSub	char enum type	Expected card type; see Appendix C.
SubHardware	version.revision	
SubSoftware	version.revision	

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

Detachable Module Table

Table name: DetachableModuleTable

Field	Values	Comments
DMId	word integer	
DMSuperEqSlot	int	Slot number in NE.
DMLocation	(1-4)	Transceiver ID for TRS1_4.
DMActual	char enum type	actual card type; ; see Appendix C.
DMExpected	char enum type	Expected card type; ; see Appendix C.
DMHardware	version.revision	
DMSoftware	version.revision	

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

TPM Sub-Equipment Table

Table name: TPMSubUnitTable

Field	Values	Comments
TPMSubUnitId	word integer	
TPMSuperEqSlot	int	Slot number in NE.
TPMSubUnitLocation	(1-4)	Card ID in the TPM module.
TPMSubUnitActual	char enum type	Actual card type; see Appendix C.
TPMSubUnitExpected	char enum type	Expected card type; see Appendix C.
TPMSubUnitHardware	version.revision	
TPMSubUnitSoftware	version.revision	

Optical Object Table

Table name: OpticalObjectTable

Field	Values	Comments
OptObjId	int [5]	Shows the unique optical object ID
OptObjType	char [20]	Shows the type of optical object: Other1, Other2, Transponder, Repeater, MUX-DEMUX, Preamplifier, Inline Amplifier, Booster, FEC, OADM, OADM-Protec, MUX, DEMUX, Video Encoder, Video Decoder, Encryptor, Decryptor, OPM, OMSP, ALS
OptObjLabel	char [32]	Shows the name (system title) of the optical object
OptObjLocation	char [64]	Shows location of the optical object
OptObjVendor	char [32]	Shows the vendor of the optical object
OptObjComment	char [128]	User defined
OptObjNEType	int [5]	The code of the relevant associated: ECI Telecom Network NE = 1, EE = 0, EME= 1046
OptObjNeId	int [5]	The ID (instance) of the relevant associated NE
OptObjEqType	int [5]	The code of the equipment (for LS NE only = 2, 0 for others)
OptObjEqId	int [5]	The instance of the associated equipment (2 for LS NEs only, 0 for others)
OptObjAdd1	int [5]	
OptObjAdd2	int [5]	

Optical Trail Table

Table name: OpticalTrailTable

Field	Value	Comments
OpticalTrailId1	Int	
OpticalTrailId2	int	
OTLabel	Char[32]	
OTCustomer	Char[16]	
OTDirectionality	One Way, Bi Directional	
OTProtection	Unprotected, Protected, Main Path, Protection Path	
Frequency	Int	
ClientType	Unknown, SDH-SONET, GbE, ATM, GbE other SDH-SONET, ATM other SDH-SONET, Video, Other	
OTComment	Char[32]	
AendPoint	Char[32]	
ZendPoint	Char[32]	
AssociatedTrailLinkId	Int	
SegId	Int	

NOTE: Fields belonging to the Segment Table (Segment Table on page 13-43) can also be accessed from this table.

Use of Tables for Finding Optical Objects – Equipment Association

Select the optical objects from the OpticalObjectTable to retrieve all fields.

Select all records from the MappingTable with all defined fields.

If the OptObjNEType = 1 in the OpticalObjectTable, then do the following:

- Select all records from EquipmentTable.
- Find records where MPSDH1 = OptObjNEType, MPSDH2 = OptObjNEId, MPSDH3 = OptObjEqType, MPSDH4 = OptObjeqId in the matching Mapping Table.
- Find matching records in the EquipmentTable, where MPInt2 = EquipId using the results of the previous search.

If the OptObjNEType = 1046 in the OpticalObjectTable, then do the following:

- Select all records from EME Table.
- Find records where MPSDH1 = OptObjNEType, MPSDH2 = OptObjNEId, MPSDH3 = OptObjEqType, MPSDH4 = OptObjeqId in the matching Mapping Table.
- Find matching records in the EME Table, where MPInt2 = EMEIntId using the results of the previous search.

Segment Table

There are 2 records per topology connection. The user should use **`select distinct`** to get unique records.

Table name: SegmentTable

Field	Values	Comments
SegId	word integer	
EdgeRate	word integer	
EdgeLabel	char[32]	
EdgeType	Unknown, SDH-SONET, Optical Channel, Optical Trail, Optical Multiplex Section, Supervisor Section	
EdgeDirectionality	One Way, Bi Directional	
EdgeProtection	Unprotected, Line Protected	
Capacity	word integer	
Size	Unknown, STM1, STM4, STM16	

Segment Termination Point Table (4 per topology connection)

Table name: SegmentTPTable

Field	Values	Comments
SegId	word integer	
STP_NEId	word integer	ID of NE.
AddDrop	Add or Drop	Function performed at the termination point.
CTPSDH1	TCPRecord. PhysicalInterface[0] display as left (5).	
CTPSDH2	TCPRecord. PhysicalInterface[1] display as left (5).	
CTPSDH3	TCPRecord. PhysicalInterface[2] display as left (5).	Value TCP Type 15 SPI TCP 21 PDHTP_PPI 1049 Port
CTPSDH4	TCPRecord. PhysicalInterface[3] display as left (5).	
CTPSDH5	TCPRecord. PhysicalInterface[4] display as left (5).	
CTPSDH6	TCPRecord. PhysicalInterface[5] display as left (5).	

NOTE: Fields belonging to the Segment Table (Segment Table on page 13-43) can also be accessed from this table.

Server Trail Table

There are 2 records per server trail. The user should use **`select distinct`** to get unique records.

Table name: ServerTrailTable

Field	Value	Comments
ExtendedSTLabel	Char[84]	
STLabel	Char[32]	
STId	Int	
StCustomer	Char[16]	
Protection	UnProtected, Protected	
DirectionType	One Way, Bi Directional	
ConcatenatedState	None Concatenated, Ready For Concatenation, Active Concatenation	

Server Trail Endpoint Table (per endpoint)

Table name: ServerTrailEPTable

Field	Value	Comments
HOEPFunction	Disconnected, Add&Drop, Add, Drop	
MainProt	Unknown, Main-Only, Prot-Only, Main-Prot	
St_ep_neid	Int	
St_NELabel	char[32]	The same as NeLabel in the NeTable.
St_NESecLabel	char[32]	The same as NESecLabel in the NeTable.
St_Location	char[64]	The same as Location in the NeTable.
St_IPAddress	char[20]	The same as IPAddress in the NeTable.
St_NEType	char enum type	The same as NEType in the NeTable.
Slot_st	Int	
STId	Int	
EEId	Int	
VC4	Int	
EMEId	Int	

NOTE: Fields belonging to the EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38) and Server Trail Table (Server Trail Table on page 13-45) can also be accessed from this table.

Server Trail Main Route Table (per segment in server trail)

Table name: ServerTrailMainTable

Field	Values	Comments
VC4Main	Int	
SegId	Int	
STId	Int	

NOTE: Fields belonging to the Segment Table (Segment Table on page 13-43) and Server Trail Table (Server Trail Table on page 13-45) can also be accessed from this table.

Server Trail Protection Route Table

Table name: ServerTrailProtTable

Field	Value	Comments
VC4Prot	Int	AUG number the server trail uses in the segment.
SegId	Int	
STId	Int	

NOTE: Fields belonging to the Segment Table (Segment Table on page 13-43) and Server Trail Table (Server Trail Table on page 13-45) can also be accessed from this table.

Client Trail Table

Table name: ClientTrailTable

Field	Values	Comments
CTId	word integer	
CTLabel	char[84]	Trail label
Customer	char[16]	Trail customer label
Bitrate	{2M, 6M, 34/45M, 140/155M}	
VPNId	char[32]	VPN ID
ProtectionQuality	Dual_Link_D&C Full, Fiber, Partial, LO_SNCP, Client None	Fiber - Fiber protection is provided for entire trail. Common NEs exist.
ProtectionType	Unprotected, LO_Prot, HO_Prot, Client Combined	Type of protection architecture used. Combined - low order and high order protection are used.

Client Trail Endpoint Table

Table name: ClientTrailEPTable

Field	Value	Comments
EPId	Int	
EPFunction	Disconnected, Add&Drop, Add, Drop	Endpoint function
EPMainProt	Unknown, Main-Only, Prot-Only, Main-Prot	Unprotected trail endpoints are Main Only. Protected trails that have the same endpoints for the main and protection are Main_Prot. Special case trails, such as those with X- and Y-protection use endpoints marked as Main_Only and Prot_Only.
CTId	Int	
TwoMPhysicalIntTTP	Int	
CTP_neid	Int	NE ID.
TribCard	Int	Slot number in NE
SlotOffset_34M	Int	
Micro_34M_Cards	Int	
SlotOffset_45M	Int	
Micro_45M_Cards	Int	
SlotOffset_140M	Int	
EEId	Int	
EMEId	Int	

NOTE: Fields belonging to the EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38), Client Trail Table (Client Trail Table on page 13-47) and PDH TP Table (PDH Topology Table on page 13-58) can also be accessed from this table.

For client trail endpoints on µSDM-1 NEs, and for client trails of rate 34/45/140 Mbit/s, it is recommended to use the tables in tables ClientTrailEP2MTable, ClientTrailEP34MTable, ClientTrailEP45MTable, and ClientTrailEP140MTable (and not this table).

ClientTrailEP2MTable

Field	Value	Comments
EPId	Int	
EPFunction	Disconnected, Add&Drop, Add, Drop	
EPMainProt	Unknown, Main-Only, Prot-Only, Main-Prot	
CTId	Int	
SlotOffset_2M	Int	
Micro_2M_Cards	103, 201, 0	
TribCard2M		-1 for EE and EME
NEId	Int	
EEId	Int	
EMEId	Int	
TwoMPhysicalIntTTP2M	Int	-1 for EE and EME

NOTE: Fields belonging to the NE table (NE Table on page 13-36), EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38), Client Trail Table (Client Trail Table on page 13-47) and PDH TP Table (PDH Topology Table on page 13-58) can also be accessed from this table.

The following query format must be used:

Select <list of fields> from ClientTrailEP2Mtable where BitRate = “2M”

ClientTrailEP34MTable

Field	Value	Comments
EPId	Int	
EPFunction	Disconnected, Add&Drop, Add, Drop	
EPMainProt	Unknown, Main-Only, Prot-Only, Main-Prot	
CTId	Int	
SlotOffset_34M	Int	
Micro_34M_Cards	103, 201, 0	
TribCard34M	Int	-1 for EE and EME
NEId	Int	
EEId	Int	
EMEId	Int	
PhysicalInterface34M TTP	Int	-1 for EE and EME

NOTE: Fields belonging to the NE table (NE Table on page 13-36), EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38) and Client Trail Table (Client Trail Table on page 13-47) can also be accessed from this table.

The following query format must be used:

Select <list of fields> from Client Trail EP34M table where BitRate = “34M” and (neid is not null or eeid is not null or emeid is not null).

ClientTrailEP45MTable

Field	Value	Comments
EPId	Int	
EPFunction	Disconnected, Add&Drop, Add, Drop	
EPMainProt	Unknown, Main-Only, Prot-Only, Main-Prot	
CTId	Int	
SlotOffset_45M	Int	
Micro_45M_Cards	103, 201, 0	
TribCard45M	Int	-1 for EE and EME
NEId	Int	
EEId	Int	
EMEId	Int	
PhysicalInterface45M TTP	Int	-1 for EE and EME

NOTE: Fields belonging to the NE table (NE Table on page 13-36), EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38) and Client Trail Table (Client Trail Table on page 13-47) can also be accessed from this table.

Both of the following query formats must be used:

Select <list of fields> from ClientTrailEP45Mtable where BitRate = “45M” and (neid is not null or eeid is not null or emeid is not null);

Select <list of fields> from ClientTrailEP45Mtable where BitRate = “34M” and (neid is not null or eeid is not null or emeid is not null).

ClientTrailEP140MTable

Field	Value	Comments
EPId	Int	
EPFunction	Disconnected, Add&Drop, Add, Drop	
EPMainProt	Unknown, Main-Only, Prot-Only, Main-Prot	
CTId	Int	
SlotOffset_140M	Int	
TribCard140M	Int	-1 for EE and EME
NEId	Int	
EEId	Int	
EMEId	Int	
PhysicalInterface140MTTP	Int	-1 for EE and EME

NOTE: Fields belonging to the NE table (NE Table on page 13-36), EE Table (External Equipment Table on page 13-37), EME Table (External Managed Element Table on page 13-38) and Client Trail Table (Client Trail Table on page 13-47) can also be accessed from this table.

The following query format must be used:

Select <list of fields> from ClientTrailEP140Mtable where BitRate = “140/155M”.

Client Trail Main Route Table

Table name: ClientTrailMainTable

Field	Value	Comments
CTId	Int	
MainResourceType	VC12, VC3, VC4, VC2	
MainResource	Int	ID of resource used within the server trail (e.g., for VC3 trails valid values are 1 through 3).
STId	Int	Server trail ID

NOTE: Fields belonging to the Server Trail Table (Server Trail Table on page 13-45) and Client Trail Table (Client Trail Table on page 13-47) the can also be accessed from this table.

Client Trail Protection Route Table

Table name: ClientTrailProtTable

Field	Value	Comments
CTId	Int	Client Trail ID
ProtResourceType	VC2, VC3, VC4, VC12	
ProtResource	Int	ID of resource used within the server trail (e.g., for VC3 trails valid values are 1 through 3).
STId	Int	

NOTE: This table can bring both protected and unprotected trails. To select only protected trails, the query should be:

```
Select CTId, … from ClientTrailProtTable where
ProtectionType != "Unprotected".
```

Fields belonging to the Server Trail Table (Server Trail Table on page 13-45) and Client Trail Table (Client Trail Table on page 13-47) can also be accessed from this table.

Timing Generator Table (two per NE)

Table name: TimingGenTable

Field	Values	Comments
NELabel	char[32]	Source NE; label on icon is the first 8 characters.
Generator	{1,2}	1 = east CLU 2 = west CLU
Priority1	Int	Priority 1 timing source internal numbering scheme; (see the translation table below).
Priority2	Int	Priority 2 timing source internal numbering scheme; (see the translation table below).

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

Table 13-1. Timing Translation Table

No.	Priority Timing Source
1	Internal
2	External
3	Tributary A
4	Tributary B
5	Tributary C
6	Tributary D
7	Other
8	Other
0	not defined

Timing Sources Table

Table name: TimingSourceTable

Field	Values	Comments
NELabel	char[32]	Label on icon is the first 8 characters
Type_A	2M or TRS	Type of timing source
Interface_A	integer (0-16)	1-16 = valid values for 2M; 0 = for all other sources.
Type_B		
Interface_B		
Type_C		
Interface_C		
Type_D		
Interface_D		

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

DCC Table

There are two records per slot. The user should use **`select distinct`** to get unique records.

Table name: DccTable

Field	Values	Comments
NELabel	char[32]	NE label on icon is the first 8 characters.
rs_DCC_Slot	Int	Slot number in NE.
ms_DCC_Slot	Int	Slot number in NE.
MS_DCC	boolean	1 = DCC is switched on 0 = DCC is switched off
RS_DCC	boolean	1 = DCC is switched on 0 = DCC is switched off

NOTE: Fields belonging to the NE table (NE Table on page 13-36) can also be accessed from this table.

Mapping Table

Table name: MappingTable

This table contains the mapping between the SDH keys and EMS-SYNCOM internal keys.

Field name	Values	Comments
MPInt1	DN2AppId. InstanceId [0] display as left (5).	
MPInt2	DN2AppId. InstanceId [1] display as left (5).	
MPSDH1	DN2AppId. DN [0] display as left (5).	
MPSDH2	DN2AppId. DN [1] display as left (5).	
MPSDH3	DN2AppId. DN [2] display as left (5).	
MPSDH4	DN2AppId. DN [3] display as left (5).	

NOTE: The name of this table should not be used in the **Select** statement. The **Select** statement will have the following form: **Select mpint1, mpint2, mpsdh1, mpsdh2, mpsdh3, mpsdh4**.

SPI Table

Table name: SPITable

This table shows the first type of the topology connection points - SPIs. This is the typical SDH topology segment when the NE is a managed element.

Field name	DB field definition	Comments
SPIInt1	Section Physical Interface TTP. InstanceId [0] display as left (5).	
SPIInt2	Section Physical Interface TTP. InstanceId [1] display as left (5).	
SPISESDH1	Section Physical Interface TTP. SupportingEquipment [0] display as left (5).	Fields SPISESDH1 – SPISESDH4 are defined the Equipment SDH key or external equipment SDH key
SPISESDH2	Section Physical Interface TTP. Supporting Equipment [1] display as left (5).	
SPISESDH3	Section Physical Interface TTP. Supporting Equipment [2] display as left (5).	
SPISESDH4	Section Physical Interface TTP. Supporting Equipment [3] display as left (5).	

PDH Topology Table

Table name: PDHTPTable

This table shows the second type of the topology connection points - PDH. These are used for topology segments from managed PDH cards to EMEs.

Field name	DB field definition	Comments
PDHTPInt1	TwoMPhysicalInterfaceTTP. InstanceId [0] display as left (5).	
PDHTPInt2	TwoMPhysicalInterfaceTTP. InstanceId [1] display as left (5).	
PDHTPSESDH1	TwoMPhysicalInterfaceTTP. SupportingEquipment [1] display as left (5).	Fields PDHTPSESDH1 – PDHTPSESDH4 are defined the Equipment SDH key
PDHTPSESDH2	TwoMPhysicalInterfaceTTP. SupportingEquipment [2] display as left (5).	
PDHTPSESDH3	TwoMPhysicalInterfaceTTP. SupportingEquipment [3] display as left (5).	
PDHTPSESDH4	TwoMPhysicalInterfaceTTP. SupportingEquipment [4] display as left (5).	

Port Table

PortTable

This table shows the third type of the topology connection points-Ports. These represent the ports in EMEs.

Field name	DB field definition	Comments
PortInt1	EME Physical Port. InstanceId [0] display as left (5).	
PortInt2	EME Physical Port. InstanceId [1] display as left (5).	
PortName	EME Physical Port. EMEPortName display as left (31).	
PortType	EME Physical Port. EMEPortType display as left (31).	
PortBR	EME Physical Port. EMEBitRate display as left (3).	Port Bit rate
EMEId	External Managed Element. EMEElementId display as left (5).	
EMEName	External Managed Element. SystemTitle display as left (31).	

The connection between EMEPhysicalPort and ExternetManagedElement is defined through set EME_EMEPhysicalPort.

Use of Tables for Topology Connection Details (External Program)

This algorithm should be implemented when the topology restoration is performed by an external program that works with every instance of the expected record(s).

1. Select the connection termination points from the SegmentTPTable to retrieve all new fields.
2. Select all records from the MappingTable with all defined fields.
3. If the CTPSDH3 = 15 and CTPSDH1 = 1 in the SegmentTPTable, then do the following:
   - Select all records from SPITable.
   - Select all records from the EquipmentTable.
   - Find records where MPSDH1 = CTPSDH1, … MPSDH4 = CTPSDH4 in the MappingTable matching.
   - Find matching records in the SPITable, where MPInt1 = SPIInt1, MPInt2 = SPIInt2 using the results of the previous search.
   - Find in the MappingTable relevant records where MPSDH1 = SPISESDH1, … MPSDH4 = SPISESDH4 using the results of the previous search.
   - Find relevant records in the EquipmentTable where MPInt2 = EquipId using the results of the previous search.
4. If in SegmentTPTable the CTPSDH3 = 15 and CTPSDH1 = 1037 (External Equipment class) , then do the following:
   - Select all records from SPITable.
   - Select all records from the EETable.
   - Find matching records in the EETable, where CTPSDH2 = EEId, using the results of the previous searches.

5. If the CTPSDH3 = 21, then do the following:
   - Select all records from PDHTPPhITable.
   - Select all records from the EquipmentTable.
   - Find relevant records in the MappingTable where MPSDH1 = CTPSDH1, … MPSDH4 = CTPSDH4.
   - Find relevant records in the PDHTPPhITable where MPInt1 = PDHTPInt1, MPInt2 = PDHTPInt2 using the results of the previous search.
   - Find relevant records in the MappingTable where MPSDH1 = PDHTPSESDH1, … MPSDH4 = PDHTPSESDH4 using the results of the previous search.
   - Find relevant records in the EquipmentTable where MPInt2 = EquipId using the results of the previous search.

For Broadgate NEs

If the CTPSDH3 = 1049 in the SegmentTPTable:

- Select all records from the PDHTPPhITable.
- Select all records from the PortTable.
- Find relevant records in the MappingTable where MPSDH1 = CTPSDH1, … MPSDH4 = CTPSDH4.
- Find relevant records in the PortTable where MPInt1 = PortInt1, MPInt2 = PortInt2, using the results of the previous search.

Use of Tables for Topology Connection Details (SQL)

This algorithm should be implemented when the topology restoration is performed by an external SQL database.

1. Select the connection termination points from the SegmentTPTable to retrieve all new fields.
2. Select all records from the MappingTable with all defined fields.
3. If the CTPSDH3 = 15 and CTPSDH1 = 1 in the SegmentTPTable, then do the following:
   - Perform the following query.

     ```
     SELECT *
     FROM segmenttp segt,mapping mp
     WHERE  segt.ctpsdh3=15
            AND segt.ctpsdh1=1
            AND mp.mpsdh1=segt.ctpsdh1
            AND mp.mpsdh2=segt.ctpsdh2
            AND mp.mpsdh3=segt.ctpsdh3
            AND mp.mpsdh4=segt.ctpsdh4
     INTO TEMP seg_map_33;
     ```
   - Find matching records in the SPITable, where MPInt1 = SPIInt1, MPInt2 = SPIInt2 using the results of the previous search.
   - Perform the following query.

     ```
     SELECT *
     FROM spi sp,seg_map_33 sm
     WHERE
          sm.mpint1=sp.spiint1
      AND sm.mpint2=sp.spiint2
      INTO TEMP seg_map_34;
     ```
   - Find in the MappingTable relevant records where MPSDH1 = SPISESDH1, … MPSDH4 = SPISESDH4 using the results of the previous search.

- Perform the following query.

```
SELECT sm.stp_neid, sm.spiint2, sm.segid, mp.*
FROM seg_map_34 sm,mapping mp
WHERE
sm. SPISESDH1=mp.mpsdh1
AND sm. SPISESDH2=mp.mpsdh2
AND sm. SPISESDH3=mp.mpsdh3
AND sm. SPISESDH4=mp.mpsdh4
INTO TEMP seg_map_35;
```

- Find relevant records in the EquipmentTable where MPInt2 = EquipId using the results of the previous search.
- Perform the following query.

```
unload to segment_1_15.unl

SELECT sgm5.*

FROM seg_map_35 sgm5,equipment eq

WHERE sgm5.mpint2=eq.equipid;

  order by sgm5.segid
```

4. If in SegmentTPTable the CTPSDH3 = 15 and CTPSDH1 = 1037 (External Equipment class), then do the following:
   - Perform the following query.

```
SELECT *

FROM segmenttp segt,mapping mp

WHERE  segt.ctpsdh3=15

       AND segt.ctpsdh1=1037

       AND mp.mpsdh1=segt.ctpsdh1

       AND mp.mpsdh2=segt.ctpsdh2

       AND mp.mpsdh3=segt.ctpsdh3

       AND mp.mpsdh4=segt.ctpsdh4

INTO TEMP seg_map_43;
```

- Perform the following query.

```
SELECT *
FROM spi sp,seg_map_43 sm
WHERE
     sm.mpint1=sp.spiint1
 AND sm.mpint2=sp.spiint2
 INTO TEMP seg_map_44;
```

- Perform the following query.

```
SELECT *
FROM ee ee1 ,seg_map_44 ss4
WHERE
      ee1.eeid=segt.ctpsdh2 ;
```

5. If the CTPSDH3 = 21, then do the following:
   - Perform the following query.

```
SELECT segt.*,mp.*
FROM segmenttp segt,mapping mp
WHERE  segt.ctpsdh3=21
       AND mp.mpsdh1=segt.ctpsdh1
       AND mp.mpsdh2=segt.ctpsdh2
       AND mp.mpsdh3=segt.ctpsdh3
       AND mp.mpsdh4=segt.ctpsdh4
INTO TEMP seg53;
```

   - Find relevant records in the PDHTPPhITable where MPInt1 = PDHTPInt1, MPInt2 = PDHTPInt2 using the results of the previous search.
   - Find relevant records in the MappingTable where MPSDH1 = PDHTPSESDH1, … MPSDH4 = PDHTPSESDH4 using the results of the previous search.

- Perform the following query.

```
SELECT *
FROM pdhtp p, seg53 sg
WHERE p.pdhtpint1 = sg.mpint1
    AND p.pdhtpint1 = sg.mpint1
    AND p.pdhtpsesdh1 = sg.mpssdh1
    AND p.pdhtpsesdh2 = sg.mpssdh2
    AND p.pdhtpsesdh3 = sg.mpssdh3
    AND p.pdhtpsesdh4 = sg.mpssdh4
INTO TEMP seg54;
```

- Find relevant records in the EquipmentTable where MPInt2 = EquipId using the results of the previous search.
- Perform the following query.

```
SELECT *
FROM equipment e ,seg54 s
WHERE
```

- equipid=s.mpint2 ;

6. If the CTPSDH3 = 1049 in the EquipmentTable:
   - Select all records from the PDHTPPhITable.
   - Select all records from the PortTable.
   - Find relevant records in the MappingTable where MPSDH1 = CTPSDH1, … MPSDH4 = CTPSDH4.
   - Perform the following query.

```
SELECT *
FROM segmenttp segt,mapping mp
WHERE  segt.ctpsdh3=1049
       AND mp.mpsdh1=segt.ctpsdh1
       AND mp.mpsdh2=segt.ctpsdh2
       AND mp.mpsdh3=segt.ctpsdh3
       AND mp.mpsdh4=segt.ctpsdh4
INTO TEMP seg6;
```

- Find relevant records in the PortTable where MPInt1 = PortInt1, MPInt2 = PortInt2, using the results of the previous search.
- Perform the following query.

```
SELECT *

FROM port p , seg6 s6

WHERE s6.mpint1 = p.portint1

 AND  s6.mpint2 = p.portint2;
```

Configuring Gateway (GNE) Protection

In a typical configuration, the EMS-SYNCOM is connected to a gateway NE (GNE) which provides routing to the DCC subnet; communication of network management information is between the EMS-SYNCOM and the GNE.

It is obviously advantageous to configure a redundant GNE, providing a secondary channel to the managed network in the event of a failed GNE or in the event of a communication failure between the EMS-SYNCOM and the GNE. This type of configuration is shown in the following figure.

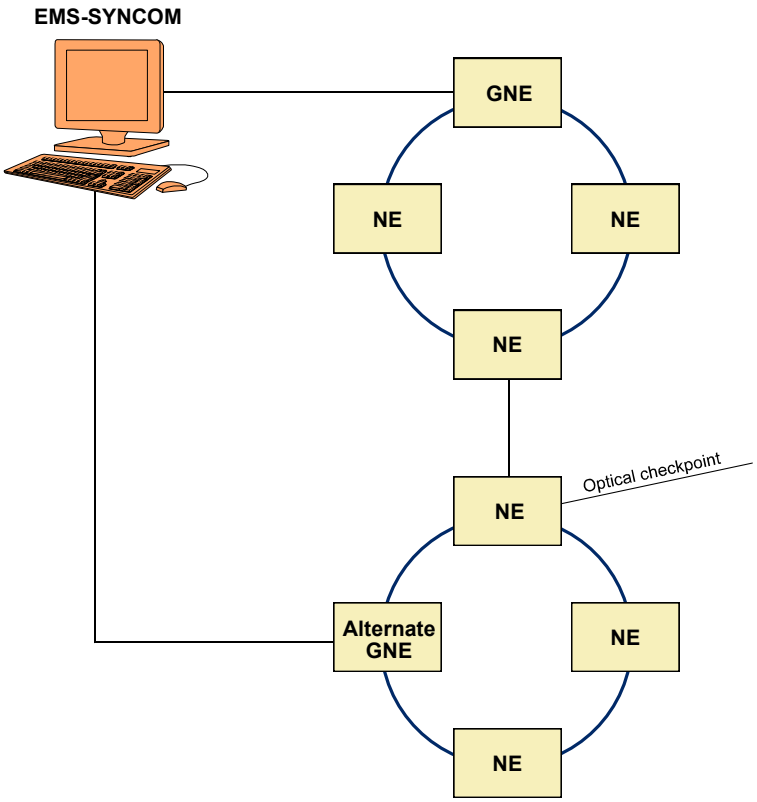

Figure 13-14. EMS-SYNCOM Gateway Protection

When a secondary GNE is configured, the protection mechanism can work in one of two ways (depending on the setup option chosen):

- The EMS-SYNCOM pings the primary GNE periodically to verify that it is functioning properly; should the ping request fail, the EMS-SYNCOM switches to the alternate route via the secondary GNE.
- The EMS-SYNCOM pings a pre-determined NE check point to verify that management information is received at that point. Should the ping request fail to arrive at the check point, the EMS-SYNCOM switches to the alternate route via the secondary GNE.

The process of configuring a redundant GNE is done using the Set Route utility, which can be accessed via the CDE or the Root menu (see Appendix A).

The Set Route utility makes changes in a file named `/etc/routing`. When the EMS-SYNCOM is initialized upon startup, it configures the EMS-SYNCOM routing to the network according to the definitions made in this file. This includes the primary and secondary (if exists) routes to the network.

To configure a protecting GNE:

- Activate the Set Route utility from the CDE or the Root menu. A UNIX window opens, showing the present EMS-SYNCOM routing configuration (Routing table); the menu at the bottom of the window allows selection of the utility options.

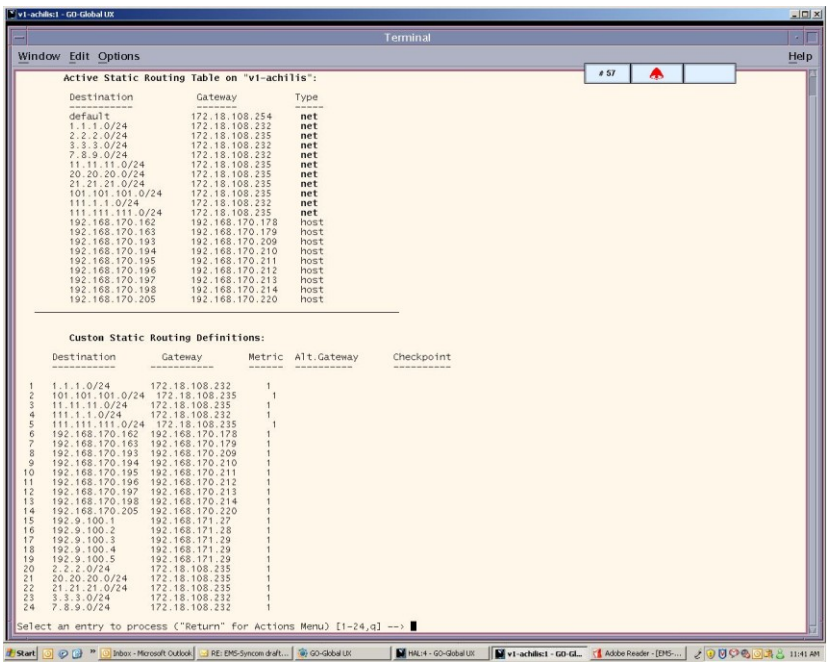

Figure 13-15. Set Route Configuration and Menu

The Routing Table lists the following information:

- The Destination column lists the IP subnets which the EMS-SYNCOM is routed to.
- The Gateway column lists the IP address of the GNE.
- The Metric field is for future use and always lists the number 1.
- If gateway protection is implemented, the IP address of the secondary GNE is listed in the Alt. Gateway column.

To add a secondary GNE:

1. Type the number **5** from the Set Route menu. The following is displayed:

```
Gateway Protection Menu
==============================
1  Add alternative gateway
2  Remove alternative gateway
Please select an item . . . . .
```

2. Type **1** to specify an alternate gateway. The following prompt is displayed:

```
Enter alternate gateway IP.
```

3. Enter the IP address of the secondary GNE. The following prompt is displayed.

```
Do you want to determine a special check point
for this entry?
```

4. Enter **Y** to specify a check point for this entry; if you define a check point, the EMS-SYNCOM will ping the specified check point IP and perform the switch to the secondary GNE when the ping fails.

   If you enter **N**, skip to Step 6. The EMS-SYNCOM will ping the primary GNE and perform the switch to the secondary GNE when the ping fails.

5. If you enter **Y**, the following prompt is displayed.

```
Enter check point IP
```

6. Return to the Set Route main menu and type **7** to save the entries.

Implementing Daylight Savings Time Support

The EMS-SYNCOM supports daylight savings time. When this support is implemented, the EMS-SYNCOM automatically updates its clock when the daylight savings time (Summer clock) starts and ends.

To support daylight savings time, you must first compile a time conversion information file, to be stored in the /usr/share/lib/zoneinfo directory (or, you can use one of the files already present in that directory). This is done by using the *zic* Unix command; for more information about this command and its syntax, type **man zic** in a Unix window.

Next, login as root (by typing **su**) in the Unix window and run the *SetTZ* script. The list of all time files will be displayed, and you will be prompted to type the name of the file you wish to use. This can be one of the files already present, or the one you created by using the *zic* command mentioned previously.

At the end of the *SetTZ* script, you will be asked to reboot. Close the Unix window, exit the EMS-SYNCOM, login as root and reboot the station. The station's time file is now set to be the one you selected. You may replace it or re-compile it (using *zic*) at any time. There is no need to reboot the station each time you change the file.

14

Troubleshooting

This chapter describes basic EMS-SYNCOM troubleshooting procedures. It is recommended that you consult this chapter prior to calling ECI Telecom's customer support.

Each of the troubleshooting procedures is listed with the possible causes and suggested solutions to the problem.

Communications Problems

This problem is characterized by no communication with the NE. The NE icon in the Main Window opens in gray; periodically, the icon turns blue (indicating that the EMS-SYNCOM is trying to communicate with the NE) and then turns gray again.

Possible Cause	Solution
A problem exists in the EMS-SYNCOM Routing table.	Use the Ping function to test the communications between EMS-SYNCOM and the NE (the Ping function is described in Using Ping to Test EMS-SYNCOM-NE Communications on page 13-9. If you are successful in establishing communications with the NE using Ping - call the EMS-SYNCOM support team. If you are unsuccessful in establishing communications using Ping, check the routing by issuing a `SetRoute` command via a Unix window (refer to Accessing the Unix Window on page 13-16 for instructions on opening a Unix window). Verify correct routing; refer to the SYNCOM™ Installation Manual for the correct routing guidelines.

Possible Cause	Solution
An NE problem. The communications channel between EMS-SYNCOM and the NE is being obstructed by another faulty NE, positioned between the EMS-SYNCOM and the NE.	Identify the last NE which EMS-SYNCOM can communicate with. Check for possible obstructions at this NE, preventing communication with other NEs.
A physical NE problem. One of the cards in the NE is not operational. Suspect cards include the MCP, COM and the ASF (or ATR) cards.	Check the cards at the NE shelf.
A cabling problem in the EMS-SYNCOM. This can be a problem with the MAU or a termination problem.	Check the MAU, termination and cable connections.
A problem in the public network or in a bridge, when EMS-SYNCOM is configured through one of these communication systems.	Check that the bridge or public network is functioning.
Incorrect IP or Gateway address setting of the NE.	An incorrect NE IP address causes all communication between the NE and EMS-SYNCOM to cut off. To restore communication, you must delete the node and create it again. If this does not help, the problem may be due to a mismatch of the address you stated and the NE software address. In this case, connect an Element Manager (EM) to the node to find out the correct TCP/IP address. Refer to LightSoft User Manual to find out how this is done. Refer to Creating an NE on page 5-4 of this manual for NE IP address setting.

Operational Problems

The EMS-SYNCOM user will experience operational problems when the disk is nearly full to capacity. When this occurs, difficulties in saving information to the database (such as when creating trails) or in saving to disk may occur.

Historical log files have to be exported from time to time, otherwise the EMS-SYNCOM disk gets full. Once the free disk capacity is down to 2%, the log files are deleted automatically.

The system will display a warning message and prompt for log files to be exported when 95% and 98% of the disk capacity is used.

Refer to Exporting Alarm Logs on page 4-38 in this manual for instructions on how to free disk space.

Technical Support

If you are unable to solve your problem, you should contact your EMS-SYNCOM dealer's support technicians. To help you make the most of your time and effort, it is always best to be at the computer on which the problem occurred when calling. In addition, please have the following information on hand when calling your local EMS-SYNCOM support team:

- Your software version; you find this information in the **About** option in the **Help** menu.
- The kind of problem encountered.
- A brief summary of what you have tried to do to diagnose the problem and the results of your attempts.

The more information you can provide at this stage, the better and faster your EMS-SYNCOM support team can help you.