

Lucent Technologies
Bell Labs Innovations



**WaveStar™ SubNetwork
Management System (SNMS)
Provisioning Guide**

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Release 4.2
Issue 1.0
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WaveStar SubNetwork Management System WaveStar SNMS
Provisioning Guide Release 4.2

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About This Information Product

Introduction

Summary

This chapter is a preface that provides an overview of this information product.

Contents

This chapter discusses the following topics:

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Purpose of This Information Product

Purpose The purpose of this Provisioning Guide is to instruct users how to provision network elements managed by the WaveStar™ Subnetwork Management System (SNMS). It provides users with the information and procedures necessary to configure or re-configure network elements after local installation and to set up the traffic network.

Intended audience This guide is written primarily for operations personnel who will be using WaveStar SNMS to provision network element (NE) subnetworks and NE equipment.

Reason for issue This Provisioning Guide, Issue 1.0, is a new document that supports WaveStar SNMS, Release 4.2.

Using this Information Product

Introduction

This section provides information to assist users of this information product.

Conventions used

Menu and submenu selections from the WaveStar SNMS Map window are shown in **boldface type**.

The terms “choose” and “select” are used interchangeably throughout this Guide. Both terms represent the following operations:

- ✦ Activating a button, such as OK, Cancel, or Help
 - ✦ Activating a menu, such as a pull-down menu on the menu bar
 - ✦ Selecting an item from a menu
 - ✦ Selecting an NE/aggregate symbol on the Map window
 - ✦ Selecting an item from a scroll list
 - ✦ Moving window focus to a text field to type an entry in the field
-

How this Guide is organized

The following table describes the structure and content of each chapter in this Guide.

Section	Title	Description
Preface	<u>About This Information Product</u>	Describes this document’s purpose and intended audience, how to use the document, and how to comment on it
Chapter 1	<u>Getting Started</u>	Describes tasks related to logging into and logging out of WaveStar SNMS, and common functions of the WaveStar SNMS Graphical User Interface (GUI)
Chapter 2	<u>Management Communications Setup</u>	Describes tasks performed to set up communications with managed network elements
Chapter 3	<u>Equipment Provisioning</u>	Describes tasks performed to provision network element equipment

Section	Title	Description
Chapter 4	<u>Topology Management</u>	Describes tasks performed to manage the network topology in WaveStar SNMS
Chapter 5	<u>Timing Provisioning</u>	Describes tasks performed for date/time synchronization of managed network elements with the WaveStar SNMS host
Chapter 6	<u>Traffic Provisioning</u>	Describes tasks performed to provision network element traffic
Chapter 7	<u>Traffic Maintenance</u>	Describes tasks performed to maintain network element traffic
Chapter 8	<u>Software Upgrade</u>	Describes tasks performed to manage and upgrade network element software
Chapter 9	<u>System Introduction</u>	Provides an general introduction to WaveStar SNMS and its functions/features
Chapter 10	<u>Getting Started Concepts</u>	Describes the WaveStar SNMS Graphical User Interface (GUI)
Chapter 11	<u>Management Communications Setup Concepts</u>	Describes communications setup with network elements managed by WaveStar SNMS
Chapter 12	<u>Equipment Provisioning Concepts</u>	Describes equipment provisioning in WaveStar SNMS
Chapter 13	<u>Topology Management Concepts</u>	Describes topology management in WaveStar SNMS
Chapter 14	<u>Timing Provisioning Concepts</u>	Describes timing provisioning in WaveStar SNMS
Chapter 15	<u>Traffic Provisioning Concepts</u>	Describes traffic provisioning in WaveStar SNMS
Chapter 16	<u>Traffic Maintenance Concepts</u>	Describes traffic maintenance in WaveStar SNMS
Chapter 17	<u>Software Upgrade Concepts</u>	Describes software management and upgrade in WaveStar SNMS
Chapter 18	<u>Glossary</u>	Provides a glossary of terms and a list of acronyms

Related Documents

- Introduction** This information product is part of a set of documents that supports WaveStar SNMS.
-
- List of documents** The document set that supports WaveStar SNMS includes:
- ▶ *WaveStar SNMS Maintenance Guide*—this document instructs users on how to maintain network elements managed by WaveStar SNMS
 - ▶ *WaveStar SNMS Administration Guide*—this document instructs users on how to administer WaveStar SNMS and the managed network elements
 - ▶ *WaveStar SNMS Provisioning Guide*—this document instructs users how to use WaveStar SNMS to provision the managed network elements
 - ▶ *WaveStar SNMS Installation Guide*—this document instructs system administrators and other operations personnel how to install WaveStar SNMS
-
- On-line documentation** Online versions of the document set listed above are available through the Help feature in the WaveStar Graphical User Interface (GUI). The online versions of the WaveStar SNMS documents are available through the Help menu option on the Map window main menu. For more information about the Help feature, see the [Getting Started Concepts](#) chapter in the *Provisioning Guide*.
-
- On-line help** The WaveStar SNMS software includes on-line help for each window with a Help button. Each window has an associated help screen that describes the purpose of the window, basic window navigation, field descriptions, and button functions.
-

How to Comment on Information Products

Introduction

Customer satisfaction is extremely important to Lucent Technologies. All users are encouraged to provide feedback on WaveStar SNMS information products.

Customer comment form

A customer comment form appears immediately after the title page of this document. Please fill out the form and fax it to the number provided on the form.

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Methods

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 - ▶ Contact the Lucent Technologies Customer Information Center (CIC):
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 - From Europe, the Middle East, and Africa, call 1-317-322-6416
 - From Asia, the Pacific Region, China, the Caribbean, and Latin America, call 1-317-322-6411
-

Introduction

Summary This chapter describes procedures for getting started with WaveStar SNMS. Procedures are included for logging into and logging out of WaveStar SNMS, using the Map window, issuing TL1 commands in Cut-Through mode, and viewing information about NE equipment.

Before you begin Read the [System Introduction](#) and [Getting Started Concepts](#) chapters to acquire basic knowledge of WaveStar SNMS and general information about the design and functions of the Map window.

Contents This chapter discusses the following topics:

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Log Into WaveStar SNMS

Background Use this procedure to log into the WaveStar SNMS Graphical User Interface (GUI).

Before you begin Before you begin this task for the first time, you must have obtained a user ID and initial password from your system administrator.

When you log into WaveStar SNMS for the first time with a new user login, you must change your password from the default password given for the login. A pop-up window is displayed, indicating that you must change your password before being allowed to log into WaveStar SNMS. You are given the option of continuing the session or exiting the system at this point. If you choose to continue the login session, the Change Password window is displayed, prompting you to change your password from the default password. The system validates your new password. If it is valid, the system re-displays the Login window to re-enter your user ID and your new password.

Task Complete the following steps to start up and log into WaveStar SNMS.

Step	Action	Reference
1	Start an instance of the GUI. This displays the Login window.	
2	If you are logging into WaveStar SNMS for the first time with a new user ID, use the sub-procedure SE 1-1: Logging Into WaveStar SNMS for the First Time immediately following this procedure. If not, skip to step 3.	SE 1-1: Logging Into WaveStar SNMS for the First Time
3	Enter your User ID. Press the Tab key.	
4	Enter your password.	
5	Click the Login button. A dialog window is displayed, indicating authorization.	
6	Close the dialog window by clicking the Close button. The Map window is displayed. Stop! End of Task.	

SE 1-1: Logging Into WaveStar SNMS for the First Time

Procedure

Use the following procedure when you log into WaveStar SNMS for the first time:

1. Start an instance of the GUI. This displays the Login window.
2. Type in your user ID (which you must initially obtain from your system administrator).
3. Press the Tab key and type in the password initially obtained from your system administrator (this is the default password).
4. Click the Login button. The system verifies your user ID and password.

A pop-up window is displayed, advising you that you must change your password before continuing with the session and asking if you want to change your password at this point to continue.

To change your password from the default one and continue with the session, choose Yes.

To stop at this point, choose No.

5. Choose Yes. The Change EMS Password window is displayed.
6. Enter your old password in the Old Password field and enter your new password in the New Password field.



NOTE:

Your new password must differ from the old password by at least six characters. A valid password is 6-10 characters. A password must include at least two non-alphabetic characters and at least one special character (!#\$%^&*()-+_=?). The following special characters are not permitted (:,;).

7. Re-enter your new password in the Confirm Password field.
8. After entering your new password, click the OK button on the Change EMS Password window.

If the new password is invalid or a mismatch for your user ID, a message is displayed, indicating that the new password entered is invalid.

Click the OK button on the warning message box and enter a different password in the Password field on the Change EMS Password window. After entering a new password on the Change EMS Password window, click the OK button again.

If your new password is valid and accepted by the system, a message is displayed, indicating that password change is successful. Click the OK button again.

The Login window is re-displayed.

9. Enter your user ID and the new password.
10. Click the Login button. A dialog window is displayed, indicating authorization.
11. Close the dialog window by clicking the Close button. The Map window is displayed.

Log Out of WaveStar SNMS

Background Use this procedure to log out of WaveStar SNMS.

Before you begin Before you begin this task, make sure any processes you have been performing on the system have finished running. Otherwise, results of these processes may be uncertain.

Task Complete the following steps to log out of SNMS..

Step	Action	Action
1	Select File from the main menu bar on the Map window. A sub-menu is displayed.	
2	Select Exit from the File menu. Result: If you have modified preferences for Map items, node positions, or both during the session, a pop-up dialog box is displayed, asking if you want to save the changes made to preferences.	
3	IF... You want to save the changes to preferences You do not want to save the changes to preferences Result: A second pop-up question dialog box is displayed, asking if you are sure that you want to log off.	THEN... Choose Yes Choose No
4	IF... You want to log off now You do not want to log off now Stop! End of Task.	THEN... Click the Exit button. The GUI session is terminated. Click the Cancel button.

Select an Item in the Subnetwork Explorer

Background Use this procedure to select an item on the Subnetwork Explorer portion of the Map window.

Before you begin Before you begin this task, locate the item (NE, aggregate, DSA, or non-managed device) to be selected on the Subnetwork Explorer portion of the Map window.

Task Complete the following steps to select an item on the Subnetwork Explorer portion of the Map window.

Step	Action	Result
1	Position the mouse pointer on the item to be selected in the Subnetwork Explorer portion of the Map window.	
2	Click the left (select) mouse button. Stop! End of Task.	The selected item is highlighted.

Expand or Collapse an Item in the Subnetwork Explorer

Background Use this procedure to expand or collapse an item (such as an aggregate) in the Subnetwork Explorer portion of the Map window.

Before you begin Before you begin this task, locate the item to be expanded or collapsed in the Subnetwork Explorer portion of the Map window.

Task Complete the following steps to expand or collapse an item in the Subnetwork Explorer portion of the Map window.

Step	Action
1	Position the mouse pointer over the item to be expanded or collapsed in the Subnetwork Explorer portion of the Map window.
2	Click the left (select) mouse button on the plus (“+”) or minus (“-”) sign next to the item to expand (“+”) to show the lower levels of the equipment hierarchy, or to collapse (“-”) and revert back to the display of the item itself. Stop! End of Task.

Select an Item in the Map Pane

Background

Use this procedure to select an item or group of items on the Map pane display portion of the Map window.

Before you begin

Before you begin this task, locate the item(s) to be selected on the Map pane portion of the Map window.

Task

Complete the following steps to select a single item or group of items on the Map pane portion of the Map window.

Step	Action	
1	<p>TO:</p> <p>Select a single NE or aggregate on the Map pane.</p> <p>Select a group of NEs or aggregates on the Map pane.</p>	<p>POSITION THE MOUSE POINTER:</p> <p>On the NE or aggregate and click the left (select) mouse button. The selected item is highlighted.</p> <p>Over a portion of the background adjacent to the items to be selected. Click the select (left) mouse button, hold the button, and drag the mouse pointer over the items to be selected. An outlined box appears over the selected area. As items are selected, they change color. Release the mouse button. The items are selected.</p>
2	<p>To deselect a selected item in the Map pane, position the mouse pointer over the label of the selected item and click the select (left) mouse button, or simply position the mouse cursor in another area of the Map pane and click the select (left) mouse button. The selected item is deselected. To deselect a group of items, position the mouse pointer within the boxed region (but not on the aggregate or NEs in the boxed region) and single-click the select (left) mouse button. Any item that is already selected in the box becomes deselected.</p> <p>Stop! End of Task.</p>	

Move an Item on the Map Pane

Background Use this procedure to move a single item (NE or aggregate) or group of items on the Map pane portion of the Map window.

Before you begin Before you begin this task, locate the item(s) to be moved on the Map pane.

Task Complete the following steps to move a single item or group of items on the Map pane portion of the Map window.

Step	Action	Action
1	<p>TO:</p> <p>Move a single item (NE or aggregate) on the Map pane display.</p> <p>Move a group of items on the Map pane display.</p> <p>Stop! End of Task.</p>	<p>DO THIS:</p> <p>Position the mouse pointer over the item you want to move. Press and hold the select (left) mouse button. Drag the item to the new position. Release the select (left) mouse button.</p> <p>Select a group of items by positioning the mouse pointer in a area of the background adjacent to the items, clicking and holding the select (left) mouse button while dragging the mouse pointer over the items to select them, and releasing the left mouse button. Position the mouse pointer over one of the selected icons, press and hold the select (left) mouse button, and drag the items to their new position. Release the select (left) mouse button.</p>

Expand or Collapse an Aggregate on the Map Window

Background Use this procedure to expand or collapse an aggregate on the Map window.

Before you begin Before you begin this task, locate the aggregate to be expanded or collapsed on the Map window.

Task Complete the following steps to expand or collapse an aggregate on the Map pane portion of the Map window.

Step	Action	
1	TO ... Expand the aggregate and show its member NEs.	DO THIS ... Position the mouse pointer over the aggregate icon in the Map pane. Click the right (menu) mouse button. A pop-up menu is displayed. Choose Expand from the pop-up menu. The aggregate is expanded to show the member NEs on the Map pane and the aggregate symbol disappears. OR Double-click on the aggregate icon in the Map pane, or click on the plus sign next to the aggregate icon in the subnetwork explorer. If you expand it on the Map pane, The aggregate is expanded to show the member NEs in the Map pane and the aggregate symbol disappears. if you expand it on the subnetwork explorer, the member NEs appear under the aggregate symbol. Note: click the left mouse button anywhere else on the Map pane to deselect an aggregate icon or member NE. <i>Continued on next page</i>

Step	Action (Contd)	
	<p>TO.... Collapse an expanded aggregate</p> <p>Stop! End of Task.</p>	<p>DO THIS... In the Map pane portion of the window, position the mouse cursor on one of the member NE icons and double-click the select (left) mouse button. The aggregate is collapsed and the aggregate symbol replaces the member NEs on the Map pane display.</p> <p>OR</p> <p>Select one of the member NE icons in the Map pane portion of the window and click the right (menu) mouse button. A pop-up menu is displayed. Choose Collapse from the pop-up menu. The aggregate is collapsed and the aggregate symbol replaces the member NEs on the Map pane display.</p> <p>OR</p> <p>In the subnetwork explorer portion of the Map window, click the minus (-) sign next to the expanded aggregate symbol. The aggregate collapses and the minus (-) sign is replaced by a plus (+) sign.</p>

Zoom the Map View

Background Use this procedure to zoom in or zoom out on the Map window.

Before you begin Before you begin this task, display the Map window.

Task Complete the following steps to zoom the Map window view.

Step	Action
1	Select View from the main menu bar on the Map window. This displays a pull-down menu.
2	<ul style="list-style-type: none">▶ To make the Map pane show fewer map items in the same size space, single click on Zoom In on the pull-down menu.▶ To make the Map pane show <i>more</i> in the same size space, single click on Zoom Out on the pull-down menu.
3	<p>To reset the Zoom level to zero (which is the default), single click on Zoom Reset on the pull-down menu.</p> <p>You can also zoom in, zoom out, and reset the zoom by using the Zoom In, Zoom Out, and Zoom Reset buttons on the Map window toolbar, or by clicking the right (menu) mouse button anywhere in the Map pane (not on a particular item) to display a pop-up menu of choices: Zoom In, Zoom Out, Zoom Reset.</p> <p>Stop! End of Task.</p>

Find a Network Element

Background Use this procedure to find an NE on the Map pane or Subnetwork Explorer portion of the Map window.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to find an NE in the Map pane or Subnetwork Explorer portion of the Map window.

Step	Action	Result
1	Select View from the main menu bar on the Map window.	The View sub-menu is displayed.
2	Select Find an NE from the View sub-menu.	The Find an NE window is displayed.
3	Enter the TID and/or Alias of the NE in the appropriate field(s).  NOTE: An asterisk(*) can be used as a wildcard character to represent 0 or more characters of the TID/Alias.	
4	Click the OK or Apply button. Stop! End of Task.	The Map pane display is repositioned to show the NE and the NE is highlighted in the Map pane and Subnetwork Explorer portions of the Map window. If more than one match is found, a list of network elements is displayed in a list. If you select one of the network elements from the list, the NE is highlighted in the Subnetwork Explorer and the Map pane. If the NE is contained in an unexpanded aggregate, the aggregate is expanded and the NE is highlighted on the Map pane.

Clear Status Messages

Background Use this procedure to clear status messages that are displayed in the status bar on the Map window.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to clear status messages from the status bar in the Map window.

Step	Action	Result
1	Select View from the main menu bar on the Map window.	The View menu is displayed.
2	Select Clear Status Line from the View menu.  NOTE: The status bar message can also be cleared by clicking the Clear Message Line button on the Map window toolbar. Stop! End of Task.	The message in the status bar area of the Map window is cleared.

Modify User Preferences

Background Use this procedure to change the characteristics of the Map window display, such as NE (node) size, NE labels, trail lines, and alarm color display.

Before you begin Before you begin this task, view the Map pane display to see the current characteristics of the Map view before changing any of them. Be aware that preferences are saved on a per-user basis.

Task Complete the following steps to modify user preferences.

Step	Action	
1	Select View from the main menu bar on the Map window. The View menu is displayed.	
2	Select Preferences from the View menu. The View Preferences window is displayed.	
3	<p>TO CHANGE THE...</p> <ul style="list-style-type: none"> ➤ NE size or thickness of trail lines between NEs and the size/thickness of aggregates ➤ Size, content, or alignment of map item labels ➤ Colors associated with alarms and/or cross-connections ➤ Shapes used to represent NEs, aggregates, EMS host, DSA, and non-managed devices on the Map window ➤ Alarm severity level displayed in the Map and Alarm Notification windows(Critical/Major/Minor/Not Alarmed for SONET, Prompt/Deferred/Informational for SDH) ➤ tooltips help on/off setting ➤ date format for items on the Map window, alarm lists, and tallies ➤ display of Bidirectional Line Switched Ring (BLSR) Protected Port Groups on the Cross-Connect View window (Note: the BLSR display option is currently not supported). 	<p>SELECT THE TAB...</p> <ul style="list-style-type: none"> ➤ Nodes & Lines ➤ Labels ➤ Colors ➤ Shapes ➤ Fault ➤ Other ➤ Other ➤ Other
<i>Continued on next page</i>		

Step	Action (Contd)
4	<p>When the selected panel of options is displayed on the View Preferences window, change the display characteristics as needed.</p> <ul style="list-style-type: none">▶ To change the shape for an item in the Shapes panel, double-click on the current shape in the scroll list. A pop-up window is displayed, showing the shapes available for selection. Click on the desired shape. The changed shape is displayed next to the Map item in the scroll list.▶ To change the color indications for alarms and cross-connections on the Map window through the Colors panel, double-click on the item in the Colors scroll-bar list to display a palette of colors. Click on the desired color box in the palette to select it. The color selected is applied to the item.
5	<p>Click one of the following buttons to adjust your preference settings:</p> <ul style="list-style-type: none">▶ Save—saves the changes made to user preferences on each panel in the SNMS database for the user, to be applied each time the Map window is brought up by the user▶ Restore—restores the saved values for the user for the current GUI session (works with the OK or Apply button)▶ Get Defaults—retrieves and displays the system defaults for the preferences category, overriding the displayed settings
6	<p>Click the Apply button to apply the changes to the Map window preferences to the current GUI session and leave the View Preferences window open, or click the OK button to apply the changes to the Map window preferences to the current GUI session and close the View Preferences window.</p> <p>Stop! End of Task.</p>

Save Preferences/Map Positions

Background

Use this procedure to save user preferences for the Map pane display and/or positions of map items on the Map pane display for the next time you log onto the system and access the Map window.

Before you begin

Before you begin this task, you should use the Preferences option to select the appearance or position of Map items on the display or accept the system defaults.

Task

Complete the following steps to save user preferences and/or map item positions.

Step	Action	
1	Select File from the main menu bar on the Map window. The File menu is displayed.	
2	Select Save from the File menu. A sub-menu is displayed.	
3	TO SAVE... <ul style="list-style-type: none"> ▶ User preferences ▶ Map item positions ▶ User preferences and Map item positions 	CHOOSE... <ul style="list-style-type: none"> ▶ Preferences ▶ Positions ▶ Both
4	A message is displayed in the status bar area, indicating that your selections have been saved. Stop! End of Task.	

Restore Preferences/Map Positions

Background Use this procedure to restore previously saved user preferences for the Map pane display and/or Map item positions.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to restore user preferences and/or map item positions.

Step	Action								
1	Select File from the main menu bar on the Map window. The File menu is displayed.								
2	Select Restore from the File menu. A sub-menu is displayed.								
3	<table border="1"> <thead> <tr> <th>TO RESTORE...</th> <th>CHOOSE...</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> ▶ User preferences </td> <td> <ul style="list-style-type: none"> ▶ Preferences </td> </tr> <tr> <td> <ul style="list-style-type: none"> ▶ Map item positions </td> <td> <ul style="list-style-type: none"> ▶ Positions </td> </tr> <tr> <td> <ul style="list-style-type: none"> ▶ User preferences and map item positions </td> <td> <ul style="list-style-type: none"> ▶ Both </td> </tr> </tbody> </table>	TO RESTORE...	CHOOSE...	<ul style="list-style-type: none"> ▶ User preferences 	<ul style="list-style-type: none"> ▶ Preferences 	<ul style="list-style-type: none"> ▶ Map item positions 	<ul style="list-style-type: none"> ▶ Positions 	<ul style="list-style-type: none"> ▶ User preferences and map item positions 	<ul style="list-style-type: none"> ▶ Both
TO RESTORE...	CHOOSE...								
<ul style="list-style-type: none"> ▶ User preferences 	<ul style="list-style-type: none"> ▶ Preferences 								
<ul style="list-style-type: none"> ▶ Map item positions 	<ul style="list-style-type: none"> ▶ Positions 								
<ul style="list-style-type: none"> ▶ User preferences and map item positions 	<ul style="list-style-type: none"> ▶ Both 								
4	<p>A message is displayed in the status bar area, indicating that the previously saved user preference settings have been restored.</p> <p>Stop! End of Task.</p>								

Copy Preferences/Map Positions

Background Use this procedure to copy the user preferences and/or Map item positions saved by another user.

Before you begin Before you begin this task, be aware that map item positions can only be copied from a user who shares the same Target Group of NEs.

Task Complete the following steps to copy another user's preferences and/or Map item positions.

Step	Action	Action	Reference
1	Select File from the main menu bar on the Map window. The File menu is displayed.		
2	Select Copy from the File menu. A sub-menu is displayed.		
3	TO COPY A USER'S... <ul style="list-style-type: none"> ▶ Preferences ▶ Map item positions ▶ Preferences and Map item positions 	CHOOSE... <ul style="list-style-type: none"> ▶ Preferences ▶ Positions ▶ Both 	
4	The Choose a User window is displayed.		
5	Choose a user and click the OK button. If you are copying map item positions, the new positions are applied to your Map pane display once a user is chosen. If you are copying another user's preferences, the View Preferences window is displayed. Make any changes as necessary to the other user's preferences before applying them. When you are finished making necessary changes, click the OK button.		Modify User Preferences
6	A message is displayed in the status bar area, indicating that the copy from another user is completed. Stop! End of Task.		

Perform Cut-Through Commands

Background Use this procedure to initiate a TL1 cut-through session from the Map window and perform enhanced cut-through commands via the Cut-Through window.

Before you begin Before you begin this task, you must have already displayed the Map window and determined the NE for which you want to initiate a cut-through session.

The Cut-Through feature is not supported for OLS 400G NEs.

Task Complete the following steps to initiate and perform cut-through.

Step	Action
1	Position the mouse pointer over the NE to which a cut-through is required and press the right (menu) mouse button. A pop-up menu appears.
2	Select Cut-Through from the pop-up menu. The Cut-Through window and the Cut-Through Output window are displayed. (If the NE is unavailable for any reason, a message identifying the cause of the error is displayed in a pop-up window.)
3	At the Cut-Through window, type the appropriate TL1 command into the Cut-Through Command field. If desired, select the displayed Command by double-clicking on the command and the desired AID from the list by single-clicking on it to save typing time. See your NE documentation for detailed command information. (You can select the Clear Command Area button any time to clear the Cut-Through Command field and start over.) The Clear Command Line button clears the command and AID input from the command field.  NOTE: The AID list for an NE displayed in the AID scroll list may not be complete. You may have to select a similar AID from the list to populate the Cut-Through Command field and then manually edit the AID to make it the correct one.
4	After completing your entry in the Cut-Through Command field, select the Send Command Now button. The command is echoed to the Cut-Through Output window and the command output appears there. Stop! End of Task.

Build TL1 Commands

Background

Use this procedure to create a TL1 command file to assist in performing maintenance and provisioning activities on one or more NEs (such as download of standard configuration), without having to manually enter a set of TL1 command strings. This feature both reduces the amount of manual entry needed to create TL1 command strings and allows for the reuse, at a later time, of the commands built on the same NE or other NEs of the same type.

Before you begin

Before you begin this task, you must have already determined the TL1 commands you wish to build.

Task

Complete the following steps to build TL1 commands.

Step	Action
1	On the Map window, select File from the main menu bar. This displays a pull-down menu.
2	Select TL1 Macro Scripts from the displayed pull-down menu. This displays a sub-menu.
3	Select TL1 Macro Builder from the displayed sub-menu. This displays the Macro Builder/Broadcaster window. Select the Macro Builder tab if it is not already selected.
4	TL1 command files can only be built for one NE type at a time, so first specify the NE type by clicking the down arrow adjacent to the NE Type field (directly below the Manage TL1 Macro Files heading) and select an NE.
5	Next type the appropriate TL1 command(s) into the Macro File Commands area at the lower left of the window. Press the Return key between commands, typing each new command on the next available line in the Macro File Commands area. If desired, select from the displayed Command List by double-clicking on the command and from the AID List by single-clicking on the AID to save typing time. To enter multiple commands from the Command List, click on the end of a command string and press the Return key before entering the next command. This will access the next available command line. See your NE documentation for detailed TL1 command information.
<i>Continued on next page</i>	

Step	Action (Contd)
6	When you have completed your macro file commands, select Save/Save As. This displays the Save As window.
7	In the Save As window, save the contents of the Macro File Command lines as a new macro file (by typing the new macro file name into the Save As field) or to an existing macro file name, overwriting the contents of the file (by selecting one from the displayed list). Don't forget to use the radio buttons to indicate whether the file should be Accessible by all or Accessible by owner only .
8	<p>The following list shows how to use remaining items on the TL1 Macro Builder window:</p> <ul style="list-style-type: none">▶ Clear Command(s)—click this button to clear the current entries in the Macro File Command area.▶ Owner—displays the macro file owner's login ID.▶ File Properties—indicates whether the displayed macro file is Accessible By All or Accessible by Owner Only. This value can be changed (by owners) via the Save As screen, which is displayed by clicking the Save/Save As button.▶ Put Into Command Area—select this button to put the contents of the selected macro file into the command line text area.▶ View Macro—use this button to view the contents of the selected macro file.▶ Delete Macro—click this button to delete the selected macro file (for owners only). <p>Stop! End of Task.</p>

Broadcast TL1 Commands

Background

The broadcast TL1 commands feature allows you to perform maintenance and provisioning activities (such as download of standard configuration) on one or more NEs, utilizing the TL1 command files created by the TL1 macro builder feature, and broadcasting those files to multiple NEs of the same type. This feature saves you time by performing similar tasks on multiple NEs in one step, and by reducing the manual entry required in the creation of TL1 command strings.

Before you begin

Before you begin this task, you must have already determined the TL1 commands you wish to broadcast, or know the name of the TL1 macro file you are going to use.

Task

Complete the following steps to broadcast TL1 commands.

Step	Action
1	On the Map window, select File from the main menu bar. This displays a pull-down menu.
2	Select TL1 Macro Scripts from the displayed pull-down menu. This displays a sub-menu.
3	Select TL1 Macro Broadcaster from the displayed sub-menu. This displays the Macro Builder/Broadcaster window.

Step	Action (Contd)
4	<p>Specify the NE type for the broadcast; select All NEs, NEs by Type, or NEs by TID from the Where to Broadcast block at the top middle of the Broadcaster window. Specify the parameters of the broadcast further by highlighting NEs in the Available Network Elements list (on the left side of the window) and clicking the single right arrow (>) to move them to the Chosen Network Elements list (on the right side). <i>The NEs placed in the Chosen Network Elements list on the right will be the ones to receive the broadcast.</i> (You can use the double arrows to move all current choices between the two lists.)</p>
5	<p>Next type the name of the macro file (to be broadcast to the NEs selected in the Chosen Network Element list) into the field in the Macro File to Broadcast block (or simply select a macro file from the displayed list by double clicking on it).</p>
6	<p>Select the Broadcast Macro button to ask the system to perform the broadcast. The following list shows how to use the remaining buttons on the Broadcaster window:</p> <ul style="list-style-type: none">■ View Macro - use this button to view the macro file, which you may want to do before executing it.■ Abort Broadcast - use this button to stop the execution of the TL1 commands at any time while the broadcast window is active. When this button is chosen, the system stops sending out the next command in the macro file to the NE(s) currently being broadcast to. Once the abort is completed, the system displays a message.■ Close - click this button any time before clicking the Broadcast Macro button to remove the Broadcast window from your screen . <p>Stop! End of Task.</p>

View NE Equipment

Background

Use this procedure to display and view NE equipment on the Equipment View window.

WaveStar SNMS indicates whether an alarm has been generated by a bay, shelf, or slot (circuit pack) in the NE on the graphical display of equipment, and what level of alarm it is.

The status of slot/circuit pack alarms is updated dynamically in the Equipment View window and propagated to the higher equipment levels in the equipment hierarchy, so the indication of the alarm status graphically on the slot/circuit pack level is also reflected at the bay/shelf level in the Equipment View. On the Equipment View window, a round dot is displayed on the selected piece of equipment with the color indicating the alarm state. The color of the dot indicates the level of alarm that has been issued by the selected equipment component, or if there have been no alarms issued. The default colors for the alarm levels are:

Alarm Color (default)	Alarm Severity Level (SONET)	Alarm Severity Level (SDH)
Red	Critical	Prompt
Yellow	Major	Deferred
Cyan	Minor	
Green	No Active Alarms	No Active Alarms

The default Alarm display colors shown in the above table can be modified through the Preferences option of the View menu on the Map window main menu bar. For more details, see [Modify User Preferences](#).

Before you begin

Before you begin this task, determine the equipment you want to view.

Task

Complete the following steps to display and view various NE equipment components on the Equipment Configuration window.

Step	Action
1	Select the NE in the Map pane portion of the Map window.
2	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
3	<p>Select Equipment from the displayed sub-menu. This displays the Equipment View window, containing equipment information for the selected NE.</p> <p>The Equipment View window allows you to view and/or “drill down” through a network element to view its various constituent parts via the graphical representation (the network element view panel), or to select a component (shelf, bay, slot) for viewing via the hierarchical representation (the network explorer panel). In addition, you can access certain features via a pop-up menu that is available in both panels.</p> <p> NOTE: When the equipment hierarchy is expanded for a LambdaRouter to the Switching shelf level, no SWIPs are shown in the explorer tree. When you select the Switching shelf for display in the Equipment View from the explorer, the shelf display indicates the number of SWIPs contained in the Switching shelf.</p> <p>Following are the navigational conventions to use to view equipment information for the selected NE.</p> <p>View Panel <i>Single Left Click</i>—selects the component both here and in the explorer. <i>Double Left Click</i>—shows the contents of the component in the view panel, and indicates that it is selected. Shows the component as selected in the explorer and its subtending components (if there are any). <i>Single Right Click</i>—indicates that the component is selected, and shows the pop-up menu.</p> <p>Explorer List Item <i>Single Left Click</i>—selects the explorer component and the view component. If the component selected has contents, it shows the content in the view panel. Does not show/hide subtending explorer components. <i>Double Left Click</i>—same as single left click on explorer list item, but does show/hide subtending components in the explorer. <i>Single Right Click</i>—indicates that the component is selected, and shows the pop-up menu.</p> <p>Explorer plus or minus sign <i>Single Left Click</i>—shows/hides subtending components.</p> <p>Stop! End of Task.</p>

View NE Equipment Lists

Background

Use this procedure to access the list of a given component's subtending equipment. When you request an equipment item from either the drop-down or pop-up menu, WaveStar SNMS provides a list of equipment for the selected item and its subtending equipment. The lists can be saved and printed.

Before you begin

Before you begin this task, determine the equipment for which you want to display equipment lists.

Task

Complete the following steps to view NE equipment lists.

Step	Action
1	Select the NE in the Map pane portion of the Map window.
2	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
3	<p>Select Equipment from the displayed sub-menu. This displays the Equipment View window, containing equipment information for the selected NE.</p> <p>The Equipment View window allows you to view and/or “drill down” through a network element to view its various constituent parts via the graphical representation (the network element view panel), or to select a component (shelf, bay, slot) for viewing via the hierarchical representation (the network explorer panel). In addition, you can access certain features via a pop-up menu that is available in both panels.</p> <p> NOTE: When the equipment hierarchy is expanded for a LambdaRouter to the Switching shelf level, no SWIPs are shown in the explorer tree. When you select the Switching shelf for display in the Equipment View from the explorer, the shelf display indicates the number of SWIPs contained in the Switching shelf.</p> <p>Following are the navigational conventions to use to view equipment information for the selected NE.</p> <p>View Panel <i>Single Left Click</i>—selects the component both here and in the explorer. <i>Double Left Click</i>—shows the contents of the component in the view panel, and indicates that it is selected. Shows the component as selected in the explorer and its subtending components (if there are any). <i>Single Right Click</i>—indicates that the component is selected, and shows the pop-up menu.</p> <p>Explorer List Item <i>Single Left Click</i>—selects the explorer component and the view component. If the component selected has contents, it shows the content in the view panel. Does not show/hide subtending explorer components. <i>Double Left Click</i>—same as single left click on explorer list item, but does show/hide subtending components in the explorer. <i>Single Right Click</i>—indicates that the component is selected, and shows the pop-up menu.</p> <p>Explorer plus or minus sign <i>Single Left Click</i>—shows/hides subtending components.</p>

Step	Action (Contd)
4	Select a component in the NE explorer part of the Equipment View Window.
5	Select View from the menu bar. This displays the View menu.
6	<p>Select Equipment List from the View menu. This displays the equipment list for the selected component. The list contains information about the NE equipment, at the level you requested. The information is textual and listed in name/value pairs.</p> <p> NOTE: Right clicking on the desired component in the Equipment View window also displays a sub-menu from which Equipment List can be selected. If the component selected for listing is a populated slot (with a circuit pack installed) then information for both the slot and circuit pack are displayed in the Equipment List.</p> <p>Stop! End of Task.</p>

View NE Equipment Details

Background Use this procedure to view details of a single component inside a network element.

Before you begin Before you begin this task, determine the NE for which you want to display equipment details.

Task Complete the following steps to display NE equipment details.

Step	Action
1	Choose Configuration from the main menu on the Map window. Result: The Configuration sub-menu is displayed.
2	Choose Equipment from the Configuration sub-menu. Result: The Choose an NE window is displayed.
3	Select an NE from the displayed list. Click the OK button. Result: The Equipment View window is displayed.
4	Select a component in the NE explorer part of the Equipment View Window)
5	Select View from the menu bar. This displays the View menu.
6	Select Equipment Details from the View menu. This displays the Equipment Details window, containing the requested information. Click the Close button on the window to close the window.  NOTE: Right clicking on the desired component in the Equipment View window also displays a sub-menu from which Equipment Details can be selected. If the component selected for details is a populated slot (with a circuit pack installed) then details for both the slot and circuit pack are displayed in Equipment Details. Stop! End of Task.

Display the Cross-Connection Window

Background Use this procedure to display the NE Cross-Connection window. This window provides access to all NE cross-connection features.

Before you begin Before you begin this task, determine the cross-connection types you want to work with.

Task Complete the following steps to display the cross-connection window and gain access to all cross-connection features.

Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	Select Cross-Connection from the displayed sub-menu. This displays the Choose an NE window.
3	<p>Choose the network element in the list by double clicking on it in the then click the OK button. The Cross-Connection window is displayed.</p> <p>You can also access the Cross-Connection window by positioning the mouse cursor on an NE in the Map window, clicking the right mouse button to display a pop-up menu and then selecting Cross Connection from the NE's pop-up menu.</p> <p>The Cross-Connection window consists of a menu bar, a toolbar, a status bar, a subnetwork explorer, and a main view. This window is used for all cross-connection operations, including viewing, adding, modifying, and deleting cross-connections.</p> <p>These operations are described in the appropriate tasks in the <i>User Tasks</i> section of this User Guide.</p> <p>Stop! End of Task.</p>

Display Ports on the Cross-Connection Window

Background Use this procedure to display port information on the Cross-Connection window.

Before you begin Before you begin this task, determine the ports to be displayed and display the Cross-Connect window.

Task Complete the following steps to display port information in the Cross-Connect window.

Step	Action	Reference
1	Display the Cross-Connect window.	Display the Cross-Connection Window
2	In the Network Element Explorer portion of the window, expand an item in the explorer tree (using the mouse) and locate the port group that contains the tributaries/ports to display in the Main View portion of the window. <i>Continued on next page</i>	

Step	Action (Contd)	Reference
3	Position the mouse cursor on the port group in the explorer and click the right mouse button to display a pop-up menu for the selected tributary.	
4	Choose either top, bottom, left, or right to expand and display the selected tributary in the the top, bottom, left, or right portion of the Main View of the window.	
5	<p>If necessary, click the arrow keys located next to the tributary block in the Main View of the window to scroll and locate the tributary you want to use. When you position the cursor on a tributary block, the status bar displays the tributary address and indicates whether the tributary is available to be used as source, destination, or both.</p> <p> NOTE: To remove a tributary block from the Main View, position the mouse cursor on the tributary block and click the left mouse button. Then click the right mouse button to display a small window with the word "Clear". Select "Clear" to clear the block from the window.</p> <p>Stop! End of Task.</p>	

Step	Action (Contd)
5	Select List Cross-Connections from the displayed sub-menu.
6	<p>To display all cross-connections for the selected entity, choose All Cross Connections from the displayed sub-menu.</p> <p>For NEs that allow creation of multiple cross-connections from the same associated legs and leg pairs or assignment of a Path Protection Group Name for path-protected cross-connections (such as BWM NEs), you also have the option of displaying/viewing a textual list of cross-connections by Group Number or Group Name.</p> <p>To list cross-connections related to a specific Group Number, choose By Group Number. A Cross-Connection By Group Number window is displayed. Click the arrow next to the Cross Connection Number field to display a pop-up list of group numbers and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>To list cross-connection related to a specific Group Name, choose By Group Name. A Cross Connection By Group Name window is displayed. Click the arrow next to the Group Name field to display a pop-up list of group names and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>The Cross-Connection List window is displayed with the selected cross-connection information. Some general information about this window follows:</p> <ul style="list-style-type: none"> ■ This list shows all the cross-connections and reservations in the selected element. ■ Headers displayed above each list differ from NE to NE, but the first three headers are always Source AID (From), Destination AID (To), and Cross-Connection Type.
7	<p>If desired, select another element from the explorer area of the Cross-Connections window to change the information in the Cross-Connection List window for the new selection. Also if desired, select a row in the list and then click the Delete or Modify button to display the windows used to delete and modify cross-connections, respectively.</p> <p>Stop! End of Task.</p>

Introduction

Summary	This chapter describes procedures for setting up communications with the Network Elements (NEs) managed by WaveStar SNMS.
Before you begin	Read the Management Communications Setup Concepts chapter in this document and the Management Communication of WaveStar SNMS chapter in the <i>WaveStar SNMS Administration Guide</i> to gain an understanding of the communications protocols supported by WaveStar SNMS and the options for discovering information about NEs in a managed network.
Contents	This chapter discusses the following topics: <ul style="list-style-type: none">▶ Add a Network Element—X.25 Communications 2-3▶ Add a Network Element—OSI Communications 2-6▶ Add a Network Element—TCP/IP Communications 2-13▶ Add a Gateway Network Element—X.25 Communications 2-17▶ Modify a Network Element 2-22▶ Delete a Network Element 2-24▶ Add a Subnetwork Name/Alias 2-25▶ Modify a Subnetwork Alias 2-26▶ Delete a Subnetwork Name/Alias 2-27▶ Associate Remote Network Elements with Gateway Network Elements 2-28

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Add a Network Element—X.25 Communications

Background

Use this procedure to add an X.25-connected NE such as the FT-2000 LCT NE. X.25-connected NEs are either directly connected to WaveStar SNMS via an X.25 network or use a Gateway Network Element (GNE) for communications with WaveStar SNMS.

Before you begin

Before you begin this task, verify that the NE that you are adding communicates with WaveStar SNMS using X.25 protocol. Before adding an NE, you must have a Target Identifier (TID), a valid NE login/password, and a valid backup NE login/password. The GNE(s) that provides the communications link for this NE in the subnetwork must be added first.

Task

Complete the following steps to add an X.25-connected NE to WaveStar SNMS.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Manage NEs window is displayed, showing the current list of NEs in your Target Group.
4	<p>Click on the Add button. The Add an NE - General Information panel is displayed.</p> <p>The Add an NE window for X.25-connected NEs is divided into three panels:</p> <ul style="list-style-type: none"> ◆ General NE Information ◆ NE Communications Details ◆ NE Security <p>There are fields on each panel that are required to add an NE. To access a panel, click the mouse select button on the panel's labeled tab.</p> <p>The General Information panel is displayed initially.</p>

Step	Action (Contd)
5	Enter the NE's Target Identifier (TID). A TID can be 1-20 alphanumeric characters. Hyphens and slashes ("/") are allowed. This field is required.
6	Enter the NE Alias. An alias can be 1-40 alphanumeric characters. Uppercase and lowercase letters are allowed. Spaces are allowed. This field is optional.
7	Select the NE Type. To do this, click the down arrow to the right of the field to display a drop-down list of choices and select the NE type. This field is required.
8	Select the NE's time zone by clicking the appropriate radio button. If Other is selected, enter the time difference, in minutes, between the NE time and Greenwich Mean Time (GMT). Specify the time difference, "+" (plus) or "-" (minus), up to five characters. Valid values are -11.0 to 13.00 (the plus "+" is implied). This field is required. If no selection is made, the Time Zone defaults to Same as Host.
9	For the Communicate Via field, click the GNE radio button. This NE is being set up communicate with WaveStar SNMS via a GNE. The default for this NE type is GNE. This field is required.
10	Click on the NE Communications Details tab. The NE Communications Details panel is displayed, showing the current list of GNEs available to provide communications with WaveStar SNMS for the NE being added.
11	Select the GNE for the NE being added. Use the type ahead field and filter/sort function to narrow the listing to the GNE(s) required.
12	Click on the NE Security tab. The NE Security panel is displayed.
13	Enter the primary NE login for the NE being added. The login can be 1-10 characters.
14	Enter the primary NE password for the NE login. An NE password can be 1-10 characters.
15	Re-enter the primary NE password, in the Re-enter Password field, for checking.
16	Enter the backup login for the NE. The backup login can be 1-10 characters.

Step	Action (Contd)
17	Enter the backup password for the NE. The backup password can be 1-10 characters.
18	Re-enter the backup password, in the Re-enter Backup Pwd field, for checking.
19	Click the Apply button to activate your choices, or click the OK button to activate your choices and close the NE Security panel of the Add/Modify NE window. A message is displayed in the status bar, indicating that the NE is being added to WaveStar SNMS. Stop! End of Task.

Add a Network Element—OSI Communications

Background

Use this procedure to add an NE that communicates with WaveStar SNMS over an OSI/LAN interface or OSI over TCP/IP. The WaveStar SNMS IAO-LAN interface provides a higher bandwidth communications path to NEs than possible via X.25. WaveStar SNMS establishes and manages OSI associations to NEs. WaveStar SNMS supports the OSI standard seven-layer protocol stack. OSI-connected NE types include the WaveStar BWM, WaveStar 2.5G, WaveStar OLS 400G, WaveStar TDM 10G (STM-64) and the NCC. When an NCC is added as a transport bridge, it is set up for OSI over TCP/IP communications with WaveStar NEs in the subnetwork. When WaveStar SNMS communicates with OSI-connected NEs over an IAO-LAN interface, one NE can serve as the point of attachment for the EMS to the subnetwork.

Before you begin

Before you begin this task, you should identify the number and types of OSI associations to be used for NE communications with WaveStar SNMS. If a WaveStar NE has been set up in the NCC's directory services for SDS, the NE's NSAP address may be retrieved from the NCC. If the NSAP address cannot be obtained from the NCC providing SDS, or is not available through SDS, then the NE's NSAP address has to be manually entered. NCCs that are serving as transport bridges for TCP/IP to OSI protocol conversion for WaveStar NEs should be added and identified as transport bridges before the WaveStar BWM NEs are added.

Be aware that any changes to the primary/secondary passwords for NEs will affect logging into the NEs from all EMS and CIT interfaces.

BWM and TDM 10G (STM-64) NEs have a password aging feature that is turned on, by default, for the LUC01 and LUC02 default super user logins. When WaveStar SNMS encounters an expired password, it uses two default alternate passwords, SNC+01 and SNC+02. The first time that WaveStar SNMS encounters an expired password, it changes the expired password to the first default alternate password SNC+01. If the NE password expires again, WaveStar SNMS changes the NE password to the second alternate password SNC+02. It will then change the NE password back to SNC+01 if it expires again. The expiration and changing of NE passwords may be transparent to the WaveStar SNMS user, so you should be aware that an NE password **may have changed from what it was set to by the user. This may be avoided by turning the NE password aging feature off for the two NE logins that WaveStar SNMS uses.**

The password aging feature for BWM and TDM 10G (STM-64) NEs can be turned off via the CIT or by issuing the appropriate TL1 command through the WaveStar

SNMS Cut-Through feature. Refer to the NE hardware documentation for the TL1 command need to turn off the password aging feature.

To perform this task, access the Map window.

Task

Complete the following steps to add an OSI-connected NE to WaveStar SNMS.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Manage NEs window is displayed, showing the current list of NEs in your Target Group.
4	<p>Click on the Add button. The Add an NE - General Information panel is displayed.</p> <p>The Add an NE window for OSI-connected NEs is divided into four panels:</p> <ul style="list-style-type: none"> ◆ General NE Information ◆ NE Communications Details (OSI) ◆ NE Communications Details (OSI) #2 ◆ NE Security <p>There are fields on each panel that are required to an NE. To access a panel, click the mouse select button on the panel's labeled tab.</p> <p>The General Information panel is displayed initially.</p>
5	Enter the NE's Target Identifier (TID). A TID can be 1-20 alphanumeric characters. Hyphens, slashes ("/"), and periods are allowed. This field is required.
6	Enter the NE's Alias. An alias can be 1-40 alphanumeric characters. Uppercase and lowercase letters are allowed. Spaces are allowed. This field is optional.
7	Select the NE Type. To do this, click the down arrow to the right of the field to display a drop-down list of choices and select the NE type. This field is required.
8	Select the NE's time zone by clicking the appropriate radio button. If Other is selected, enter the time difference, in minutes, between the NE time and Greenwich Mean Time (GMT). Specify the time difference, "+" (plus) or "-" (minus), up to five characters. Valid values are -11.0 to 13.00 (the plus "+" is implied). This field is required. If no selection is made, the Time Zone defaults to Same as Host.
<i>Continued on next page</i>	

Step	Action (Contd)	
9	<p>IF YOU ARE ADDING...</p> <ul style="list-style-type: none"> • an OSI-connected NE • an NCC as a DSA for WaveStar BWM NEs • an NCC or OLS 400G as a transport bridge for NEs 	<p>THEN CHOOSE TO COMMUNICATE VIA...</p> <ul style="list-style-type: none"> • OSI • OSI • OSI over TCP/IP
10	<p>Click on the NE Communications Details (OSI) tab. The Communications Details panel for OSI communications is displayed.</p>	
	<p>Fill in the following fields, as needed:</p> <ul style="list-style-type: none"> • Controller #1 NSAP—If NSAP address information was received from the SDS for this NE type, the NSAP address fields are filled in with known information. If information was not received from the SDS or is unavailable, the NSAP address must be entered manually. The Routing Domain part of the NSAP is used to associate NEs with a transport bridge (this field is editable for the transport bridge). See the NSAP address entry section immediately following this procedure for a description of the NSAP address fields. • This is a Transport Bridge NE—If an NCC or OLS 400G is being added and is serving as a transport bridge for OSI over TCP/IP protocol conversion for NEs, click on this box to place a check in it. Otherwise, leave this box blank. • Transport Bridge (Primary and Secondary)—Click on the down arrow next to the Primary Transport field to display a drop down list of nodes available to serve as a transport bridge. Select a node from the list. If a backup transport bridge is needed, click on the arrow next to the Secondary Transport Bridge field, display a drop down list, and select another node. • IP Address for Transport Bridge —If the NCC or OLS 400G being added is a transport bridge, enter the IP address. An entry in this field is required for a transport bridge. 	
11	<p>Click on the NE Communications Details (OSI) #2 tab. The NE Communications (OSI) #2 panel is displayed.</p>	
<p><i>Continued on next page</i></p>		

Step	Action (Contd)
12	<p>Fill in the following fields, as needed:</p> <ul style="list-style-type: none"> ◆ Number of OSI Associations—Choose the number of OSI associations for the NE type by clicking the corresponding radio button: 1, 2, or 3. This field is required. The number of available associations varies by NE type: <ul style="list-style-type: none"> — WaveStar BWM or 2.5G: 3 — NCC: 2 — WaveStar OLS 400G: 1 (default, no change allowed by user) — WaveStar TDM 10G (STM-64): 1 ◆ Notification Type—For each OSI association chosen, choose the notification type. Only one notification type can be assigned per association. This field is required. The notification types vary by NE type. If the Notification type All is chosen for an NE type, all other association type choices are disabled. If the notification type All is chosen, after you click the OK or Apply button, a pop-up message window is displayed, advising you that other system responses will be received and could affect performance, and asking if you want to change the association type. Choose Yes to continue or No to change the association type.
13	Click on the NE Security tab. The NE Security panel is displayed.
14	Enter the primary NE login for the NE/NCC being added. The login can be 1-10 characters.
15	Enter the primary NE password for the NE/NCC login. An NE password can be 1-10 characters.
16	Re-enter the primary NE/NCC password, in the the Re-enter Password field, for checking.
17	<p>Enter the backup login for the NE/NCC. The backup login can be 1-10 characters.</p> <p> NOTE: The OLS 400G R. 1.0 NE supports only a single super user login via WaveStar SNMS, so no backup login/password can be entered.</p>
<i>Continued on next page</i>	

Step	Action (Contd)
18	Enter the backup password for the NE/NCC. The backup password can be 1-10 characters.
19	Re-enter the backup password, in the Re-enter Backup Pwd field, for checking.
20	Click the Apply button to activate your choices, or click the OK button to activate your choices and close the NE Security panel of the Add/Modify NE window. A message is displayed in the status bar, indicating that the NE is being added to WaveStar SNMS. Stop! End of Task.

NSAP address entry

The following table lists the NSAP address fields, indicates field defaults, character widths, and which fields are editable in the GUI.

Field Name	Notes	NE(s)	Default	Octet Size	Editable?
AFI	Area Format Identifier.	All	0x39	1	Yes
IDI + pad	Initial Domain Part.	All	0x840 0xF	2	Yes
DFI	Domain Format Identifier. Specifies format for rest of address.	All	0x80	1	Yes
Operator ID		All	0x000000	3	Yes
Reserved	Currently not used. Reserved for future use.	All	0x0000	2	No
Routing Domain	NSAP unique Routing Domain within an administrative domain.	NCC,BWM, OLS 400G	0x0000	2	Yes

Field Name	Notes	NE(s)	Default	Octet Size	Editable?
Area	NSAP Area Identifier. Identifies NEs in the same area.	All	0x0000	2	Yes
System ID	System Identifier. This field is used to guarantee that NSAP address is globally unique.	All	no default	1	Yes
SEL	NSAP Selector. Used to differentiate multiple NSAP addresses associated with same End System.	All	0x1D*	1	No

*The value of the SEL field is 1D hex when TP4 is run over CLNP.

The System ID field is not defaulted, but is mandatory.

All of the NSAP address fields, except for the Reserved and SEL fields, are editable on the Add a Network Element to the DIB window in the GUI.

Add a Network Element—TCP/IP Communications

Background

Use this procedure to add an NE with a direct TCP/IP interface to WaveStar SNMS host. NEs with a “pure” direct TCP/IP interface can be set up to communicate directly via TCP/IP with the WaveStar SNMS host or through a TCP/IP-connected NE serving as a Gateway Network Element (GNE) for the other NEs in a ring. To provide support in the event of a communications failure, a backup GNE can be assigned to a subnetwork to allow switchover to another GNE.

Before you begin

Before you begin this task, if you are adding a TCP/IP-connected NE as a GNE, the following must be established:

- ▶ The GNE’s Target Identifier (TID)
- ▶ A valid NE login/password, and a valid backup NE login/password
- ▶ The GNE’s IP address
- ▶ The number of associations for exchanging messages between the GNE and the other NEs in a ring

Before adding a TCP/IP GNE, you must first create a subnetwork to which it can be assigned.

Task

Complete the following steps to add a TCP/IP-connected GNE.

Step	Action
1	Select Administration from the main menu bar on the Map window.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Manage NEs window is displayed, showing the current list of NEs in your Target Group.

Step	Action (Contd)	
4	<p>Click on the Add button. The Add an NE - General Information panel is displayed.</p> <p>The Add an NE window for GNEs is divided into three panels:</p> <ul style="list-style-type: none"> ➤ General NE Information ➤ NE Communications Details (GNE or TCP/IP) ➤ NE Security <p>There are fields on each panel that are required to add a GNE. To access a panel, click the mouse select button on the panel's labeled tab.</p> <p>The General Information panel is displayed initially.</p>	
5	<p>Enter the NE's Target Identifier (TID). A TID can be 1-20 alphanumeric characters. Hyphens, slashes ("/"), and periods are allowed. This field is required.</p>	
6	<p>Enter the NE's Alias. An alias can be 1-40 alphanumeric characters. Uppercase and lowercase letters are allowed. Spaces are allowed. This field is optional.</p>	
7	<p>Select the NE Type. To do this, click the down arrow to the right of the field to display a drop-down list of choices and select the NE type. This field is required.</p>	
8	<p>Select the NE's time zone by clicking the appropriate radio button. If Other is selected, enter the time difference, in minutes, between the NE time and Greenwich Mean Time (GMT). Specify the time difference, "+" (plus) or "-" (minus), up to five characters. Valid values are -11.0 to 13.00 (the plus "+" is implied). This field is required. If no selection is made, the time zone defaults to Same as Host.</p>	
9	<p>In the Communicate Via field of the General Information panel: IF ...</p> <p>The NE is communicating with the WaveStar SNMS host via a GNE</p> <p>The NE is communicating directly with the WaveStar SNMS host via TCP/IP</p>	<p>CLICK...</p> <p>the GNE radio button. Go to step 10.</p> <p>the TCP/IP radio button. Go to step 11.</p>
10	<p>If you selected the Communicate Via GNE option in step 9, click on the NE Communications Detail (GNE) panel. Select a GNE from the list on the panel. Skip to step 17.</p> <p style="text-align: right;"><i>Continued on next page</i></p>	

Step	Action (Contd)
11	If you selected the Communicate Via TCP/IP option in step 9, click on the NE Communications Details (TCP/IP) tab. The NE Communications Details (TCP/IP) panel is displayed. This panel is used to enter information about the interface between this GNE, the WaveStar SNMS host and the other NEs in the subnetwork.
12	The Communication Type defaults to TL1 Only. The other options are currently not available.
13	Click on the down arrow to the right of the Choose a Subnetwork field to display a list of subnetworks, and select a subnetwork. This field is required.
14	Enter the NE's IP address. The IP address field is divided into four 3-character fields separated by periods.
15	<p>For NEs discovered under the GNE being added (Discovered Remotes), choose one of the following options (by clicking on that option's radio button):</p> <ul style="list-style-type: none"> ▶ This GNE—the NE login and password entered for this GNE in the NE Security panel will be used to log into the NEs. ▶ WaveStar SNMS Default for Remote NEs—the system-wide WaveStar SNMS default NE login and password for the NE type of the Remote Terminal (RT) being discovered will be used to log into the NEs. ▶ WaveStar SNMS Default for GNE Type—the system-wide WaveStar SNMS default NE login and password for the NE type of the GNE being added will be used to log into the NEs.
16	Choose the number of associations for the NE type. This field is required. Go to step 17.
17	Click on the NE Security tab. The NE Security panel is displayed.
18	Enter the primary NE login for the NE being added. The login can be 1-10 characters.
19	Enter the primary NE password for the NE login. An NE password can be 1-10 characters.
20	Re-enter the primary NE password, in the Re-enter Password field, for checking.

Continued on next page

Step	Action (Contd)
21	Enter the backup login for the NE. The backup login can be 1-10 characters.
22	Enter the backup password for the NE. The backup password can be 1-10 characters.
23	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the NE Security panel of the Add/Modify NE window.</p> <p>If you are adding a GNE, the system prompts if you want to run DNO immediately to update the WaveStar SNMS database with complete information about the newly added NE. Choose Yes to run DNO or No to not perform DNO at this time.</p> <p> NOTE: If you are adding more GNEs to the same subnetwork, choose No to not perform DNO at this time. A DNO should not be performed until all GNEs in the same subnetwork have been added so new RNEs discovered automatically by WaveStar SNMS via a newly added GNE can be reassigned to another GNE in the same subnetwork, if necessary. See Associate Remote Network Elements with Gateway Network Elements for details on how to reassign RNEs to another GNE in the same subnetwork.</p> <p>A message in the status bar is displayed, indicating that the NE is being added to WaveStar SNMS.</p> <p>Stop! End of Task.</p>

Add a Gateway Network Element— X.25 Communications

Background

When to use

Use this procedure to add an FT-2000 LCT Gateway Network Element (GNE) for X.25-based communications between WaveStar SNMS and the NEs in a subnetwork. The GNE establishes communication with the WaveStar SNMS host through a synchronous port over a Packet-Switched Network (PSN). To provide support in the event of a communications failure, a backup (secondary) GNE can be assigned to a subnetwork to allow switchover to another GNE.

Before you begin

Before you begin this task, the following must be established before adding a FT-2000 LCT GNE:

- ▶ The GNE's Target Identifier (TID)
- ▶ A valid NE login/password, and a valid backup NE login/password
- ▶ The synchronous port that the PSN uses for connectivity to the WaveStar SNMS host
- ▶ The PVCs and/or SVCs that are being used for command/response messages, autonomous maintenance/alarm messages, and autonomous database change/provisioning commands/responses

Before adding a GNE, you must first create a subnetwork to which it can be assigned.

Task

Complete the following steps to add an X.25-connected GNE.

Step	Action
1	Select Administration from the main menu bar on the Map window.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Manage NEs window is displayed, showing the current list of NEs in your Target Group.

Step	Action (Contd)
4	<p>Click on the Add button. The Add an NE - General Information panel is displayed.</p> <p>The Add an NE window for X.25-connected GNEs is divided into three panels:</p> <ul style="list-style-type: none"> ➤ General NE Information ➤ NE Communications Details ➤ NE Security <p>There are fields on each panel that are required to add a GNE. To access a panel, click the mouse select button on the panel's labeled tab.</p> <p>The General Information panel is displayed initially.</p>
5	<p>Enter the GNE's Target Identifier (TID). A TID can be 1-20 alphanumeric characters. Hyphens, slashes ("/"), and periods are allowed. This field is required.</p>
6	<p>Enter the GNE's Alias. An alias can be 1-40 alphanumeric characters. Uppercase and lowercase letters are allowed. Spaces are allowed. This field is optional.</p>
7	<p>Select the NE Type. To do this, click the down arrow to the right of the field to display a drop-down list of choices and select the NE type FT-2000 LCT. This field is required.</p>
8	<p>Select the NE's time zone by clicking the appropriate radio button. If Other is selected, enter the time difference, in minutes, between the NE time and Greenwich Mean Time (GMT). Specify the time difference, "+" (plus) or "-" (minus), up to five characters. Valid values are -11.0 to 13.00 (the plus "+" is implied). This field is required. If no selection is made, the time zone defaults to Same as Host.</p>
9	<p>For the Communicate Via field, click the PSN radio button. As a GNE, this NE is being set up to communicate with WaveStar SNMS and other NEs in the subnetwork via a PSN. This field is required.</p>
10	<p>Click on the NE Communications Details (PSN) tab. The NE Communications Detail panel is displayed. This panel is used to enter information about the GNE's X.25 interface.</p>
11	<p>Click on the down arrow to the right of the Choose an X.25 Interface field to display a list of X.25 port names, and select a port. This field is required.</p>
12	<p>Click on the down arrow to the right of the Choose a Subnetwork field to display a list of subnetworks, and select a subnetwork. This field is required.</p>

Step	Action (Contd)
19	Enter the primary NE password for the GNE login. An NE password can be 1-10 characters.
20	Re-enter the primary NE password, in the Re-enter Password field, for checking.
21	Enter the backup login for the GNE. The backup login can be 1-10 characters.
22	Enter the backup password for the GNE. The backup password can be 1-10 characters.
23	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the NE Security panel of the Add/Modify NE window.</p> <p>The system prompts if you want to run DNO immediately to update the WaveStar SNMS database with complete information about the newly added NE. Choose Yes to run DNO or No to not perform DNO at this time.</p> <p> NOTE: If you are adding more GNEs to the same subnetwork, choose No to not perform DNO at this time. A DNO should not be performed until all GNEs in the same subnetwork have been added so new RNEs discovered automatically by WaveStar SNMS via a newly added GNE can be reassigned to another GNE in the same subnetwork, if necessary. See Association Remote Network Elements with Gateway Network Elements for details on how to reassign RNEs to another GNE in the same subnetwork.</p> <p>A message in the status bar is displayed, indicating that the GNE is being added to WaveStar SNMS.</p> <p>Stop! End of Task.</p>

Modify a Network Element

Background Use this procedure to modify an NE.

Before you begin Before you begin this task, be aware that the TID and Communicate Via fields cannot be modified.

Be aware that you can use the Modify an NE window to define NE passwords for a BWM or 10G (STM-64) NE if both passwords were changed through the CIT due to the password aging feature for these NE types.

If both NE passwords have been changed through the CIT, and you do not know what the new NE passwords are, use the Modify an NE window in the WaveStar SNMS GUI to change/modify the NE passwords. You do not have to know the existing passwords that were defined through the CIT.

To perform this task, access the Map window.

Task Complete the following steps to modify an NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Network Element Manager window is displayed, showing the current list of NEs in your Target Group.
4	Choose the NE to be modified.

Continued on next page

Step	Action (Contd)
5	Click the Modify button. The Add/Modify a Network Element - General Information panel is displayed.
6	Click on the tab of the appropriate panel, and change the NE field(s), as needed.
7	Click the Apply button to activate your choices, or click the OK button to activate your choices and close the Add/Modify a Network Element window. A pop-up window is displayed, asking if you want to perform DNO at this time. Choose Yes to perform DNO or choose No to not perform DNO at this time. A message in the status bar is displayed, indicating that the NE is being modified. Stop! End of Task.

Delete a Network Element

Background Use this procedure to delete an NE.

Before you begin Before you begin this task, make sure that if the NE is assigned to an aggregate, that you remove it from the aggregate before deleting it. When an NE is deleted, all information related to that NE is immediately removed from the WaveStar SNMS database. Associated trails may also be deleted. Any trail that is deleted as a result of deleting an NE is also removed from any open window that shows the deleted trail (like the Map window pane and the Trail Manager).

If you are deleting a GNE, you must first reassign all RNEs associated with the GNE or delete the RNEs from the WaveStar SNMS database.

To perform this task, access the Map window.

Task Complete the following steps to delete an NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Network Elements from the sub-menu. The Network Element Manager window is displayed, showing the current list of NEs in your Target Group.
4	Choose the NE to be deleted.
5	Click the Delete button.
6	Click the OK button. A pop-up window is displayed, asking if you really want to delete the chosen NE.
7	Choose Yes. A message in the status bar is displayed, indicating that the NE is being deleted. Stop! End of Task.

Add a Subnetwork Name/Alias

Background

Use this procedure to add a subnetwork name and subnetwork alias. Once a subnetwork name and alias is created, you can associate one or more active GNEs with that subnetwork. The Remote Network Elements (RNEs) associated with a GNE become grouped under that subnetwork name/alias. RNEs in a subnetwork can be manually reassigned to another GNE in the same subnetwork.

Before you begin

Before you begin this task, you must add at least one of the network elements that will be part of the subnetwork you are adding. To perform this task, you must first access the Map window.

Task

Complete the following steps to add a subnetwork name and its alias.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	A sub-menu is displayed.
3	Select Subnetwork from the sub-menu.	The Subnetwork Manager window is displayed.
4	Click the Add button to add a new subnetwork name/alias.	The Add a Subnetwork window is displayed.
5	Enter the name of the subnetwork, which is the name of one of the member Network Elements, in the Subnetwork Name field.	
6	Enter the name of the subnetwork alias in the Subnetwork Alias field.	
7	Click the Apply button to add the new information to the WaveStar SNMS database, or click the OK button to add the new information and close the window. Stop! End of Task.	The Status Dialog window is displayed, indicating that the subnetwork name/alias has been added to the system.

Modify a Subnetwork Alias

Background Use this procedure to change a subnetwork's alias once it has been created.

Before you begin Before you begin this task, the subnetwork name/alias being modified must exist in WaveStar SNMS.

To perform this task, access the Map window.

Task Complete the following steps to change a subnetwork alias.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	A sub-menu is displayed.
3	Select Subnetwork from the sub-menu.	The Subnetwork Manager window is displayed.
4	Select the subnetwork name to be modified from the scroll list.	
5	Click the Modify button.	The Add a Subnetwork window is displayed with the current subnetwork name and alias.
6	Change the subnetwork alias name and click the OK button.	The Status Dialog window is displayed, indicating that the subnetwork alias change has been made in the system. All references to the subnetwork are updated to reflect the changes made.
	Stop! End of Task.	

Delete a Subnetwork Name/Alias

Background

Use this procedure to delete a subnetwork name and alias from the WaveStar SNMS database.

Before you begin

Before you begin this task, the subnetwork name/alias must exist in the WaveStar SNMS database. The NE(s) assigned to the subnetwork name being deleted must first be reassigned to another subnetwork by modifying the network element, via the Add/Modify a Network Element window.

To perform this task, access the Map window.

Task

Complete the following steps to delete a subnetwork name and alias from the WaveStar SNMS database.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	A sub-menu is displayed.
3	Select Subnetwork from the sub-menu.	The Subnetwork Manager window is displayed.
4	Select the subnetwork to be deleted.	
5	Click the Delete button.	A pop-up message window is displayed, asking if you really want to delete the selected subnetwork. Choose Yes to delete the subnetwork. The Status Dialog window is displayed, indicating that the subnetwork name/alias has been deleted. All references to the deleted subnetwork name/alias and subnetwork/NE relationships are updated in WaveStar SNMS.
	Stop! End of Task.	

Associate Remote Network Elements with Gateway Network Elements

Background

When to use

Use this procedure to view the Gateway Network Elements (GNEs) in a subnetwork and associated Remote Network Elements (RNEs) and to reassign RNEs to a different GNE in the same subnetwork, as needed.

Before you begin

Before you begin this task, network elements to be reassigned to a different GNE must be initially assigned to a GNE in the subnetwork. The GNEs/RNEs must be given an existing subnetwork name/alias. To perform this task, you must first access the Map window.

Task

Complete the following steps to view a GNE and its associated RNEs in a subnetwork and, if needed, to reassign RNEs to a different GNE in the subnetwork.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	The Network sub-menu is displayed.
3	Select GNE Associations from the Network sub-menu.	A sub-menu is displayed.
4	Select GNE/RNE from the sub-menu.	The GNE/RNE Association window is displayed. This window is divided into two parts. It consists of: <ul style="list-style-type: none"> ▶ An explorer tree, which shows the names of all subnetworks in your Target Group (unexpanded) ▶ A table which displays the TID and type of each RNE

Step	Action (Contd)	Result
5	To view GNEs in a subnetwork, double-click on a subnetwork name in the explorer tree to select and expand the subnetwork's associations.	
6	To view RNEs associated with a GNE, select the GNE.	The GNE's associated RNEs are displayed in the table.
7	To reassign an RNE from one GNE to another one in the subnetwork, select the RNE by left-clicking on it in the "Remote NEs" part of the window.	A pop-up window is displayed, with the message "Associate with...".
8	Right-click on the same RNE selected.	A pop-up window is displayed, with the message "Associate with...".
9	Click the select (left) mouse button on the "Associate with.." message that is displayed.	A message is displayed in the status bar "Select a GNE within the same subnet to associate this RNE with".
10	Double-click on a GNE under the same subnetwork in the explorer tree to select it for reassignment of the RNE.	The GNE/RNE reassignment is processed. Messages are displayed in the status bar of the window, indicating the progress of the reassignment and when it is completed.
11	Continue making reassignments as needed.	
12	When you are finished, click the Close button to close the window. Stop! End of Task.	

Add a Secondary (Backup) Gateway Network Element Association

Background

Use this procedure to add a GNE association. A GNE association is a pair of GNEs in the same subnetwork that serve, respectively, as the Primary GNE and Secondary (backup) GNE for the other NEs in the subnetwork to communicate with WaveStar SNMS. The Primary GNE initially serves as the point of communications for the other NEs in a subnetwork with WaveStar SNMS. The backup (secondary) GNE is the backup GNE should communications with the Primary GNE fail.

Before you begin

Before you begin this task, you must configure both NEs to be GNEs in the same subnetwork. You must also verify that the Secondary GNE does not have a separate set of Remote Network Elements communicating with it.

To perform this task, access the Map window.

Task

Complete the following steps to add a GNE association.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	The Network sub-menu is displayed.
3	Select GNE Associations from the Network sub-menu.	A sub-menu is displayed.
4	Select Primary/Secondary from the sub-menu.	The Primary/Secondary GNE Associations window is displayed. This window shows the current GNE associations (if any exist). An "X" to the left of a GNE in an association indicates that it is the currently active GNE.
5	Click the Add New Association button.	The Add a Primary/Secondary GNE Association window is displayed.

Step	Action (Contd)	Result
6	Select the Primary GNE from the Primary GNE scroll list.	The GNE(s) available to serve as the Secondary GNE in the association is displayed in the Secondary GNE scroll list.
7	Select the Secondary GNE from the Secondary GNE scroll list.	
8	Click the Apply button to create the association or click the OK button to create the association and close the Add a Primary/Secondary GNE Association window.	The GNE association is added to the GNE Associations list. The Primary GNE in the newly created association becomes the currently active GNE.
9	Close the status window by clicking the Close button.	
10	Click the Close button to close the Primary/Secondary GNE Association window. Stop! End of Task.	

Switch Primary/Secondary Gateway Network Elements

Background Use this procedure to switch the active and standby status of the GNEs in an association. When a switch is made, the Secondary GNE becomes the active GNE.

Before you begin Before you begin this task, be aware that a manual switch of the active and standby GNEs will cause temporary loss of communications with all of the NEs connected via the GNE pair, resulting in generation of alarms and/or loss of alarms.

To perform this task, access the Map window.

Task Complete the following steps to manually switch the active and standby GNE in a GNE association.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. The Network sub-menu is displayed.
3	Select GNE Associations from the Network sub-menu. A sub-menu is displayed.
4	Select Primary/Secondary from the sub-menu. The Primary/Secondary Associations window is displayed.
5	Select the Primary/Secondary GNE association to be switched. The Status Dialog window is displayed, indicating that the switch is being made. When the switch is made, the "X" moves to the newly active GNE in the association.
6	Click the Close button to close the window. Stop! End of Task.

Delete a Gateway Network Element Association

Background

Use this procedure to delete a GNE association. This procedure is only used to remove the association between two GNEs, not to delete the GNEs from the network. When a GNE association is deleted, NEs in a subnetwork remain connected to the currently active GNE.

Before you begin

Before you begin this task, identify the GNE association to be deleted.

To perform this task, access the Map window.

Task

Complete the following steps to delete a GNE association.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. The Network sub-menu is displayed.
3	Select GNE Associations from the Network sub-menu. A sub-menu is displayed.
4	Select Primary/Secondary from the sub-menu. The Primary/Secondary Association window is displayed.
5	Select the GNE association to be deleted.
6	Click the Delete button.
7	The Status Dialog window is displayed, indicating that the association has been deleted.
8	Click the Close button to close the window. Stop! End of Task.

Manage Transport Bridges

Background Use this procedure to reassign NEs to transport bridges as needed to remove NE associations from transport bridges.

Before you begin Before you begin this task, you must have added NCCs or OLS 400G NEs as designated transport bridges and assigned WaveStar NEs to transport bridges to make changes to assignments. You also must have selected a primary and, if needed, backup transport bridge for each of the WaveStar NEs in your Target Group that require TCP/IP to OSI protocol conversion.

Be aware that only reassignment of a primary transport bridge will cause the actual switch of the transport bridge. The switch of a primary transport bridge may cause the link from WaveStar SNMS and the target NE to go down and up, which can trigger automatic alarm re-synchronization.

To perform this task, access the Map window.

Task Complete the following steps to view Transport Bridge assignments for NEs, modify the assignments as needed, and to enable/disable automatic assignment of Primary and Secondary (Backup) Transport Bridges.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Communications from the Administration menu. The Communications menu is displayed.
<i>Continued on next page</i>	

Manually Initiate DNO

Background

Use this procedure to manually initiate DNO for one or more NEs or an aggregate. For a WaveStar BWM or WaveStar OLS 400G, you can perform a DNO for all configuration data, or on any single bay or shelf. You can specify that all information be included in the DNO update, or just port, cross-connection, port protection group, subnetwork, NE parameters, or equipment information.

Before you begin

Before you begin this task, you must be logged into WaveStar SNMS.

Task Complete the following steps to manually initiate DNO.

Step	Action	
1	<p>IF ...</p> <ul style="list-style-type: none"> ▶ you are performing DNO on a single NE, group of NEs, or aggregate ▶ you are performing DNO on a single bay or shelf 	<p>THEN ...</p> <ul style="list-style-type: none"> ▶ select one or more NEs or an aggregate. ▶ select the bay or shelf on the Network Element Explorer
2	<p>Access the DNO function (as appropriate) through:</p> <ul style="list-style-type: none"> ▶ The Map window Configuration menu—select DNO from the Configuration menu on the main menu bar of the Map window. The Choose an NE/Aggregate window is displayed. Double-click on the NE(s)/aggregate(s) for which you want to perform DNO. Click the OK button. ▶ The NE's or aggregate's pop-up menu—position the mouse cursor over the NE/aggregate icon on the Map pane or Subnetwork Explorer, and click the menu (right) mouse button. A pop-up menu is displayed. Select DNO from the pop-up menu. ▶ The Equipment View window (for the chosen NE/aggregate)—Select Configuration from the main menu. A sub-menu is displayed. Select DNO from the sub-menu. ▶ The Cross-Connection window (for the chosen NE/aggregate)—select Configuration from the main menu. A sub-menu is displayed. Select DNO from the sub-menu. <p>The Manual DNO window is displayed.</p> <p> NOTE: If the DNO channel is down, a message is displayed in the status bar of the window, indicating that you cannot perform a DNO at this time. Click the Close button to close the window.</p>	
<i>Continued on next page</i>		

Step	Action (Contd)
4	<p>Click the Apply button to initiate DNO and select the next data type for update, or click the OK button to initiate DNO and close the window.</p> <p>The DNO process is started.</p> <p> NOTE: To obtain DNO status for an NE before or after initiating DNO, click on the GetStatus button.</p> <p>When the DNO is completed, a message is displayed on the window's status bar, indicating whether the DNO is successful or if there are any errors.</p> <p> CAUTION: <i>For certain NE types, such as the BWM and OLS 400G, DNO command requests for some data may result in DENY messages but the DNO process will continue, resulting in a "COMPLETED" status even though all data has not been updated in the database. In this case, your system administrator may have to check the ERRORLOG file in the \$oamlog directory to check the NE responses to the DNO process.</i></p> <p>If DNO cannot be performed for the selected NE(s), the system issues a message.</p> <p>If you choose to perform DNO on all NEs in your Target Group, or for an NCC with the DSA function enabled, a pop-up window is displayed, informing you that the DNO process may take a long time and affect system performance. You can choose to perform DNO or stop the process. Choose Yes to perform DNO anyway or No to stop the DNO process.</p> <p>Stop! End of Task.</p>

Schedule DNO

Background

Use this procedure to schedule a Dynamic Network Operations (DNO) database update for an NE.

Before you begin

Before you begin this task, be aware that DNO cannot be scheduled for a bay or shelf in a WaveStar BWM NE. Unless you are scheduling a DNO for all NE data, you can only specify a database update for one data type. The first time that a DNO is scheduled for an NE, the system does database synchronization for all data types, even if you select only one type for database synchronization.

To perform this task, access the Map window.

Task

Complete the following steps to schedule DNO for an NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub-menu is displayed.
3	Select DNO from the sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled DNOs.
4	Click the Add button. The Add a Scheduled DNO window is displayed.
5	Choose an NE (by TID) from the Choose an NE scroll bar list by double-clicking on the item. Use the type ahead field and/or filter/sort functions to narrow the list, if necessary.
<i>Continued on next page</i>	

Step	Action (Contd)	
6	<p>TO SCHEDULE A DNO FOR... all data types</p> <p>a specific data type</p> <p>⇒ NOTE: When you perform DNO the first time on an NE, the system does database synchronization on all data types, even if you choose only one data type.</p>	<p>CLICK... The All Information radio button under the DNO Type portion of the window.</p> <p>Click the "Only the following..." button and then click one of the following radio buttons:</p> <ul style="list-style-type: none"> ▶ Port Parameters ▶ Subnetwork ▶ Equipment ▶ Cross Connections ▶ NE Parameters ▶ Port Protection Groups ▶ Optical Associations <p>⇒ NOTE: One or more data type buttons may be disabled for a specific NE type.</p>

Step	Action (Contd)
7	<p>Choose the following Scheduling Options, as needed:</p> <ul style="list-style-type: none">▶ Weekly on...—click on this radio button if you want the task to be done on a weekly basis. If you schedule the task to be done weekly, choose the day of the week by using the spinner field list next to this option.▶ Once every...—click on this radio button if you want the task to be done periodically. If you schedule the task to be done periodically, choose the frequency (every x month(s) and the day of the month it will be done using the spinner field lists next to this option or click the Last Day of the Month checkbox.▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format.▶ Number of Retries—click the up and down arrows on this spinner field to specify the number of retries for the scheduled task.▶ Retry Interval—If the Number of Retries selected is greater than 1, specify the retry interval, in minutes. Click the up and down arrows on the spinner field to select the time interval.
8	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window.</p> <p>Stop! End of Task.</p>

Modify a Scheduled Task

Background Use this procedure to change the parameters of a task for any function that can be scheduled.

Before you begin Before you begin this task, be aware that you cannot modify a scheduled task that is already in progress. You cannot modify another user's scheduled tasks unless you are the system administrator or have a privileged login.

To perform this task, access the Map window.

Task Complete the following steps to modify a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. Result: The Administration menu is displayed.
2	Select Schedule from the Administration menu. Result: The Schedule sub-menu is displayed.
3	Select the function of the task to be modified. Result: The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Select a task from the list to be modified.
5	Click the Modify button. Result: The appropriate Modify a Scheduled Item window is displayed.
6	Make modifications to the information.
7	Click the Apply button to apply the changes or click the OK button to apply the changes and close the window. Stop! End of Task.

Delete a Scheduled Task

Background Use this procedure to delete a scheduled task for any function that can be scheduled.

Before you begin Before you begin this task, be aware that you cannot delete any scheduled DNO that is already in progress. You cannot delete another user's scheduled tasks unless you are the system administrator or have a privileged login.

To perform this task, access the Map window.

Task Complete the following steps to delete a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. Result: The Administration menu is displayed.
2	Select Schedule from the Administration menu. Result: The Schedule sub-menu is displayed.
3	Select the function of the task to be deleted. Result: The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Choose the item to be deleted, which is identified by TID, from the list.
5	Click the Delete button. Result: A pop-up question dialog window is displayed, asking if you want to delete the selected scheduled task. Choose Yes to delete the selected scheduled task or No to cancel the deletion. Stop! End of Task.

Provision DSA

Background

Use this procedure to select a Network Communication Controller (NCC) or the WaveStar SNMS-based DSA (if activated) to serve as the DSA from which WaveStar SNMS can gather directory information about WaveStar BWM and OLS 400G NEs in the network.

Before you begin

Before you begin this task, make sure that there are existing NCCs added to the WaveStar SNMS database with the DSA capability enabled or the WaveStar SNMS-based DSA has been activated. The WaveStar SNMS-based DSA is activated during installation. The DSA function for an NCC can be enabled through the Craft Interface Terminal (CIT) of the NCC or through the NE parameters function in the GUI. If the WaveStar SNMS server is being used as the DSA, make sure the DSA capability has been enabled for the server.

To perform this task, access the Map window.

Task

Complete the following steps to choose the NCC/DSA or WaveStar SNMS-based DSA through which WaveStar SNMS can communicate with the NCC's Directory Information Base (DIB) for NE directory information.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Communications from the Administration menu. The Communications menu is displayed.

Step	Action (Contd)
3	Select Provision DSA from the Communications menu. The Provision DSA window is displayed.
4	<p>Click the down arrow to the right of the DSA to Monitor field to display a list of NCCs/server (SNMS-based DSA is shown as "Local") with the DSA function enabled. Select a DSA to be used.</p> <p> NOTE: If there is no NCC currently in the WaveStar SNMS database with the DSA function enabled or the WaveStar SNMS-based DSA is not activated, a pop-up message window is displayed, advising you that none exist and that you must manually add an NCC/DSA.</p>
5	<p>Click the Apply button to activate your choice, or click the OK button to activate your choice and close the Provision DSA window.</p> <p>Stop! End of Task.</p>

Add a DIB Prefix

Background

Use this procedure to add a DIB Prefix to an SNMS-based DSA's T.1245 Directory (DIB) for SONET Directory Services (SDS). NEs that register with the EMS-based DSA are stored in the T1.245 DIB in a tree structure under a DIB Prefix provisioned for the SNMS-based DSA DIB. The DIB Prefix is used by the DUA process in the WaveStar SNMS application to query the DSA for NE directory information contained in the T1.245 DIB. The DIB Prefix consists of a company name, an organization, and zero to six organizational units.

Before you begin

Before you begin this task, make sure that the WaveStar SNMS application has the DSA functionality enabled.

Task

Complete the following steps to add a DIB Prefix to the DSA T1.245 DIB for the SDS feature.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	<p>Select DSA Management from the Administration menu. The DSA Manager window is displayed.</p> <p>The DSA Manager window consists of an explorer, which allows you to view the current DIB Prefix(es), with the Prefix composite information, in the DSA DIB, the associated NEs under the DIB Prefix, and the application information for each NE.</p> <p>There is also a text field and a Find button, to do a text string search in the explorer tree.</p> <p>There are four action buttons to the right of the explorer on the window:</p> <ul style="list-style-type: none"> ◆ Add Prefix ◆ Add NE ◆ Delete ◆ Modify <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
3	Click the Add Prefix button. The Add Prefix window is displayed.
4	Fill in the following fields, as needed: <ul style="list-style-type: none"><li>▶ Country—Click the down arrow next to this field to display a drop-down list of Country Codes. Select a Country Code from the drop-down list. The default is US. This field is required.<li>▶ Organization Name—Enter the Organization name. The Organization name can be 1-40 characters. This field is required.<li>▶ Level 1 to Level 6 fields—These fields are optional. Enter from one to six organization unit names. These fields are related to each other. For example, you cannot enter a Level 2 organization unit name until you have entered a Level 1 organizational unit name.
5	Click the OK button. The DIB Prefix is added to the DSA DIB. Stop! End of Task.

Modify a DIB Prefix

Background

Use this procedure to modify a DIB Prefix in the DSA T.1245 DIB for SDS.

You can modify the Organization Name or one to six Organization Unit fields. What you can modify depends on the DIB Prefix information selected for modification in the explorer portion of the DSA Manager window. For example, if you selected the Organization Name under a Country Code to modify on the DSA Manager window, you can change the Organization Name and Organization Unit fields on this window, but you cannot change the Country Code part of the DIB Prefix.

The window displays the current value(s) for the field(s) to be modified. Change the value(s) for the selected field(s) as needed.

Before you begin

Before you begin this task, be sure that there are no NEs registered under the existing DIB Prefix before you modify the prefix information.

Task

Complete the following steps to modify a DIB Prefix in the DSA's T1.245 Directory (DIB).

Step	Action	Reference
1	Access the DSA Manager window.	Add a DIB Prefix
2	In the explorer on the window, choose the Organization name or Organization Unit of the DIB Prefix to be modified.	
3	Click the Modify button. The Modify a Prefix window is displayed with the prefix information for the current level.	
4	Change the Organization name, and/or organizational unit values, as needed.	
5	Click the OK button. The changes to the DIB Prefix are made in the DSA's DIB. Stop! End of Task.	

Delete a DIB Prefix

Background

Use this procedure to delete a DIB Prefix from the DSA DIB.

Before you begin

Before you begin this task, be sure that there are no NEs or Organizational units set up under the DIB prefix to be deleted.

Task

Complete the following steps to delete a DIB Prefix from the DSA DIB.

Step	Action	Reference
1	Access the DSA Manager window.	Add a DIB Prefix
2	In the explorer on the window, choose the Organization name of the DIB Prefix to be deleted.	
3	Click the Delete button. The DIB Prefix is deleted from the DSA DIB. Stop! End of Task.	

Add an Network Element to the Directory Information Base (DIB)

Background Use this procedure to add an NE to the T1.245 DIB of an SNMS-based DSA for the SONET Directory Services (SDS) feature.

Before you begin Before you begin this task, be sure that the DIB Prefix under which the NE will be contained in the T1.245 DIB has been created.

Task Complete the following steps to add an NE to the DSA's T1.245 DIB.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	<p>Select DSA Management from the Administration menu. The DSA Manager window is displayed.</p> <p>The DSA Manager window consists of an explorer, which allows you to view the current DIB Prefix(es), with the Prefix composite information, in the DSA DIB, the associated NEs under the DIB Prefix, and the application information for each NE.</p> <p>There is also a text field and a Find button, to do a text string search in the explorer tree.</p> <p>There are four action buttons to the right of the explorer on the window:</p> <ul style="list-style-type: none"> ▶ Add Prefix ▶ Add NE ▶ Delete ▶ Modify
3	Click the Add NE button. The Add a Network Element to the DIB window is displayed.
4	In the explorer portion of the window, click on the Country Code of the DIB Prefix for the NE. Expand the hierarchy under the selected Country Code until the Organizational Unit under which the NE will be stored is displayed.

Step	Action (Contd)
5	Click on the Organizational Unit in the explorer to select it. The selected Organizational Unit is selected. (The NE can be placed under the Organizational unit; this step is optional.)
6	<p>Fill in the following fields, as needed:</p> <ul style="list-style-type: none"> ▶ TID—This is the NE's TID. A TID can be 1-20 characters. This field is required. ▶ Vendor Name—This field is used to specify the NE's vendor. The default name used in this field is Lucent Technologies. This field is optional. ▶ NE Type—This field is used to specify the NE type. Click the down arrow next to the field to display a list of NE types and choose an NE type. This field is required. ▶ IP Address—This field is used to specify the IP address of the NE. The IP address is specified as four groups of 1-3 digit numbers. For octets less than 3 digits, leading zeros must be entered. Each set of numbers is 0-255, inclusive. This field is mandatory if the NE/NCC is serving as a transport bridge; it is optional for all other NE types. ▶ NSAP—This field is used to specify the NSAP (presentation) address of the NE, for SDS directory/message routing purposes. Refer to the NSAP address entry section immediately following this procedure for information about NSAP address field widths and values. <p> NOTE: All of the NSAP address fields, except for the Reserved and SEL fields, are editable on this window.</p> <ul style="list-style-type: none"> ▶ Application Information—This field is used to select the application service/message type used by the NE. Click the CMISE or TL1 radio button. ▶ FTAM—Click this box to place a check mark in it if the NE being added is an NCC or OLS 400G. This indicates that the File Transfer Access Method (FTAM) will be used for backups/restorals of NE memory and downloads of NE executable software. Otherwise, click in the box to remove the check mark, or leave it blank.
7	Click the OK button. The NE is added to the DSA T1.245 DIB. Stop! End of Task.

NSAP address entry

The following table lists the NSAP address fields, indicates field defaults, character widths, and which fields are editable in the GUI.

Field Name	Notes	NE(s)	Default	Octet Size	Editable?
AFI	Area Format Identifier.	All	0x39	1	Yes
IDI + pad	Initial Domain Part.	All	0x840 0xF	2	Yes
DFI	Domain Format Identifier. Specifies format for rest of address.	All	0x80	1	Yes
Operator ID		All	0x000000	3	Yes
Reserved	Currently not used. Reserved for future use.	All	0x0000	2	No
Routing Domain	NSAP unique Routing Domain within an administrative domain.	NCC,BWM, OLS 400G	0x0000	2	Yes
Area	NSAP Area Identifier. Identifies NEs in the same area.	All	0x0000	2	Yes
System ID	System Identifier. This field is used to guarantee that NSAP address is globally unique.	All	no default	1	Yes
SEL	NSAP Selector. Used to differentiate multiple NSAP addresses associated with same End System.	All	0x1D*	1	No

*The value of the SEL field is 1D hex when TP4 is run over CLNP.

The System ID field is not defaulted, but is mandatory.

All of the NSAP address fields, except for the Reserved and SEL fields, are editable on the Add a Network Element to the DIB window in the GUI.

Modify a Network Element in the Directory Information Base (DIB)

Background Use this procedure to modify an NE's information that is contained in the SNMS-based DSA's T1.245 DIB.

Before you begin Before you begin this task, make sure that the NE to be modified has been added to the DSA's DIB.

Task Complete the following steps to modify an NE contained in the DIB.

Step	Action	Reference
1	Access the DSA Manager window.	Add a DIB Prefix
2	In the explorer portion of the window, expand the DIB Prefix to locate the NE to be modified.	
3	Click on the TID of the NE to be modified in the explorer tree to select it. The selected NE (TID) is highlighted.	
4	Click the Modify button. The Modify a Network Element in the DIB window is displayed with the current NE information.	
5	Modify the NE information, as needed.	
6	Click the OK button. The changes are made to the NE information in the DSA's DIB. Stop! End of Task.	

Delete a Network Element from the Directory Information Base (DIB)

Background Use this procedure to delete an NE from the Directory Services Agent (DSA) DIB.

When an NE is deleted from the DSA DIB, it still exists in the WaveStar SNMS database. When subnetwork discovery is triggered either by performing DNO on the DSA or automatically when the system performs a resynch, the database is updated with the change to the T1.245 DIB.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to delete an NE from the DSA DIB.

Step	Action	Reference
1	Access the DSA Manager window.	Add a DIB Prefix
2	In the explorer portion of the window, select the DIB Prefix under which the NE to be deleted is contained and expand it until the NE is shown in the explorer tree.	
3	Click on the TID of the NE to be deleted in the explorer portion of the window. The TID is highlighted.	
4	Click the Delete button. The NE is deleted from the DSA DIB. Stop! End of Task.	

Reset a Network Element (for OLS 400G NEs)

Background Use this procedure to reset an OLS 400G NE. This is, in effect, a reboot of the communications session between WaveStar SNMS and the NE.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to reset an OLS 400G NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Reset NE from the displayed sub-menu. The Choose an NE window is displayed.
4	Double-click on the NE in the list to select it.
5	Click the OK button. A pop-up window is displayed, explaining that resetting the NE will cause a disruption of communications between the EMS and NE and is a lengthy process and asks if you want to continue with the reset. Choose Yes to continue with the process of resetting the NE or choose No to cancel the request. Stop! End of Task.

Update System (for OLS 400G NEs)

Background Use this procedure to update the system on OLS 400G R. 2.0 (or later) NEs. This function causes all OTU In ports on the NE to be reset to the Auto State.

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to update the system on an OLS 400G NE.

Step	Action
1	Select an NE in the Map pane portion of the Map window. OR Select no NE at this point.
2	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
3	Select Network from the Administration menu. A sub-menu is displayed.
4	Select Update System from the displayed sub-menu. If you did not select an NE in step 1, the Choose an NE window is displayed. Double-click on the NE in the list and click the OK button. A pop-up question dialog window is displayed, with the message: "This operation will cause all OTU In ports to reset to the Auto State. Are you sure you wish to continue?" There are two buttons on the pop-up question dialog box: Yes and No.
5	Click the Yes button to perform the NE system update. Stop! End of Task.

Display the Communication State of the Network Element

Background

When to use Use this procedure to obtain the current communication state of a specified set of NEs.

The information provided includes whether WaveStar SNMS is configured to communicate with the specified NE, whether WaveStar SNMS has established a communication pathway to the NE, whether WaveStar SNMS has successfully logged into the NE, and the type of communications used by WaveStar SNMS to communicate with the NE.

WaveStar SNMS can establish the following types of connections to NEs (see the following table):

Communication Type	Command Language	Protocol	Relationship to Gateway NE (GNE)
TL1/RT	TL1	X.25	connected through GNE
TCP/IP - RT	TL1	TCP/IP	connected through GNE
CMISE/OSI	CMIP	OSI	
CMISE/TCP	CMIP	OSI over TCP/IP	
TL1/TCP	CMIP	TCP/IP	
TL1/GNE	TL1	X.25	NE is a GNE
IP/GNE	TL1	TCP/IP	NE is a GNE

Before you begin Before you begin this task, access the Map window.

Task Complete the following steps to obtain the communication status of an NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Communications from the Administration menu. A sub-menu is displayed.
3	Select NE Communications from the displayed sub-menu. The Choose an NE window is displayed.
4	Double-click on the NE in the list to select it. <i>Continued on next page</i>

Step	Action (Contd)
5	<p>Click the OK button. The NE Communication window is displayed.</p> <p>This window consists of a table with four columns:</p> <ul style="list-style-type: none"> ▶ NE - the display name for the given NE. ▶ Activated - whether the SNMS software is configured to communicate with the given NE. The value 'Y' indicates that SNMS will attempt to establish communication with the NE. The value 'N' indicates that SNMS will NOT attempt to establish communication with the NE. The user may request SNMS to change the state of this flag via the Activate/Deactivate/Reset buttons on the bottom of the window. ▶ Link State - indicates whether WaveStar SNMS has successfully established a communication pathway to the NE. ▶ Login State - indicates whether WaveStar SNMS has successfully logged into the NE. ▶ CommType - indicates the type of communications connection between WaveStar SNMS and the NE.
6	<p>To reset the connection between WaveStar SNMS and the NE, select the line of information about the NE in the window and click the Reset button.</p> <p>To activate communications between WaveStar SNMS and the NE, select the line of information about the NE in the window and click the Activate button.</p> <p>To force termination of communication between WaveStar SNMS and prevent further communication attempts until the NE is reactivated (to reactivate the NE, select it and click the Activate button), click the Deactivate button.</p>
7	<p>If you are finished with the display, click the Close button to close the window without performing any further operation.</p> <p>Stop! End of Task.</p>

Introduction

Summary This chapter describes procedures for provisioning network element equipment using the WaveStar SNMS Graphical User Interface (GUI).

Before you begin Read the [Getting Started Concepts](#) chapter to gain a basic familiarity with the WaveStar SNMS GUI. Read the [Equipment Provisioning Concepts](#) chapter to learn about the equipment components that can be provisioned through WaveStar SNMS.

Equipment provisioning can also be done by issuing TL1 commands to NEs that do not exchange messages with WaveStar SNMS using CMISE services. Instructions about how to issue TL1 commands in Cut-Through mode are available in the [Getting Started](#) chapter.

Contents This chapter discusses the following topics:

- [Provision System Parameters](#) [3-3](#)
- [Provision NE Ports](#) [3-4](#)
- [Provision NE Equipment Information](#) [3-8](#)
- [Establish WaveStar Equipment](#) [3-9](#)

▶ [Remove WaveStar Equipment](#)

[3-18](#)

Provision System Parameters

Background Use this procedure to display the windows used to provision NE system parameters.

Before you begin Before you begin this task, determine specifically what type of system provisioning you want to accomplish.

Task Complete the following steps to display the windows used to provision system parameters.

Step	Action
1	From the main menu bar on the Map window, select Configuration . This displays a sub-menu.
2	Select Provision from the displayed sub-menu. This displays the Choose an NE window.
3	Use the mouse to select an NE on the Choose an NE window. (Double click on the desired NE and then click the OK button.) The Provisioning window is displayed.  NOTE: The Provisioning window can be displayed in similar fashion from the Alarm Summary, Equipment View, and Cross-Connection windows.
4	Use the mouse to select the TID from the Network Element Explorer portion of the window. Then click the Provision button. This displays the system parameters (for your selection) in the Provisioning area of the window. (Parameters that have no value reported for them, and which therefore do not apply to the current operation, are not shown in the provisioning panel.)
5	Make your provisioning changes in the Provisioning section of the window using the available fields and your selected values.
6	Click Apply to enter your changes. Stop! End of Task.

Provision NE Ports

Background Use this procedure to display the windows used to provision NE ports.

Before you begin Before you begin this task, determine specifically what type of port provisioning you want to accomplish.

Task Complete the following steps to display the windows used to provision port parameters.

Step	Action	Reference
1	From the main menu bar on the Map window, select Configuration . This displays a sub-menu.	
2	Select Provision from the displayed sub-menu. This displays the Choose an NE window.	
3	<p>Use the mouse to select an NE on the Choose an NE window. (Double click on the desired NE and then click the OK button.)</p> <p>The Provisioning window is displayed.</p> <p> NOTE: The Provisioning window can be displayed in similar fashion from the Alarm Summary, Equipment View, and Cross-Connection windows.</p> <p style="text-align: right;"><i>Continued on next page</i></p>	

Step	Action (Contd)	Reference
4	Expand the explorer tree if it has not already been expanded.	
5	<p>Use the mouse to select the port from the Network Element Explorer portion of the window. (Click on the plus [+] signs to display available circuit packs.) Then click the Provision button. This displays the port attributes (for your selection) in the Provisioning area of the window. Use the tabs to go to the specific port attribute to provision.</p> <p>⇒ NOTE: Provisioning of the fixed Tributary Input Signal Rate or Tributary Output Signal Rate, while accessed through the Provisioning window, requires a special sub-procedure that is described in the <u>Provisioning Fixed Incoming or Outgoing Signal Rate</u> sub-procedure following this task.</p>	<p><u>SE 3-1:Provisioning Fixed Incoming or Outgoing Signal Rate</u></p>
6	<p>Make your provisioning changes in the Provisioning section of the window.</p> <p>Stop! End of Task.</p>	

SE 3-1: Provisioning Fixed Incoming or Outgoing Signal Rate

Procedures

Use the following procedure to provision the fixed rate for the Tributary Incoming or Outgoing Signal Rate for a port tributary.

1. Follow Steps 1-5 in the [Provision NE Ports](#) task for selecting the port to be provisioned. Locate the Tributary Incoming Signal Rate or Tributary Outgoing Signal Rate port fields on the right side of the Provisioning window.

The Tributary Incoming Signal Rate or Tributary Outgoing Signal Rate field shows the current signal rate values for the port tributary group and the chosen values for the port tributary group. For example, in a 2.5G/10G NE, on an OC-12 port, the current signal rate value may be shown in the Signal Rate field box as "121", representing 12 STS-1 tributaries. You can reconfigure the number and combination of tributary signal rates.

2. Click the Input Details or Output Details button to the right of the Chosen Values field of the Input Signal Rate or Output Signal Rate parameter.

A secondary provisioning window is displayed, showing the port group and a series of numbers, separated by commas, which represent the current number of tributaries and the signal rate that each can carry. From the example used in Step 1, the window may display the group "sts12-1", which may be currently configured as 12 STS-1 tributaries, which is represented as "1,1,1,1,1,1,1,1,1,1,1,1" in the Values field on this secondary provisioning window.

3. Position the mouse cursor on the row of numbers in the Group & Values field and click the left mouse button to select them.

When you click the numbers at the top of the provisioning window, the color of the buttons that correspond to the current signal rate of each tributary turns to dark grey.

To configure a different fixed signal rate for one or more tributaries, click on one or more of the buttons of a different signal rate that are located at the bottom of the secondary provisioning window to change the value and combination of signal rates for the tributaries.

From the example used in Step 2: the current value for the STS-12 group shown in the Values field on the secondary Provisioning Input window may be "1,1,1,1,1,1,1,1,1,1,1,1", representing that this port group may currently be configured as 12 STS-1 tributaries. Suppose you want to change **all** of the twelve STS-1 tributaries to carry STS-3 signals. You would click **all four** of the STS-3 provisioning buttons at the bottom of the window. If you

wanted to change six of the STS-1 tributaries to carry STS-3 signals, you would click on two of the STS-3 provisioning buttons at the bottom of the window.

4. Once you have selected and configured the tributary rates, click the Apply button at the bottom of the secondary provisioning window to apply your selections. The numbers shown in the Values field will change to reflect the selection(s) you have made.
5. Click the OK button. The system returns to the Provisioning window. The value now shown in the Tributary Input Signal Rate or Tributary Unequipped Output Signal Rate (depending on the field you configured), reflects the new tributary signal configuration.

If you changed all of the STS-1 tributaries to STS-3 tributaries, the value now shown in the Input Signal Rate or Output Signal Rate field on the Provisioning window would be "43", representing the configuration change to four STS-3 tributaries.

If you changed six of the STS-1 tributaries to STS-3 tributaries, the value now shown in the Input Signal Rate or Output Signal Rate (depending on the field you chose to reconfigure) would be "23-61", representing two STS-3 tributaries and six STS-1 tributaries.

Provision NE Equipment Information

When to use Use this procedure to display and provision NE equipment parameters on the Provisioning window.

Task Complete the following steps to display and provision equipment parameters.

Step	Action
1	From the main menu bar on the Map window, select Configuration . This displays a sub-menu.
2	Select Provision from the displayed sub-menu. This displays the Choose an NE window.
3	Use the mouse to select an NE on the Choose an NE window. (Double click the desired NE and then click the OK button.) This displays the Provisioning window.
4	<p>In the Network Element Explorer part of the Provisioning View window, select the equipment for which you want to provision parameters. Click the plus (+) sign to display circuit packs. Select a slot number. Click the Provision button.</p> <p>Make the required changes in the Provisioning part of the window. Click the Apply button. Your changes are entered. When you have completed all your provisioning, click the Close button to remove the Provisioning window from your screen.</p> <p>Stop! End of Task.</p>

Establish WaveStar Equipment

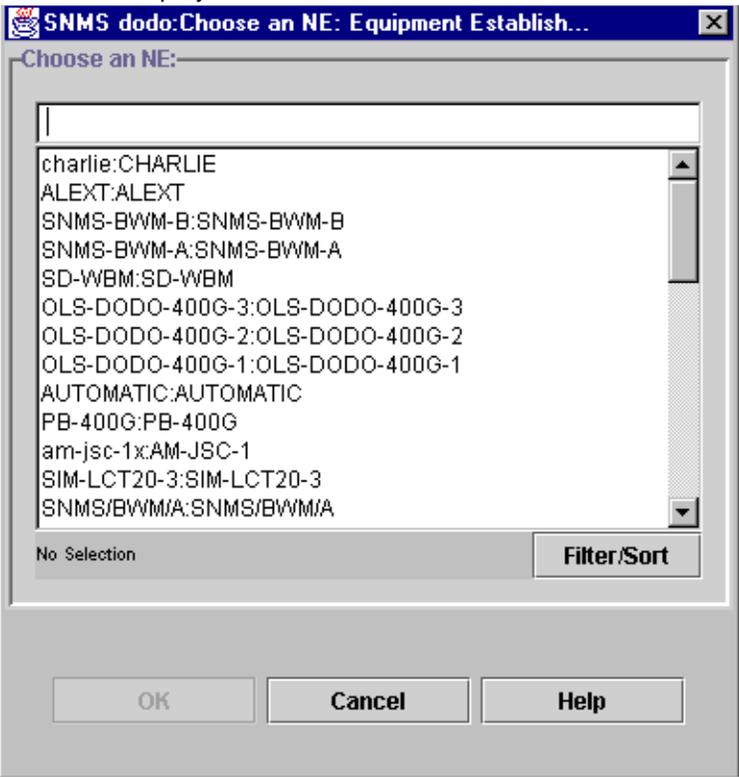
When to use Use this procedure to manually establish (manually pre-provision) new bays, shelves, and circuit packs for WaveStar NEs. Bays, shelves, and circuit packs can be added and removed.

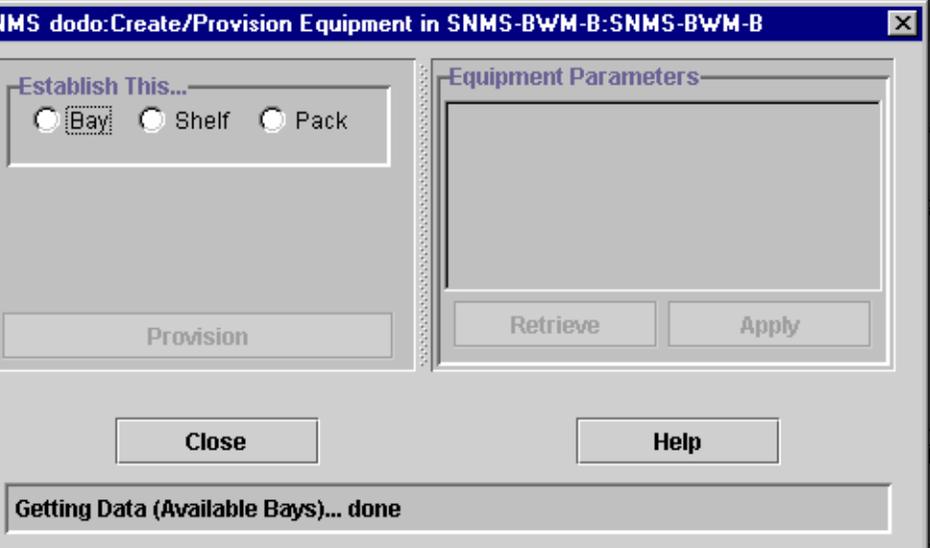
Before you begin Before you begin this task, decide what equipment you want to establish.

Be aware that you can establish (pre-provision) new shelves, circuit packs, or ports for a LambdaRouter, but you cannot manually pre-provision bays.

Task

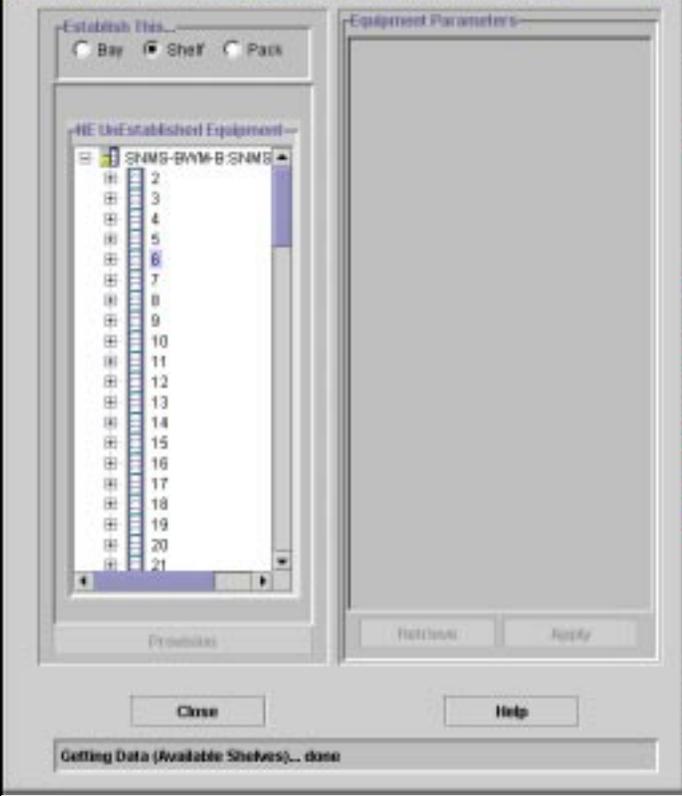
Complete the following steps to establish WaveStar equipment.

Step	Action
1	From the main menu bar on the Map window, select Configuration . This displays a sub-menu.
2	Select Establish from the displayed sub-menu. The Choose an NE window is displayed. 
3	Double-click on an NE in the list to select it.

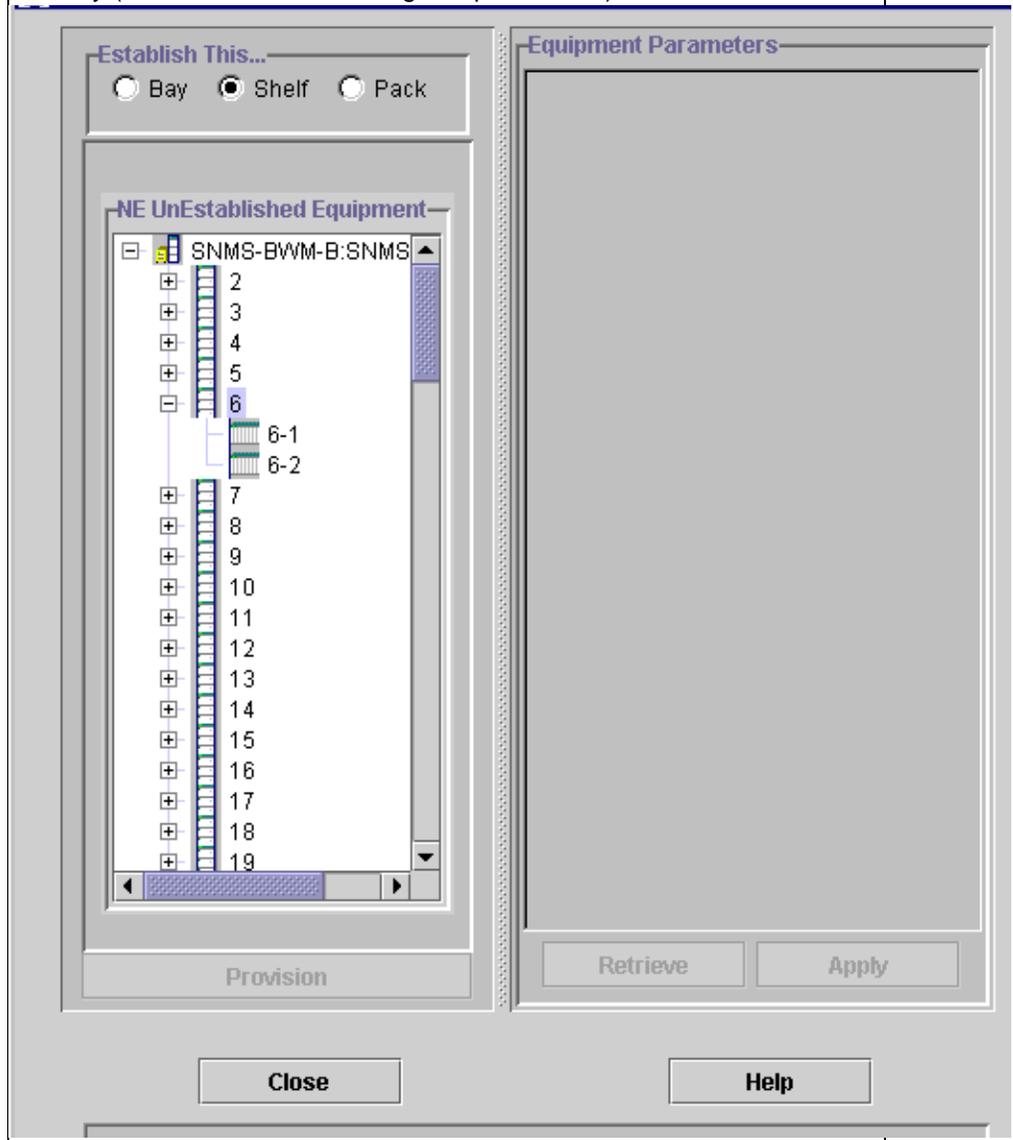
Step	Action (Contd)
4	<p>Click the OK button. The Create/Provision Equipment window for the selected NE is displayed.</p>  <p>The window initially consists of a section called “Establish this” and three radio buttons labeled Bay, Shelf, and Pack, and an explorer portion that will be unpopulated when the window is initially displayed.</p> <p> ⇒ NOTE: You may need to expand the window to see the explorer portion when it is populated. To expand the window, position the mouse cursor on the lower right hand corner of the window, and then click and hold the left mouse button to resize the window in order to display all components of the window, including the explorer when it is populated (when it is resized, the window should look similar to the following sample window): </p>

Step	Action (Contd)
SNMS dodo:Create/Provision Equipment in SNMS-BWM-B:SNMS-BWM-B [X]	
<p>Establish This...</p> <p><input checked="" type="radio"/> Bay <input type="radio"/> Shelf <input type="radio"/> Pack</p> <p>Provision</p>	<p>Equipment Parameters</p> <p>[Empty Field]</p> <p>Retrieve Apply</p>
<p>Close Help</p>	
<p>Getting Data (Available Bays)... done</p>	

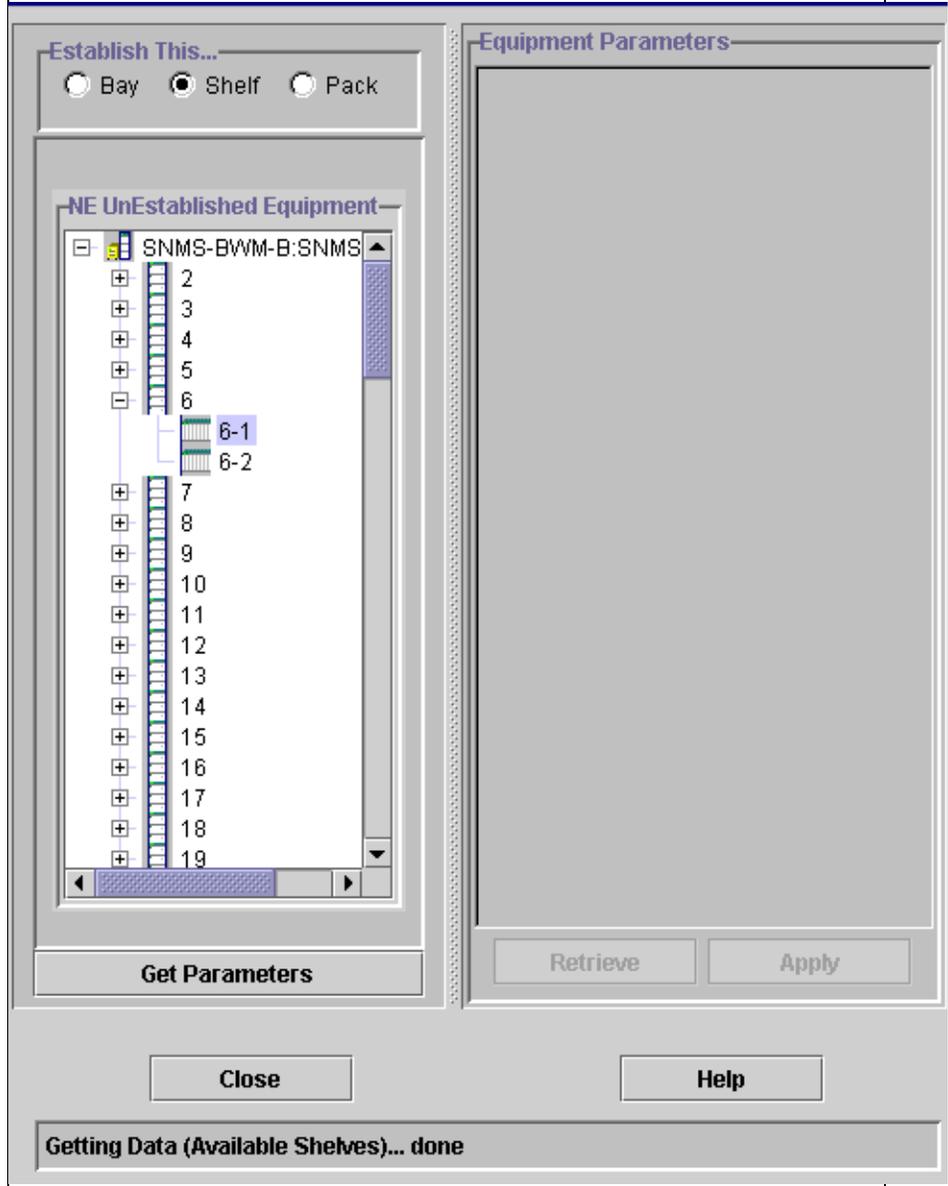
Continued on next page

Step	Action (Contd)
5	<p>Select one of the three radio buttons near the top left of the window to establish equipment for a Bay, Shelf, or Pack.</p> <ul style="list-style-type: none"> ▶ Bay—When you select this radio button, the Explorer section (just below the radio buttons) contains the available data on all bays, including the AIDs of all bays that have not yet been established. <i>You can choose a bay to establish.</i> ▶ Shelf—When you select this radio button, the Explorer section (just below the radio buttons) contains the available data on all bays, including the AIDs of all bays that have not yet been established and the corresponding shelf AIDs for those bays. It also contains the AID of each bay that does not have all shelves established in it, and the AID of the shelf or shelves that are not established. <i>You can choose a shelf to establish.</i> ▶ Pack—When you select this radio button, the Explorer section (just below the radio buttons) contains the available circuit pack data, including the AIDs of <i>existing</i> bays and <i>existing</i> shelves. Under the shelves are displayed only those slots for which no circuit pack has been established. Within the slot is displayed the type of circuit packs that are legal types for that slot AID. <i>You can choose a circuit pack type within the slot.</i> <p>As an example, let's assume that you have clicked the Shelf radio button to establish a new shelf in the NE. The explorer portion of the window would contain the bays of the NE, as shown in the following sample window:</p> 

Step	Action (Contd)
6	<p>Click the plus (+) sign next to the AID of the equipment above the component you want to establish, to expand the explorer tree until the AID of the equipment component to be established is displayed.</p> <p>In the example shown in this procedure, you would click the plus (+) sign next to the associated bay, to expand and show the associated shelves in the bay (as shown in the following sample window).</p>

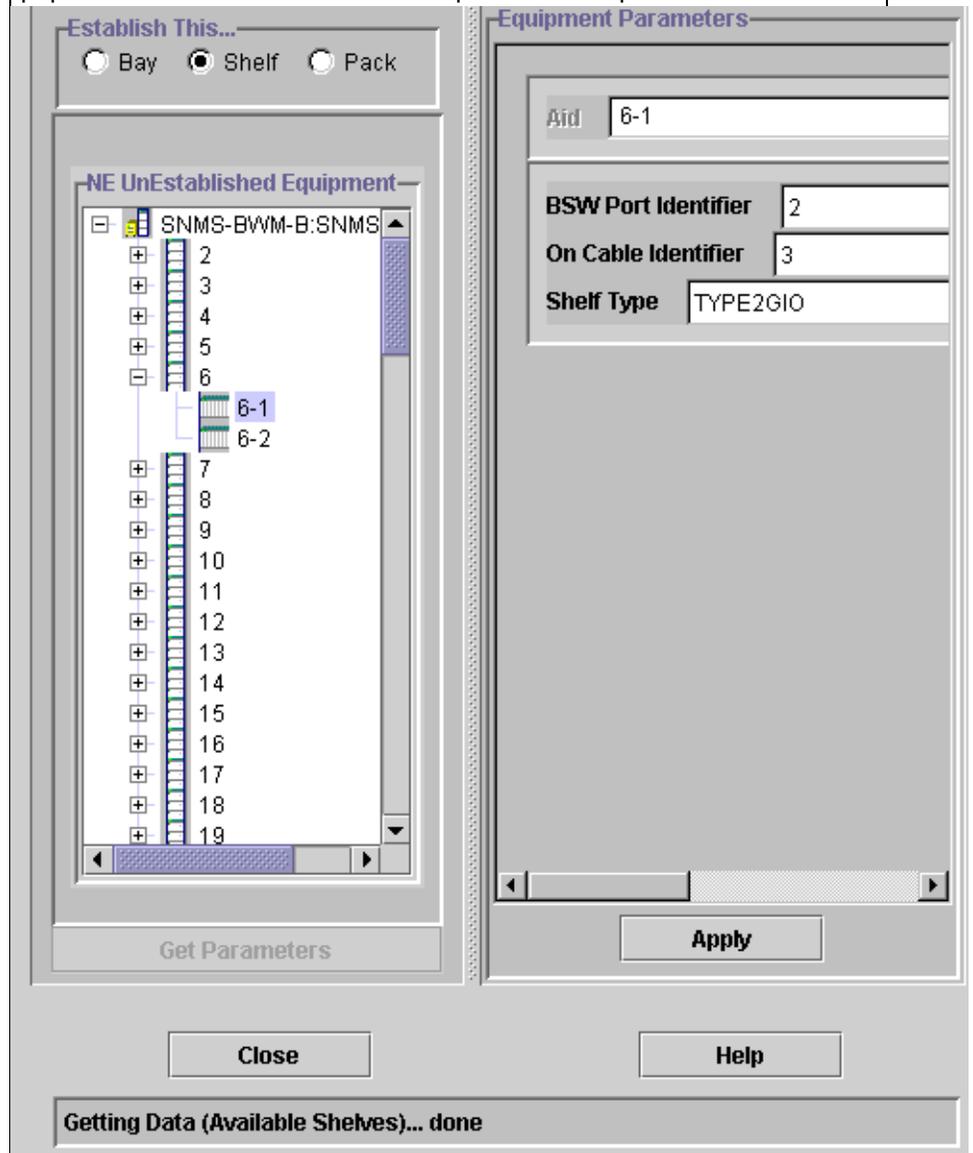


Step	Action (Contd)
7	Single-click on the equipment AID (in this case, the shelf AID) in the explorer to select it. Selecting the AID enables the Get Parameters button.



Step	Action (Contd)
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8 Click the Get Parameters button. The right hand portion of the panel is populated with the current values for provisionable parameters. .



Additional parameter information may have to be entered before the equipment is established. The correct parameter labels are displayed and are populated with their default values, which are updatable. Enter or change the equipment parameters.

NOTE:
The equipment AID field should not be modified. The label next to this field is greyed out, indicating that this field cannot be modified.

Step	Action (Contd)
9	<p>Click the Apply button. The equipment is established. If there is a problem with the request to establish equipment, a pop-up error message is displayed, indicating the nature of the problem.</p> <p>Additional Information:</p> <p>When the type of circuit pack being provisioned on a Universal I/O shelf is a Switching Interface (SWIF) circuit pack, the BSW Port Identifier must be provisioned in such a manner that no two SWIF circuit pack pairs both have the same identifier. SWIF circuit packs are paired based on their slot AIDs. Each pair of circuit packs share a single BSW Port ID, so if there is already a circuit pack in one slot of the slot pair, then the other circuit pack should have the same BSW Port ID defaulted in the provisioning window.</p> <p>When the circuit pack being provisioned is the first one in the current slot pair, the list of possible values for the BSW Port Identifier parameter includes only those values that are not already assigned to a slot pair. When the circuit pack being provisioned is the second one in the current slot pair, the list of possible values includes only the value already chosen for the first circuit pack provisioned in the slot pair.</p> <p>When provisioning I/O shelves, the list of possible values for the ON Cable Pair parameter is a list of only those values that are not currently assigned to another shelf in this BWM.</p> <p>Stop! End of Task.</p>

Remove WaveStar Equipment

When to use Use this procedure to remove WaveStar NE equipment. In the BWM, bays, shelves, and circuit packs can be added and removed.

Before you begin Before you begin this task, decide what equipment you want to remove.

Task Complete the following steps to remove WaveStar equipment.

Step	Action
1	From the main menu bar on the Map window, select Configuration . This displays a sub-menu.
2	Select Remove from the displayed sub-menu. The Choose an NE window is displayed.
3	Double-click on the NE in the list to select it.
4	Click the OK button. The Removing Equipment window is displayed. This window allows you to choose existing equipment from the explorer tree and to remove that equipment provisioning from the network element.
5	To remove the undesired equipment, first select it with the mouse. <ul style="list-style-type: none"> ◆ select a circuit pack, or ◆ select an <i>empty</i> bay or shelf.
6	After selecting the undesired equipment with the mouse, click the Remove button. If the removal is allowed, the system displays a confirmation window to which you should reply Yes. <p> NOTE: If you try to remove a bay/shelf that is not empty, the system displays a message window explaining that the bay/shelf is not empty and cannot be removed. You must first empty the bay/shelf before removing it (if that is still desired).</p> <p>Stop! End of Task.</p>

Introduction

Summary This chapter describes procedures for defining trails (physical links between Data Communication Channel (DCC)-connected NEs, represented graphically as solid lines between NEs on the Map pane) and aggregates (a named collection of related NEs).

Before you begin Read the [Getting Started Concepts](#) chapter to gain a basic familiarity with the WaveStar SNMS GUI. Read the [Topology Management Concepts](#) chapter to learn about trails and aggregates in WaveStar SNMS.

Contents This chapter discusses the following topics:

- ✦ [Add a Trail](#) [4-2](#)
 - ✦ [Delete a Trail](#) [4-4](#)
 - ✦ [Add an Aggregate](#) [4-5](#)
 - ✦ [Modify an Aggregate](#) [4-8](#)
 - ✦ [Delete an Aggregate](#) [4-9](#)
-

Add a Trail

Background

Use this procedure to manually add a trail between two NEs. Trails between identical Lucent Technologies NEs may be autodiscovered by the DNO feature and do not have to be manually added. Manually added trails may also be manually deleted.

Before you begin

Before you begin this task, verify that the NEs at either end of the trail are compatible for the connection and that the AIDs at both ends of the trail are using compatible software releases. DNO has to be performed on the NEs at either end of the trail before manually adding a trail.

When you are adding a trail between an NE managed by WaveStar SNMS and a non-managed device (such as a DDM-2000), the AID(s) may not be available for the non-managed device, and, subsequently, will not be displayed in the AID list on the Add a Trail window. The trail can still be added between the managed and non-managed NE.

To perform this task, access the Map window.

Task

Complete the following steps to manually add a trail.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	The Network sub-menu is displayed.
3	Select Trails from the Network sub-menu.	The Trail Manager window is displayed, showing the current list of user-defined trails between NEs.

Step	Action (Contd)	Result
4	Click the Add button.	<p>The Add a Trail window is displayed. This window consists of:</p> <ul style="list-style-type: none"> • From TID and To TID scroll lists for both NEs • From AID and To AID explorers for both NEs <p>The Trail Termination Point (TTP) for either end of the trail consists of the NE's TID and AID.</p>
5	Select the first NE's TID from the From TID list.	The corresponding AIDs for the first NE's TID are displayed in the From AID explorer.
6	Select the second NE's TID from the To TID list.	<p>The corresponding AIDs for the second NE's TID are displayed in the To AID explorer.</p> <p> NOTE: If the TID chosen is for a non-managed device, the associated AID list is empty and disabled. The trail can still be added between the managed NE and non-managed device.</p>
7	Select a valid AID for the first NE's TID from the From AID explorer.	
8	Select a valid AID for the second NE's TID from the To AID explorer.	
9	<p>Click the Apply button to create the trail, or click the OK button to create the trail and close the window.</p> <p>Stop! End of Task.</p>	

Delete a Trail

Background

Use this procedure to manually delete a trail between two NEs. Automatically discovered trails are deleted automatically if one of the NEs at either end is deleted.

Before you begin

Before you begin this task, be aware that if you delete a trail, it is removed from the trail list in any open windows, including the Trail Manager window. The deleted trail is also removed from all open Map windows. Be aware that autodiscovered trails cannot be deleted.

To perform this task, access the Map window.

Task

Complete the following steps to manually delete a trail.

Step	Action	Result
1	Select Administration from the main menu bar on the Map window.	The Administration menu is displayed.
2	Select Network from the Administration menu.	The Network sub-menu is displayed.
3	Select Trails from the Network sub-menu.	The Trail Manager window is displayed, showing the current list of trails between NEs
4	Select a trail to be deleted.	
5	Click the Delete button.	A pop-up window is displayed, asking if you really want to delete the trail.
6	Choose Yes to delete the trail. Stop! End of Task.	The Status Dialog window is displayed, indicating that the trail is being deleted.

Add an Aggregate

Background

Use this procedure to add an aggregate. An aggregate is a collection of related NEs/aggregates that are grouped and named for purposes of streamlining network monitoring and resynchronization. A new aggregate is created by providing a unique aggregate name and alias and adding NEs or other aggregates to it.

Before you begin

Before you begin this task, identify which NEs and/or aggregates you want to associate with the aggregate being created.

To perform this task, access the Map window.

Task

Complete the following steps to create a new aggregate.

Step	Action	Reference
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.	
2	Select Network from the Administration menu. The Network sub-menu is displayed.	
3	Select Aggregates from the Network sub-menu. The Aggregates sub-menu is displayed.	
4	Select Add from the Aggregates sub-menu. The Add a New Aggregate window is displayed.	

Step	Action (Contd)	Reference
5	Fill in the following fields, as needed: <ul style="list-style-type: none"> ➤ Aggregate Name—This is the aggregate name. The Aggregate name can be 1-20 alphanumeric characters. Dashes are allowed. This field is required. The Aggregate name must be unique. ➤ Aggregate Alias—This is the aggregate alias (alternate label). The Aggregate alias can be 1-20 alphanumeric characters. Dashes are allowed. This field is optional. 	
6	Click the OK button. The new Aggregate is created.  NOTE: When a new aggregate is created, it is automatically placed into the TOP layer of the Map view. Any NE or aggregate that is placed into the aggregate is removed from the TOP layer. The icon for the new aggregate is displayed in the current Map view and the subnetwork explorer, and is automatically selected.	
7	Add NEs and/or aggregates to the newly created aggregate using the sub-procedure immediately following this procedure. Stop! End of Task.	SE 4-1: Add Network Elements/Aggregates to an Aggregate

SE 4-1: Add Network Elements/ Aggregates to an Aggregate

Procedure

Perform the steps below to add an NE or aggregate to the parent (owner) aggregate.

1. From the Map window, position the mouse cursor on the aggregate icon on the Map pane and single-click the select mouse button to select the aggregate icon, if it is not already selected.
2. Select an NE or aggregate (by pointing at it with the mouse cursor and single-clicking on it with the mouse select button).
3. Drag the NE or aggregate icon into the parent (owner) aggregate.



NOTE:

An NE or aggregate can be moved out of the current parent aggregate into the TOP Map view by choosing **Return to Top** in the NE/aggregate's pop-up menu.

Modify an Aggregate

When to use Use this procedure to change an aggregate's alias. To change the contents of an aggregate, use [SE 4-1:Add Network Elements/Aggregates to an Aggregate](#) following the task [Add an Aggregate](#).

Before you begin Before you begin this task, identify the aggregate to be modified. Be aware that the aggregate name for the Top Level Aggregate (TOP), which is the default parent of all member NEs in the network, cannot be changed.

Task Complete the following steps to change the aggregate alias.

Step	Action
1	Select the aggregate to be modified from the Map window or subnetwork explorer. OR Select no aggregates at this point.
2	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
3	Select Network from the Administration menu. The Network sub-menu is displayed.
4	Select Aggregates from the Network sub-menu. The Aggregates sub-menu is displayed.
5	Select Modify Alias from the Aggregates sub-menu. If no aggregates were chosen from the Map window or Subnetwork Explorer in Step 1, the Choose an NE/Aggregate window is displayed for selection of the aggregate to be modified. Select the aggregate to be modified and click the OK button. The Modify Aggregate window is displayed with the current aggregate name and/or alias.
6	Change the aggregate alias, as desired.
7	Click the OK button. The Status Dialog box is displayed, indicating that the changes to the aggregate are being made by WaveStar SNMS. Stop! End of Task.

Delete an Aggregate

Background Use this procedure to delete an aggregate from WaveStar SNMS.

Before you begin Before you begin this task, be aware that NEs/aggregates that are members of the aggregate being deleted must be reassigned to another aggregate or to the TOP aggregate level as part of this task.

Task Complete the following steps to delete an aggregate.

Step	Action	Reference
1	Before deleting the aggregate, you may want to move the member NEs out of the aggregate and return them to the TOP level using the sub-procedure immediately following this procedure.	SE 4-1: Add Network Elements/Aggregates to an Aggregate
2	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.	
3	Select Network from the Administration menu. The Network sub-menu is displayed.	
4	Select Aggregates from the Network sub-menu. The Aggregates sub-menu is displayed.	
5	Select Delete from the Aggregates sub-menu. The Choose an Aggregate Aggregate/Delete window is displayed. Select the aggregate to be deleted and click the OK button. <i>Continued on next page</i>	

Step	Action (Contd)	Reference
6	The Reassign an Aggregate window is displayed.	
7	<p>Choose an aggregate from the list to which you want to reassign any member NEs/aggregates. You may also choose "Return to TOP" to return the NE(s) to the TOP Level Aggregate, which includes all NEs.</p> <p>⇒ NOTE: If you are not moving the majority of NEs to a single aggregate, it is recommended that you select the TOP Level Aggregate and modify those aggregates that take the NEs from the deleted aggregate.</p>	
8	<p>Click the OK button. The Status Dialog window is displayed, indicating that the aggregate is being deleted.</p> <p>Stop! End of Task.</p>	

SE 4-2: Moving an NE to the TOP Aggregate Level

Procedure

Perform the following steps below to move an NE out of an aggregate to the TOP level.

1. Expand the aggregate by selecting it on the Map window, clicking the right (menu) mouse button to display a pop-up menu, and choosing **Expand**.
2. Select the NE to be moved.
3. When the NE is selected, click the right (menu) mouse button to display a pop-up menu.
4. Choose **Return to TOP**.

The NE is brought to the TOP aggregate level and is taken out of the aggregate.

Introduction

Summary This chapter describes procedures for synchronizing the date and time settings of a network element with the WaveStar SNMS host.

Before you begin Read the [Timing Provisioning Concepts](#) chapter to learn about NE date/time synchronization.

Contents This chapter discusses the following topics:

- [Set Network Element Date/Time Synchronization](#) [5-2](#)
- [Enable Fall Back and Spring Forward](#) [5-4](#)
- [Set Drift Threshold for Date/Time Synchronization](#) [5-7](#)
- [Enable/Disable Automatic Date/Time Synchronization](#) [5-8](#)
- [Schedule Network Element Date/Time Synchronization](#) [5-10](#)
- [Modify a Scheduled Task](#) [5-12](#)
- [Delete a Scheduled Task](#) [5-13](#)

Set Network Element Date/Time Synchronization

Background Use this procedure to manually initiate date/time synchronization for a single NE, a group of NEs, an aggregate, or all NEs under WaveStar SNMS control.

Before you begin Before you begin this task, you must take into account whether the NE(s) being set with the date/time synchronization feature are located in the same or a different time zone as the WaveStar SNMS host. The NE's time zone can be set when you manually add a network element through the Add an NE window, or be modified through the Modify an NE window. You can also select to have WaveStar SNMS automatically make adjustments for Daylight Savings Time (Spring Forward) and standard time (Fall Back) before doing date/time synchronization for the selected NE(s).

Related information For related information, see [Add a Network Element—X.25 Communications](#), [Add a Network Element—OSI Communications](#), [Add a Network Element—TCP/IP Communications](#), [Add a Gateway Network Element—X.25 Communications](#), and [Modify a Network Element](#) in the [Management Communications Setup](#) chapter.

Task Complete the following steps to manually perform date/time synchronization..

Step	Action	Reference
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.	
2	Select Date/Time Synchronization from the Configuration menu. A sub-menu is displayed.	
3	Select Manual from the sub-menu. The Choose an NE/Aggregate window is displayed.	

Step	Action (Contd)		Reference
4	TO... <ul style="list-style-type: none"> ➤ display a list of NEs ➤ display a list of aggregates 	CLICK... <ul style="list-style-type: none"> ➤ the NEs radio button ➤ the Aggregates radio button 	
5	Double-click on the NE or aggregate to select it for date/time synchronization. To perform date/time synchronization on all NEs, scroll to the top of the Choose an NE/Aggregate window and double-click on the word ALL in the list. ⇒ NOTE: If there are any non-communicating NEs in the system, a warning dialog box is displayed with the warning message "...getTimeRsp is incomplete for X out of Y NEs". Click the OK button to close this dialog box.		
6	Click the OK button. The Manual Date/Time Synchronization window is displayed.		
7	Click the OK button to initiate date/time synchronization for the NE(s) or aggregate. Date/Time synchronization is initiated. A pop-up window is displayed, showing the status of the date/time synchronization. The status is as follows: <ul style="list-style-type: none"> ➤ Completed—date/time synchronization is completed for the selected NE(s) or aggregate. ➤ Incomplete—The command to perform date/time synchronization may be completed but the time difference between the host and NE is greater than the drift threshold set. Stop! End of Task.		Set Drift Threshold for Date/Time Synchronization

Enable Fall Back and Spring Forward

When to use

Use this procedure to enable or disable the Spring Forward (Daylight Savings Time) and Fall Back (standard time) feature to make automatic time adjustments in date/time synchronization for the selected NE(s)/aggregate(s).

Task

Complete the following steps to enable or disable the Spring Forward/Fall Back time adjustment feature.

Step	Action	Reference
1	Select one or more NEs/aggregates from the Map window using the sub-procedure immediately following this procedure. OR Select no NEs/aggregates to use this feature for all NEs in your Target group.	SE 5-1: Selecting NEs and Aggregates on the Map Pane
2	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.	
3	Select Date/Time Synchronization from the Configuration menu. A sub-menu is displayed.	

Step	Action (Contd)		Reference
4	<p>Select Spring/Fall Change from the displayed sub-menu. If you have not yet selected the NE(s)/aggregate(s), the Choose an NE/Aggregate window is displayed. Select the NE(s)/aggregate(s) on which to use the Spring Forward/Fall Back feature and click the OK button.</p> <p>The Fall Back and Spring Forward Status window is displayed.</p>		
5	<p>IF ...</p> <ul style="list-style-type: none"> ▶ you want to enable the Spring Forward/Fall Back feature for the selected NE(s) ▶ you want to disable the Spring Forward/Fall Back feature for the selected NE(s) 	<p>THEN ...</p> <ul style="list-style-type: none"> ▶ Click the "Enable FB/SF for above NEs" button. ▶ Click the "Disable FB/SF for above NEs" button. 	
6	<p>Click the OK button to activate your choices.</p> <p>⇒ NOTE: If Daylight Savings Time is already in effect for an NE, and you disable Spring Forward/Fall Back for an NE, requiring a date/time synchronization, a pop-up window is displayed, asking if you want to automatically initiate date/time synchronization for the NE(s). Choose Yes to initiate automatic date/time synchronization for the NE or No to skip date/time synchronization for the NE.</p> <p>Stop! End of Task.</p>		

SE 5-1: Selecting NEs and Aggregates on the Map Pane

Procedure

To select a single NE or aggregate on the Map pane, position the mouse pointer over the NE or aggregate icon and click the select mouse button.

To select a group of NEs or aggregates on the Map pane.

1. Position the mouse pointer over a portion of the background adjacent to the items to be selected.
2. Click the mouse select button and drag the mouse pointer. As you drag the mouse pointer, an outlined box appears over the selected area.
3. Drag the mouse pointer over the NE(s)/aggregate(s) to be selected, enclosing them in the selection box. As items in the Map pane are selected, they change color. Release the mouse select button. The items are selected.

To deselect a selected item in the Map pane, position the mouse pointer over the item and single-click the mouse select button. To deselect a group of items, position the mouse pointer anywhere in the Map pane (not on the NE symbol itself) and single-click the mouse select button. Any item in the box that is already selected becomes deselected.

Set Drift Threshold for Date/Time Synchronization

When to use Use this procedure to set the drift threshold, or the maximum time difference allowed (in seconds) between the NE and the EMS host before date/time synchronization is performed automatically. The default drift threshold is 15 seconds. If the time difference between the NE and EMS host is greater than the drift threshold set here when a communications link that was down has been brought back up, the NE's time zone changes, or there is a daylight savings time adjustment, date/time synchronization is performed automatically.

Before you begin Before you begin this task, be sure that you make the drift threshold setting before enabling the Automatic Date/Time Synchronization feature.

To perform this task, access the Map window.

Task Complete the following steps to set a drift threshold for automatic date/time synchronization.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. A sub-menu is displayed.
3	Select Date/Time Mgmt from the sub-menu. The Date/Time Management sub-menu is displayed.
4	Select Set Drift from the displayed sub-menu. The Set Date/Time Synchronization Drift Cycle window is displayed.
5	Use the up and down spinner buttons next to the NE Drift Threshold field to select a drift value, in seconds, for the time difference between the NE and the EMS host before date/time synchronization is performed automatically.
6	Click the OK button. The system processes your choice. Stop! End of Task.

Enable/Disable Automatic Date/Time Synchronization

When to use

Use this procedure to enable or disable automatic date/time synchronization. When this feature is enabled, WaveStar SNMS automatically sets each NE's date/time to match the WaveStar SNMS host's date/time on establishing communication with an NE for the first time or if the communications link between the WaveStar SNMS host and the NE is down for more than 15 seconds, or the drift threshold specified using the Date/Time Synchronization Drift window. Automatic date/time synchronization takes into account whether the NE is set up in a different time zone than the WaveStar SNMS host. WaveStar SNMS also makes adjustments for Daylight Savings Time and Standard time if the NE has the Fall Back/Spring Forward feature enabled.

Before you begin

Before you begin this task, you must decide if changes to the time zone setting must be made for the NE(s) in the network for date/time synchronization to work properly. You must also check if the Fall Back/Spring Forward feature is enabled (it is enabled, by default). To perform this task, access the Map window.

Task

Complete the following steps to enable or disable automatic date/time synchronization.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Network from the Administration menu. The Network sub-menu is displayed.
3	Select Date/Time Mgmt from the Network sub-menu. The Date/Time Management sub-menu is displayed.
4	Select Automatic Date/Time Sync from the Date/Time Management sub-menu. The Automatic Date/Time Sync window is displayed.

Step	Action (Contd)	
5	IF ... you want to enable Automatic Date/Time Synchronization you want to disable Automatic Date/Time Synchronization	THEN ... click the Enable button. click the Disable button.
6	Click the OK button. The system processes your choice. When processing is completed, the Status Dialog window is displayed, indicating the change in the automatic date/time synchronization setting. Stop! End of Task.	

Schedule Network Element Date/Time Synchronization

Background Use this procedure to schedule date/time synchronization for an NE.

Task Complete the following steps to schedule date/time synchronization for an NE.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub-menu is displayed.
3	Select Date/Time Sync from the sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled date/time synchronizations.
4	Click the Add button. The Add a Scheduled Date/Time Sync window is displayed. <i>Continued on next page</i>

Step	Action (Contd)
5	Choose an NE (by TID) from the Choose an NE scroll bar list by double-clicking on the item. Use the type ahead field and/or filter/sort functions to narrow the list, if necessary.
6	<p>Choose the following Scheduling Options, as needed:</p> <ul style="list-style-type: none"> ▶ Daily—click on this radio button if you want the task to be done on a daily basis. If you schedule the task to be done daily, use the Schedule Time spinner field to select the time of day for the scheduled task. ▶ Weekly on...—click on this radio button if you want to task to be done on a weekly basis. If you schedule the task to be done weekly, choose the day of the week by using the spinner field list next to this option. ▶ Once every...—click on this radio button if you want the task to be done periodically. If you schedule the task to be done periodically, choose the frequency (every x month(s)) and the day of the month it will be done using the spinner field lists next to this option or click the Last Day of the Month checkbox. ▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format.
7	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window.</p> <p>Stop! End of Task.</p>

Modify a Scheduled Task

Background Use this procedure to change the parameters of a task for any function that can be scheduled.

Before you begin Before you begin this task, be aware that you cannot modify a scheduled task that is already in progress. You cannot modify another user's scheduled tasks unless you are the system administrator or have a privileged login.

To perform this task, access the Map window.

Task Complete the following steps to modify a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. Result: The Administration menu is displayed.
2	Select Schedule from the Administration menu. Result: The Schedule sub-menu is displayed.
3	Select the function of the task to be modified. Result: The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Select a task from the list to be modified.
5	Click the Modify button. Result: The appropriate Modify a Scheduled Item window is displayed.
6	Make modifications to the information.
7	Click the Apply button to apply the changes or click the OK button to apply the changes and close the window. Stop! End of Task.

Delete a Scheduled Task

Background Use this procedure to delete a scheduled task for any function that can be scheduled.

Before you begin Before you begin this task, be aware that you cannot delete any scheduled DNO that is already in progress. You cannot delete another user's scheduled tasks unless you are the system administrator or have a privileged login.

To perform this task, access the Map window.

Task Complete the following steps to delete a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. Result: The Administration menu is displayed.
2	Select Schedule from the Administration menu. Result: The Schedule sub-menu is displayed.
3	Select the function of the task to be deleted. Result: The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Choose the item to be deleted, which is identified by TID, from the list.
5	Click the Delete button. Result: A pop-up question dialog window is displayed, asking if you want to delete the selected scheduled task. Choose Yes to delete the selected scheduled task or No to cancel the deletion. Stop! End of Task.

Introduction

Summary This chapter describes procedures related to traffic provisioning, including procedures for setting up optical associations and NE cross-connections.

Before you begin Read the [Traffic Provisioning Concepts](#) chapter to learn about optical associations and cross-connections in the NE.

Contents This chapter discusses the following topics:

- ✦ [Add an Optical Association or Connection](#) [6-3](#)
- ✦ [Delete an Optical Association](#) [6-10](#)
- ✦ [Add a Reservation](#) [6-13](#)
- ✦ [Modify a Reservation](#) [6-16](#)
- ✦ [Delete a Reservation](#) [6-19](#)
- ✦ [Add a Single NE Cross-Connection](#) [6-20](#)
- ✦ [Roll a One-Way Cross-Connection](#) [6-31](#)
- ✦ [Roll a Two-Way Cross-Connection](#) [6-35](#)
- ✦ [Add a Path-Protected Cross-Connection](#) [6-38](#)

- ✦ [Add an Adjunct Path-Protected Cross-Connection](#) [6-45](#)
 - ✦ [Add an NE Multi-Cast Cross-Connection](#) [6-51](#)
 - ✦ [Delete an NE Cross-Connection—Graphical](#) [6-53](#)
 - ✦ [Delete an NE Cross-Connection—Textual](#) [6-56](#)
 - ✦ [Modify an NE Cross-Connection—Graphical](#) [6-59](#)
 - ✦ [Modify an NE Cross-Connection—Textual](#) [6-62](#)
 - ✦ [Add a Cross-Connect Loopback](#) [6-64](#)
 - ✦ [View Cross-Connect Loopbacks](#) [6-67](#)
 - ✦ [Delete a Cross-Connect Loopback](#) [6-69](#)
-

Add an Optical Association or Connection

Background Use this procedure to add an optical association or connection.

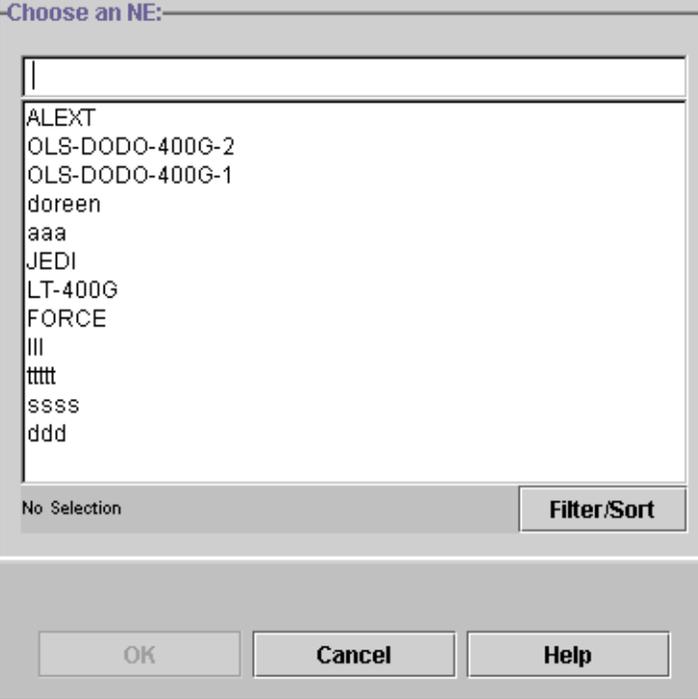
Before you begin During this task, the user will need to specify the following:

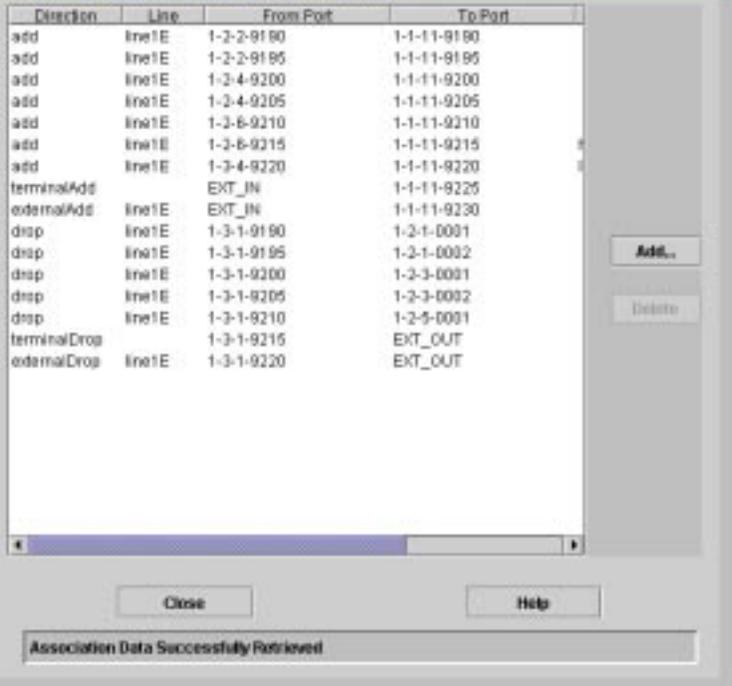
- ▶ The association type (for optical associations) or connection type (for optical connections)
- ▶ The line on which the association will operate
- ▶ The optical channel power level (for OLS 400G R. 3.0 External Add associations only).
- ▶ The source and destination port information
- ▶ The port location (for OLS 400G R. 3.0 Add or Terminal Drop associations only)

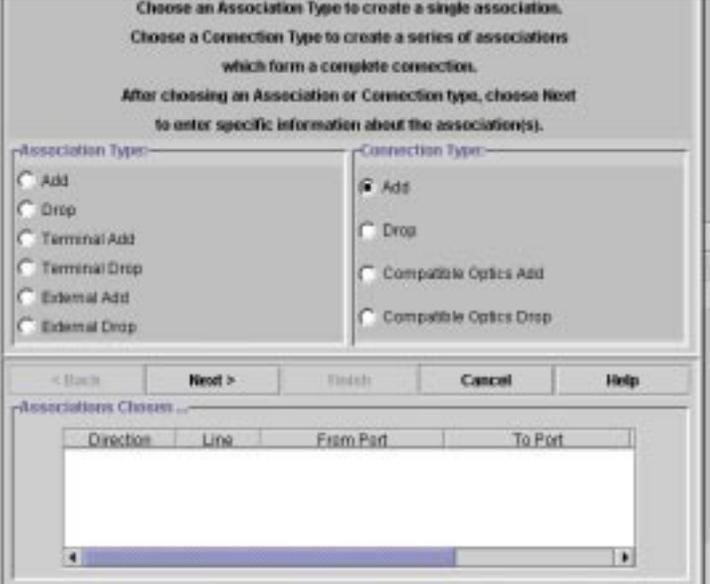
Screen examples shown in this procedure are for illustration purposes. The specific information displayed on a window will vary, based on the NE type.

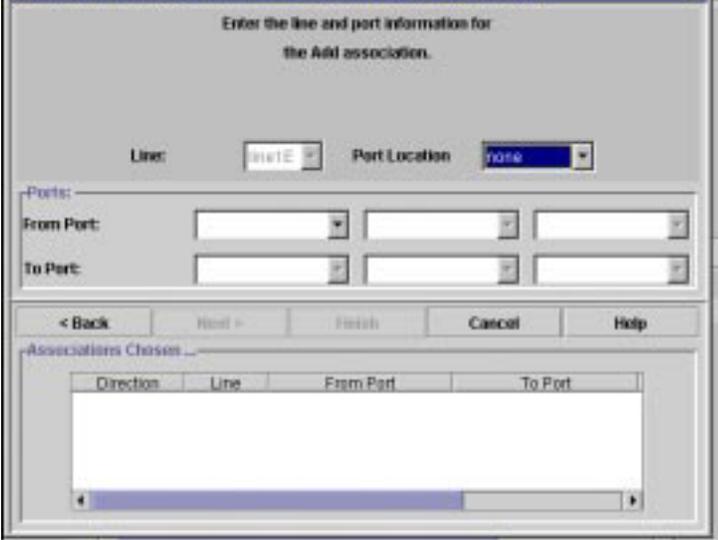
Task

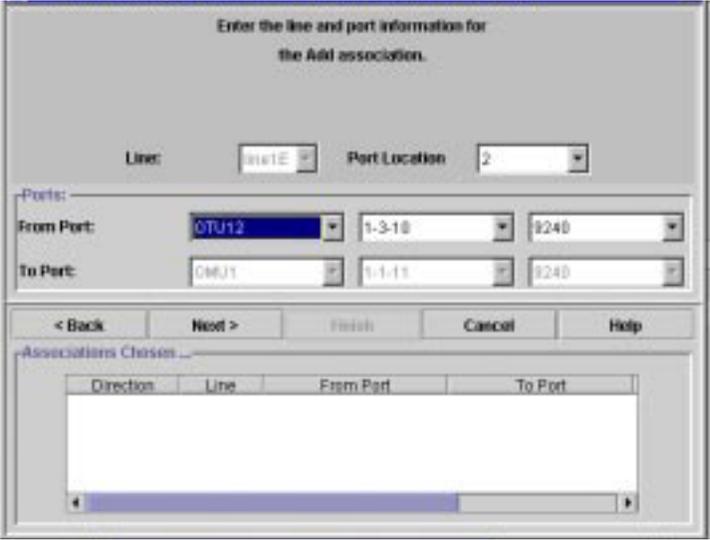
Complete the following steps to add an optical association.

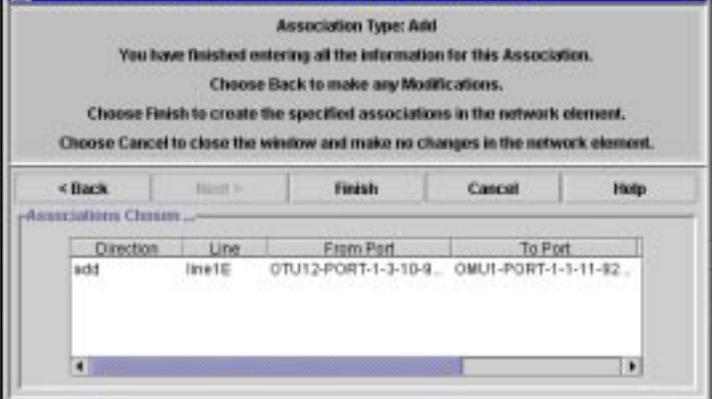
Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	<p>Select Optical Associations from the displayed sub-menu. The Choose an NE window is displayed.</p> 
3	Double-click on the NE to select it.

Step	Action (Contd)																																																																				
4	Click the OK button. The Optical Associations Manager window is displayed.																																																																				
 <p>The screenshot shows a window titled 'Optical Associations Manager'. It contains a table with the following data:</p> <table border="1"> <thead> <tr> <th>Direction</th> <th>Line</th> <th>From Port</th> <th>To Port</th> </tr> </thead> <tbody> <tr><td>add</td><td>line1E</td><td>1-2-2-9190</td><td>1-1-11-9190</td></tr> <tr><td>add</td><td>line1E</td><td>1-2-2-9195</td><td>1-1-11-9195</td></tr> <tr><td>add</td><td>line1E</td><td>1-3-4-9200</td><td>1-1-11-9200</td></tr> <tr><td>add</td><td>line1E</td><td>1-3-4-9205</td><td>1-1-11-9205</td></tr> <tr><td>add</td><td>line1E</td><td>1-3-6-9210</td><td>1-1-11-9210</td></tr> <tr><td>add</td><td>line1E</td><td>1-3-6-9215</td><td>1-1-11-9215</td></tr> <tr><td>add</td><td>line1E</td><td>1-3-4-9220</td><td>1-1-11-9220</td></tr> <tr><td>terminalAdd</td><td></td><td>EXT_IN</td><td>1-1-11-9225</td></tr> <tr><td>externalAdd</td><td>line1E</td><td>EXT_IN</td><td>1-1-11-9230</td></tr> <tr><td>drop</td><td>line1E</td><td>1-3-1-9190</td><td>1-2-1-0001</td></tr> <tr><td>drop</td><td>line1E</td><td>1-3-1-9195</td><td>1-2-1-0002</td></tr> <tr><td>drop</td><td>line1E</td><td>1-3-1-9200</td><td>1-2-3-0001</td></tr> <tr><td>drop</td><td>line1E</td><td>1-3-1-9205</td><td>1-2-3-0002</td></tr> <tr><td>drop</td><td>line1E</td><td>1-3-1-9210</td><td>1-2-5-0001</td></tr> <tr><td>terminalDrop</td><td></td><td>1-3-1-9215</td><td>EXT_OUT</td></tr> <tr><td>externalDrop</td><td>line1E</td><td>1-3-1-9220</td><td>EXT_OUT</td></tr> </tbody> </table> <p>Below the table are buttons for 'Add...', 'Delete', 'Close', and 'Help'. A status bar at the bottom reads 'Association Data Successfully Retrieved'.</p>		Direction	Line	From Port	To Port	add	line1E	1-2-2-9190	1-1-11-9190	add	line1E	1-2-2-9195	1-1-11-9195	add	line1E	1-3-4-9200	1-1-11-9200	add	line1E	1-3-4-9205	1-1-11-9205	add	line1E	1-3-6-9210	1-1-11-9210	add	line1E	1-3-6-9215	1-1-11-9215	add	line1E	1-3-4-9220	1-1-11-9220	terminalAdd		EXT_IN	1-1-11-9225	externalAdd	line1E	EXT_IN	1-1-11-9230	drop	line1E	1-3-1-9190	1-2-1-0001	drop	line1E	1-3-1-9195	1-2-1-0002	drop	line1E	1-3-1-9200	1-2-3-0001	drop	line1E	1-3-1-9205	1-2-3-0002	drop	line1E	1-3-1-9210	1-2-5-0001	terminalDrop		1-3-1-9215	EXT_OUT	externalDrop	line1E	1-3-1-9220	EXT_OUT
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Step	Action (Contd)
5	<p>Click the Add button to add an optical association or connection. The first Add Optical Associations window is displayed.</p>  <p>⇒ NOTE: The sample window shown is for an OLS 400G NE node type that does not support one or two OTU Thru connections. The association types/connection types shown on this window will vary, depending on the NE type selected.</p>
6	<p>Choose an association type or connection type to be added for the selected NE. The Next button is enabled.</p>

Step	Action (Contd)
7	<p>Click the Next button. The next Add Optical Associations window is displayed to choose line and port information for the selected association/connection type.</p>  <p>The values that you can select in the Line, From Port, and To Port fields are limited to what is compatible with the NE selected, the association/connection type chosen, and the available ports for that association/connection. In many cases, some of these fields are disabled, because the only available choice has already been pre-selected by the system.</p> <p>⇒ NOTE: The Port Location field is only displayed for OLS 400G R. 3.0 NEs for Add or Terminal Drop associations, and it is an optional field. Some OLS 400G NEs do not require a Port Location to be chosen.</p>

Step	Action (Contd)
8	<p>Choose the port information by clicking the down arrow next to the applicable port field to display a drop-down list of choices. Select a port from the drop-down list.</p> <p>The port information fields consist of the following:</p> <ul style="list-style-type: none"> ▶ The first field is a drop-down list of valid circuit pack types for the source of the association/connection type ▶ The second field is a drop-down list of valid bay-shelf-slot level AIDs for the circuit pack type chosen in the first field ▶ The third field is a drop-down list of valid frequencies for the circuit pack type and bay-shelf-slot level AIDs chosen for the association/connection type <p>For OLS 400G NE External Add associations, an additional parameter field is displayed at the top of the window:</p> <ul style="list-style-type: none"> ▶ Optical Channel Power Level—Select the optical channel power level by clicking the down arrow next to the field to display a drop-down list. The available choices are high and low. <p>For each port information field, click the down-arrow next to the field to display a drop-down list of available choices. Select a choice from the drop-down list.</p> <p>When completed, the selections on the window should look similar to the following example:</p> 

Step	Action (Contd)
9	<p>Click the Next button. The next Add Optical Associations window is displayed, showing the selected information for the association/connection.</p> 
10	<p>If you want to change any information entered for the association/connection, or enter additional associations/connections for this NE, click the Back button to go back to the previous windows. If you are finished adding associations/connections at this point, click the Finish button.</p>
11	<p>If you clicked the Finish button in step 10, a status window is displayed. If you entered a multi-association connection, one line per association (not one line per connection) is shown in the status window. If the association/connection addition is successful, a status of “Completed” is shown in the status window indicating that the association/connection has been added. If the operation failed for some reason (for example, the NE lost communications with the system while in the process of adding the association/connection), a status of “Incomplete” is shown in the status window next to the attempted addition. Click the Close button to close the status window.</p> <p>Stop! End of Task.</p>

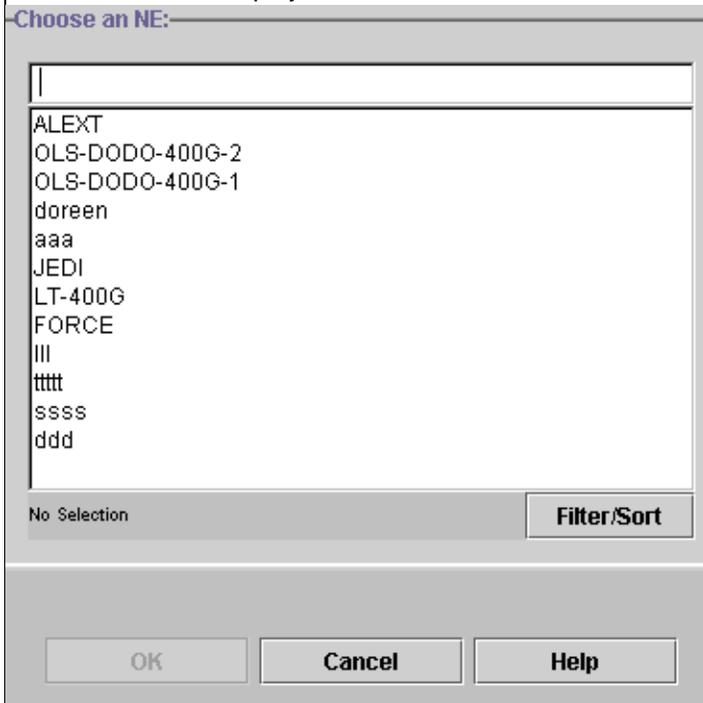
Delete an Optical Association

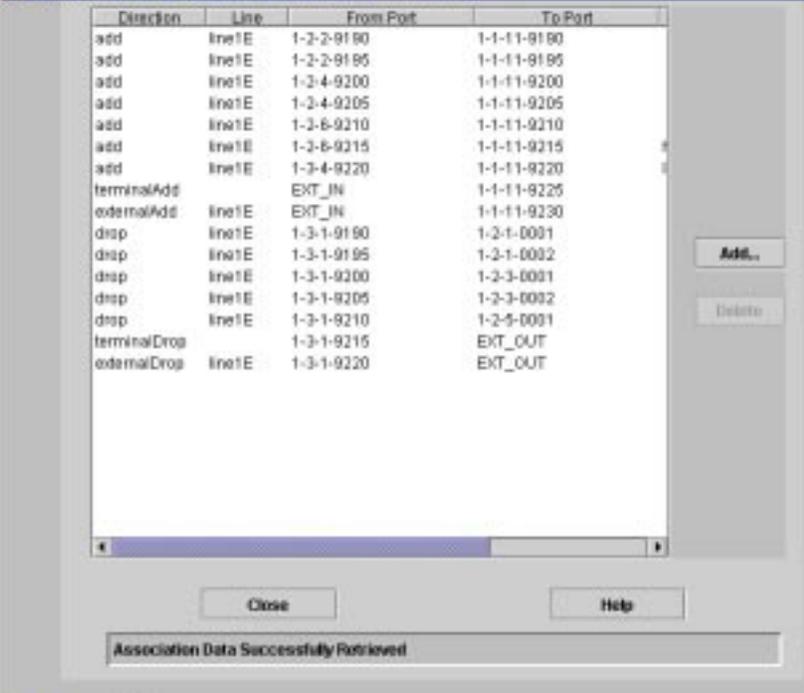
Background

Use this procedure to delete an optical association.

Task

Complete the following steps to delete an optical association.

Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	Select Optical Associations from the displayed sub-menu. The Choose an NE window is displayed. 
3	Double-click on the NE to select it.

Step	Action (Contd)
4	<p>Click the OK button. The Optical Associations Manager window is displayed.</p>  <p>The Optical Associations Manager window contains all optical associations currently in the network element with Direction, Line, From Port, To Port, Optical Channel Power and Port Location information (for OLS 400G R. 3.0 NEs).</p>
5	<p>Click on the association to be deleted in the list.</p> <p>To select more than one adjacent association in the list for deletion, press and hold the left mouse button and drag the mouse cursor down the list until the desired associations are selected. To select more than one non-adjacent association in the list, press and hold the Control key while positioning the mouse cursor and clicking the left mouse button to select one association at a time, or clicking/holding the left mouse button and dragging the mouse cursor across the desired association entries. Then, release the mouse button. The selections are highlighted.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
6	Click the Delete button.
7	A message box is displayed asking you to confirm the deletion. Click on Yes to delete the association(s) in the NE. If you do not want to delete the association(s), click on No to return to the Manage Optical Associations window.
8	Choose Yes. A status window is displayed, indicating whether the deletion is successfully completed. If you deleted more than one association, one line per deleted association is shown in the status window. Stop! End of Task.

Add a Reservation

Background

Use this procedure to reserve a tributary on a port for a cross-connection.

Before you begin

Before you begin this task, display the Cross-Connection window and the NE port group of the tributary to be reserved, to make sure there is no existing reservation or cross-connection on the tributary. Any tributary that is being used for a cross-connection is displayed as blue on the Cross-Connect window. Any tributary that has an existing reservation is displayed as dark blue on the Cross-Connect window. The tributary should not be in a port that is part of an NE port protection group and should be in a valid state.

Task

Complete the following steps to add a tributary reservation.

Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	Select Cross-Connection from the displayed sub-menu. This displays the Choose an NE window.
3	<p>Choose the network element in the list by double clicking on it in the then click the OK button. The Cross-Connection window is displayed.</p> <p>You can also access the Cross-Connection window by positioning the mouse cursor on an NE in the Map window, clicking the right mouse button to display a pop-up menu and then selecting Cross Connection from the NE's pop-up menu.</p> <p>The Cross-Connection window consists of a menu bar, a toolbar, a status bar, a subnetwork explorer, and a main view. This window is used for all cross-connection operations, including viewing, adding, modifying, deleting cross-connections, and reserving tributaries.</p> <p>The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can also expand any level of the equipment hierarchy (bay, shelf, slot, port) in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If the items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p>
4	Position the mouse cursor on the slot displayed in the explorer tree. Press the select (left) mouse button twice to highlight the slot and expand the explorer tree to show the port groups beneath the slot.

Step	Action (Contd)
5	<p>Expand and display the desired port tributary in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none"> • Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom). • Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View
6	<p>Position the mouse cursor on the tributary in the Main View to be reserved and click the left mouse button to select it. The color of the selected tributary block changes from yellow to magenta.</p>
7	<p>Click the Reserve toolbar button. The Create Reservation Attributes window is displayed. A list of NE TIDs for the source NE is shown.</p>
8	<p>Select one of the NEs displayed in the list. Make sure the choice is appropriate for the reservation being made.</p>
9	<p>Click the OK button. A confirmation window is displayed, asking if you really want to reserve the selected tributary (the AID of the selected tributary is shown). Choose Yes to reserve the tributary or No to cancel the reservation.</p> <p>If the reservation is successful, the color of the tributary changes to dark blue on the Cross-Connection window.</p> <p>Stop! End of Task.</p>

Modify a Reservation

Background

Use this procedure to modify a tributary reservation. The TID of the source NE can be modified.

Before you begin

Before you begin this task, display the Cross-Connection window and the NE port group of the tributary to be modified, to make sure there is no existing cross-connection on the tributary. Any tributary that is being used for a cross-connection is displayed as blue on the Cross-Connect window.

Task

Complete the following steps to modify a tributary reservation.

Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	Select Cross-Connection from the displayed sub-menu. This displays the Choose an NE window.
3	<p>Choose the network element in the list by double clicking on it in the then click the OK button. The Cross-Connection window is displayed.</p> <p>You can also access the Cross-Connection window by positioning the mouse cursor on an NE in the Map window, clicking the right mouse button to display a pop-up menu and then selecting Cross Connection from the NE's pop-up menu.</p> <p>The Cross-Connection window consists of a menu bar, a toolbar, a status bar, a subnetwork explorer, and a main view. This window is used for all cross-connection operations, including viewing, adding, modifying, deleting cross-connections, and reserving tributaries.</p> <p>The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can also expand any level of the equipment hierarchy (bay, shelf, slot, port) in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If the items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p>
4	Position the mouse cursor on the slot displayed in the explorer tree. Press the select (left) mouse button twice to highlight the slot and expand the explorer tree to show the port groups beneath the slot.

Step	Action (Contd)
5	<p>Expand and display the port of the reserved tributary you want to modify, in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none">▶ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom).▶ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View. <p>The reserved port/tributary will be displayed as dark blue on the Cross-Connection window.</p>
6	Single-click on the reserved tributary to be modified to select it.
7	Click the Modify toolbar button. The Modify Reservation Attributes window is displayed.
8	Change the source TID of the NE.
9	<p>Click the OK button. A confirmation window is displayed, asking if you really want to modify the information about the tributary reservation (the AID of the selected tributary is shown). Choose Yes to modify the reservation or No to cancel the operation.</p> <p>Stop! End of Task.</p>

Delete a Reservation

Background Use this procedure to remove a tributary reservation.

Before you begin Before you begin this task, display the Cross-Connection window and the NE port group of the tributary to be deleted, to make sure there is no existing cross-connection on the tributary. Any tributary that is being used for a cross-connection is displayed as blue on the Cross-Connect window.

Task Complete the following steps to delete a tributary reservation.

Step	Action	Reference
1	Display the Cross-Connection window.	Add a Reservation
2	Display the port of the tributary with the reservation you want to delete (remove).	
3	Single-click on the reserved tributary to be deleted. A reserved tributary is displayed in dark blue on the Cross-Connect window.	
4	<p>Click the Delete toolbar button.</p> <p>A confirmation window is displayed, asking if you really want to modify the information about the tributary reservation (the AID of the selected tributary is shown). Choose Yes to delete the reservation or No to cancel the deletion.</p> <p>If the reservation is successfully removed, the color of the tributary changes to yellow on the Cross-Connection window.</p> <p>Stop! End of Task.</p>	

Add a Single NE Cross-Connection

Background

Use this procedure to add new NE cross-connections.

Before you begin

Before you begin this task, determine the NE and the elements for which you want to add cross-connections.

Prior to creating cross-connections, make sure that the associated ports have been provisioned correctly. See [Provision NE Ports](#) in [Chapter 3, Equipment Provisioning](#).

There are several ways to access the Cross-Connection window besides the method described in this procedure. Other ways to access the Cross-Connection window:

A. From the Map Main Menu

1. Choose the network element to work with in the Map.
2. Choose **Configuration** from the main menu.
3. Choose **Cross Connection** from the sub-menu.
4. The Cross Connection Window is displayed.

B. Equipment View Window Menu

1. Choose **Configuration** from the equipment view main menu.
2. Choose **Cross Connection** from the sub-menu.
3. The Cross-Connection Window is displayed.

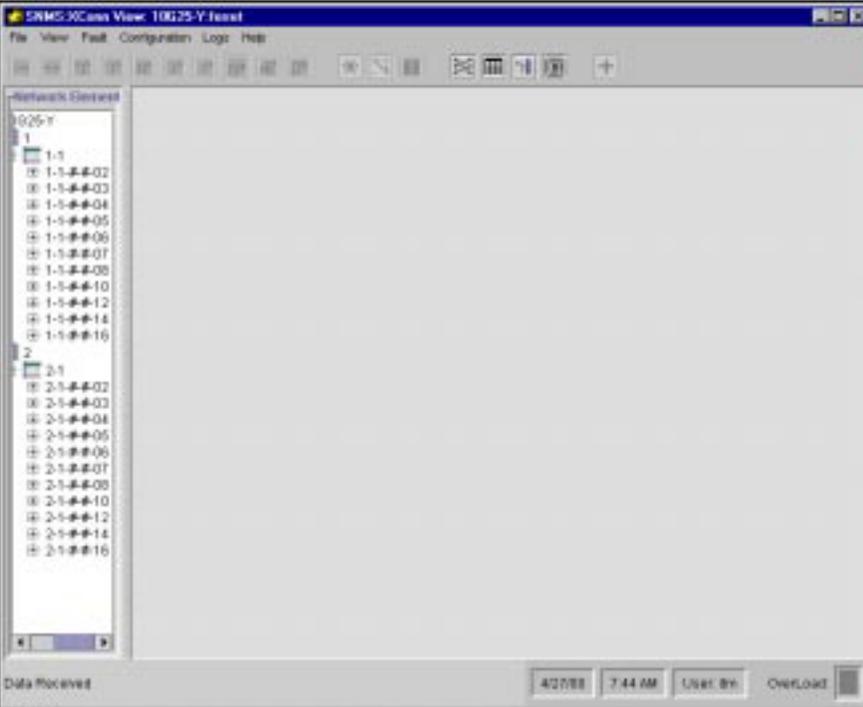
C. Equipment View Pop-Up Menu

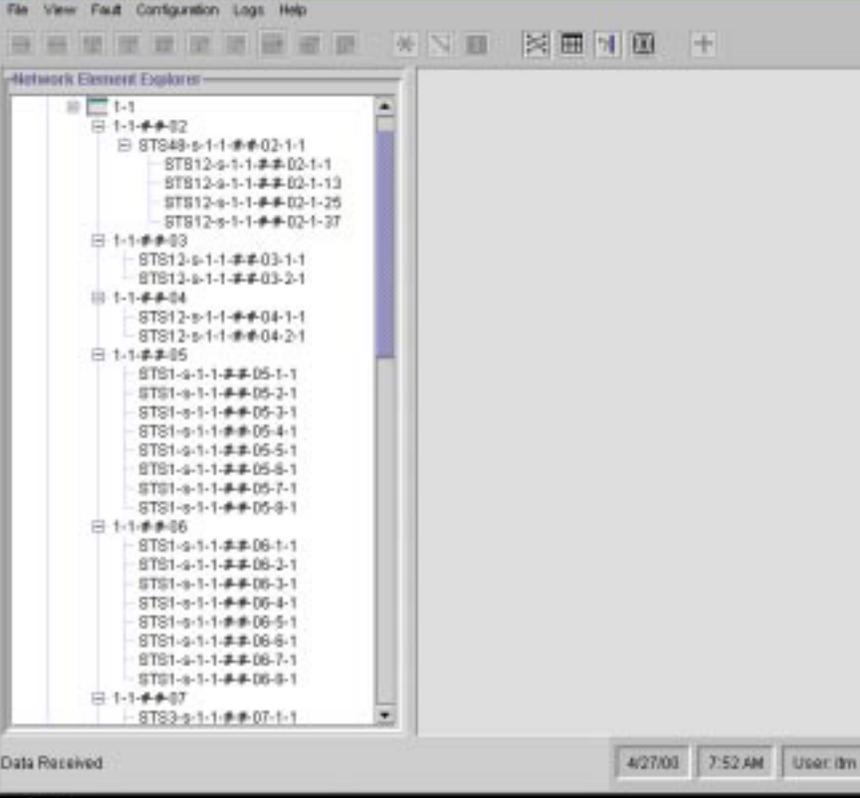
1. Right click over the equipment whose cross connection window is to be displayed.
 2. Choose **Cross Connection** from the popup menu.
 3. The Cross-Connection Window is displayed.
-

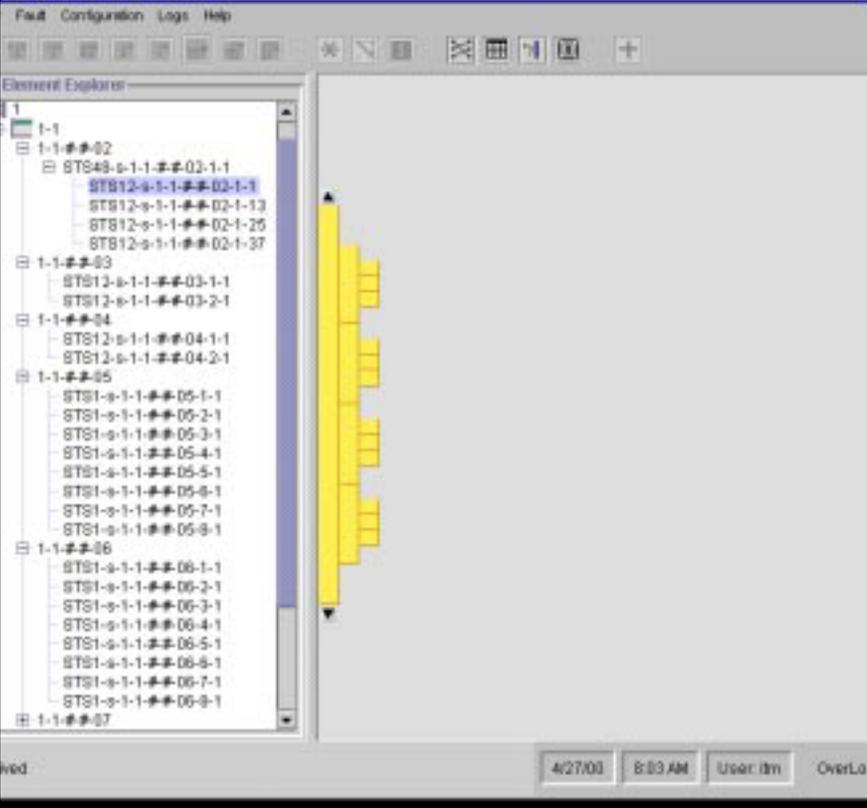
Task

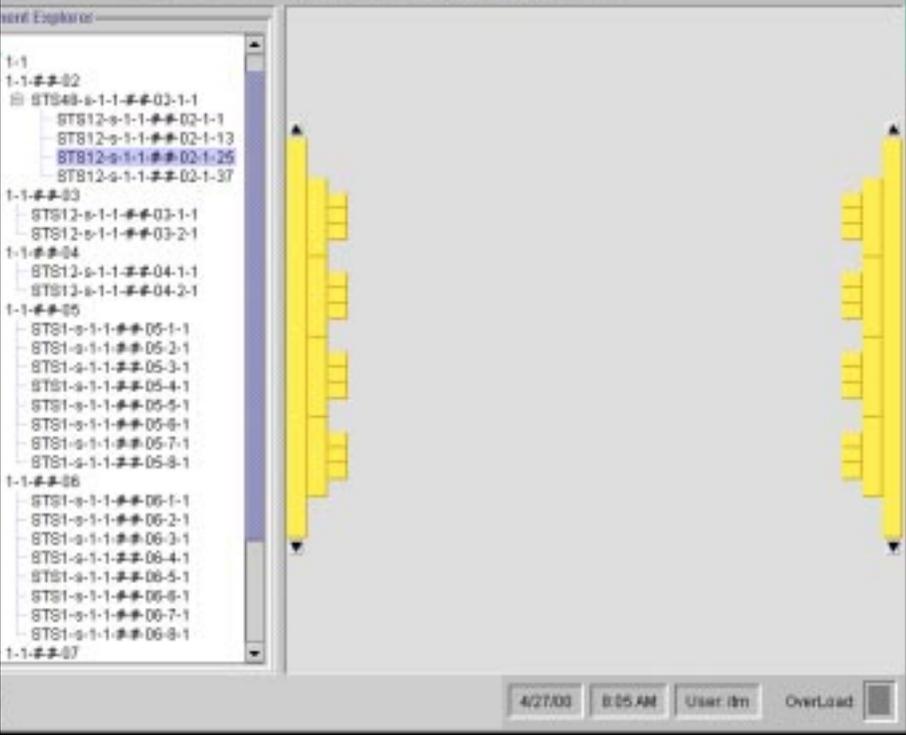
Complete the following steps to add a single new cross-connection.

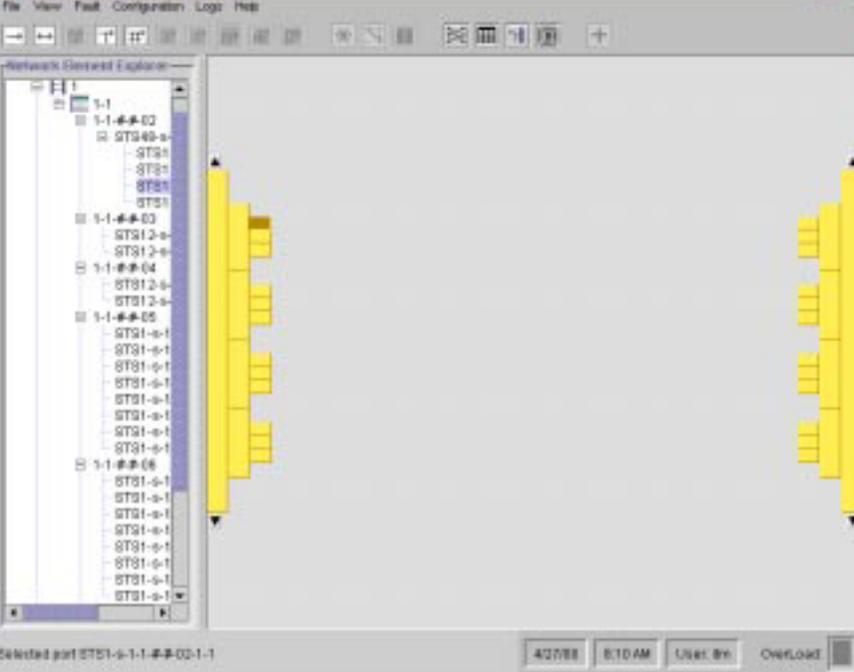
The screen examples shown in this procedure are for illustration purposes. The specific information displayed on the Cross-Connection window will vary by NE type.

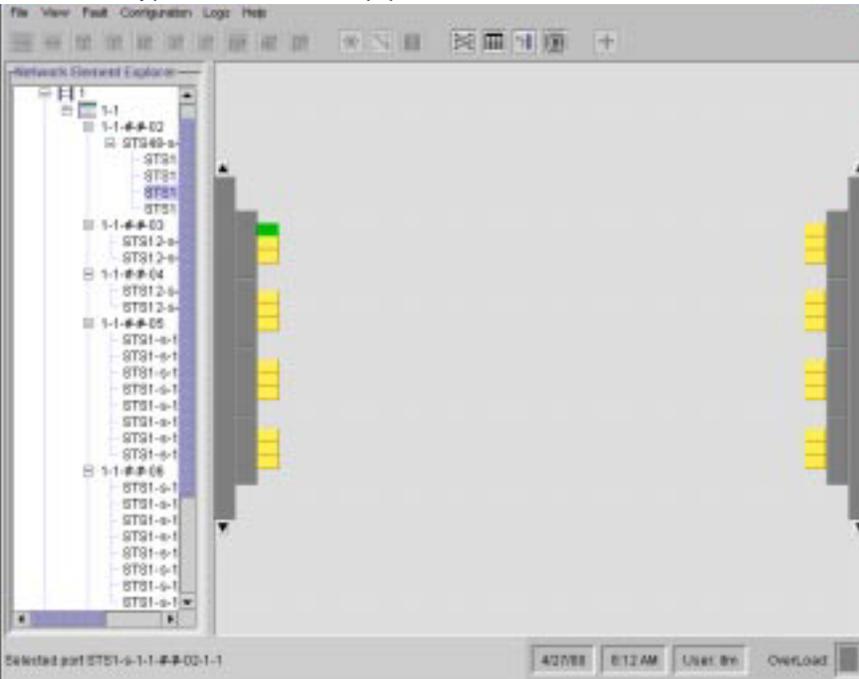
Step	Action
1	<p>Position the mouse cursor on the NE in the Map pane portion of the Map window and click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu.</p> <p style="text-align: center;">OR</p> <p>Choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Cross Connection from the Configuration menu. The Choose an NE window is displayed. Double-click on the NE in the window list and click the OK button.</p> <p>The Cross-Connection window for the selected NE is displayed.</p>  <p>The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can also expand any level of the equipment hierarchy (bay,shelf, slot, port) in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

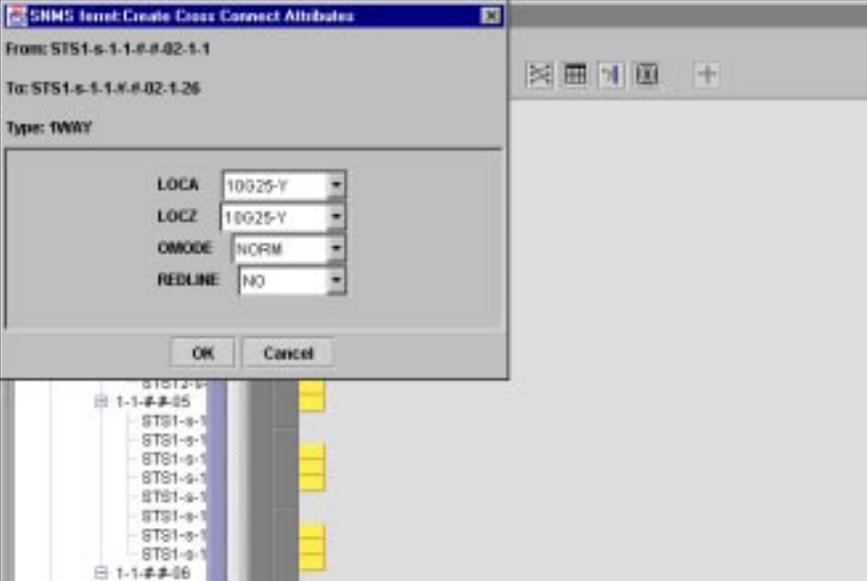
Step	Action (Contd)
2	<p>Position the mouse cursor on the slot displayed in the explorer tree. Press the select (left) mouse button twice to highlight the slot and expand the explorer tree to show the port groups beneath the slot.</p> 
	<p>To show or hide all cross-connection lines, Either click the Show/Hide button on the window toolbar or select View from the menu bar and then Show Cross Connection Lines from the sub-menu. If cross-connection lines were hidden, they will now be displayed. If they were displayed, they will now be hidden.</p> <p>To show or hide a single cross-connection line, click on an AID representation (building block) that indicates that it contains a cross-connection and click the Show/Hide toolbar button. The desired cross-connection line is displayed or hidden.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

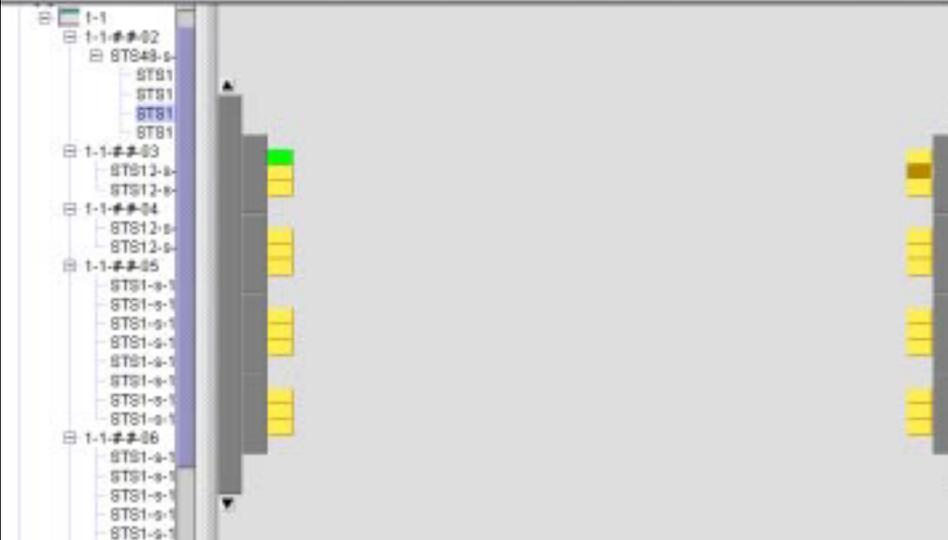
Step	Action (Contd)
3	<p>Expand and display the desired source port tributary in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none"> ▶ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom). ▶ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View.
	
	<p>NOTE: To remove a tributary block from the Main View, position the mouse cursor on the tributary block. Then, click the right mouse button. A single option, "Clear", is displayed in a pop-up window. Move the mouse cursor over the word "Clear" in the pop-up window and click the left mouse button. The tributary block is cleared from the Main View.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

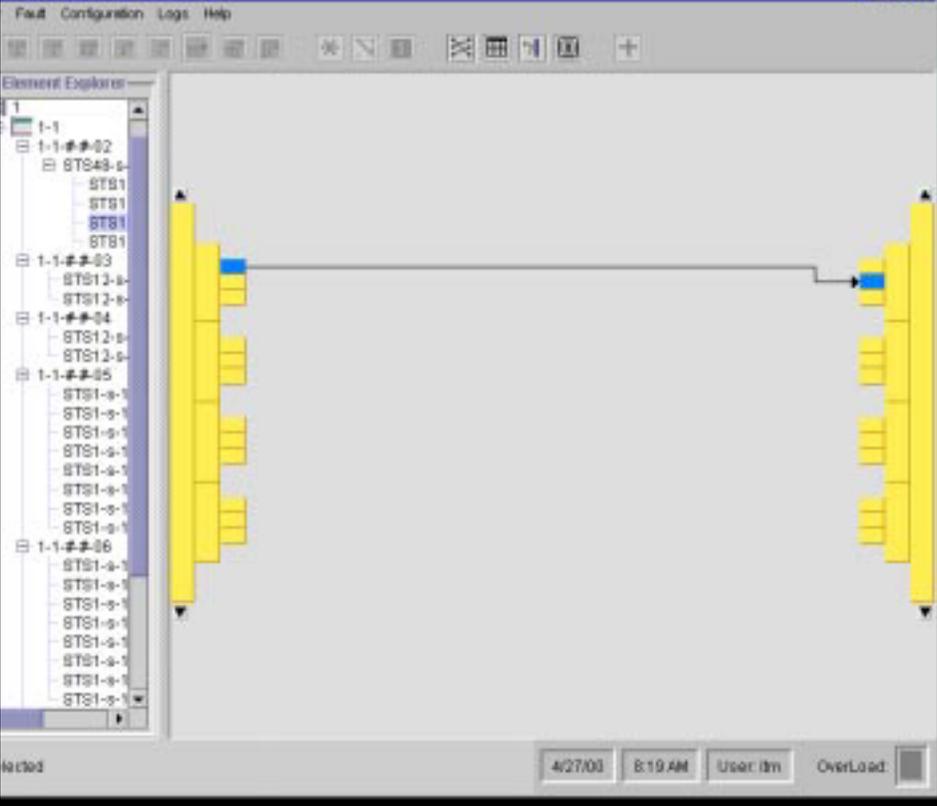
Step	Action (Contd)
	<p>When a port tributary is displayed in the Main View of the Cross-Connection window, and you position the mouse cursor on the tributary block, a message is displayed next to the tributary address in the status bar identifying it as a "Source" or "Destination" tributary. The "Source" and "Destination" literal displayed in the status bar is used to indicate whether the tributary could act as a "Source" or "Destination", or both, for additional cross-connections.</p>
<p>4</p>	<p>Select the destination port tributary using one of the methods described and position it on the top, bottom, left, or right portion of the Main View, using one of the methods described in step 3 for the source port tributary.</p> 
	<p>NOTE: Do not place the destination tributary on top of a previously selected/positioned source tributary block.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
5	<p>Move the mouse cursor to the source tributary block on the Main View and click the select (left) mouse button to select the source tributary for the cross-connection. The color of the selected tributary block changes from yellow to magenta.</p> 
	<p>⇒ NOTE: If necessary, click the arrow keys located next to the tributary blocks displayed to scroll and locate the tributary you want to use. When you position the cursor on a tributary block, the status bar indicates the tributary address and whether the tributary is available to be used as a source or destination, or both.</p> <p>The available cross-connection type buttons are enabled at the top toolbar portion of the window above the Main View and Network Element Explorer. If a specific type of cross-connection is not possible for the source tributary selected, its cross-connection type button is greyed out.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
6	<p>Select the cross-connection type by clicking on the appropriate cross-connection type button at the top portion of the window.</p>  <p>The color of the selected source tributary block changes to green.</p>
7	<p>Move the mouse cursor and position it on the destination port tributary block.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
8	<p>Click the select (left) mouse button on the destination port tributary block to select it.</p>  <p>In some cases (for example, for 2.5G NEs), a Cross-Connect Attributes window is displayed for selecting certain attributes for the cross-connection, such as LOCA node, LOCZ node, OMODE (originating mode), and Redline status. If necessary, change any/all of the attributes displayed on this window by clicking the down arrow next to the respective field to display a drop-down list of choices, select the choice from the list, and then click the OK button on the Cross-Connect Attributes window to activate your choice(s) or the Cancel button to cancel the attribute changes and the current cross-connection operation for the previously selected source/destination tributaries.</p> <p>⇒ NOTE: If you click the Cancel button on the Cross-Connect Attributes window (if one is displayed) at this point, you will have to select the source tributary, the cross-connection type, and the destination tributary again.</p> <p>Next, a pop-up question dialog window is displayed, asking if you are sure that you want to create the selected type of cross-connection between the selected source and destination tributaries. Choose Yes to initiate the cross-connection or No to cancel the cross-connection operation.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
<p>Are you sure you want to create a One Way cross connection between STS1-s-1-1-3-X-02-1-1 and STS1-s-1-1-3-X-02-1-20?</p> <p><input type="button" value="Yes"/> <input type="button" value="No"/></p>	
 <p>The diagram shows a network topology with a tree view on the left. The tree view includes nodes for STS1 and STS13 under various parent identifiers (e.g., 1-1-#-02, 1-1-#-03, 1-1-#-04, 1-1-#-05, 1-1-#-06). The main area displays a grid of nodes with yellow and green highlights, representing connections between these nodes.</p>	
<p><i>Continued on next page</i></p>	

Step	Action (Contd)
9	<p>Choose Yes to create the cross-connection. The line of the newly created cross-connection momentarily changes to orange. When the cross-connection has been established, the line and arrows of the created cross-connection change color from orange to black and the colors of the tributary blocks change to blue, indicating that the cross-connection has been made.</p>
	 <p>The screenshot shows a network provisioning software interface. On the left is an 'Element Explorer' tree with a hierarchical structure of nodes including '1-1', '1-1-#-02', '1-1-#-03', '1-1-#-04', '1-1-#-05', and '1-1-#-06'. The main workspace displays a network diagram with two vertical columns of yellow rectangular blocks representing tributary blocks. A horizontal line connects a block in the left column to a block in the right column. The connection line and the blocks it connects are highlighted in blue. The interface includes a menu bar at the top with 'File', 'Configuration', 'Logs', and 'Help'. At the bottom, there is a status bar with the text 'Noted', a date '4/27/00', a time '8:19 AM', a user 'User: itm', and an 'OverLoad' indicator.</p>
	<p>Stop! End of Task.</p>

Roll a One-Way Cross-Connection

When to use

Use this procedure to roll a one-way cross-connection. A roll operation consists of moving the input (source) of an existing leg of a one-way or two-way point-to-point cross-connection from the current input (source) tributary to a new input (source) tributary, while leaving the output tributary unchanged. Typically, a roll is used as a tail-end switch in a “facility or tributary” rolling operation, whereby traffic is moved from one facility to another or from one tributary to another on a facility. The head-end side of a facility or tributary roll usually has a bridge established (in one NE) so that the traffic flows on both the old and new facilities, minimizing the signal interruption time when the roll is carried out to that introduced by the roll itself (in the other NE). A roll is inherently a one-way operation, but because facilities are generally two-way, a head-end bridge/tail-end roll sequence is typically done in both directions.

Before you begin

Before you begin this task, determine the existing cross-connection for which you want to roll a cross-connection.

Task

This task explains how to roll an input (source) of an existing one-way point-to-point cross-connection.

In this procedure, rolling the input (source) of an existing one-way cross-connection is described in the context of a “bridge and roll” operation, where the output tributary on an existing one-way cross-connection is “bridged” to a new destination (output) tributary to preserve traffic flow. Once the bridge is established, the original one-way cross-connection can be deleted. The newly formed one-way cross-connection can be rolled to a new input (source) tributary.

Use the following procedure to roll a one-way cross-connection (explained in the context of a “bridge and roll” operation..

Step	Action	Action
1	Display the Cross-Connection window, as described in Add a Single NE Cross-Connection .	
2	Add a new one-way cross-connection as described in Add a Single NE Cross-Connection .	
3	<p>IF...</p> <p>The Main View of the Cross-Connecton window is open and the one-way cross-connection to be rolled is displayed.</p> <p>The Main View of the Cross-Connection window is not open and the one-way cross-connection to be rolled is not displayed</p>	<p>THEN...</p> <p>Go to Step 5.</p> <p>Display the Cross-Connection window, as described in Add a Single NE Cross-Connection. Select the source tributary of the existing cross-connection and display the cross-connection. There are two ways to do this:</p> <ul style="list-style-type: none"> ▶ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom). <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)	Action
		<p>➤ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View.</p>
4	<p>IF... If the existing one-way cross-connection to be rolled is not yet displayed and you selected the source tributary in Step 3</p>	<p>THEN... Select and display the destination tributary of the cross-connection, using one of the methods described in Step 3. The cross-connection for the selected tributary should be displayed in the Main View of the Cross-Connection window.</p> <p>⇒ NOTE: If the existing cross-connection is not displayed in the Main View, click the Show/Hide toolbar button to see if the lines of the cross-connection were hidden.</p>
5	<p>Select the one-way cross-connection to be rolled by positioning the mouse cursor on the lines of the cross-connection and clicking the left mouse button. The line of the cross-connection becomes thicker.</p>	
6	<p>Click the Roll button on the Cross-Connection window toolbar.</p> <p>⇒ NOTE: If you are not sure which button is the Roll button on the toolbar, move the mouse cursor across each button until the Roll function is indicated in the status bar and/or a tooltip. Then click the Roll button.</p> <p>Result: A pop-up window is displayed, prompting you to select a new input (source) tributary for the roll.</p>	
7	<p>Click the OK button to close the pop-up window.</p>	

Step	Action (Contd)	Action
8	Select the new input tributary (source) for the roll by clicking on the tributary block. Result: A Roll Cross Connect Attributes window is displayed.	
9	On the Roll Cross Connect Attributes window, choose the new LOCA NE by clicking the down arrow next to the NEWLOCA field to display a drop-down list of choices. This list may contain just the current NE or more choices, depending on the rate of the selected source tributary.	
10	After choosing the NEWLOCA NE, click the OK button on the Roll Cross Connect Attributes window. Result: A pop-up window is displayed, asking if you really want to perform the roll operation for the selected cross-connection.	
11	Choose Yes. The color of the line of the cross-connection momentarily changes to orange, then to black when it is completed. The cross-connection is rolled to the new source tributary. Stop! End of Task.	

Roll a Two-Way Cross-Connection

When to use

Use this procedure to roll a two-way cross-connection. A roll operation consists of moving the input (source) of an existing leg of a one-way or two-way point-to-point cross-connection from the current input (source) tributary to a new input (source) tributary, while leaving the output tributary unchanged. Typically, a roll is used as a tail-end switch in a “facility or tributary” rolling operation, whereby traffic is moved from one facility to another or from one tributary to another on a facility. The head-end side of a facility or tributary roll usually has a bridge established (in one NE) so that the traffic flows on both the old and new facilities, minimizing the signal interruption time when the roll is carried out to that introduced by the roll itself (in the other NE). A roll is inherently a one-way operation, but because facilities are generally two-way, a head-end bridge/tail-end roll sequence is typically done in both directions.

Before you begin

Before you begin this task, determine the existing cross-connection for which you want to roll a cross-connection.

Task

This task explains how to roll input (source) legs of an existing two-way point-to-point cross-connection in both directions..

Step	Action
1	Display the Cross-Connection window, as described in Add a Single NE Cross-Connection .
2	Add a new two-way cross-connection using the methods described in Add a Single NE Cross-Connection . Result: The two-way cross-connection created is displayed in the Main View of the Cross-Connection window.
3	Click the right mouse button to display a pop-up list showing the two one-way cross-connections that comprise the two-way cross-connection.
4	Select the first one-way cross-connection to be rolled to a different source tributary by positioning the mouse cursor on the cross-connection in the pop-up list and clicking the left mouse button. Result: The selected cross-connection is highlighted in the display list. The pop-up list disappears from the window and the line and arrow of the selected cross-connection becomes thicker in the Main View.

Step	Action (Contd)
5	<p>Click the Roll button on the Cross-Connection window toolbar.</p> <p> NOTE: If you are not sure which button is the Roll button on the toolbar, move the mouse cursor across each button until the Roll function is indicated in the status bar and/or a tooltip. Then click the Roll button.</p> <p>Result: A pop-up window is displayed, prompting you to select a new input (source) tributary for the roll.</p>
6	Click the OK button to close the pop-up window.
7	<p>Select the new input tributary (source) for the roll by clicking on the tributary block.</p> <p>Result: A Roll Cross Connect Attributes window is displayed.</p>
8	On the Roll Cross Connect Attributes window, choose the new LOCA NE by clicking the down arrow next to the NEWLOCA field to display a drop-down list of choices. This list may contain just the current NE or more choices, depending on the rate of the selected source tributary.
9	<p>After choosing the NEWLOCA NE, click the OK button on the Roll Cross Connect Attributes window.</p> <p>Result: A pop-up window is displayed, asking if you really want to perform the roll operation for the selected cross-connection.</p>
10	<p>Choose Yes.</p> <p>The color of the line of the cross-connection momentarily changes to orange, then to black when it is completed. The cross-connection is rolled to the new source tributary.</p>
11	<p>Select the other one-way cross-connection that comprises the two-way cross-connection by either positioning the mouse cursor on the cross-connection line and clicking the left mouse button to select it or by positioning the mouse cursor on the cross-connection line, clicking the right mouse button to display a pop-up list window with the cross-connection, then clicking the left mouse button to select it in the pop-up list window.</p> <p>Result: The line of the cross-connection becomes thicker and the color of the destination tributary block changes to purple.</p>

Step	Action (Contd)
12	<p>Click the Roll button on the Cross-Connection window toolbar.</p> <p> NOTE: If you are not sure which button is the Roll button on the toolbar, move the mouse cursor across each button until the Roll function is indicated in the status bar and/or a tooltip. Then click the Roll button.</p> <p>Result: A pop-up window is displayed, prompting you to select a new input (source) tributary for the roll.</p>
13	<p>Click the OK button to close the pop-up window.</p>
14	<p>Select the new input tributary (source) for the roll by clicking on the tributary block.</p> <p>Result: A Roll Cross Connect Attributes window is displayed.</p>
15	<p>On the Roll Cross Connect Attributes window, choose the new LOCA NE by clicking the down arrow next to the NEWLOCA field to display a drop-down list of choices. This list may contain just the current NE or more choices, depending on the rate of the selected source tributary.</p>
16	<p>After choosing the NEWLOCA NE, click the OK button on the Roll Cross Connect Attributes window.</p> <p>Result: A pop-up window is displayed, asking if you really want to perform the roll operation for the selected cross-connection.</p>
17	<p>Choose Yes.</p> <p>The color of the line of the cross-connection momentarily changes to orange, then to black when it is completed. The cross-connection is rolled to the new source tributary.</p> <p>Stop! End of Task.</p>

Add a Path-Protected Cross-Connection

Background

When to use

Use this procedure to create a path-protected cross-connection. This type of cross-connection can be used in Bidirectional Line-Switched Ring (BLSR)/Dual Node Interconnection (DNI) and Unidirectional Path-Switched Ring (UPSR)/Subnetwork Connection Protection (SNCP) topologies.

For Dual Ring Interworking(DRI)/DNI applications, the path-protected cross-connection comprises one add and one through cross-connection with a working and protection leg. On an LCT, the source address for DRI-type path-protected cross-connections must be on a low speed interface.

For UPSR/SNCP applications, a 1-way path-protected cross-connection is created at the drop node, consisting of two drop cross-connections with a working and protection leg.

This type of cross-connection can be assigned to a Path Protection Group Name, which allows all cross-connections with the same Path Protection Group Name to be retrieved in a single request to the NE. This is a 1-26 character name that can consist of, for example, a combination of both input port AIDs.

The path protection behavior between the working and protection legs of the cross-connection can be defined as non-revertive with no hold-off time (the initial setting for UPSR/SNCP applications) or revertive with a hold-off time enabled (the initial setting for DRI/DNI applications).

Before you begin

Before you begin this task, determine the NE for which you want to create a path-protected cross-connection.

Task

Complete the following steps to add a path-protected cross-connection.

Step	Action
1	<p>Position the mouse cursor on the NE in the Map pane portion of the Map window and click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu.</p> <p style="text-align: center;">OR</p> <p>Choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Cross Connection from the Configuration menu. The Choose an NE window is displayed. Double-click on the NE in the window list and click the OK button.</p> <p>Result: The Cross-Connection window for the selected NE is displayed.</p> <p>The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can expand any item in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p>
2	<p>Position the mouse cursor on the plus (+) sign next to each slot in the explorer portion of the window, then click and expand the equipment hierarchy until all ports for the cross-connection are shown.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
3	<p>Expand and display the desired source port tributary in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none"> ▶ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom). ▶ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. <p>Result: The tributary block for the selected port is displayed in the Main View.</p> <p>To remove a tributary block from the Main View, position the mouse cursor on the tributary block. Then, click the right mouse button. A single option, "Clear", is displayed in a pop-up window. Move the mouse cursor over the word "Clear" in the pop-up window and click the left mouse button. The tributary block is cleared from the Main View.</p>
4	<p>Select and display the destination port tributary in the Main View, using one of the methods described in step 3. If necessary, click the arrow keys located next to the tributary blocks displayed to scroll and locate the tributary you want to use. When you position the cursor on a tributary block, the status bar indicates the tributary address and whether the tributary is available to be used as a source or destination, or both.</p>
5	<p>Select and display the secondary source port tributary (to be used initially for the protection leg of the cross-connection) in the Main View, using one of the methods described in step 3.</p>
6	<p>Position the cursor on the tributary to be used as the source (input) tributary and click the left mouse button to select it. The selected tributary block changes color from yellow to magenta (yellow/brown). The available cross-connection type buttons are enabled at the toolbar portion of the window above the Main View and Network Element Explorer. If a specific type of cross-connection is not possible for the source tributary selected, these cross-connection type buttons are greyed out.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
7	<p>Click on the cross-connection type toolbar button, One Way PP (for One Way Path-Protected).</p> <p>⇒ NOTE: If you are not sure which button is the One way PP cross-connection type toolbar button, move the mouse cursor across each cross-connection type toolbar button until the label One Way PP is displayed in the status bar in the bottom portion of the window. A tooltip help bubble with the label One Way PP will also be displayed (if tooltips help has been enabled through the Preferences window. See T 111, Modify User Preferences in the <i>User Tasks</i> section for details on how to set or modify user preferences like tooltips help).</p> <p>Result: The color of the selected source/input tributary changes to green</p>
8	<p>Position the cursor on the tributary to be used for the working output/destination leg of the cross-connection and click the left mouse button to select it.</p> <p>Result: The color of the selected tributary changes to purple. <i>Continued on next page</i></p>

Step	Action (Contd)
9	<p>Position the cursor on the tributary to be used for the protection/secondary source leg of the cross-connection and click the left mouse button to select it.</p> <p>Result: The color of the selected protection/secondary tributary block changes from yellow to magenta (yellow/brown).</p> <p>A pop-up Cross-Connections Attributes window is displayed.</p> <p> NOTE: For the example in this procedure, the Attributes window has been expanded by click-dragging the bottom edge to show all fields on the window.</p> <p>This window is used to specify the attributes of the path-protected cross-connection. Select values for the following fields as needed:</p> <ul style="list-style-type: none"><li>▶ LOCA—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the source node for this cross-connection. The field defaults to the current NE.<li>▶ LOCZ—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the destination node for this cross-connection. The field defaults to the current NE. <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<ul style="list-style-type: none"> <li>➤ LOCA2—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the secondary source node (for DRI/DNI application of the path-protected cross-connection). The field defaults to the current NE. <li>➤ OMODE—click the down arrow next to this field to display a drop-down list of options for the Output Mode for this cross-connection. <li>➤ APPL (Application)—click the down arrow next to this field to display a drop-down list of choices for the application (type) of cross-connection. Select 1-Way Path-Protected as the application. <li>➤ XCNUM (Cross-Connection Number)—this field is pre-populated with a Cross-Connection number (it functions as a drop-down list; you can click the down arrow to display and select the number). The Cross-Connection Number is used to associate all atomic cross-connections that are created from the same associated legs and leg-pairs so information can be retrieved from the NE together. This Cross-Connection number can be used to modify and delete associated legs of one or more cross-connections with the same number on the List Cross-Connections window at one time. The List Cross-Connections window can be accessed by clicking the List Cross-Connections toolbar button on the Cross-Connection window toolbar. <li>➤ PPGNAME (Path Protection Group Name)—this is an optional field for entering a 1-26 character Path Protection Group Name that identifies a path protection group for the path-protected cross-connection. All cross-connections associated with a Path Protection Group Name can be retrieved in a single request to the NE. <li>➤ PPBV (Path Protection Behavior)—click the down arrow next to this field to display a list of choices for the Path Protection Behavior between the working and protection legs of the cross-connection. The choices are: NN (Non-Revertive with No Holdoff Time) and RH (Revertive with a Holdoff Time Enabled). <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
10	<p>Click the OK button to activate your attribute choices in the Attributes window.</p> <p>Result: A pop-up confirmation window is displayed.</p>
11	<p>Choose Yes. The lines and arrows of the newly created cross-connection are momentarily displayed in orange.</p> <p>Result: When the cross-connection has been established, the lines and arrows of the cross-connection change to black and the tributary blocks change to blue, indicating that they are cross-connected The protection leg of the cross-connection is represented by a dashed line.</p>
12	<p>The path-protected cross-connection is represented on the Main View as a cross-connection with multiple legs.</p> <p>To illustrate this, position the mouse cursor on the working leg (line) of the cross-connection and click the right mouse button. The source and destination addresses for the working and protection legs of the cross-connection are indicated</p> <p>Stop! End of Task.</p>

Add an Adjunct Path-Protected Cross-Connection

Background

Use this procedure to add an adjunct path-protected cross-connection. An adjunct path-protected cross-connection is created by using the same input tributary as an existing path-protected cross-connection with a different output tributary. Adjunct path-protected cross-connections are used only for Unidirectional Path-Switched Ring (UPSR)/Subnetwork Connection Protection (SNCP) NE ring topologies. There must be an existing path-protected cross-connection from which to form an adjunct path-protected cross-connection. The adjunct path-protected cross-connection is not assigned to a separate path protection group as the existing path-protected cross-connection.

Before you begin

Before you begin this task, determine if there is an existing path-protected cross-connection for which an adjunct path-protected cross-connection can be added.

Task

Complete the following steps to add an adjunct path-protected cross-connection.

Step	Action
1	<p>Position the mouse cursor on the NE in the Map pane portion of the Map window and click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu.</p> <p style="text-align: center;">OR</p> <p>Choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Cross Connection from the Configuration menu. The Choose an NE window is displayed. Double-click on the NE in the window list and click the OK button.</p> <p>Result: The Cross-Connection window for the selected NE is displayed. The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can expand any item in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p>
2	<p>Position the mouse cursor on the plus (+) sign next to each slot in the explorer portion of the window, then click and expand the equipment hierarchy until all ports for the cross-connection are shown.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
3	<p>Locate the tributary pair on the NE that have the path-protected cross-connection to which the adjunct path-protected cross-connection is being added.</p> <p>One method of locating existing cross-connections on the NE is by clicking on the NE's TID at the top level of the equipment hierarchy in the Network Element explorer, then clicking the List Cross Connections toolbar button on the Cross-Connection window toolbar (which is identified by a message in the Status bar or by tooltips help when you position the mouse cursor on the correct button). The List Cross Connections window for the entire NE is displayed.</p> <p> NOTE: The first time you choose to list all cross-connections for the NE, a pop-up window may be displayed, advising you that the listing of all cross-connections for the NE may take a long time and asks if you want to proceed. Choose Yes to display the List Cross Connections window.</p> <p>The tributary of the path-protected cross-connection's working leg has a type of "1WAYPSW" in the Type field of the List Cross Connections display.</p>
4	<p>You can leave the List Cross-Connections window open (position the mouse cursor, then click and hold the left mouse button to drag the window to a different position to avoid obscuring the rest of the Cross-Connection window display) or click the Close button to close the List Cross Connections window.</p> <p>Once you have identified the source tributary that has the path-protected cross-connection to which the adjunct cross-connection is being added, expand the explorer tree until the same source tributary is found.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
5	<p>Expand and display the source, destination, and secondary source tributaries for the path-protected cross-connection in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none"> ▶ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a drop-down menu of positions. Select the position for the tributary block from the drop-down menu list (left, right, top, or bottom). ▶ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View. <p>Result: The lines and arrows of the existing path-protected cross-connection are displayed in the Main View</p>
6	<p>Position the mouse cursor on the working leg of the existing path-protected cross-connection closest to the input (source) tributary block.</p> <p>Result: The color of the input (source) tributary block changes to green, the lines of the working legs of the cross-connection become thicker, and the One Way Adjunct cross-connection type button is enabled.</p>
7	<p>Click on the One Way Adjunct cross-connection type button on the toolbar.</p> <p>Result: A message is displayed in the status bar, "Please select destination for One Way Adjunct cross-connection."</p>
8	<p>Select the destination tributary for the adjunct cross-connection.</p> <p>Result: The color of the selected destination tributary changes from yellow to magenta (yellow/brown), and the Cross-Connection Attributes window is displayed.</p>

Step	Action (Contd)
9	<p>The Attributes window is used to specify the attributes of the path-protected cross-connection. Select values for the following fields as needed:</p> <ul style="list-style-type: none"> ▶ LOCA—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the source node for this cross-connection. The field defaults to the current NE. ▶ LOCZ—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the destination node for this cross-connection. The field defaults to the current NE. ▶ LOCA2—click the down arrow next to this field to display a drop-down list of NEs and select the NE to be used as the secondary destination node (for DRI/DNI application of the path-protected cross-connection). The field defaults to the current NE. ▶ OMODE—click the down arrow next to this field to display a drop-down list of options for the Output Mode for this cross-connection. ▶ XCAPPL (Application)—click the down arrow next to this field to display a drop-down list of choices for the application (type) of cross-connection. Select 1-Way Adjunct Path-Protected as the application. ▶ XCNUM (Cross-Connection Number)—this field is pre-populated with a Cross-Connection number (it functions as a drop-down list; you can click the down arrow to display and select the number). The Cross-Connection Number is used to associate all atomic cross-connections that are created from the same associated legs and leg-pairs so information can be retrieved from the NE together. This Cross-Connection number can be used to modify and delete associated legs of one or more cross-connections with the same number on the List Cross-Connections window at one time. The List Cross-Connections window can be accessed by clicking the List Cross-Connections toolbar button on the Cross-Connection window toolbar. <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<ul style="list-style-type: none"> ▶ PPGNAME (Path Protection Group Name)—this is an optional field for entering a 1-26 character Path Protection Group Name that identifies a path protection group for a path-protected cross-connection. All cross-connections associated with a Path Protection Group Name can be retrieved in a single request to the NE. ▶ PPBV (Path Protection Behavior)—click the down arrow next to this field to display a list of choices for the Path Protection Behavior between the working and protection legs of the cross-connection. The choices are: NN (Non-Revertive with No Holdoff Time) and RH (Revertive with a Holdoff Time Enabled).
10	<p>Click the OK button to activate your attribute choices in the Attributes window.</p> <p>Result: A pop-up confirmation window is displayed, asking if you are sure that you want to create the adjust cross-connection.</p>
11	<p>Choose Yes.</p> <p>Result: The lines and arrows of the newly created cross-connection are momentarily displayed in orange. When the cross-connection has been established, the lines and arrows of the cross-connection change to black and the tributary blocks change to blue, indicating that they are cross-connected.</p> <p>Stop! End of Task.</p>

Add an NE Multi-Cast Cross-Connection

Background

Use this procedure to add a new multi-cast cross-connection. This is accomplished via the Add a Multi-Cast Cross-Connection window, which allows you to choose the number of destination AIDs for a multi-cast cross-connection.

Before you begin

Before you begin this task, determine the NE and the elements for which you want to add a multi-cast cross-connection.

Task

Complete the following steps to add a new multi-cast cross-connection.

Step	Action
1	Display the port tributaries to which a multi-cast cross-connection is to be added, as described in Add a Single NE Cross-Connection .
2	Single-click on a high or low speed tributary at the appropriate signal rate for the new multi-cast cross-connection.
3	Choose the multi-cast button from the group of cross-connection buttons at the top of the Cross-Connections window (if tooltips help is enabled, positioning the mouse pointer over the button will indicate the correct button). This displays the Add a Multi-Cast Cross-Connection window.
4	In the Total Number of Destinations in this NE field on the Add a Multi-Cast Cross-Connection window, enter the number of drops to be included in the cross-connection.

Continued on next page

Step	Action (Contd)
5	In the main view area of the Cross-Connections window, click on each port/tributary that is to be a drop for the new multi-cast cross-connection. Notice that as each drop is specified, it is added to the Chosen Destinations area of the Add a Multi-Cast Cross-Connection window. (If necessary, you can remove a previously selected AID from the Chosen Destinations area by selecting it with the mouse and then clicking the nearby Remove AID button.) After you have specified the last drop, click the Done button.
6	After you complete the Add a Multi-Cast Cross-Connection window and click the Done button, the system asks you to specify additional information for the cross connection, if any is needed. Specifically, for the purposes of a multi-cast cross-connection, a destination TID must be present for each and every destination that you specified. To get this information the system displays the Additional Cross-Connection Information window. Type the additional requested information into this window and click OK.
7	The system displays the Cross-Connection Confirmation window. Click the Yes button to send the new cross-connection command to the NE. Stop! End of Task.

Delete an NE Cross-Connection— Graphical

- Background** Use this procedure to delete a selected cross-connection using the graphical representation.
-
- Before you begin** Before you begin this task, you must determine the cross-connection to be deleted and display it.
- Task** Complete the following steps to delete a cross-connection.

Step	Action
1	<p>Position the mouse cursor on the NE in the Map pane portion of the Map window and click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu.</p> <p style="text-align: center;">OR</p> <p>Choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Cross Connection from the Configuration menu. The Choose an NE window is displayed. Double-click on the NE in the window list and click the OK button. The Cross-Connection window for the selected NE is displayed.</p> <p>Result: The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can also expand any level of the equipment hierarchy (bay, shelf, slot, port) in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p> <p> NOTE: To obtain a textual list of all existing cross-connections on the NE, while on the Cross-Connection window, click on the NE's TID in the explorer portion of the window, choose View from the Cross-Connection window menu bar, then choose List Cross Connections and then choose All Cross Connections. A pop-up window is displayed, providing a textual list of cross-connections. A listing of all existing cross-connections for an NE entity (such as a bay, shelf, slot, or port), can be obtained by selecting entity in the explorer, choosing View from the Cross-Connection window menu bar, choosing List Cross Connections from the View menu, and then choosing All Cross Connections from the displayed sub-menu to display a textual list of all existing cross-connections for the selected entity. To select a cross-connection from the list, position the mouse cursor on the cross-connection and click the select (left) mouse button. You can then click the Modify button on this window to modify the cross-connection or click the Delete button to delete it. In both cases, a pop-up question dialog is displayed, asking if you really want to perform the operation. Choose Yes to perform the operation or No to cancel the operation.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
2	<p>Position the mouse cursor on the port in the explorer tree and click the left mouse button to select it.</p> <p>Result: The port is highlighted in the explorer.</p>
3	<p>Click the right mouse button to display a drop-down list and select the position to place the associated tributaries in the Main View of the Cross-Connection window.</p> <p>The other way to do this is to click and hold the left mouse button and drag the port into the left, right, or bottom position to display the associated tributaries in the Main View.</p> <p>Result: The window shows any existing cross-connections for the port. If the cross-connection is not displayed, click the Show/Hide toolbar button to show the cross-connection. If there are multiple cross-connections, position the mouse cursor over one of the cross-connections and click the right mouse button to display a listing of the existing cross-connections. Then select the desired cross-connection.</p>
4	<p>On the Cross-Connection window, position the mouse cursor on the line that represents the cross-connection and click the left mouse button.</p> <p>Result: The line of the selected cross-connection becomes thicker and the color displayed is black.</p> <p> NOTE: If you want to delete a two-way cross-connection, each leg of the two-way cross-connection must be deleted, one at a time. To select the leg of the two-way cross-connection to be deleted, position the mouse cursor on the cross-connection line and click the right mouse button to display a listing of the cross-connection legs, select the leg to be deleted, and go to Step 5 to follow the rest of this procedure. This step must be repeated to select the other leg of the two-way cross-connection for deletion.</p> <p>Also, the request to remove a red-lined cross-connection will be denied.</p>
5	<p>Click the Delete button on the Cross-Connection window toolbar.</p> <p>Result: The system displays a confirmation window</p>
6	<p>Select Yes in the confirmation window to delete the cross-connection.</p> <p>Stop! End of Task.</p>

Step	Action (Contd)	Action
6	<p>To display all cross-connections for the selected entity, choose All Cross Connections from the displayed sub-menu.</p> <p>For NEs that allow creation of multiple cross-connections from the same associated legs and leg pairs or assignment of a Path Protection Group Name for path-protected cross-connections (such as BWM NEs), you also have the option of displaying/viewing a textual list of cross-connections by Group Number or Group Name.</p> <p>To list cross-connections related to a specific Group Number, choose By Group Number. A Cross-Connection By Group Number window is displayed. Click the arrow next to the Cross Connection Number field to display a pop-up list of group numbers and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>To list cross-connection related to a specific Group Name, choose By Group Name. A Cross Connection By Group Name window is displayed. Click the arrow next to the Group Name field to display a pop-up list of group names and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>The Cross-Connection List window is displayed with the selected cross-connection information. Some general information about this window follows:</p> <ul style="list-style-type: none"> ▶ This list shows all the cross-connections and reservations in the selected element. ▶ Headers displayed above each list differ from NE to NE, but the first three headers are always Source AID (From), Destination AID (To), and Cross-Connection Type. <p style="text-align: right;"><i>Continued on next page</i></p>	

Step	Action (Contd)	Action
7	Use your mouse to select the cross-connection to be deleted.	
8	<p>Press the Delete key or click the Delete button. Result: The system displays a confirmation window.</p> <p>The following three scenarios will cause a cross-connection deletion request to be <i>denied</i>:</p> <ul style="list-style-type: none">▶ a request to remove a red-lined cross-connection▶ a request to remove a cross-connection from a tributary used in a loop-back cross-connection▶ a request to remove a cross-connection from a tributary used in a test access connection.	
9	<p>If you are certain you want to delete the cross-connection indicated for deletion in the cross-connection window, click the Yes button. The system deletes the indicated cross-connection.</p> <p> NOTE: Upon successful deletion of a cross-connection, all reference to that cross-connection, in any window in the GUI, is removed.</p> <p>Stop! End of Task.</p>	

Modify an NE Cross-Connection— Graphical

Background

Use this procedure to modify cross-connections graphically via the Cross-Connections window. Use this procedure to modify certain parameters for the cross-connection, such as the redline status or source/destination node. For example, if you modify the redline parameter and enable redlining, it means that the cross-connection is prohibited from being deleted until you change the redline status from Yes to No in the associated Attributes window.

Before you begin

Before you begin this task, determine the cross-connection you need to modify and the modification you need to make.

The screen examples shown in this procedure are for illustration purposes. The specific information displayed on the Cross-Connection window will vary by NE type.

Task

Complete the following steps to modify cross-connections graphically via the Cross-Connections window.

Step	Action
1	Position the mouse cursor on the NE in the Map pane portion of the Map window and click the select (left) mouse button to select it. The NE is highlighted in the Map window.
2	Click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu. The Cross-Connection window is displayed.
3	Double-click on the TID of the NE in the Network Element Explorer portion of the window to expand and show the bay, shelf, slot, circuit pack, and port that contains the cross-connection to be deleted. If the equipment hierarchy is not expanded to show all components down to port level, double-click on the bay, shelf, and slot in successive order until the explorer tree expands to show the desired port.
4	Position the mouse cursor on the port in the explorer tree and click the left mouse button to select it. The port is highlighted in the explorer.

Continued on next page

Step	Action (Contd)
5	<p>Click the right mouse button to display a drop-down list and select the position to place the associated tributaries in the Main View of the Cross-Connection window.</p> <p>The other way to do this is to click and hold the left mouse button and drag the port into the left, right, or bottom position to display the associated tributaries in the Main View.</p> <p>Result: The existing cross-connections are displayed in the window.</p> <p> NOTE: If the existing cross-connection(s) is not displayed, click the Hide/Show button on the Cross-Connection window toolbar to display it. To expand the view of the Network Element Explorer to see any obscured tributary AIDs, position the mouse cursor next to the bar between the right edge of the Explorer and the tributary block display in the Main view, click the left mouse button and drag the border to the right.</p>
6	<p>Position the mouse cursor on the line of the cross-connection to be modified and click the select (left) mouse button to select it.</p> <p>Result: The cross-connection lines become thicker and the color is black.</p>
7	<p>Click the Modify button on the toolbar part of the window.</p> <p> NOTE: If you are not sure which button is the Modify button, move the cursor to each button until the tooltips help is displayed to indicate that it is the Modify button. Then click the button.</p> <p>Result: A Cross-Connection Attributes window is displayed for the selected cross-connection, showing the parameters that can be modified. For example, the REDLINE parameter can be changed from NO to YES to redline the cross-connection and prohibit it from being deleted.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
8	To change the REDLINE parameter, click the down arrow next to the REDLINE field in the Attributes window to display a drop-down list and select YES to enable the REDLINE feature
9	After making all necessary parameter changes, click the OK button in the Cross-Connect Attributes window. Result: A question dialog window is displayed, asking if you really want to modify the parameters for the cross-connection.
10	Choose Yes to modify the cross-connection. In this example, the REDLINE status of the cross-connection was changed. When the modification is completed, The color red will be displayed on the cross-connection line to indicate that the cross-connection is redlined (prohibited from being deleted, until the REDLINE status is changed again to NO, to disable redlining). Stop! End of Task.

Step	Action (Contd)	Action
6	<p>To display all cross-connections for the selected entity, choose All Cross Connections from the displayed sub-menu.</p> <p>For NEs that allow creation of multiple cross-connections from the same associated legs and leg pairs or assignment of a Path Protection Group Name for path-protected cross-connections (such as BWM NEs), you also have the option of displaying/viewing a textual list of cross-connections by Group Number or Group Name.</p> <p>To list cross-connections related to a specific Group Number, choose By Group Number. A Cross-Connection By Group Number window is displayed. Click the arrow next to the Cross Connection Number field to display a pop-up list of group numbers and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>To list cross-connection related to a specific Group Name, choose By Group Name. A Cross Connection By Group Name window is displayed. Click the arrow next to the Group Name field to display a pop-up list of group names and select one. Click the OK button. To close this window without making a selection, click the Close button.</p> <p>The Cross-Connection List window is displayed with the selected cross-connection information. Some general information about this window follows:</p> <ul style="list-style-type: none"> ▶ This list shows all the cross-connections and reservations in the selected element. ▶ Headers displayed above each list differ from NE to NE, but the first three headers are always Source AID (From), Destination AID (To), and Cross-Connection Type. 	
7	Choose a cross-connection to modify and select Modify . This displays a Modify Cross Connect Attributes window, with the current information for the selected cross-connection.	
8	Make the desired changes to the cross-connection attributes on this window and click the OK button. A pop-up question dialog window is displayed, asking if you are sure you want to make the selected modifications.	
9	Choose Yes. The system changes the selected cross-connection with the selected modifications.	Stop! End of Task.

Add a Cross-Connect Loopback

Background

Use this procedure to add a cross-connect loopback to an NE's port tributary. A cross-connect loopback is created from an input tributary to the output of the same tributary for testing purposes.

Before you begin

Before you begin this task, you need to identify the port tributary in the NE for which the cross-connect loopback will be created for testing purposes. Information about the port tributary, including the rate and AID, can be found by displaying the Cross-Connection window for the NE, and expanding the equipment hierarchy in the Network Element explorer portion of the Cross-Connection window until the desired port tributary is shown in the Network Element Explorer. For instructions on how to display port/tributary information on the Cross-Connection window, see [Add a Single NE Cross-Connection](#).

When a loopback is removed from a tributary, any pre-existing cross-connections on the tributary are automatically re-established in the NE.

Related information

For additional information about configuring loopbacks for testing purposes in the 2.5G NE, refer to the *WaveStar TDM 2.5G User/Service Manual* and *WaveStar TDM 2.5G Operations Systems Engineering Guide*.

Task

Complete the following steps to add a cross-connect loopback to a port tributary in an NE for testing purposes.

Step	Action	Reference
1	<p>Display the Cross-Connection window for the selected NE and obtain the AID of the port tributary to be put in loopback by expanding the Network Element explorer on the Cross-Connection window and “drilling down” the equipment hierarchy until the port tributary is found.</p> <p>The Cross-Connection window can remain open while you access the Manage Loopbacks window to actually add the loopback to the port tributary. Or you may close the Cross-Connection window at this point. To close the Cross-Connection window, choose File from the Cross-Connection window menu bar and then Close from the File sub-menu.</p>	<p>See Add a Single NE Cross-Connection for instructions on how to display the Cross-Connection window for an NE and expand the Network Element Explorer portion of this window to obtain port tributary information.</p>
2	<p>If the Cross-Connection window is open, the NE is already chosen.</p> <p>Otherwise, click on the NE icon in the Map pane portion of the Map window to select it.</p> <p style="text-align: center;">OR</p> <p>Select no NE at this point.</p>	
3	<p>Go to the Map window and choose TestManagement on the Map window menu bar. A sub-menu is displayed.</p>	
4	<p>Choose Loopbacks from the displayed sub-menu.</p> <p>If the NE for setting up the loopback was not already chosen in step 1 or step 2, the Choose an NE window is displayed.</p> <p>To choose the NE from this window, double-click on the NE in the list and click the OK button.</p>	
<p>The Manage Loopback window is displayed.</p>		
5	<p>Click the Operate button. A secondary Operate/Release Loopback window is displayed.</p>	<p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)	Reference
6	<p>Fill in the following fields:</p> <ul style="list-style-type: none"> ▶ Access Identifier—enter the AID of the port tributary to be placed in loopback. Note: do not enter the portion of the AID obtained from the Network Element explorer of the Cross-Connection window that indicates the rate and port side of the tributary (for example, if the AID shown on the Cross-Connection window is “STS12-s-1-1-#-#-03-1-1”, do not enter the “STS12-s-” segment of the AID). <p>⇒ NOTE: For SDH NEs (such as the TDM 10G/STM-64) and for SDH ports on a BWM NE, the AID format has to comply with the ITU-T format.</p> <ul style="list-style-type: none"> ▶ Rate—click the down arrow next to this field to display a drop-down list of choices and select the rate of the port tributary to be placed in loopback. ▶ Loopback Type—this field is greyed out (display-only) and defaults to “Cross-Connect Loopback”. ▶ Action—click the down arrow next to this field to display a list of choices. The choices are: Operate Loopback or Forced Loopback. 	
7	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window.</p> <p>A pop-up dialog window is displayed, informing you that the loopback being created may affect service and asking if you want to proceed.</p>	
8	<p>Choose Yes. The newly created loopback cross-connection for the selected port tributary is displayed on the Manage Loopback window.</p> <p>⇒ NOTE: If part of the AID is obscured in the display portion of the window, position the mouse cursor on the pane edge between the Network Element Explorer and the display portion of the window, which displays a double-arrow cursor. Click and hold the left mouse button and drag the cursor to the left or right until the complete display of the loopback details is visible. You can also use the left/right scrollbar buttons at the bottom of the display portion to maneuver the display to the left or right.</p>	
9	<p>Repeat steps 5-7 to create more loopback cross-connections on additional port tributaries, or click the Close button to close the window.</p> <p>Stop! End of Task.</p>	

View Cross-Connect Loopbacks

Background

Use this procedure to view cross-connect loopbacks in an NE.

Before you begin

Before you begin this task, one or more loopbacks must be created in the NE to be viewed.

Task

Complete the following steps to view loopback cross-connections.

Step	Action
1	Select an NE in the Map pane portion of the Map window OR Select no NE at this point.
2	Choose TestManagement from the main menu bar on the Map window. A sub-menu is displayed.
3	Choose Loopbacks from the displayed sub-menu. If you did not choose an NE in step 1, the Choose an NE window is displayed. Double-click on the NE in the list to select it. Click the OK button.
	The Manage Loopback window is displayed.

Step	Action (Contd)
4	Click the plus (+) sign next to each level of the equipment hierarchy shown in the Network Element explorer portion of the window until the display expands down the shelf level.
5	Position the mouse cursor on the desired shelf in the explorer and click the left mouse button to select it. The List button, located at the bottom of the Network Element Explorer portion of the window, is enabled.
6	Click the List button. The loopback cross-connections created for the selected piece of equipment are displayed.  NOTE: Use the left/right scroll buttons located at the bottom of the loopback cross-connections display to move the display left or right to view all data. Stop! End of Task.

Delete a Cross-Connect Loopback

When to use Use this procedure to delete a cross-connect loopback. After a cross-connect loopback is deleted on a port tributary, any other cross-connections defined for that tributary are automatically re-established in the NE.

Before you begin Before you begin this task, you need to identify the port tributary in the NE from which the cross-connect loopback will be deleted.

To view existing existing loopbacks, use the List Loopbacks window as described in [Modify an NE Cross-Connection—Textual](#).

Task Complete the following steps to delete a loopback cross-connection.

Step	Action
1	Select an NE in the Map pane portion of the Map window OR Select no NE at this point.
2	Choose TestManagement from the main menu bar on the Map window. A sub-menu is displayed.
3	Choose Loopbacks from the displayed sub-menu. If you did not choose an NE in step 1, the Choose an NE window is displayed. Double-click on the NE in the list to select it. Click the OK button.
	The Manage Loopback window is displayed.
4	Click the plus (+) sign next to each level of the equipment hierarchy shown in the Network Element explorer portion of the window until the display expands down the shelf level.
5	Position the mouse cursor on the desired shelf in the explorer and click the left mouse button to select it. The List button, located at the bottom of the Network Element Explorer portion of the window, is enabled.

Step	Action (Contd)
6	<p>Click the List button. The loopback cross-connections created for the selected piece of equipment are displayed.</p> <p> NOTE: Use the left/right scroll buttons located at the bottom of the loopback cross-connections display to move the display left or right to view all data.</p>
7	Double-click on the loopback cross-connection in the display portion of the window to select it for deletion. The Delete button is enabled.
8	Click the Delete button. A pop-up question dialog window is displayed, informing you that deletion of the selected loopback cross-connect may affect service and asking if you want to continue with the deletion.
9	Choose Yes to delete the loopback cross-connection. The deleted loopback cross-connection is removed from the display.
10	Click the Close button to close the window. Stop! End of Task.

Introduction

Summary This chapter describes procedures related to maintaining traffic for network elements managed by WaveStar SNMS.

Before you begin Read the [Traffic Maintenance Concepts](#) chapter to learn about protection groups and protection switching in WaveStar SNMS.

Contents This chapter discusses the following topics:

- [Add Network Element Protection Groups](#) [7-3](#)
- [View Network Element Protection Groups](#) [7-14](#)
- [Modify Network Element Protection Groups](#) [7-19](#)
- [Delete Network Element Protection Groups](#) [7-25](#)
- [Operate Protection Switch \(from the Manage Protection Groups Window\)](#) [7-29](#)
- [Display Protection Switching Status](#) [7-40](#)
- [Operate Protection Switch \(from the Protection Status Management Window\)](#) [7-41](#)

- Switch the Working and Protection Legs of a Path-Protected Cross-Connection

[7-53](#)

Add Network Element Protection Groups

Background

Use this procedure to add a port protection group to an NE.

Before you begin

Before you begin this task, make sure that you have identified the NE to which you want to add a protection group. Be aware that only certain types of protection are supported for a given transmission interface (rate) and NE type. For details about the types of protection supported for a given transmission interface (rate) and NE type, see the [Protection Groups](#) section in [Chapter 16, Traffic Maintenance Concepts](#).

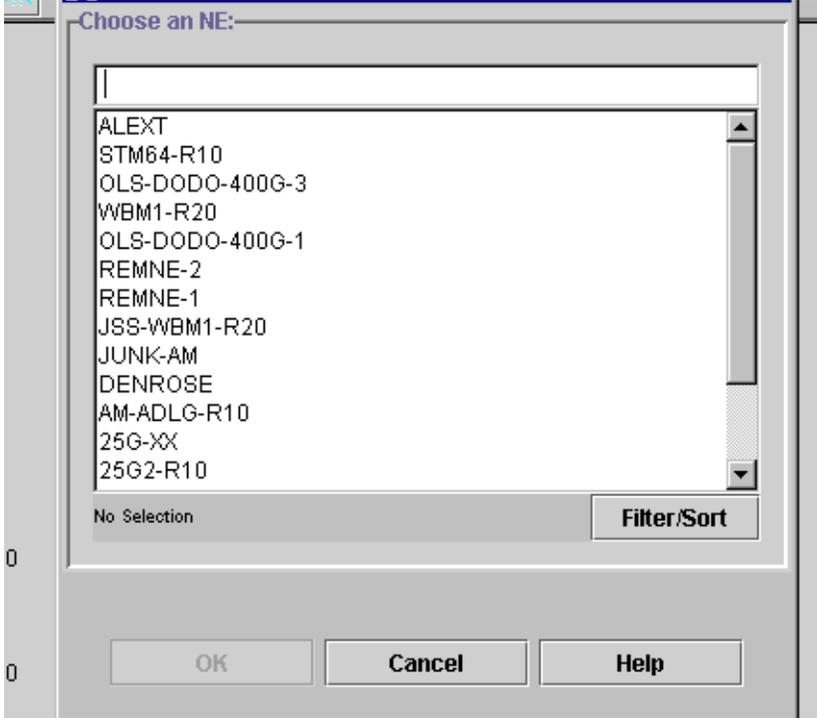
Related information

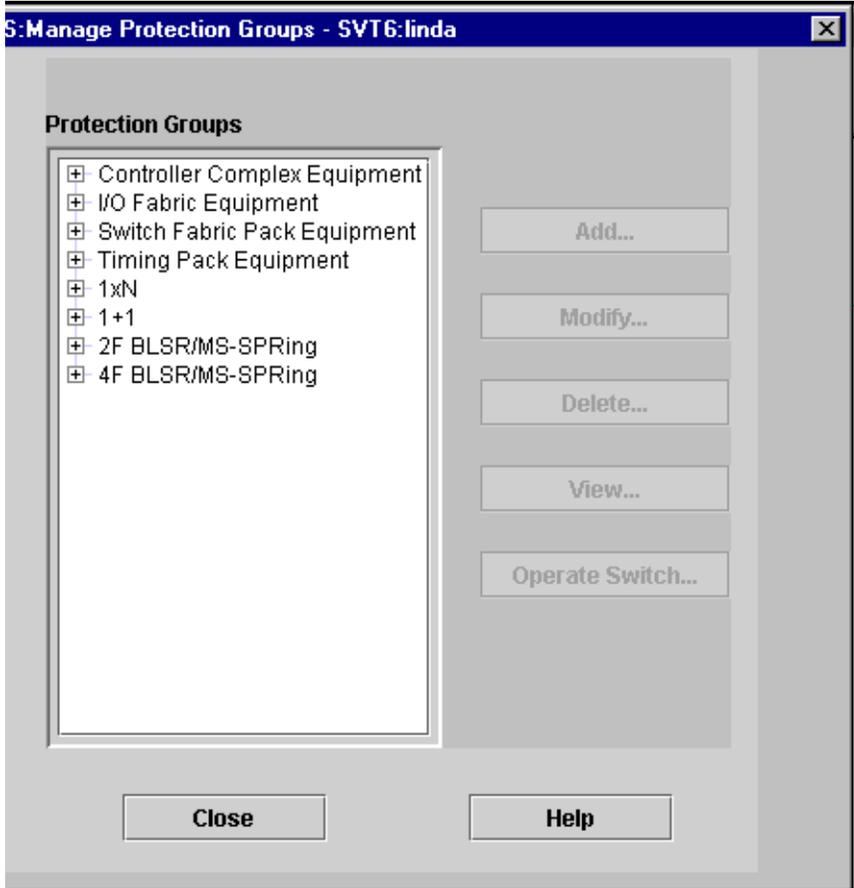
For related information, see the following:

- [View Network Element Protection Groups](#)
 - [Modify Network Element Protection Groups](#)
 - [Delete Network Element Protection Groups](#)
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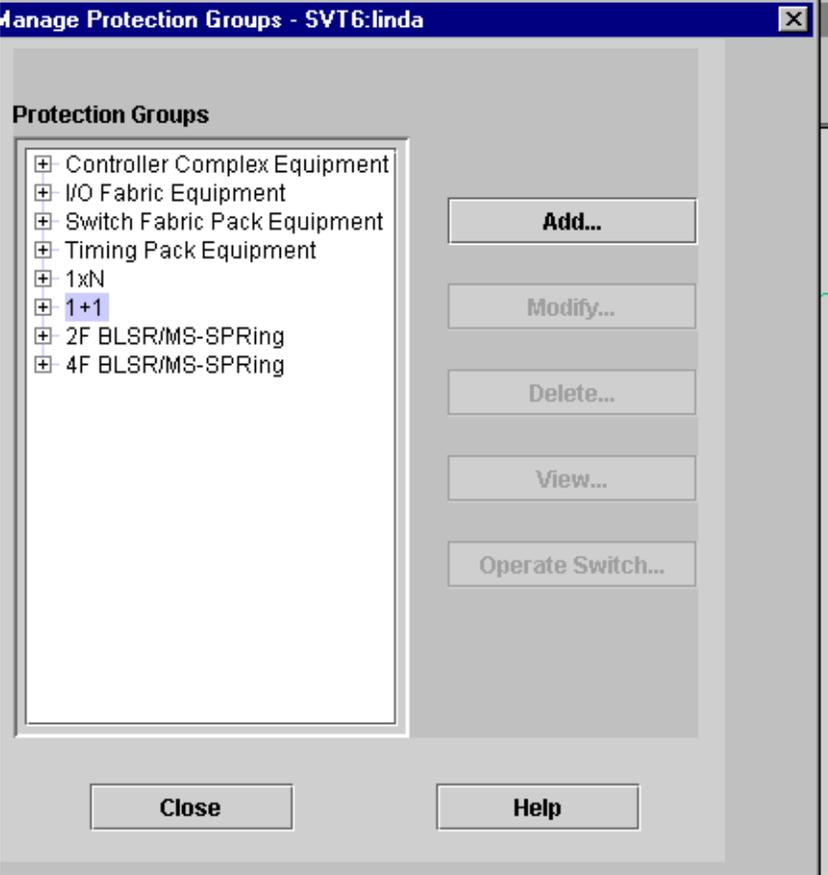
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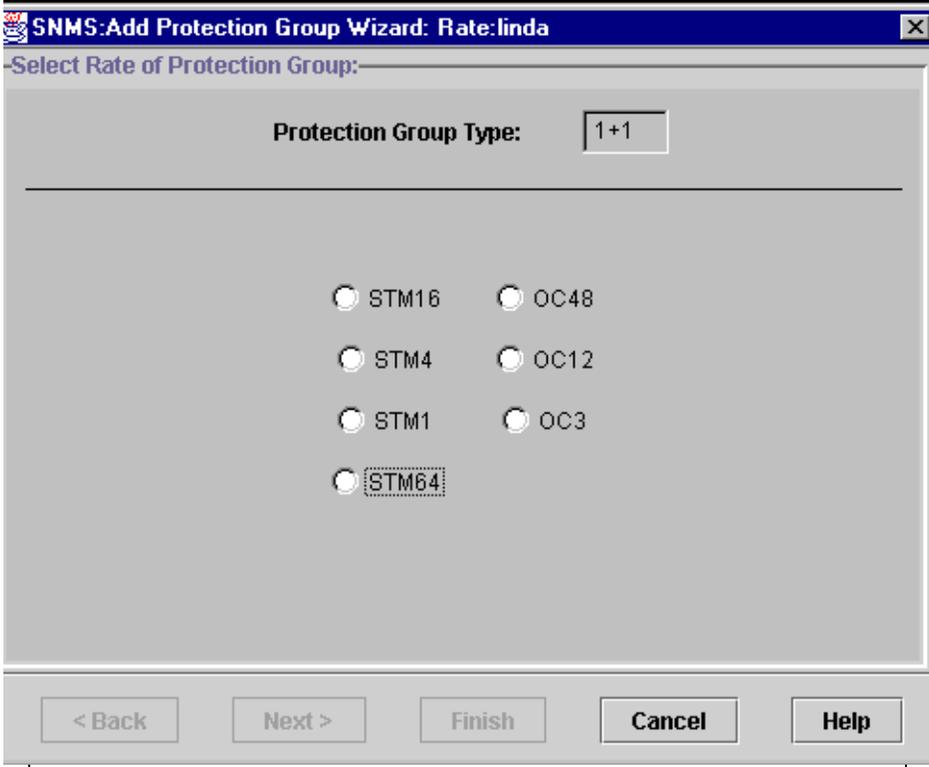
Complete the following steps to create protection groups on the Protection Provisioning window.

Step	Action
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.
2	<p>Select Protection Groups from the Configuration menu. The Choose an NE window is displayed.</p> 
<i>Continued on next page</i>	

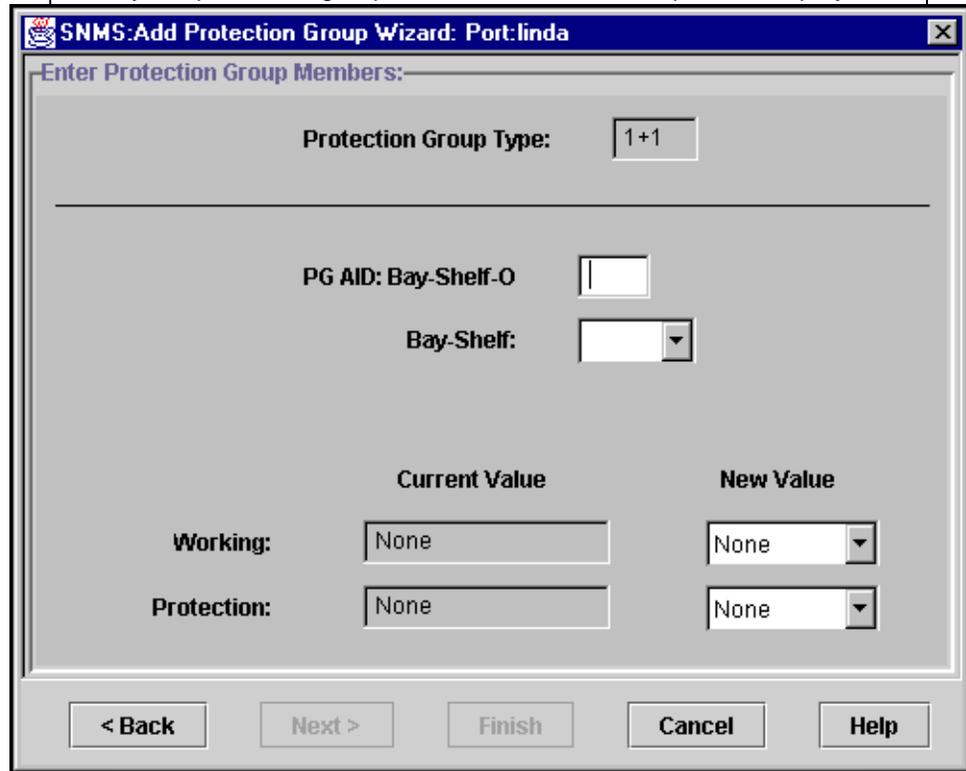
Step	Action (Contd)
3	<p>Double-click on the NE in the list to select it and click the OK button.</p> <p style="text-align: center;">OR</p> <p>Select an NE in the Map pane portion of the Map window, then choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Protection Groups from the Configuration menu.</p> <p>The Protection Provisioning Manager window is displayed for the selected NE.</p>  <p>The Protection Provisioning Manager window has an explorer that shows the available protection group types and port protection groups created for each type.</p> <p>To display existing protection groups for a protection group type, click the plus (+) sign next to the protection group type. The explorer expands the list to show existing protection groups for a type, if any. If there are no existing protection groups for a given type, the explorer tree shows “No protection Groups”. To collapse the listing, click the minus (-) sign next to the protection group type.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<p>The Protection Provisioning Manager window also has a series of buttons:</p> <ul style="list-style-type: none">■ Add—click this button to add a new protection group.■ Modify—click this button to modify an existing protection group.■ Delete—click this button to delete an existing protection group.■ View—click this button to view the member ports and attributes of an existing protection group.■ Operate Switch—click this button to provision a protection switch for the selected protection group.■ Close—click this button to close the Protection Provisioning Manager window.■ Help—click this button to display online help for this window.

Step	Action (Contd)
4	<p>Single-click on the protection group type to select it. The Add button is enabled.</p>  <p><i>Continued on next page</i></p>

Step	Action (Contd)
5	Click the Add button. The Add Protection Group wizard window to select a transmission interface (rate) is displayed.
	
6	Select the rate by clicking on the appropriate radio button. The Next button is enabled.
<p><i>Continued on next page</i></p>	

Step	Action (Contd)
7	Click the Next button. The Add Protection Group wizard window to identify the protection group and select the member ports is displayed.



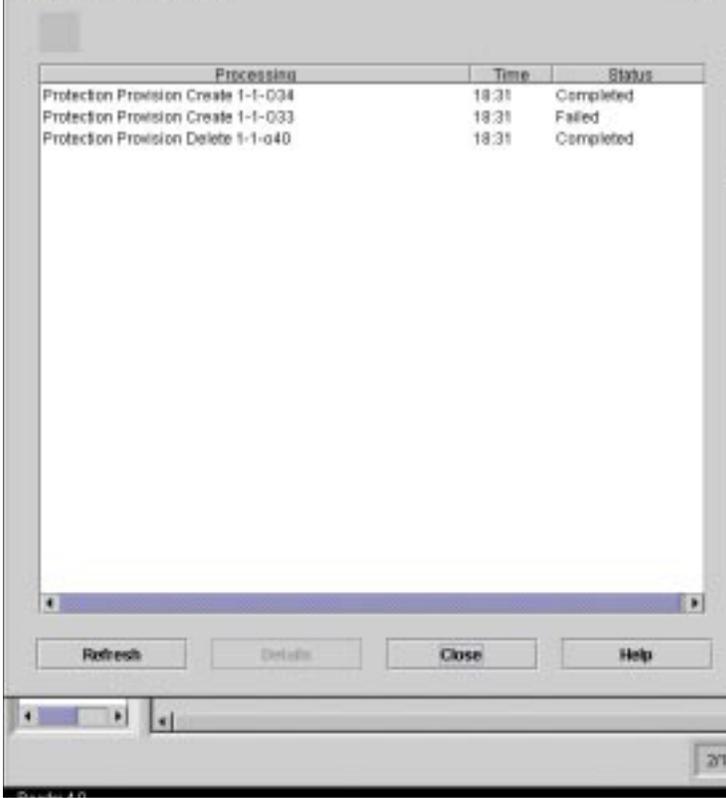
	The Protection Group Type is displayed at the top of the window.
8	If this is 2-Fiber BLSR/MSPRing or 4-Fiber BLSR/MSPRing protection group, a Protection Group Name field is displayed. Enter the protection group name (this field is optional). If this is another type of protection group, skip to step 9.

Continued on next page

Step	Action (Contd)
9	<p>Click the down arrow next to the Bay-Shelf field to display a drop-down list of bays and shelves. Select the bay/shelf for the port protection group.</p> <p>The bay and shelf selected becomes part of the Protection Group ID displayed on the window and is later used to identify the protection group. The Protection Group (PG) ID (identifier) is derived from the information you provide. The format for the PG AID is {BayAID}{ShelfAID}{Entity Type Qualifier}{Protection Group AID}, where the {Entity Type Qualifier} is:</p> <p>T - 2 Fiber F - 4 Fiber O - 1+1 Optical</p>
10	<p>Enter the Protection Group (PG) AID number(00-99) in the field next to the PG AID label. This number is used to uniquely identify a protection group of the same type provisioned on the same shelf. This field is required.</p>
11	<p>In the portion of the window labelled Current Value and New Value, select the member ports for the protection group. Depending on the protection group type chosen, the member ports may be labelled "East/West" (2-Fiber BLSR/MSSPRing), "Working/Protection" (1+1 Optical, 1xN Electrical), or "East Working/East Protection, West Working/West Protection" (4-Fiber BLSR/MSSPRing).</p> <p>The system enforces that the ports selected are on the same shelf and the same transmission rate you selected. Mixing of SONET and SDH rates is not allowed by the system.</p> <p> NOTE: At any point on this window, you can click the Back button to go back to the previous wizard window to change the rate for the protection group. However, if you do this, the current selections you have made on this wizard window to identify the protection group and select the member ports will be removed.</p>
12	<p>To select the first port, click the down arrow under the New Value column to display a list of available ports for the selected bay/shelf. Click on a port in the displayed drop-down list.</p>
13	<p>To select the next port, click the down arrow under the New Value column to display a list of available ports for the selected bay/shelf. The system only displays a list of ports that are on the same bay/shelf as the first (reference) port chosen and the rate chosen on the previous wizard window. The system enforces that the working and protection ports are the same rate.</p>

Step	Action (Contd)
14	<p>After selecting the member ports, click the Next button. A question dialog window is displayed, asking if you really want to create the protection group. Choose Yes.</p> <p>A second window is displayed, informing you that the protection group is in the process of being created for the network element. When the process is finished, the text in the window informs you that the protection group has been successfully created in the network element.</p> <p>To view or modify any additional attributes for the protection group, click the Next button. Go to step 15.</p> <p>If you are finished at this point, click the Finish button. Go to step 16.</p>

Step	Action (Contd)
15	<p>If you clicked the Next button on the previous window to change attributes, the Enter Protection Group Attributes window is displayed.</p> <div style="border: 1px solid gray; padding: 10px;"> <p>Enter Protection Group Attributes:</p> <p>Protection Group Type: <input type="text" value="1+1"/></p> <p>PG AID: 1-1-O <input type="text" value="33"/></p> <hr/> <p>Wait to Restore <input type="text" value="5"/> ▾</p> <div style="border-top: 1px solid gray; padding-top: 5px;"> < Back Next > Finish Cancel Help </div> </div> <p> Wait to Restore—this field is used to select the amount of time (seconds) to wait before switching back to the working port when it becomes available again. Click the down arrow next to this field to display a list of choices. Click on the choice in the list to select it. If you are finished changing the protection group attribute(s), click the Next button. A window is displayed, indicating whether you changed any attributes and asking if you would like to view the protection group (members, attributes, identifier). Click the Next button to view the protection group created, or click the Finish button. Go to step 16. </p>

Step	Action (Contd)												
16	<p>After clicking the Finish button, a status window is displayed showing</p> <div><table border="1"><thead><tr><th>Processing</th><th>Time</th><th>Status</th></tr></thead><tbody><tr><td>Protection Provision Create 1-1-034</td><td>18:31</td><td>Completed</td></tr><tr><td>Protection Provision Create 1-1-033</td><td>18:31</td><td>Failed</td></tr><tr><td>Protection Provision Delete 1-1-040</td><td>18:31</td><td>Completed</td></tr></tbody></table></div> <p>whether the protection group was successfully created. If it was not successfully created, this is indicated on the status window. If the protection group was not successfully created, it may be that the protection group already exists or another problem with the NE or selections made.</p> <p>Click the Refresh button to clear the status window or click the Close button to close it.</p> <p>Stop! End of Task.</p>	Processing	Time	Status	Protection Provision Create 1-1-034	18:31	Completed	Protection Provision Create 1-1-033	18:31	Failed	Protection Provision Delete 1-1-040	18:31	Completed
Processing	Time	Status											
Protection Provision Create 1-1-034	18:31	Completed											
Protection Provision Create 1-1-033	18:31	Failed											
Protection Provision Delete 1-1-040	18:31	Completed											

View Network Element Protection Groups

Background Use this procedure to select an NE's port protection group and view all member ports and current attribute settings.

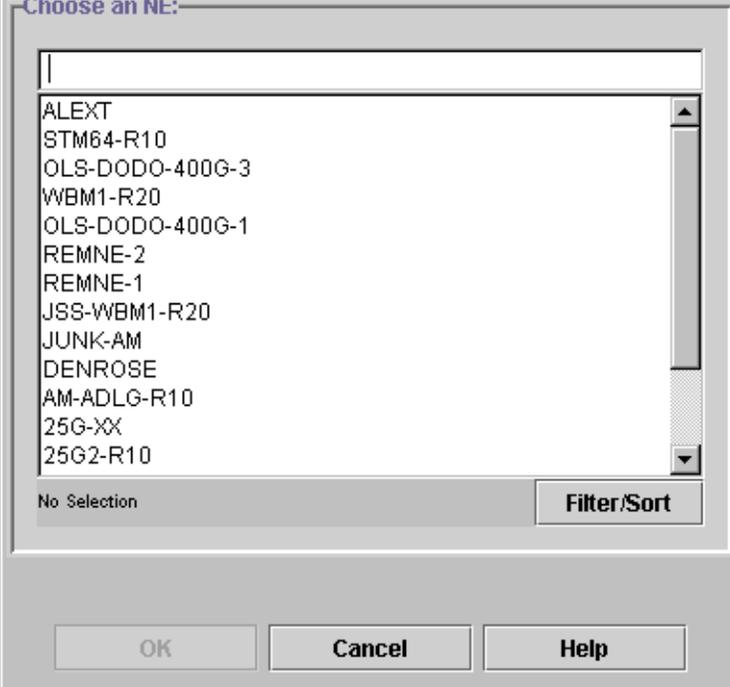
Before you begin Before you begin this task, determine the NE and protection group to be viewed. To perform this task, access the Map window.

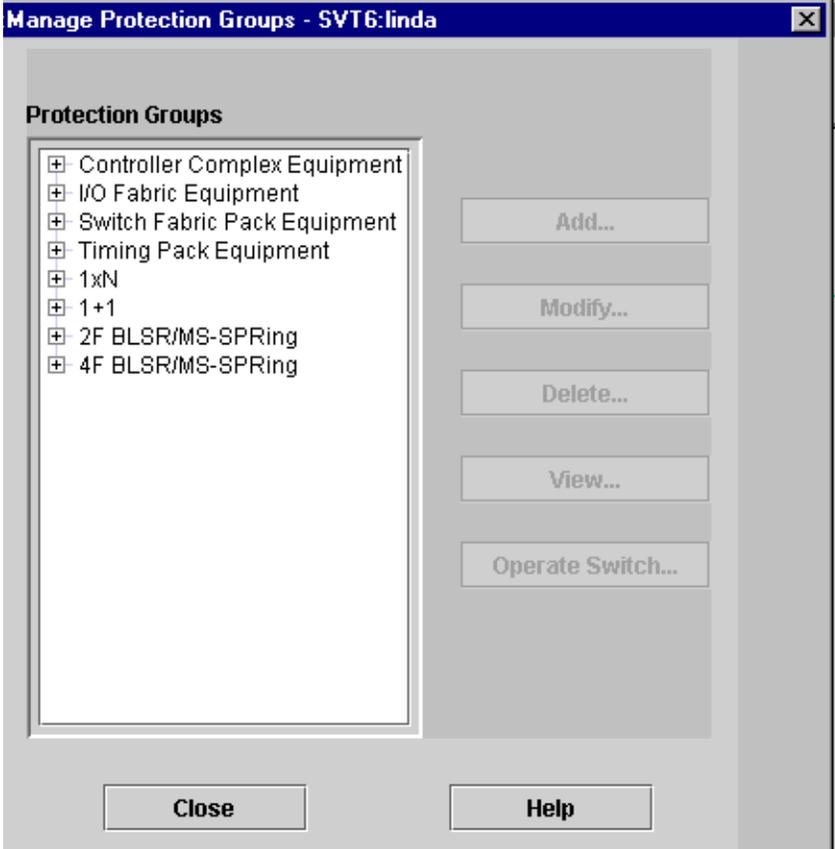
Related information For related information, see the following:

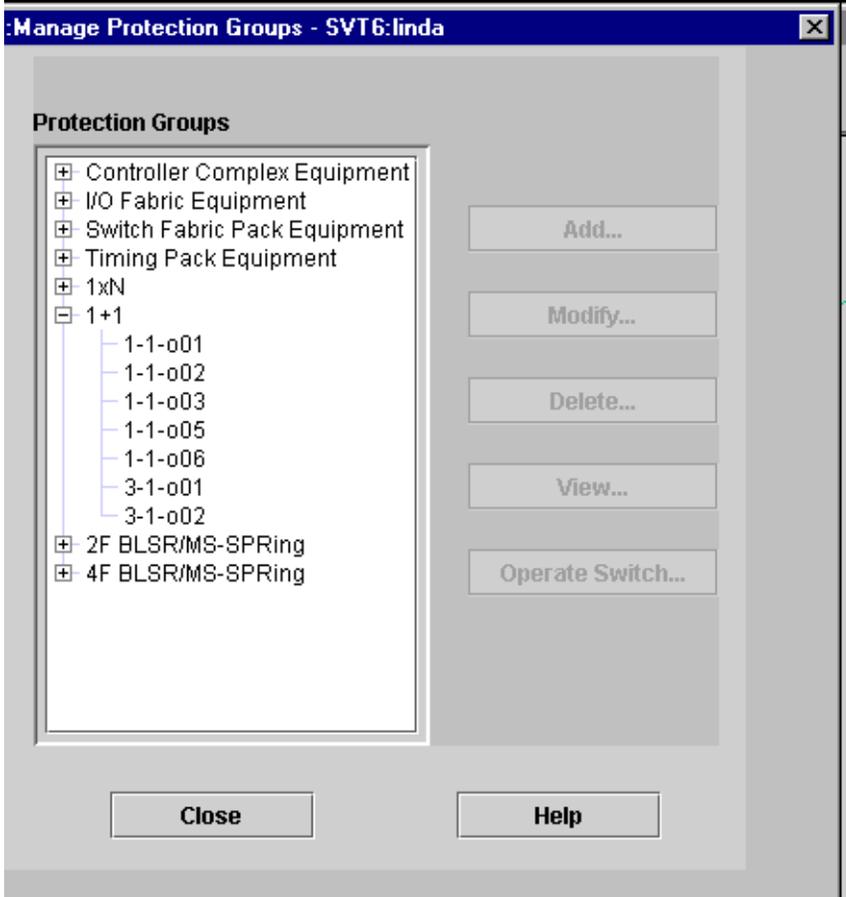
- [Add Network Element Protection Groups](#)
- [Modify Network Element Protection Groups](#)
- [Delete Network Element Protection Groups](#)

Task

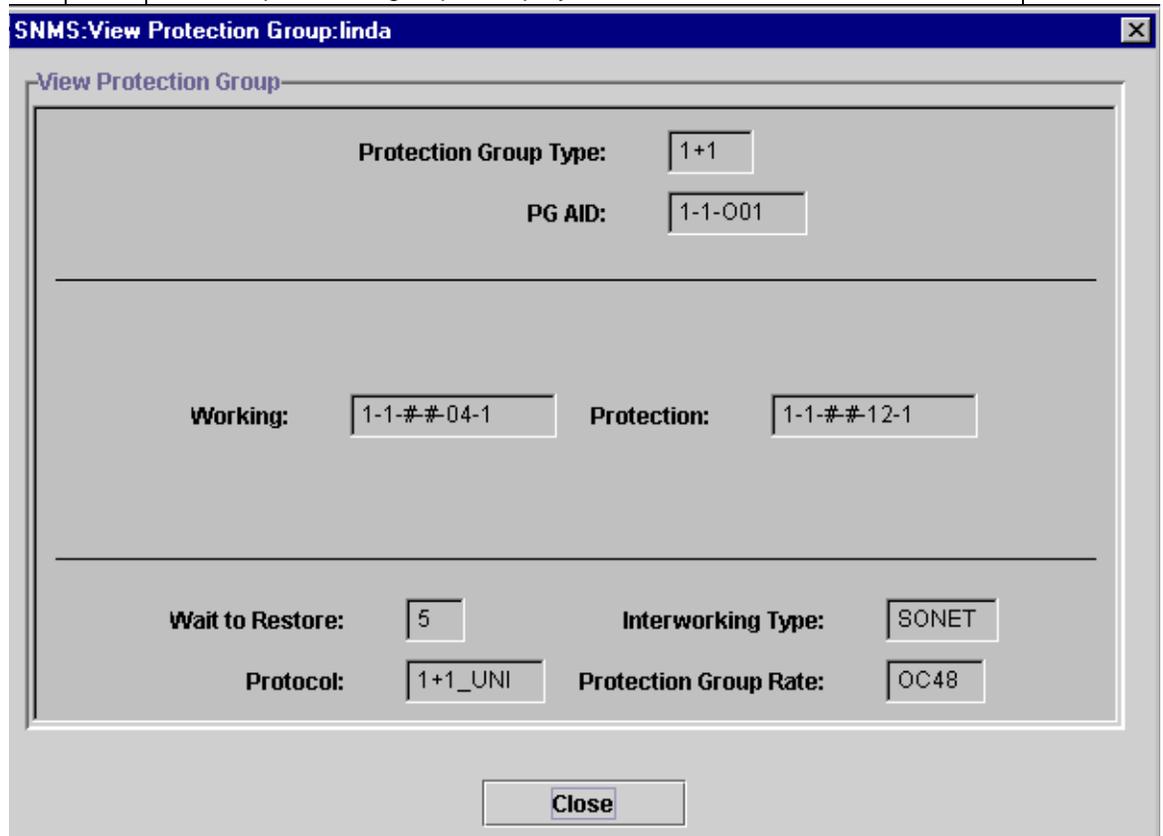
Complete the following steps to display protection groups on the Protection Provisioning window.

Step	Action
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.
2	<p>Select Protection Groups from the Configuration menu. The Choose an NE window is displayed.</p> 
3	<p>Double-click on the NE in the list to select it and click the OK button.</p> <p>OR</p> <p>Select an NE in the Map pane portion of the Map window, then choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Protection Groups from the Configuration menu.</p>

Step	Action (Contd)
	<p>The Protection Provisioning Manager for the selected NE is displayed.</p> 
4	<p>In the explorer portion of the window, click on the plus (+) sign next to the protection group type under which is the protection group you want to view. The explorer expands to show the existing protection groups under the type selected.</p>

Step	Action (Contd)
5	<p>Select the protection group to be viewed by clicking on its protection group AID in the explorer tree.</p>  <p>The screenshot shows a window titled ':Manage Protection Groups - SVT6:linda'. It features a tree view on the left under the heading 'Protection Groups'. The tree includes the following items: <ul style="list-style-type: none"> Controller Complex Equipment I/O Fabric Equipment Switch Fabric Pack Equipment Timing Pack Equipment 1xN 1+1 <ul style="list-style-type: none"> 1-1-o01 1-1-o02 1-1-o03 1-1-o05 1-1-o06 3-1-o01 3-1-o02 2F BLSR/MS-SPRing 4F BLSR/MS-SPRing </p> <p>On the right side of the window, there are five buttons: 'Add...', 'Modify...', 'Delete...', 'View...', and 'Operate Switch...'. At the bottom of the window, there are two buttons: 'Close' and 'Help'.</p>

Step	Action (Contd)
6	Click the View button. The View Protection Group window for the selected protection group is displayed.



	This window shows the Protection Group Type, protection group (PG) AID, member ports and their value (assignment), and the current setting of any provisionable attributes.
7	Click the Close button to close the window. The Protection Provisioning Manager window remains on the screen. Click the Close button to close this window. Stop! End of Task.

Modify Network Element Protection Groups

Background

Use this procedure to modify NE protection groups. WaveStar SNMS allows you to swap the function of existing member ports (for example, swap the East and West ports or Working and Protection ports) and to change any attributes associated with the protection group.

Before you begin

Before you begin this task, determine the NE and protection group to be modified. To perform this task, access the Map window.

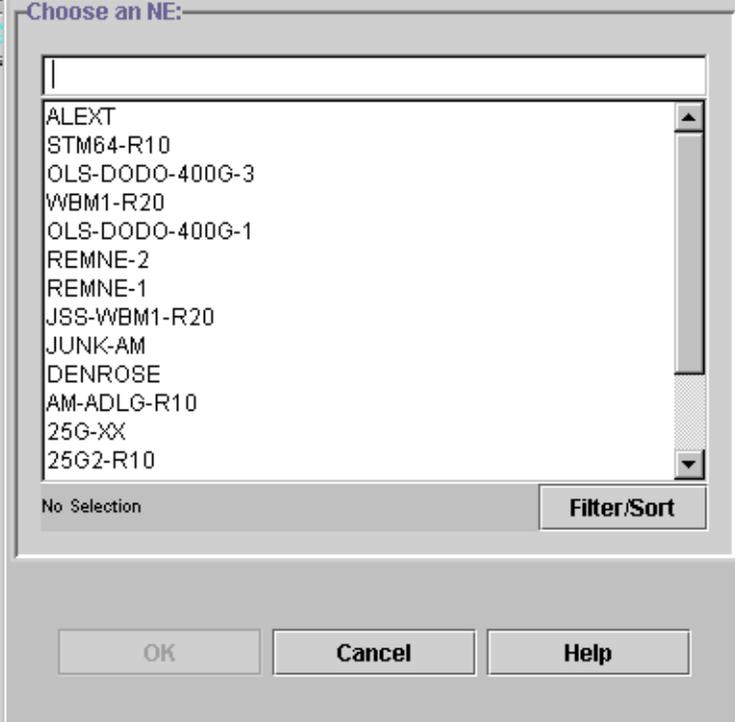
Related information

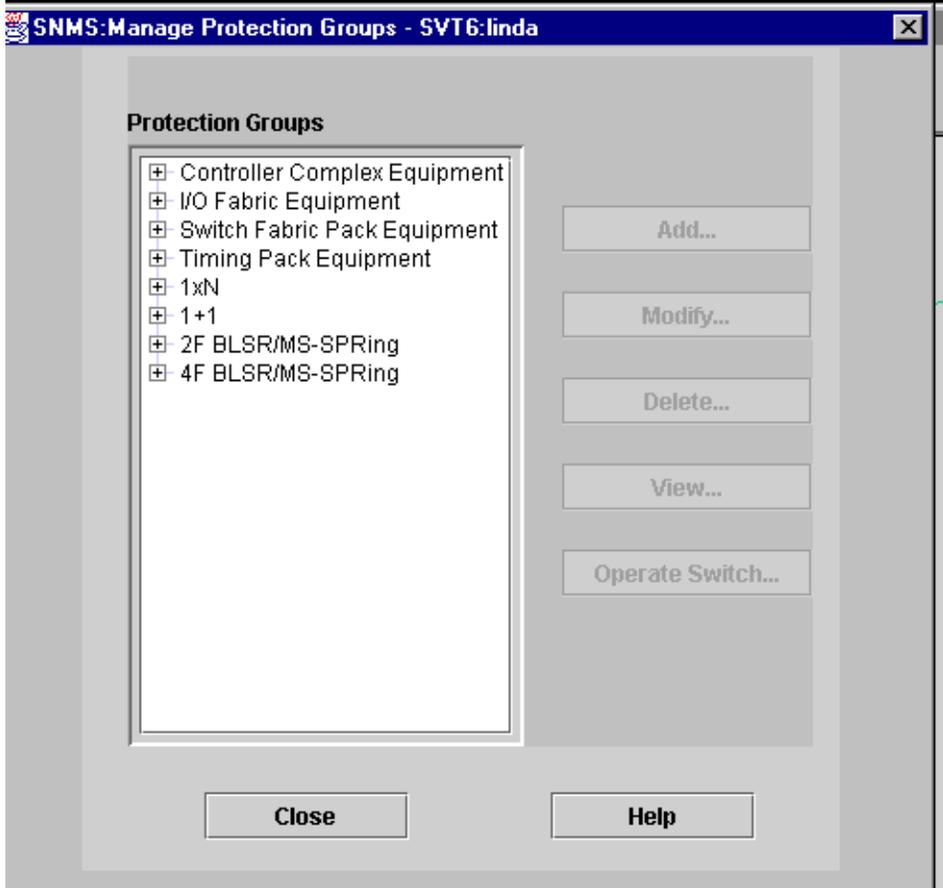
For related information, see the following:

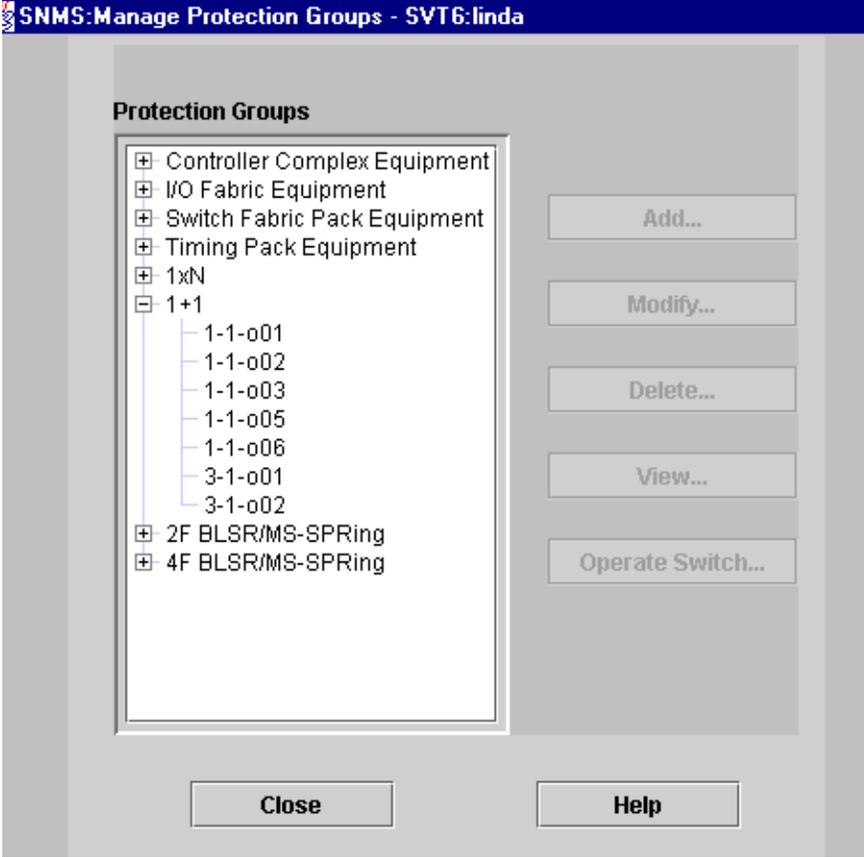
- ▶ [Add Network Element Protection Groups](#)
 - ▶ [View Network Element Protection Groups](#)
-

Task

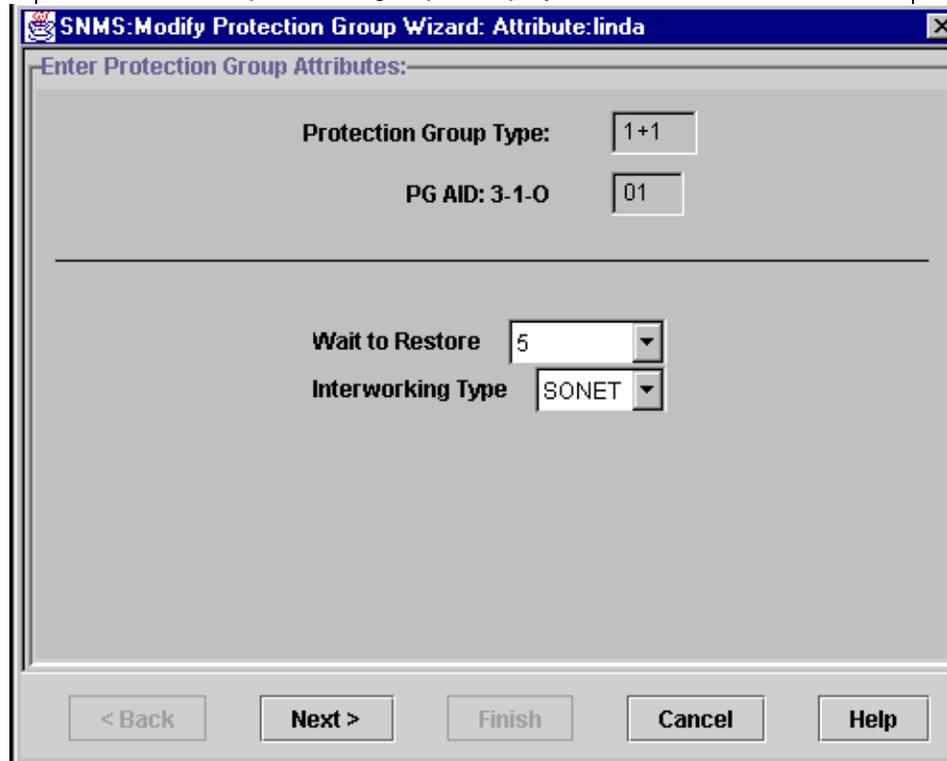
Complete the following steps to modify protection groups on the Protection Provisioning window.

Step	Action
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.
2	<p>Select Protection Groups from the Configuration menu. The Choose an NE window is displayed.</p> 
3	<p>Double-click on the NE in the list to select it and click the OK button.</p> <p>OR</p> <p>Select an NE in the Map pane portion of the Map window, then choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Protection Groups from the Configuration menu.</p>

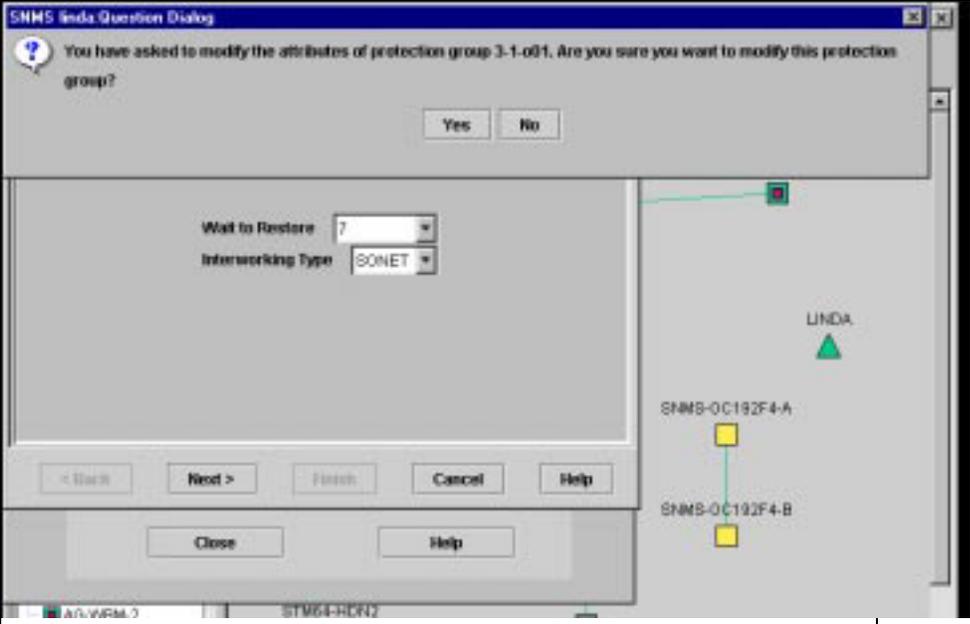
Step	Action (Contd)
	<p>The Protection Provisioning Manager is displayed for the selected NE.</p>  <p><i>Continued on next page</i></p>

Step	Action (Contd)
4	<p>Click on the plus sign (+) next to the protection group type of the protection group to be modified in the explorer portion of the window. The explorer expands to show a list of existing protection groups for the selected type.</p>  <p style="text-align: right;"><i>Continued on next page</i></p>
5	<p>Single-click on the protection group (identified by its Protection Group ID) in the list. Your selection is highlighted and the Modify button is enabled.</p>

Step	Action (Contd)
6	Click the Modify button. The Protection Group wizard window for the selected NE and protection group is displayed.



The top of this window shows the Protection Group Type and Protection Group (PG) AID (which cannot be modified). The bottom portion of the window shows the current value (assignment) of any provisionable attributes.

Step	Action (Contd)
7	Make any changes to the attributes, as needed.
8	Click the Next button. A pop-up question dialog window is displayed, asking if you really want to make the selected modifications to the protection group.
	
9	<p>Choose Yes. When the modifications are completed, a status window is displayed, showing that the changes for the selected protection group are completed. If, for some reason, the modification fails, the status window displays the request with a status of “Failed” and a pop-up window is displayed, providing the reason for the failure. Click OK on this pop-up window. The system returns to the Attributes panel to make more modification. Make the required change(s) and click the Next button, or click the Cancel button to cancel the operation and exit the window.</p> <p>Stop! End of Task.</p>

Delete Network Element Protection Groups

Background Use this procedure to delete an existing port protection groups from an NE. Deleting a protection group removes all member ports from the group.

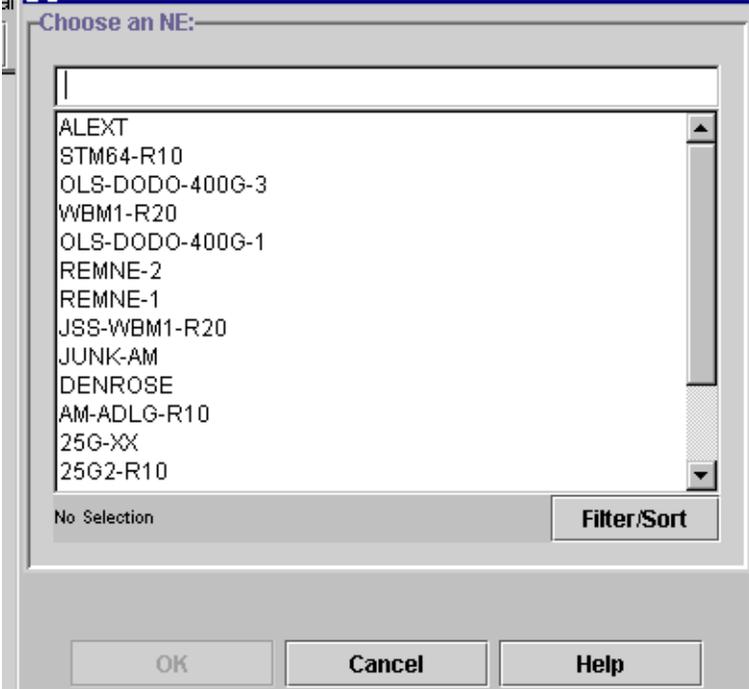
Before you begin Before you begin this task, determine the NE and the protection group to be deleted. Be aware that removing protection groups with existing cross-connections or reservations is not permitted.

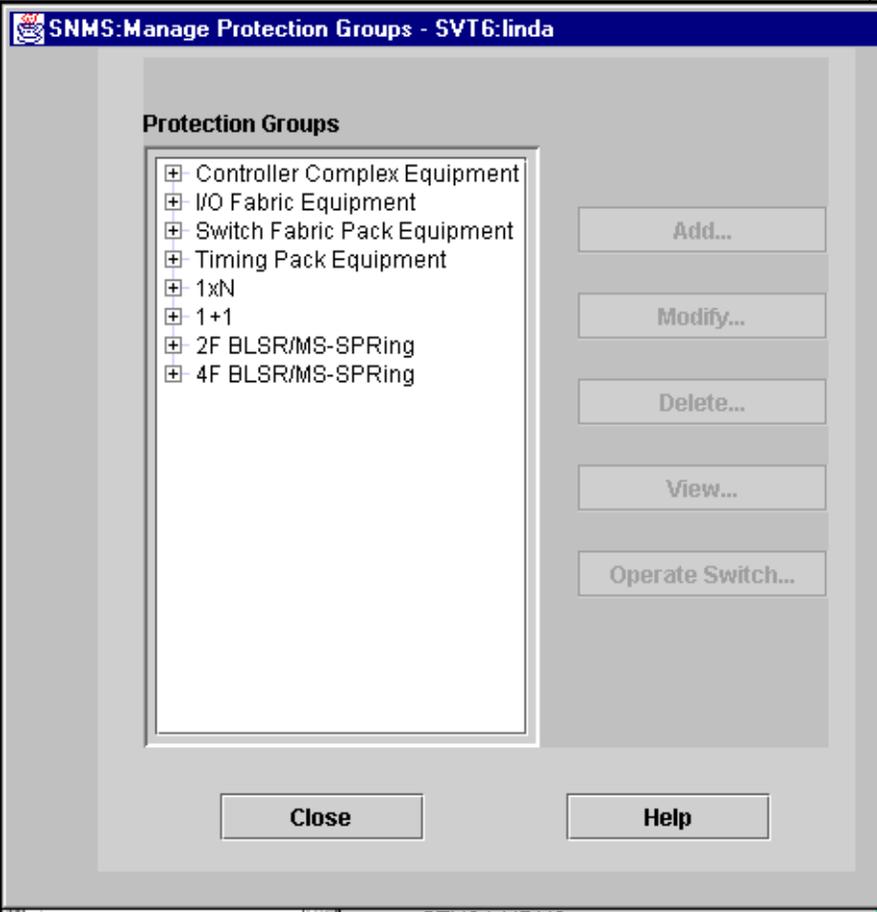
Related information For related information, see the following:

- ▶ [Add Network Element Protection Groups](#)
- ▶ [View Network Element Protection Groups](#)

Task

Complete the following steps to delete protection groups on the Protection Provisioning window.

Step	Action
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.
2	<p>Select Protection Groups from the Configuration menu. The Choose and NE window is displayed.</p> 
3	<p>Double-click on the NE in the list to select it and click the OK button.</p> <p style="text-align: center;">OR</p> <p>Select an NE in the Map pane portion of the Map window, then choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Protection Groups from the Configuration menu.</p>

Step	Action (Contd)
	<p>The Protection Provisioning Manager window is displayed.</p> 
4	<p>In the explorer portion of the window, click on the plus (+) sign next to the protection group type to expand the explorer and show the list of protection group AIDs under that type.</p>
5	<p>Select the protection group ID of the port protection group to be deleted by single-clicking on it. Your selection is highlighted and the Delete key is enabled.</p>
6	<p>Click the Delete key. A pop-up window is displayed, asking if you really want to remove the port protection group.</p>

Step	Action (Contd)
7	Choose Yes to remove the protection group.
8	Select a port group AID of the NE protection group to be deleted.
9	<p>Click the Remove button. A pop-up window is displayed, asking if you really want to remove the network element protection group. Choose Yes to remove the protection group.</p> <p>A status window is displayed, showing the progress of the deletion. If the deletion is successfully completed, the status is shown as "Completed" on the status window.</p> <p>Stop! End of Task.</p>

Operate Protection Switch (from the Manage Protection Groups Window)

Background Use this procedure to provision a protection switch, for a specified protection group, from the Manage Protection Groups window.

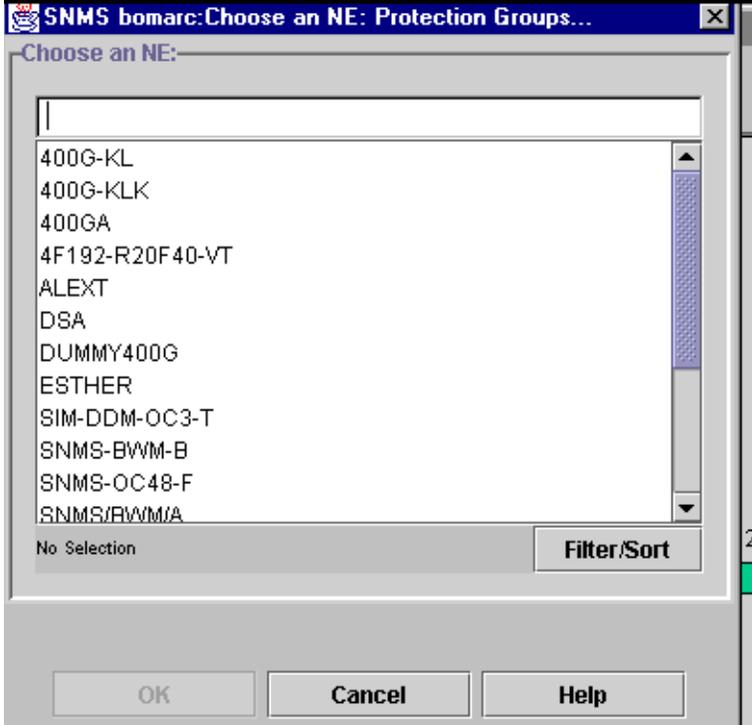
Before you begin Before you begin this task, identify the type of protection group and type of protection switch you want to provision. For details about the types of protection supported for a given transmission interface (rate) and NE type, see the [Protection Groups](#) section in the [Traffic Maintenance Concepts](#) chapter.

Related information For related information, see the following:

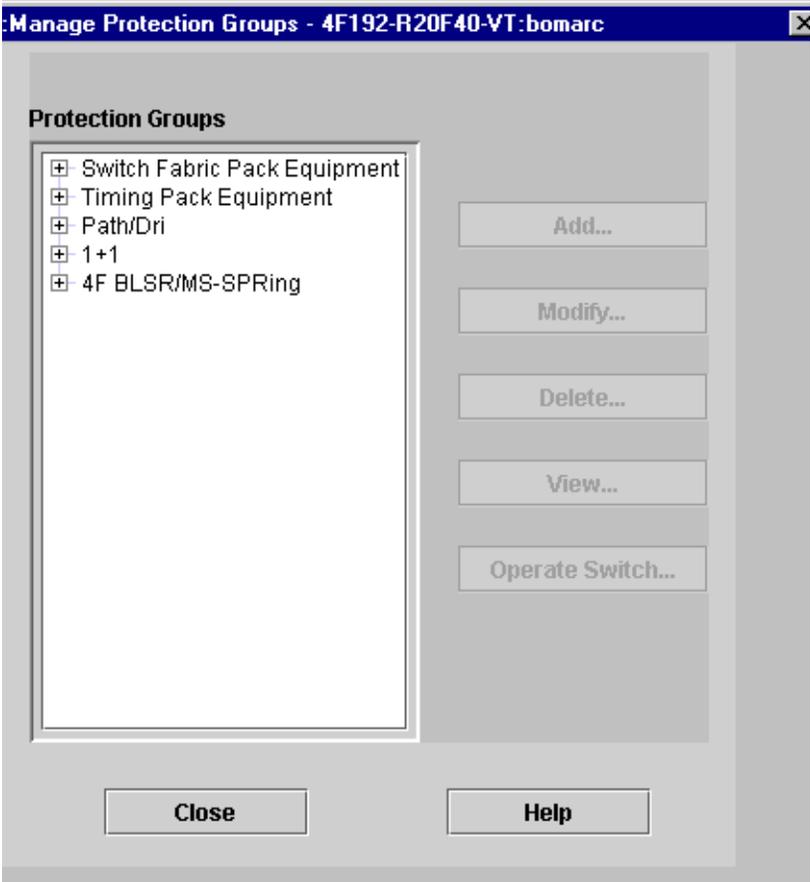
- [Add Network Element Protection Groups](#)
- [View Network Element Protection Groups](#)
- [Modify Network Element Protection Groups](#)
- [Delete Network Element Protection Groups](#)

Task

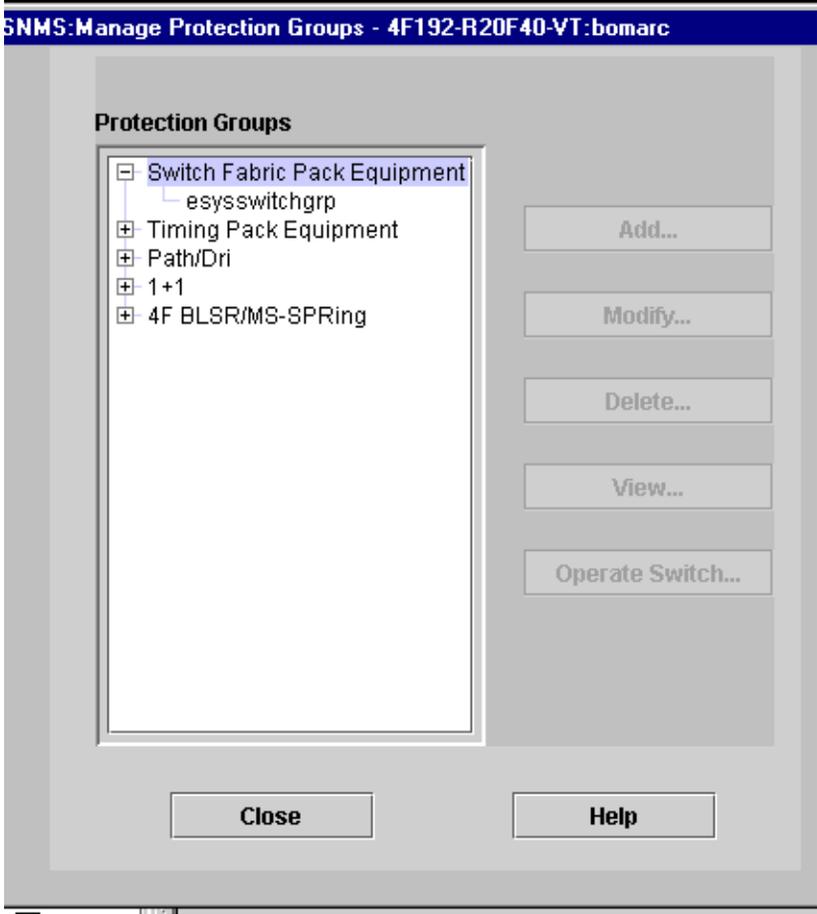
Complete the following steps to create protection groups on the Protection Provisioning window.

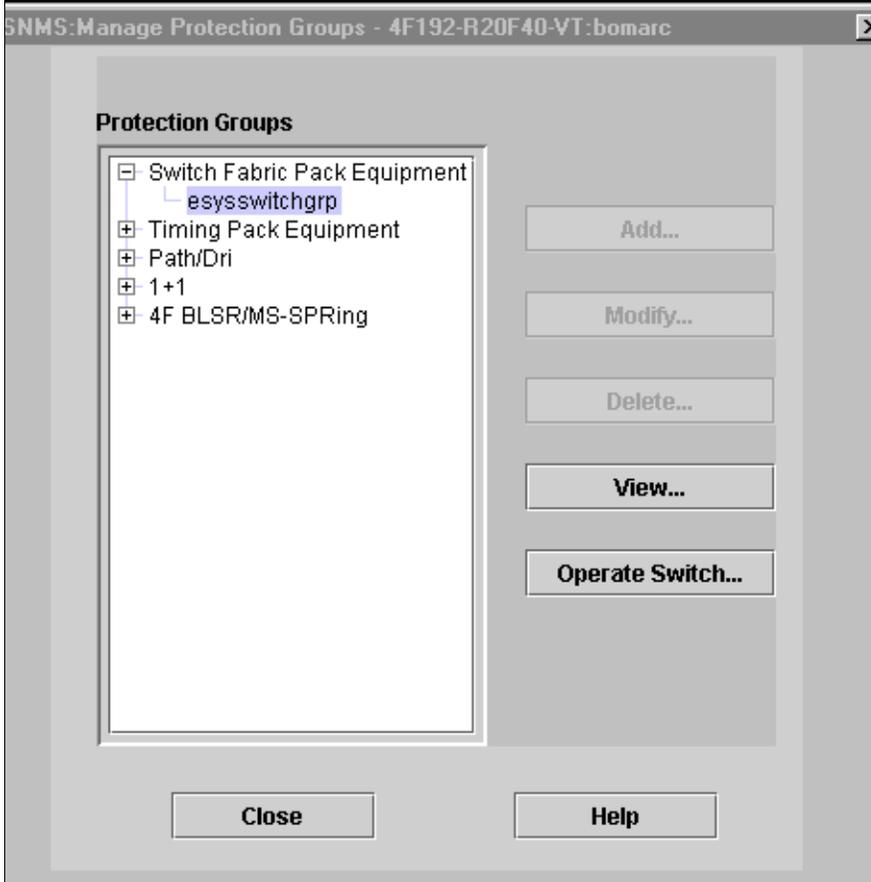
Step	Action
1	Select Configuration from the main menu bar on the Map window. The Configuration menu is displayed.
2	<p>Select Protection Groups from the Configuration menu. The Choose an NE window is displayed.</p> 
<i>Continued on next page</i>	

Step	Action (Contd)
3	Double-click on the NE in the list to select and click the OK button. OR Select an NE in the Map pane portion of the Map window, then choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Protection Groups from the Configuration menu. <i>Continued on next page</i>

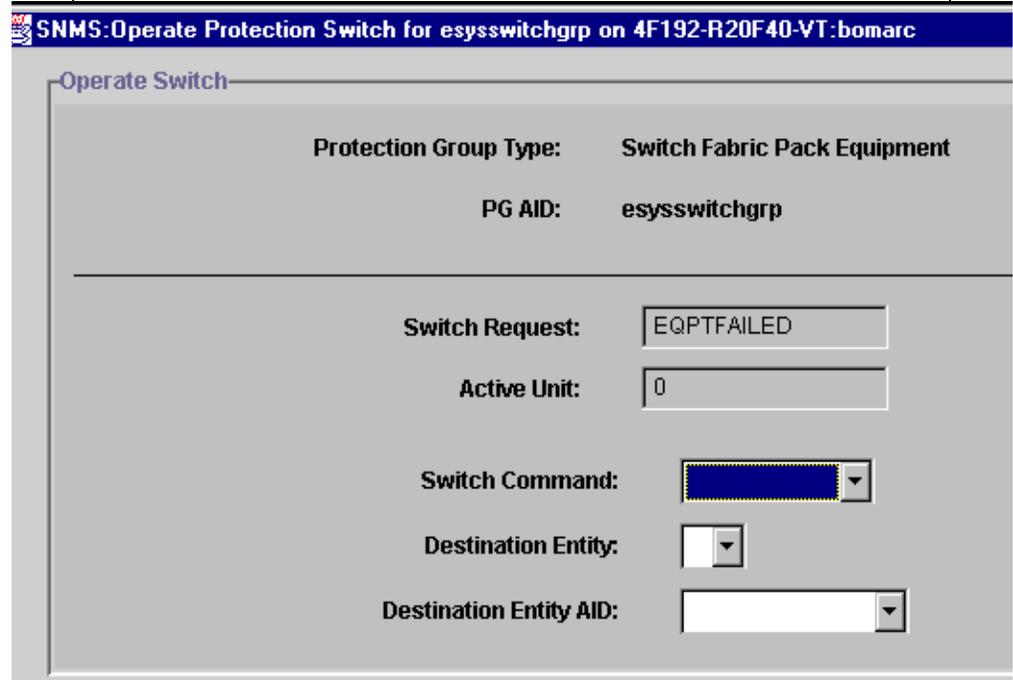
Step	Action (Contd)
	<p>The Protection Provisioning Manager window is displayed for the selected NE.</p>  <p>The Protection Provisioning Manager window has an explorer that shows the available protection group types and port protection groups created for each type.</p> <p>To display existing protection groups for a protection group type, click the plus (+) sign next to the protection group type. The explorer expands the list to show existing protection groups for a type, if any. If there are no existing protection groups for a given type, the explorer tree shows "No protection Groups". To collapse the listing, click the minus (-) sign next to the protection group type.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<p>The window also has a series of buttons:</p> <ul style="list-style-type: none">• Add—click this button to add a new protection group.• Modify—click this button to modify an existing protection group.• Delete—click this button to delete an existing protection group.• View—click this button to view the member ports and attributes of an existing protection group.• Operate Switch—click this button to bring up the Operate Protection Switch window to provision a protection switch for the selected protection group.• Close—click this button to close the Protection Provisioning Manager window.• Help—click this button to display online help for this window. <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
4	<p>Click the plus (+) sign next to the protection group type to expand and see the protection groups set up for the selected protection group type.</p>  <p><i>Continued on next page</i></p>

Step	Action (Contd)
5	<p>Select the protection group to be provisioned for a protection switch by single-clicking on it in the explorer portion of the window, under the selected protection group type.</p>
	
<p>The buttons for actions that can be performed for the selected protection group are enabled. For example, if you cannot add or change the member entities of the selected protection group type or delete the protection group itself (as for Switch Fabric Pack Equipment in the example shown), the Add, Modify, or Delete buttons remain disabled.</p> <p style="text-align: right;"><i>Continued on next page</i></p>	

Step	Action (Contd)
6	Click the Operate Switch button. The Operate Protection Switch window for the selected protection group is displayed.



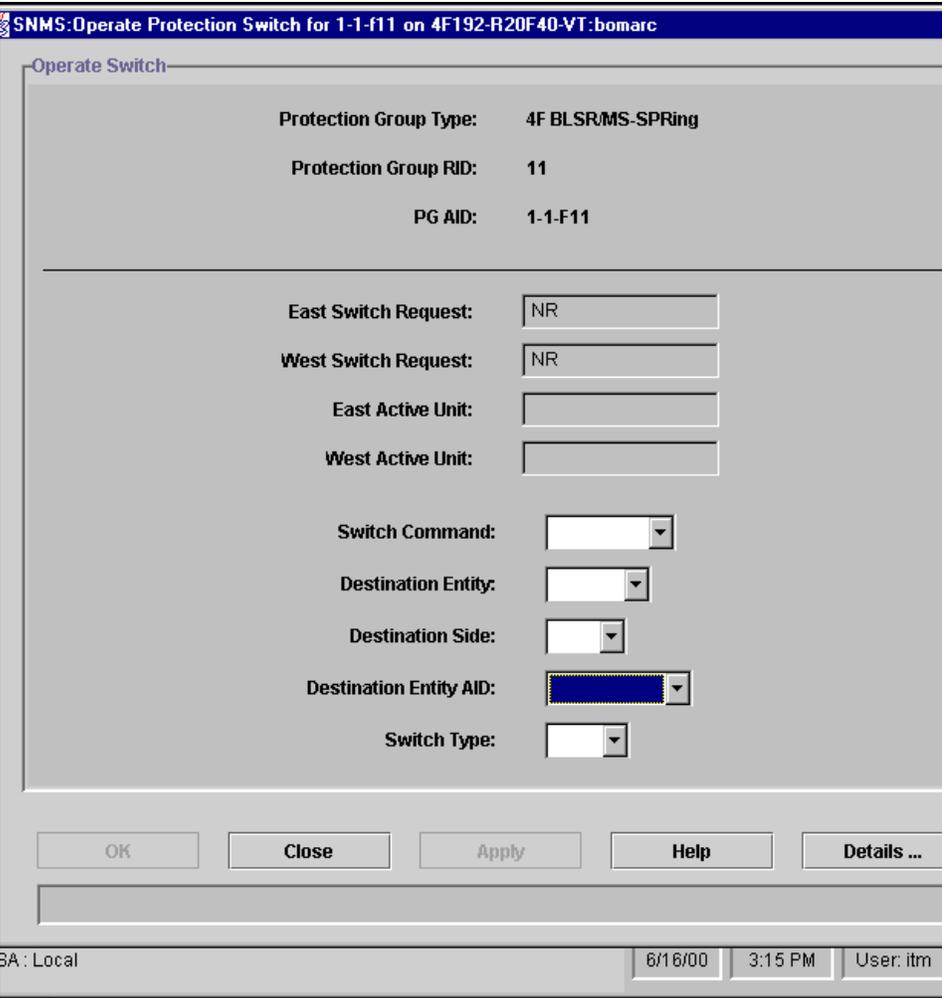
The fields shown on the Operate Protection Switch window will vary, based on the Protection Group Type selected.

The fields common to all Protection Group Types are:

- ◆ Protection Group Type—this is a display-only field that shows the selected Protection Group Type.
- ◆ PG AID—this is a display-only field that shows the Protection Group AID of the selected protection group.
- ◆ Switch Request—this is a display-only field that shows the last message prompting a protection switch. If there is no current message, this field indicates that there has been No Request (“NR”).
- ◆ Switch Command—this field allows you to select the command for provisioning the type of protection switch to be performed. Click the down arrow next to the field to display a drop-down list of commands.

Continued on next page

Step	Action (Contd)
	<p>The list of commands displayed depends on the selected Protection Group Type. Possible choices from the command list are:</p> <p>CLEAR LOCKOUT FRCED (Forced) MAN (Manual) CLEARFRCD (Clear Forced)</p> <p>Switch priorities for WaveStar TDM NEs, in descending order, are: CLEAR, LOCKOUT, FRCED, MAN</p> <p>Select the switch command from the drop-down list of commands.</p>
7	<p>Select the destination of the entity that should be active after operation of the protection switch.</p> <p>For the Protection Group Type shown in the example in the previous steps of this procedure (Switch Fabric Pack Equipment), the entity selected is a circuit pack, with a circuit pack ID. The Active Unit field in this example indicates the ID of the circuit pack currently active.</p> <p>For the example shown (Switch Fabric Pack Equipment), click the down arrow next to the Destination Entity field to display a drop-down list of choices. In this case, the list contains the list of slots. Choose the slot to become active after the switch is operated if both circuit packs are being switched to protection.</p> <p>To choose an individual circuit pack in the slot to be switched, click the down arrow next to the Destination Entity AID field to display a drop-down list of choices and choose the AID of the circuit pack being switched to protection. Note: this field should be chosen instead of the Destination Entity field if you are switching an individual circuit pack on the shelf to protection.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<p>If the entities to be switched are ports (for example, in a 4-Fiber BLSR/MS-SPRing Protection Group), the version of the Operate Switch window displayed is different:</p>
	
	<p>Identifying fields for this Protection Group Type (display-only) shown on the window are:</p> <ul style="list-style-type: none"> ◆ Protection Group Type ◆ Protection Group Ring ID (RID) ◆ Protection Group AID <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<p>The fields displayed to select the destination entity (port) for this type of protection group are:</p> <ul style="list-style-type: none"> • Destination Entity—click the down arrow next to this field to display a drop-down list and select the entity that is being switched to protection, if both working or protection ports are being switched to protection. The choices are WKG (Working) or PROTN (Protection). • Destination Side—click the down arrow next to this field to display a drop-down list and select the port side that is being switched to protection. The choices are east, west, or both. • Destination Entity AID—click the down arrow next to this field to display a drop-down list and select the individual port AID of a working or protection group to be switched to protection. Note: in a 4-Fiber BLSR/MSSPRing configuration, this field must be selected before selecting either the Destination Entity or Destination Side fields. • Switch Type—click the down arrow next to this field to display a drop-down list and select the NE configuration involved in the protection switch. The choices are span or ring.
8	<p>To review the details of the protection group affected by the switch, click the Details button. A second window is displayed, showing the Protection Group Type, Protection Group Ring ID (if applicable), and Protection Group AID. To close this details window, click the Close button.</p>
9	<p>After your choices are made, click the Apply button to initiate the switch request and leave the Operate Switch window open, or click the OK button to initiate the switch request and close the window.</p> <p>A status window is displayed, showing the results of the request. If it is completed successfully, the status is shown as “Completed”. If the request fails for some reason, the status of the request is shown as “Failed”.</p> <p>Stop! End of Task.</p>

Display Protection Switching Status

Background

Use this procedure to display protection switching status.

Task

Complete the following steps to display protection switching status.

Step	Action
1	From the main menu bar of the Map window, select Configuration . This displays a sub-menu.
2	Choose Protection Switch from the displayed sub-menu. This displays the Choose an NE/Aggregate window. Choose either Network Elements or Aggregates.  NOTE: A Filtering/Sorting option is also available to the user by clicking on the Filter/Sort button. After setting the parameters for this option, click the Apply button to enter your data and then click the OK button to return to the Choose an NE/Aggregate window.
3	Double click on the desired selection from the list. The OK button becomes enabled.
4	Click the OK button. The Choose Protection Type window is displayed showing the available protection types to select.
5	From the available valid protection types, choose the protection type(s) to be displayed in the Protection Switching Status window. The OK button becomes enabled.
6	Click the OK button. The Protection Switching Status window is displayed with the correct information as indicated by the user.
7	When you have finished viewing the data, click on the Close button. Stop! End of Task.

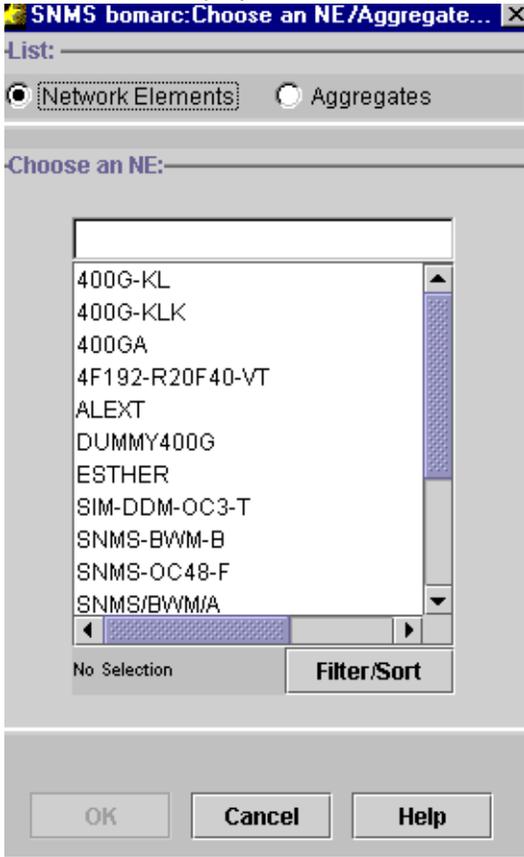
Operate Protection Switch (from the Protection Status Management Window)

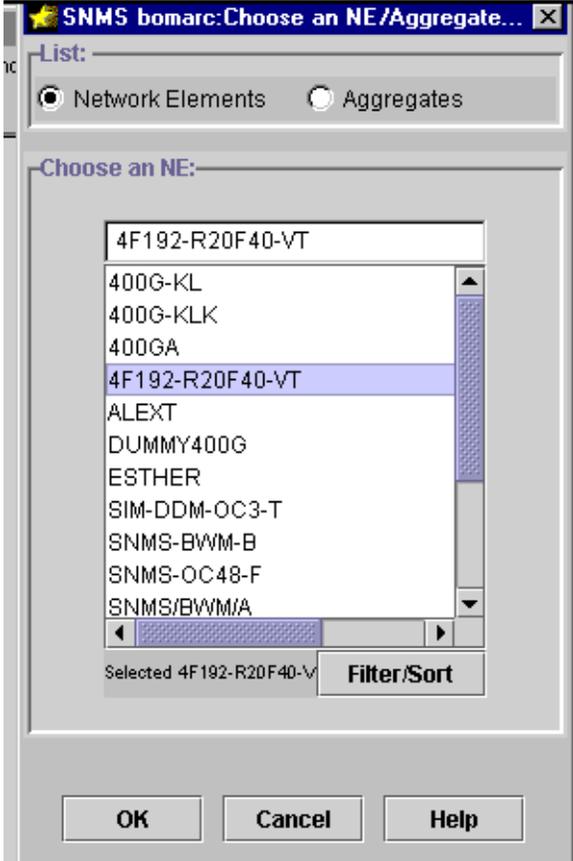
Background

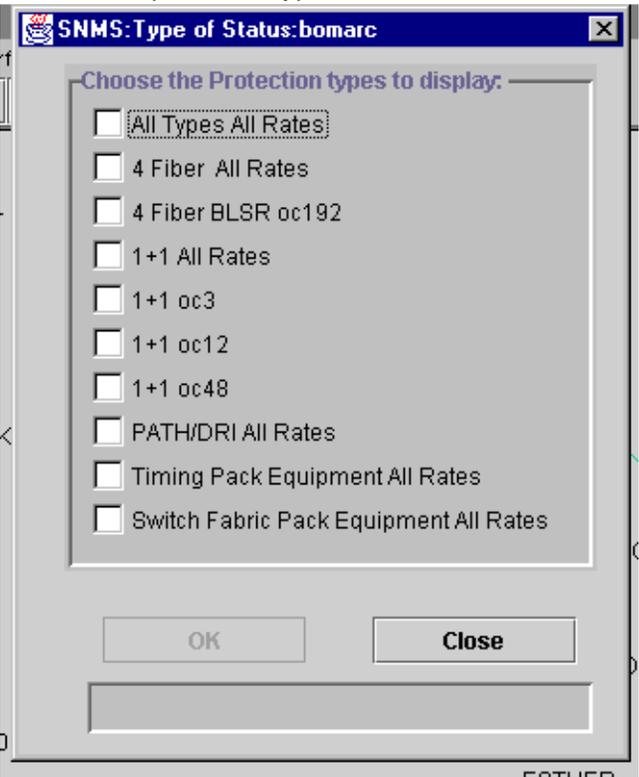
Use this procedure to provision a protection switch for a selected protection group type and protection switch message related to that protection group type, from the Protection Status Management window.

Task

Complete the following steps to provision a protection switch for a given protection group type and protection switch message.

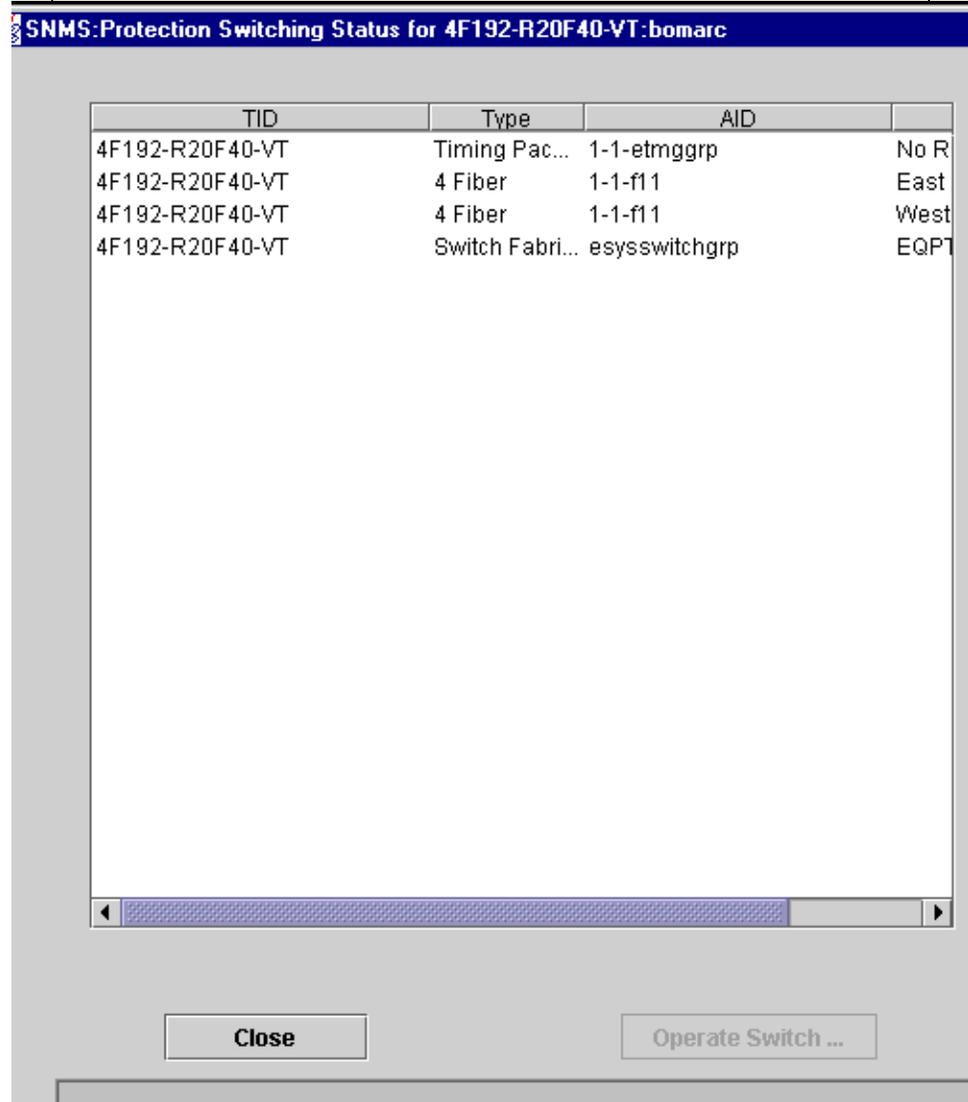
Step	Action
1	From the main menu bar of the Map window, select Configuration . This displays a sub-menu.
2	<p>Choose Protection Switch from the displayed sub-menu. The Choose an NE/Aggregate window is displayed.</p>  <p>Click the Network Elements radio button to obtain a list of NEs. Click the Aggregates radio button to obtain a list of aggregates. For the purposes of this function, click the Network Elements radio button to obtain a list of NEs.</p> <p>Once the list criteria is selected (Network Elements or Aggregates), you can use the Filtering/Sorting option to filter and limit the list to only the named items that you want (for details on how to use the Filter/Sort option, see the Filter/Sort section in the Getting Started Concepts chapter).</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
3	<p>Double-click on the NE in the list to select it.</p>  <p>The screenshot shows a dialog box with the title "SNMS bomarc: Choose an NE/Aggregate...". It has a "List:" section with two radio buttons: "Network Elements" (selected) and "Aggregates". Below this is a "Choose an NE:" section containing a list box with the following items: 4F192-R20F40-VT, 400G-KL, 400G-KLK, 400GA, 4F192-R20F40-VT (highlighted), ALEXT, DUMMY400G, ESTHER, SIM-DDM-OC3-T, SNMS-BWM-B, SNMS-OC48-F, and SNMS/BWM/A. At the bottom of the list box, it says "Selected 4F192-R20F40-V". To the right of the list box is a "Filter/Sort" button. At the very bottom of the dialog are three buttons: "OK", "Cancel", and "Help".</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
4	<p>Click the OK button. The Choose Protection Type window is displayed showing the available protection types to select.</p>  <p style="text-align: right;"><i>Continued on next page</i></p>

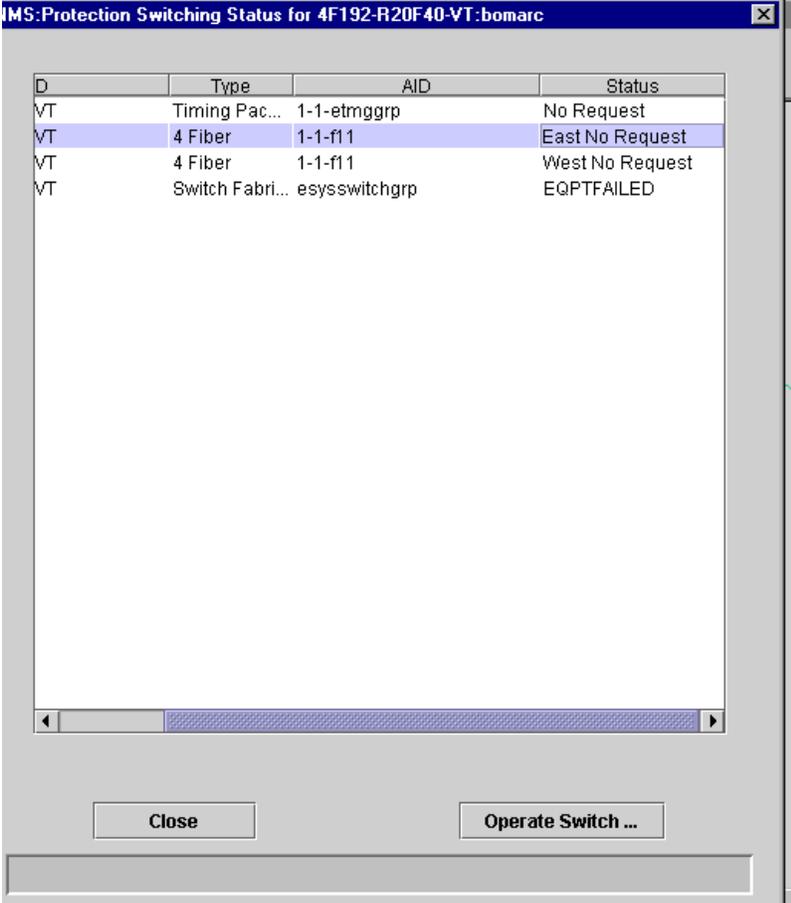
Step	Action (Contd)
5	<p>From the available valid protection types, choose the protection type(s) to be displayed in the Protection Switching Status window by positioning the mouse cursor in the box and clicking the select (left) mouse button to select the box. A checkbox is placed in the box and the OK button is enabled.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p>Choose the Protection types to display:</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> All Types All Rates <li><input type="checkbox"/> 4 Fiber All Rates <li><input type="checkbox"/> 4 Fiber BLSR oc192 <li><input type="checkbox"/> 1+1 All Rates <li><input type="checkbox"/> 1+1 oc3 <li><input type="checkbox"/> 1+1 oc12 <li><input type="checkbox"/> 1+1 oc48 <li><input type="checkbox"/> PATH/DRI All Rates <li><input type="checkbox"/> Timing Pack Equipment All Rates <li><input type="checkbox"/> Switch Fabric Pack Equipment All Rates <p>OK</p> <p>Close</p> </div> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
6	Click the OK button. The Protection Switching Status window is displayed, showing protection switch status messages (if any), for the selected protection group type(s).



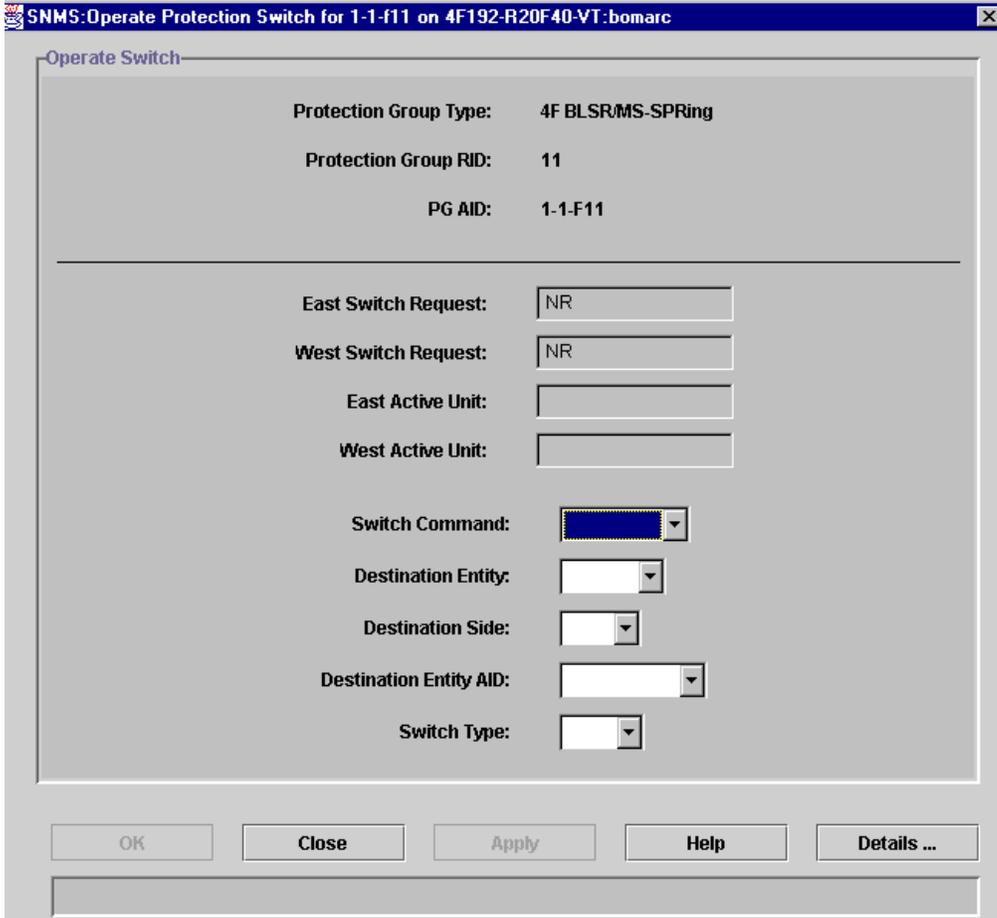
Use the left/right scroll bar buttons located at the bottom of the display area of this window to scroll left or right, to see the complete status message.

Continued on next page

Step	Action (Contd)																				
7	<p>Once you have located the protection group type and message for which you want to provision a protection switch, click on the message in the display portion of the window to select it.</p>  <table border="1"> <thead> <tr> <th>D</th> <th>Type</th> <th>AID</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>VT</td> <td>Timing Pac...</td> <td>1-1-etmggrp</td> <td>No Request</td> </tr> <tr style="background-color: #e6f2ff;"> <td>VT</td> <td>4 Fiber</td> <td>1-1-f11</td> <td>East No Request</td> </tr> <tr> <td>VT</td> <td>4 Fiber</td> <td>1-1-f11</td> <td>West No Request</td> </tr> <tr> <td>VT</td> <td>Switch Fabri...</td> <td>esysswitchgrp</td> <td>EQPTFAILED</td> </tr> </tbody> </table>	D	Type	AID	Status	VT	Timing Pac...	1-1-etmggrp	No Request	VT	4 Fiber	1-1-f11	East No Request	VT	4 Fiber	1-1-f11	West No Request	VT	Switch Fabri...	esysswitchgrp	EQPTFAILED
D	Type	AID	Status																		
VT	Timing Pac...	1-1-etmggrp	No Request																		
VT	4 Fiber	1-1-f11	East No Request																		
VT	4 Fiber	1-1-f11	West No Request																		
VT	Switch Fabri...	esysswitchgrp	EQPTFAILED																		

Continued on next page

Step	Action (Contd)
8	Click the Operate Switch button. The Operate Protection Switch for the selected protection group type and message is displayed.



Operate Switch

Protection Group Type: 4F BLSR/MS-SPRing
 Protection Group RID: 11
 PG AID: 1-1-F11

East Switch Request:
 West Switch Request:
 East Active Unit:
 West Active Unit:

Switch Command:
 Destination Entity:
 Destination Side:
 Destination Entity AID:
 Switch Type:

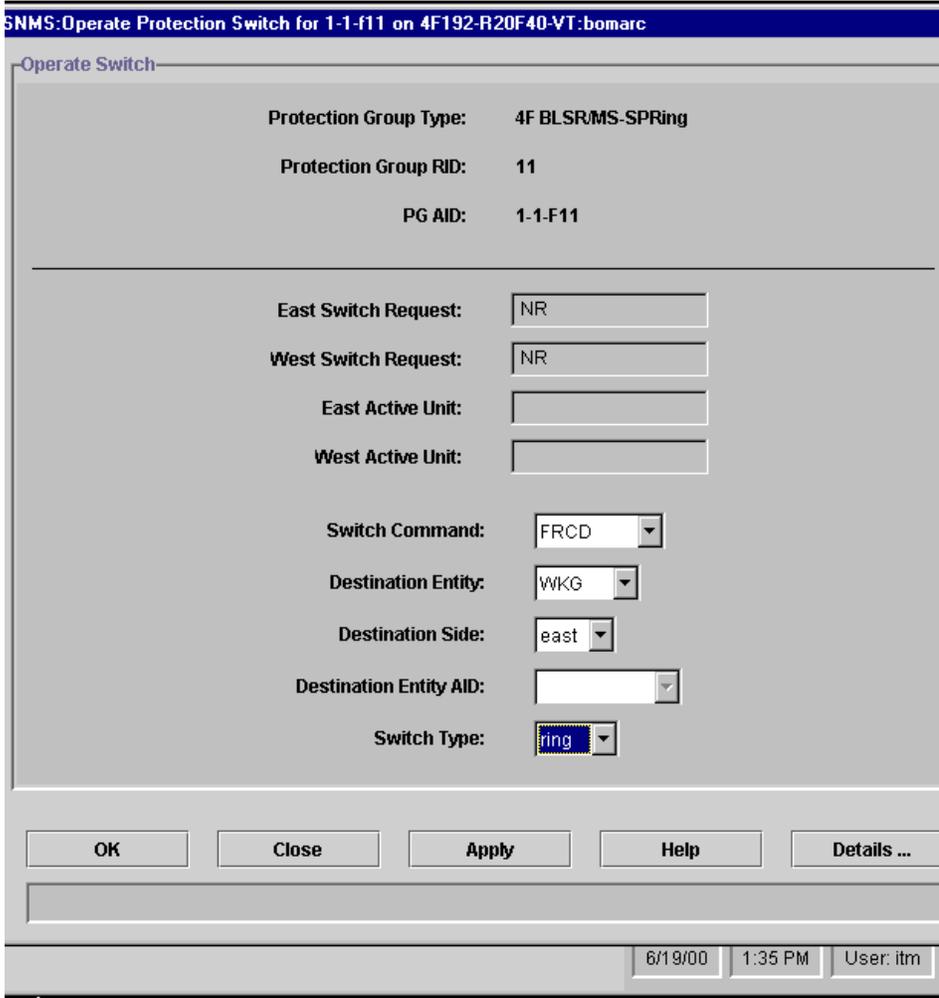
OK Close Apply Help Details ...

The fields shown on the Operate Protection Switch window will vary, based on the Protection Group Type selected.

Continued on next page

Step	Action (Contd)
	<p>Identifying fields for this Protection Group Type (display-only) shown on the window are:</p> <ul style="list-style-type: none"> • Protection Group Type • Protection Group Ring ID (RID) • Protection Group AID <p>The fields common to all Protection Group Types are:</p> <ul style="list-style-type: none"> • Protection Group Type—this is a display-only field that shows the selected Protection Group Type. • PG AID—this is a display-only field that shows the Protection Group AID of the selected protection group. • Switch Request—this is a display-only field that shows the last message prompting a protection switch. If there is no current message, this field indicates that there has been No Request (“NR”). • Switch Command—this field allows you to select the command for provisioning the type of protection switch to be performed. Click the down arrow next to the field to display a drop-down list of commands. <ul style="list-style-type: none"> The list of commands displayed depends on the selected Protection Group Type. Possible choices from the command list are: CLEAR LOCKOUT FRCED (Forced) MAN (Manual) CLEARFRCD (Clear Forced) Switch priorities for WaveStar TDM NEs, in descending order, are: CLEAR, LOCKOUT, FRCED, MAN <p>Select the switch command from the drop-down list of commands.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
9	<p>Select the destination of the entity that should be active after operation of the protection switch.</p> <p>The fields displayed to select the destination entity (port) for this type of protection group are:</p> <ul style="list-style-type: none"><li>■ Destination Entity—click the down arrow next to this field to display a drop-down list and select the entity that is being switched to protection, if both working or protection ports are being switched to protection. The choices are WKG (Working) or PROTN (Protection).<li>■ Destination Side—click the down arrow next to this field to display a drop-down list and select the port side that is being switched to protection. The choices are east, west, or both.<li>■ Destination Entity AID—click the down arrow next to this field to display a drop-down list and select the individual port AID of a working or protection group to be switched to protection. Note: in a 4-Fiber BLSR/MSSPRing configuration, this field must be selected before selecting either the Destination Entity or Destination Side fields.<li>■ Switch Type—click the down arrow next to this field to display a drop-down list and select the NE configuration involved in the protection switch. The choices are span or ring. <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
	<p>When your selections have been made (in the 4-Fiber BLSR/MS-SPRing example shown, the Switch Command, either selection of the Destination Entity and Destination Side, or Destination AID), and the Switch Type, the window should look similar to the following example (for the Protection Group Type shown):</p> 
10	<p>To review the details of the protection group affected by the switch, click the Details button. A second window is displayed, showing the Protection Group Type, Protection Group Ring ID (if applicable), and Protection Group AID. To close this details window, click the Close button.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
11	<p>After your choices are made, click the Apply button to initiate the switch request and leave the Operate Switch window open, or click the OK button to initiate the switch request and close the window.</p> <p>A status window is displayed, showing the results of the request. If it is completed successfully, the status is shown as "Completed". If the request fails for some reason, the status of the request is shown as "Failed".</p> <p>Stop! End of Task.</p>

Switch the Working and Protection Legs of a Path-Protected Cross- Connection

Background Use this procedure to switch the working and protection legs of a path-protected cross-connection.

Before you begin Before you begin this task, determine the existing path-protected cross-connection of an NE for which you want to switch the working and protection legs.

Task Complete the following steps to switch the working and protection legs of a path-protected cross-connection.

Step	Action
1	<p>Position the mouse cursor on the NE in the Map pane portion of the Map window and click the menu (right) menu mouse button. A pop-up menu is displayed. Choose Cross Connection from the pop-up menu.</p> <p style="text-align: center;">OR</p> <p>Choose Configuration from the main menu bar on the Map window. The Configuration menu is displayed. Choose Cross Connection from the Configuration menu. The Choose an NE window is displayed. Double-click on the NE in the window list and click the OK button.</p> <p>Result: The Cross-Connection window for the selected NE is displayed. The equipment hierarchy in the Network Element Explorer portion of the window is automatically expanded to the slot (circuit pack) level for the NE.</p> <p>You can expand any item in the Network Element Explorer by clicking the plus (+) sign next to the item. To collapse the item, click the minus (-) sign next to it. If items in the explorer are partially obscured, place the mouse cursor on the pane edge between the right side of the explorer and Main View, click and hold the left mouse button, and drag the edge to the right until the explorer items can be seen clearly.</p>
2	<p>Position the mouse cursor on the plus (+) sign next to each slot in the explorer portion of the window, then click and expand the equipment hierarchy until all ports for the cross-connection are shown.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
3	<p>Locate the tributary pair on the NE that have the path-protected cross-connection for which the working and protection legs are being switched.</p> <p>One method of locating existing cross-connections on the NE is by clicking on the NE's TID at the top level of the equipment hierarchy in the Network Element explorer, then clicking the List Cross Connections toolbar button on the Cross-Connection window toolbar (which is identified by a message in the Status bar or by tooltips help when you position the mouse cursor on the correct button). The existing cross-connections for the entire NE are displayed in the List Cross Connections window.</p> <p>⇒ NOTE: The first time you choose to list all cross-connections for the NE, a pop-up window may be displayed, advising you that the listing of all cross-connections for the NE may take a long time and asks if you want to proceed. Choose Yes to display the List Cross Connections window.</p> <p>The tributary of the path-protected cross-connection's working leg has a type of "1WAYPSW" in the Type field of the List Cross Connections display.</p>
4	<p>You can leave the List Cross-Connections window open (position the mouse cursor, then click and hold the left mouse button to drag the window to a different position to avoid obscuring the rest of the Cross-Connection window display) or click the Close button to close the List Cross Connections window.</p>

Step	Action (Contd)
5	<p>Once you have located the source and destination tributaries for the path-protected cross-connection, expand and display the source, destination, and secondary destination tributaries for the path-protected cross-connection in the Main View of the Cross-Connect window. There are two ways to do this:</p> <ul style="list-style-type: none"> ■ Position the mouse cursor on the port in the explorer to be expanded and click the menu (right) mouse button to display a pop-up menu of positions. Select the position for the tributary block from the pop-up menu list (left, right, top, or bottom). ■ Position the mouse cursor on the port in the explorer, click and hold the select (left) mouse button and drag the selected port into the left, right, top, or bottom portion of the Main View of the Cross-Connect window. The tributary block for the selected port is displayed in the Main View. <p>Result: The lines and arrows of the existing path-protected cross-connection are displayed in the Main View.</p>
6	<p>Position the mouse cursor on the working or protection leg of the cross-connection, which is represented by a dashed line, and click the left mouse button to select the cross-connection.</p> <p style="text-align: center;">OR</p> <p>Position the mouse cursor on any leg of the cross-connection, click the right mouse button, which displays a small pop-up window with a textual list of the cross-connection legs for selection. Position the mouse cursor on either the working leg (identified as "One Way PSW "with the source/destination tributary addresses) or the protection leg (identified as "One Way PSP" with the source/destination tributary addresses) and then release the mouse button to select the cross-connection leg.</p> <p>Result: The color of the source tributary changes to green and the color of the destination tributary changes to purple. The protection leg of the cross-connection is represented by a dashed line. The lines of the cross-connection become thicker when it is selected.</p>

Step	Action (Contd)
7	<p>Click the Switch button on the Cross-Connection window toolbar.</p> <p> NOTE: If you are not sure which button is the Switch button, move the cursor to each button until the tooltips help or a message in the Status bar is displayed to indicate that it is the Switch button. Then click the button.</p>
8	<p>Click the Switch Working and Protection Legs button on the Modify Cross-Connect Attributes window.</p> <p>Result: A pop-up question dialog window is displayed, asking if you really want to switch the working and protection legs of the cross-connection.</p>
9	<p>Choose Yes. The lines of the working and protection legs of the cross-connection are switched in the Main View of the window.</p> <p>Stop! End of Task.</p>

Introduction

Summary This chapter describes procedures related to managing and upgrading the network element software in WaveStar SNMS.

Before you begin Read the [Software Upgrade Concepts](#) chapter to learn about the NE software management functions supported by WaveStar SNMS.

Contents This chapter discusses the following topics:

- [Import Software to WaveStar SNMS](#) [8-3](#)
- [Download NE Software](#) [8-9](#)
- [Copy Software from NE to NE](#) [8-11](#)
- [Activate NE Software](#) [8-13](#)
- [Delete NE Software](#) [8-15](#)
- [Back Up NE Data](#) [8-17](#)
- [Restore NE Data](#) [8-20](#)
- [Schedule NE Data Backup](#) [8-25](#)
- [Schedule NE Software Download](#) [8-28](#)

- ▶ [Schedule NE Software Copy](#) [8-30](#)
 - ▶ [Schedule NE Software Activation](#) [8-32](#)
 - ▶ [Modify a Scheduled Task](#) [8-34](#)
 - ▶ [Delete a Scheduled Task](#) [8-35](#)
-

Import Software to WaveStar SNMS

Background

Use this procedure to import an NE software release from a Digital Access Tape (DAT) or CD-ROM to the WaveStar SNMS host for eventual downloading to an NE.

Before you begin

Before you begin this task, the DAT must be physically mounted (if the file source is tape) or the CD-ROM must be physically loaded and the file system mounted on the WaveStar SNMS host (if the file source is CD-ROM). If you are importing the NE software from CD-ROM, a special setup procedure must be performed for the WaveStar SNMS host prior to doing the software import; this procedure is explained as part of the task.

Task

Complete the following steps to transfer NE software to WaveStar SNMS.

Step	Action (Contd)	Action	Reference
7	Single-click on the NE type in the NE Type list to select it.		
8	Click the OK button. The system begins a search for the software release on the tape or CD. The status dialog window is displayed, indicating that the software transfer is in progress (working). If the software transfer is successful, the status shown on the window is "Completed". If the software transfer is not successful, an error message is displayed and the status shown is "Incomplete".		
9	Click the Close button to close the status dialog window. Stop! End of Task.		

SE 8-1: Setting Up the WaveStar SNMS Host for Transferring NE Software from CD-ROM

Procedure

Before NE software can be transferred from CD-ROM onto the WaveStar SNMS host machine, the WaveStar SNMS system administrator must do the following once while configuring the WaveStar SNMS host or installing the host software:

1. Log into the WaveStar SNMS host machine as *root* and enter the following command to find the hardware path to the CD-ROM drive:

ioscan -fn -C disk

A response similar to the following is displayed:

```
disk 45 10/8.6.0 sdisk CLAIMED DEVICE SEAGATE ST34371W
/dev/dsk/c3t6d0 /dev/rdisk/c3t6d0

> disk 46 10/8.8.0 sdisk CLAIMED DEVICE SEAGATE T39173WC
/dev/dsk/c3t8d0 /dev/rdisk/c3t8d0

> disk 30 10/12/5.2.0 sdisk CLAIMED DEVICE TOSHIBA CD-ROM XM-5701TA
/dev/dsk/c4t2d0 /dev/rdisk/c4t2d0
```

2. Locate the output line that contains the hardware path to the CD-ROM drive.

In the sample output shown in Step 2, the third line of the sample output indicates that the hardware path to the CD-ROM drive is:

```
/dev/dsk/c4t2d0
```

3. Create a symbolic link between the above hardware path and */dev/cdrom* using the following command as *root*:

ln -s /dev/dsk/c4t2d0 /dev/cdrom

If the Software Transfer function performed through the GUI is successful, the file system for the CD-ROM drive will be mounted each time the CD-ROM is physically loaded into the drive.

The CD-ROM drive may fail to mount because:

1. The CD is not physically loaded into the drive.
2. The file system for the CD-ROM drive failed to be mounted.

In the latter case, log in as *root* (if not already logged in) and issue the following command:

mount /dev/cdrom /SD_CDROM

To remove the CD-ROM, issue the following command:
umount /SD_CDROM

SE 8-2: View NE Software

Procedure

Perform the steps below to see what software releases are already stored in WaveStar SNMS for an NE type.

4. Select **Configuration** from the Map window main menu. The Configuration menu is displayed.
 5. Select **Software Management** from the Configuration menu. The Software Management menu is displayed.
 6. Select **View Software Release Descriptive Information** from the Software Management menu. The NE Type Selection for Viewing Descriptive Files is displayed.
 7. Select the NE type from the NE Type list or type the NE type in the text field.
 8. Click the OK button. A description of all the software releases stored in WaveStar SNMS for the selected NE type is displayed.
-

Download NE Software

Background Use this procedure to download a selected software release to a specific NE.

Before you begin Before you begin this task, you must first access the Map window. The software release to be downloaded to the NE must be transferred to WaveStar SNMS from CD-ROM or tape. Be aware that after you download software to an OLS 400G NE, you must perform DNO on the NE before the release software can be activated.

Be aware that for a 2.5G_10G R. 3.0 NE, the WaveStar SNMS software download feature only supports download of an unpacked CD-ROM version of the NE release software.

Note: Only one software download should be performed at a time. A software download may take up to two hours due to data communications and the size of the software being downloaded.

Related information For related information, see [Import Software to WaveStar SNMS](#).

Task Complete the following steps to download software to an NE.

Step	Action	Result
1	Select Configuration from the main menu bar on the Map window.	The Configuration menu is displayed.
2	Select Software Management from the Configuration menu.	The Software Management menu is displayed.
<i>Continued on next page</i>		

Step	Action (Contd)	Result
3	Select Download Software To NE from the Software Management menu.	The Choose an NE/Aggregate window is displayed.
4	Select an NE by double-clicking on the NE's TID and click the OK button.	The Software Download to NE window is displayed.
5	<p>Select a software release from the Releases Available list and click the Apply button.</p> <p> NOTE: You can abort the software download at this point, if necessary, by clicking the Abort button. A pop-up window is displayed, asking if you really want to abort the download. Choose Yes to abort the download or No to continue it.</p> <p>Stop! End of Task.</p>	<p>The system verifies that the software release is not the same or older than the version currently running on the NE and is supported by WaveStar SNMS. If the software version currently on the NE is the same or newer than the version being downloaded, WaveStar SNMS displays a error message; otherwise, the software download process continues.</p> <p>A pop-up message window is displayed, informing you that the download may take a certain amount of time and asks if you want to proceed with the software download. Choose:</p> <ul style="list-style-type: none"> ▶ Yes to continue with the software download <p>OR</p> <ul style="list-style-type: none"> ▶ No to cancel the software download <p>The software download is initiated. The status bar shows when the software download has been completed.</p>

Copy Software from NE to NE

Background

Use this procedure to copy software from one specified NE to one or more other specified NEs on demand.

Before you begin

Be aware that an NE to NE software copy requires that the source NE and destination NE(s) are of the same NE type, and part of the same OSI domain. Thus, once the source NE has been selected, only other NEs of that type and part of the same OSI domain are allowable choices. To perform an software upgrade for this type of NE, the new or upgraded release of executable software must be downloaded to individual NEs.

Task

Complete the following steps to copy software from NE to NE.

Step	Action
1	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
2	Select Software Management from the sub-menu. This displays another sub-menu.
3	Select NE To NE Software Copy from the sub-menu. This displays the Copy Software From NE to NE window. The Source NE list is populated with all the applicable NEs in the user's Target Group that support the NE to NE software copy feature, along with their release version.
4	<p>Double-click on the desired source NE in the Source NE list. The Available NE(s) list becomes populated with the NEs that are of the same type as the selected source NE.</p> <p>For OLS 400G NEs, the Copy from active partition button and Copy from inactive partition button become enabled. For OLS 400G NEs only, the user must specify which memory partition of the source NE from which the software generic is to be copied (active partition is the default).</p> <p>A Filtering/Sorting option is also available to the user by clicking on the Filter/Sort button. After setting the parameters for this option, click the Apply button to enter your data and then click the OK button to return to the Copy Software From NE to NE window.</p> <p style="text-align: right;"><i>Continued on next page</i></p>

Step	Action (Contd)
5	Populate the Chosen NE(s) list with NEs from the available NE(s) list by using the arrow push buttons. The OK button becomes enabled.
6	Click the OK button. A confirmation pop-up window is displayed, asking if you want to continue with the software copy.
7	Choose Yes to continue with the copy or choose No to return to the Copy Software From NE to NE window.
8	Choose Yes to continue with the software copy. When the copy is completed, a message notifies the user. Stop! End of Task.

Activate NE Software

Background

Use this procedure to activate software that has previously been transferred via software download or software copy.

Before you begin

Be aware that the NE Software Activate function provides the set of allowable NEs for activation and only allows the user to select from among those choices. To activate software on an OLS 400G NE, perform a DNO after the software download is completed.

Be aware that you may lose the NE visibility on the Map window for some time as the NE reboots during this process.

Task

Complete the following steps to activate software that has previously been transferred via software download or software copy.

Step	Action
1	Select the desired network element(s) in the WaveStar SNMS map window.
2	Select Configuration from the main menu bar on the Map window. This displays a sub-menu.
3	Select Software Management from the sub-menu. This displays another sub-menu.
4	Select Activate NE Software from the sub-menu. This displays the Activate Software window populated with the selected NE(s) and their currently active software release.
5	Select an NE(s) and click Retrieve Standby Release to retrieve the standby release number of the selected NE(s). The user can also click on Remove From List to remove the chosen NE from the list. <i>Continued on next page</i>

Step	Action (Contd)
6	Click on OK to initiate the activation of the new release.
7	EMS verifies that the NE release version that has been requested for activation, is higher than the release version that is currently running on the NE, and also if the selected release is supported by the EMS. A warning box appears if there is a problem with the selected software release.
8	Once verified, a dialog box confirms the software release number and NE. Click on Yes to continue with the activation if the information is correct, or click on No to return to the Activate Software window. Stop! End of Task.

Delete NE Software

Background Use this procedure to delete a specific executable software release for an NE type from WaveStar SNMS.

Before you begin Before you begin this task, access the Map window. The software to be deleted must be transferred to the WaveStar SNMS from CD-ROM or tape.

Task Complete the following steps to delete a specific software release for the NE type.

Step	Action	Result
1	Select Configuration from the main menu.	The Configuration menu is displayed.
2	Select Software Management from the Configuration menu.	The Software Management menu is displayed.
3	Select Delete Software From the EMS from the Software Management menu.	The Delete NE Software window is displayed.
	<i>Continued on next page</i>	

Back Up NE Data

Background

Use this procedure to back up an NE's provisioning data. The provisioning data includes port parameters and cross-connections. For the WaveStar BWM and NCC, you can use this procedure to choose to back up the NE data to WaveStar SNMS memory or the NE's local secondary memory. For the NCC, you can choose to back up from NCC memory or NCC Directory Services data.

Before you begin

Before you begin this task, determine the NE for which you want to perform a backup. Ensure that there are no alarms present on the NE. You must access the Map window to perform this function.

Related information

For related information, see [Restore NE Data](#).

Task

Complete the following steps to perform an NE backup.

Step	Action	Result
1	Select Configuration from the main menu bar on the Map window.	The Configuration menu is displayed.
2	Select Software Management from the Configuration menu.	The Software Management menu is displayed.
3	Select Backup from the Software Management menu. <i>Continued on next page</i>	The Choose an NE/Aggregate window is displayed.

Step	Action (Contd)	Result
4	<p>Double click on the desired NE and click the OK button.</p> <p>IF ... a WaveStar BWM or NCC is selected.</p> <p>For a WaveStar BWM or NCC, select EMS memory or NE Secondary Memory for NE data on the Backup Details window. For an NCC, select NCC Memory or NCC Directory Services data as the backup source.</p> <p>Stop! End of Task.</p>	<p>THEN ... the Backup Details window is displayed.</p> <p>⇒ NOTE: If there is an alarm on the NE, a pop up window is displayed, indicating this and asks if you want to proceed with the backup. Choose Yes to continue with the backup or No to cancel the backup.</p> <p>A pop-up window is displayed, indicating how long the backup process will take and asking if you want to proceed with the backup. Choose:</p> <ul style="list-style-type: none"> • Yes to perform the NE backup <p>OR</p> <ul style="list-style-type: none"> • No to cancel the NE backup

Restore NE Data

Background

Use this procedure to restore NE provisioning data from a specified backup file. You can specify the type of provisioning data to be restored. This option restores all backup data from the selected NE file, including the default settings.

For the NCC, you have the option of restoring data from NCC memory or the Directory Services database.

Before you begin

Before you begin this task, determine the NE to which you want to restore data. You must access the Map window to perform this function.

Related information

For related information, see [Back Up NE Data](#).

Task

Complete the following steps to restore an NE's backup data.

Step	Action	Result	Reference
1	If the NE data being restored is for a 2.5G, 10G (STM-64), or BWM NE, put the NE in maintenance mode (in other words, enable the maintenance mode parameter) using the Provisioning window in the GUI. If the NE data restore operation is for a different NE type, skip to step 2.		Provision System Parameters in Chapter 3, Equipment Provisioning
2	Select Configuration from the main menu bar on the Map window.	The Configuration menu is displayed.	
3	Select Software Management from the Configuration menu.	The Software Management menu is displayed.	
4	Select Restore from the Software Management menu.	A sub-menu is displayed.	
5	Select Regular Restore from the sub-menu. <i>Continued on next page</i>	The Choose an NE/Aggregate window is displayed.	

Step	Action (Contd)	Result	Reference
6	<p>Double click on the desired NE and click the OK button.</p> <p>IF ... an NCC is selected. For an NCC, choose NCC Memory or NCC Directory Services as the source of backup data and click the OK button.</p>	<p>THEN ... the NCC Restore window is displayed.</p> <p>The Select File for Restore window is displayed. For a WaveStar BWM or NCC, the list includes the backup file that is stored in the NE's Non Volatile Memory.</p>	
7	<p>Select a backup file for restoral. To look at a description of the backup data contained in the file before restoring it, click the View Descriptive Files button.</p>		
<i>Continued on next page</i>			

Step	Action (Contd)	Result	Reference
8	<p>Click the OK button.</p> <p>IF ... you respond Yes to perform the restore anyway</p>	<p>The restore process is started. As part of the restore process, the system performs several validation checks, comparing the software release, equipment, and switch settable parameters in the backup file with the current NE values. If there are discrepancies, a pop-up window is displayed with an error message asking if you want to continue with the restore. Choose:</p> <ul style="list-style-type: none"> • Yes to perform the NE restore anyway <p>OR</p> <ul style="list-style-type: none"> • No to cancel the NE restore <p>THEN ...</p> <p>The system continues with the restore. A pop-up message window is displayed, informing you that the restore may take a long time and asking if you want to proceed with the restore. Choose:</p> <ul style="list-style-type: none"> • Yes to perform the NE restore <p>OR</p> <ul style="list-style-type: none"> • No to cancel the NE restore <p><i>Continued on next page</i></p>	

Step	Action (Contd)	Result	Reference
9	IF ... you respond Yes to perform the restore.	THEN ... The restore is initiated. The system informs you of the restore's progress with a status message. When the restore is completed, an information window appears that notifies you of the completion. If the restore fails, an error message is displayed in a pop-up window, indicating the source of the problem. <i>Continued on next page</i>	

Step	Action (Contd)	Result	Reference
10	<p>If the restore operation has been initiated, wait several minutes while the affected NE turns white on the Map window and then back to its original color (normally green, in the absence of alarms against the NE).</p> <p> NOTE: The WaveStar SNMS kicks off a post-restore DNO at the end of the Restore operation, and it can continue after the "Restore Completed" message is displayed.</p> <p>You must wait until the post-restore DNO is completed before proceeding to the next step of this procedure.</p> <p>When the NE icon changes back to green, this indicates that the post-restore DNO process has completed.</p> <p> WARNING: <i>Because the NE's previous database is backed up during inservice mode, once this database is restored, the NE is automatically placed in inservice mode, which occurs with restoral of the previous NE database. In this case, you do not have to use the GUI NE Provisioning window to disable or take the NE out of maintenance mode (if it is a 2.5G NE). The service mode of the NE on the WaveStar SNMS GUI does not reflect the new state of the NE until the DNO is completed. Therefore, there is an interval that WaveStar SNMS treats the NE as still being in maintenance mode before the NE exits maintenance mode.</i></p>		
11	<p>Perform a complete manual DNO on the NE.</p> <p>Stop! End of Task.</p>		

Schedule NE Data Backup

Background Use this procedure to schedule backup of an NE's provisioning data.

Before you begin Before you begin this task, be aware that for WaveStar BWM and NCC NE types, scheduling a backup to the NE's local secondary storage is not allowed. All scheduled backups for these NE types must be to EMS memory. For NCCs, a separate backup can be scheduled for NCC Memory and NCC Directory Services.

Related informaton For related information, see [Modify a Scheduled Task](#) and [Delete a Scheduled Task](#).

Task Complete the following steps to schedule an NE software backup.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub-menu is displayed.
3	Select Software Mgmt from the sub-menu. The Software Management sub-menu is displayed.
4	Select Backup from the Software Management sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled NE backups.
5	Click the Add button. The Add a Scheduled Software Backup window is displayed.
6	Choose an NE (by TID) from the Choose an NE scroll bar list by double-clicking on the item. Use the type ahead field and/or filter/sort function to narrow the list, if necessary.

Continued on next page

Step	Action (Contd)
7	For Backup Type, click the Regular Backup or Intelligent Backup radio button.  NOTE: The Intelligent Backup option is disabled for any NE that uses file transferred based memory backup.
<i>Continued on next page</i>	

Step	Action (Contd)	
8	IF THE NE TYPE IS... an NCC any other NE type	CHOOSE.... to back up NCC Memory or NCC Directory Services in the "What to Backup" portion of the window. skip this step, Go to Step 9.
9	Choose the following Scheduling Options, as needed: <ul style="list-style-type: none"> ▶ Daily—click on this radio button if you want the task to be done on a daily basis. If you schedule the task to be done daily, use the Schedule Time spinner field to select the time of day for the scheduled task. ▶ Weekly on...—click on this radio button if you want to task to be done on a weekly basis. If you schedule the task to be done weekly, choose the day of the week by using the spinner field list next to this option. ▶ Once every...—click on this radio button if you want the task to be done periodically. If you schedule the task to be done periodically, choose the frequency (every x months) and the day of the month it will be done using the spinner field lists next to this option or click the Last Day of the Month checkbox. ▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format. ▶ Number of Retries—click the up and down arrows on this spinner field to specify the number of retries for the scheduled task. ▶ Retry Interval—If the Number of Retries selected is greater than 1, specify the retry interval, in minutes. Click the up and down arrows on the spinner field to select the time interval. 	
10	Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window. Stop! End of Task.	

Schedule NE Software Download

Background

Use this procedure to schedule an NE software download.

Before you begin

Before you begin this task, make sure that the software release to be downloaded to the NE has been transferred to the WaveStar SNMS host. Be aware that after a software download is performed on an OLS 400G NE, you must perform DNO on the NE before the release software can be activated.

Related information

For related information, see [Modify a Scheduled Task](#) and [Delete a Scheduled Task](#).

Task

Complete the following steps to schedule an NE software download.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub--menu is displayed.
3	Select Software Mgmt from the sub-menu. The Software Management sub-menu is displayed.
4	Select Download Software to NE from the Software Management sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled NE software downloads.
5	Click the Add button. The Add a Scheduled Software Download window is displayed.
6	Choose an NE (by TID) from the Choose an NE scroll bar list by double-clicking on the item. Use the type ahead field and/or filter sort function to narrow the list, if necessary. The NE type is displayed in the NE Type field after you choose an NE.

Continued on next page

Step	Action (Contd)
7	Click the down arrow next to the Release field to display a drop-down list of available releases and select the release to download. This field is required.
8	Choose the following Scheduling options, as needed: <ul style="list-style-type: none">▶ Date—click the up and down arrows on this spinner field to select the schedule date. Choose Today or the date. This field is required.▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. This field is required. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format.▶ Number of Retries—click the up and down arrows on this spinner field to specify the number of retries for the scheduled task.▶ Retry Interval—if the Number of Retries selected is greater than 1, specify the retry interval, in minutes. Click the up and down arrows on the spinner field to select the time interval.
9	Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window. Stop! End of Task.

Schedule NE Software Copy

Background Use this procedure to schedule an NE software copy from one NE to one or more NEs of the same type.

Before you begin Before you begin this task, be aware that WaveStar BWM NEs do not support the NE Software Copy feature.

Related information For related information, see [Modify a Scheduled Task](#) and [Delete a Scheduled Task](#).

Task Complete the following steps to schedule an NE software copy to one or more NEs.

Step	Action
1	Select Administration from main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub-menu is displayed.
3	Select Software Mgmt from the sub-menu. The Software Management sub-menu is displayed.
4	Select NE to NE Software Copy from the Software Management sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled NE software copy jobs.
5	Click the Add button. The Add a Scheduled Software Copy window is displayed.
6	Choose the TID of the Source NE (the NE to be copied from) from the Source NE list by double-clicking on the item. Use the type ahead field and/or filter/sort function to narrow the list, if necessary. <i>Continued on next page</i>

Step	Action (Contd)
7	<p>Choose the TID of one or more Destination NEs (to be copied to) from the Destination NE list by clicking on the item.</p> <p>Note: The system currently defaults to copying the software from the active partition of the source NE.</p>
8	<p>Choose the following Scheduling options, as needed:</p> <ul style="list-style-type: none"> ▶ Date—click the up and down arrows on this spinner field to select the schedule date. Choose Today or the date. This field is required. ▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. This field is required. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format. ▶ Number of Retries—click the up and down arrows on this spinner field to specify the number of retries for the scheduled task. ▶ Retry Interval—if the Number of Retries selected is greater than 1, specify the retry interval, in minutes. Click the up and down arrows on the spinner field to select the time interval.
9	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window.</p> <p>Stop! End of Task.</p>

Schedule NE Software Activation

Background

Use this procedure to schedule activation of an NE's executable software. When new software is downloaded to an NE, it is placed in "standby" until it is activated; it then replaces the old software. Software activations can be scheduled for more than one NE at a time, up to the limit imposed by the WaveStar SNMS host type.

Before you begin

Before you begin this task, make sure that the software to be activated has already been downloaded to the NE. Be aware that after a software download is performed on an OLS 400G NE, you must perform DNO on the NE before the release software can be activated.

Related information

For related information, see the following:

- ▶ [Download NE Software](#)
 - ▶ [Schedule NE Software Download](#)
 - ▶ [Modify a Scheduled Task](#)
 - ▶ [Delete a Scheduled Task](#)
-

Task

Complete the following steps to schedule software activation for one or more NEs.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. A sub-menu is displayed.
3	Select Software Mgmt from the sub-menu. The Software Management sub-menu is displayed.
4	Select Activate NE Software from the Software Management sub-menu. The Schedule Manager window is displayed, showing a list of currently scheduled NE software activations.

Continued on next page

Step	Action (Contd)
5	<p>Click the Add button. The Add a Scheduled Software Activate window is displayed. The window is designed to show the current active and standby software releases for each NE once this information is displayed.</p> <p>If necessary, use the scroll bar to move the window left to right to see the entire contents of the window.</p>
6	<p>Choose an NE (by TID) from the Choose an NE scroll bar list by positioning the mouse cursor on the item and single-clicking on it with the select (left) mouse button.</p>
7	<p>Click the Get Standby Release button to display the standby (currently inactive) release for the NE.</p>
8	<p>After displaying the standby release, single-click on the NE (by TID) again in the scroll list.</p>
9	<p>Choose the following Scheduling options, as needed:</p> <ul style="list-style-type: none"> ▶ Date—click the up and down arrows on this spinner field to select the schedule date. Choose Today or the date. This field is required. ▶ Schedule Time—click the up and down arrows on this spinner field to select the time of day for the scheduled task. The schedule time is in 24-hour format, in hours:minutes. This field is required. You can also type the time into this field. The time must be input in 24-hour format as hh:mm in 15 minute increments (for example, 11:15 P.M. is entered as 23:15). If the time entry is invalid, the color of the field changes to yellow, and you must re-enter a valid time in the proper format. ▶ Number of Retries—click the up and down arrows on this spinner field to specify the number of retries for the scheduled task. ▶ Retry Interval—if the Number of Retries selected is greater than 1, specify the retry interval, in minutes. Click the up and down arrows on the spinner field to select the time interval.
10	<p>Click the Apply button to activate your choices, or click the OK button to activate your choices and close the window.</p> <p>The Status Dialog window is displayed, indicating that the task schedule request has been processed. Click the Close button to close the status window.</p> <p>Stop! End of Task.</p>

Modify a Scheduled Task

Background

Use this procedure to change the parameters of a task for any function that can be scheduled.

Before you begin

Before you begin this task, be aware that you cannot modify a scheduled task that is already in progress. You cannot modify another user's scheduled tasks unless you are the system administrator or have a privileged login.

Task

Complete the following steps to modify a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. The Schedule sub-menu is displayed.
3	Select the function of the task to be modified. The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Select a task from the list to be modified.
5	Click the Modify button. The appropriate Modify a Scheduled Item window is displayed.
6	Make modifications to the information.
7	Click the Apply button to apply the changes or click the OK button to apply the changes and close the window. Stop! End of Task.

Delete a Scheduled Task

Background

Use this procedure to delete a scheduled task for any function that can be scheduled.

Before you begin

Before you begin this task, be aware that you cannot delete another user's scheduled tasks unless you are the system administrator or have a privileged login.

Task

Complete the following steps to delete a scheduled task.

Step	Action
1	Select Administration from the main menu bar on the Map window. The Administration menu is displayed.
2	Select Schedule from the Administration menu. The Schedule sub-menu is displayed.
3	Select the function of the task to be deleted. The Scheduler Manager window for the selected function is displayed, showing a list of currently scheduled tasks.
4	Choose the item to be deleted, which is identified by TID, from the list.
5	Click the Delete button. A pop-up question dialog window is displayed, asking if you want to delete the selected scheduled task. Choose Yes to delete the selected scheduled task or No to cancel the deletion. Stop! End of Task.

Introduction

Purpose

This chapter provides a general system overview of WaveStar SNMS.

Objectives

This chapter explains how to do the following:

- ▶ List the features available on WaveStar SNMS and briefly describe each feature
- ▶ Identify the basic hardware components of WaveStar SNMS
- ▶ Identify the basic software components of WaveStar SNMS
- ▶ Identify the network element types and releases supported by WaveStar SNMS
- ▶ Identify the system interfaces of WaveStar SNMS

Contents

This chapter discusses the following topics:

- ▶ [System Overview](#) [9-3](#)
- ▶ [Features](#) [9-5](#)
- ▶ [Hardware Architecture](#) [9-9](#)
- ▶ [Software Architecture](#) [9-15](#)
- ▶ [Supported Network Elements](#) [9-16](#)

• System Interfaces

[9-17](#)

System Overview

Description

The Lucent Technologies' WaveStar™ SubNetwork Management System (SNMS) is an Element Management System (EMS) that supports the new generation of Lucent Technologies' transmission products: the Lucent Technologies' WaveStar product family. The WaveStar products are intelligent Network Elements (NEs) which can discover and report their configuration (including physical equipage) and connectivity within the network.

WaveStar SNMS operates as an enhanced graphical tool and as a general configuration management aid. It is designed to take advantage of the capabilities of the WaveStar NEs, and to optimize the role of the NEs in management functions to create an intelligent operations environment.

Just as the WaveStar network elements are the solution to your transport network needs, WaveStar SNMS is the answer to the corresponding operations needs to efficiently manage the network. The following details some of the ways WaveStar SNMS achieves this:

- ✦ WaveStar SNMS provides centralized, secure, remote administration of Synchronous Optical Networks (SONET) and Dense Wavelength Division Multiplexing (DWDM) subnetworks. From a single work center, a WaveStar SNMS user can remotely manage SONET and DWDM NEs. Lucent Technologies patented Dynamic Network Operations (DNO) process gathers network configuration information from the NEs, providing accurate, hands-off population of the WaveStar SNMS database, and ensures that the WaveStar SNMS management functions operate using the actual network configuration.
- ✦ WaveStar SNMS provides fault, performance, configuration, security, and log management functions via the GUI.
- ✦ WaveStar SNMS supports 7-layer OSI as well as OSI over Transmission Control Protocol/Internet Protocol (TCP/IP) communication protocols over LAN physical interfaces.
- ✦ WaveStar SNMS supports X.25-based protocol layer for Lucent Technologies' Large Capacity Terminal (LCT).
- ✦ WaveStar SNMS supports CMISE and TL1 application protocols.
- ✦ WaveStar SNMS supports communication multiplexing or concentration to provide network security and to record all database changes.
- ✦ WaveStar SNMS provides a TL1 cut-through capability, allowing the user to access an NE through a native command set.

Graphical user interface

WaveStar SNMS incorporates a platform independent, Java-based Graphical User Interface (GUI) that allows for the use of PCs running Windows NT as the user's terminals. The WaveStar SNMS GUI is a common interface to all NEs, regardless of type, and provides a powerful, flexible, and user friendly interface to execute the most frequently used actions. The GUI also supports numerous customization options so that users may tailor the displays in accordance with their own preferences.

The GUI provides graphical features such as multilevel displays of the network, an automatically generated map of the overall managed domain, hierarchically arranged equipment displays down to the shelf level, a graphical representation of the cross connection configuration with point and click provisioning, and form and menu-based provisioning for viewing and setting provisional parameters. The GUI also provides the ability to initiate a cut-through session to directly send TL1 commands to NEs.

Year 2000 compliance

WaveStar SNMS and the underlying software platforms are designed to comply with the Year-2000¹ initiative to ensure correct date representation and date/time calculation for the year 2000 and beyond. This includes data that is received by WaveStar SNMS from the supported NEs.

1 WaveStar SNMS Release 4.2 and UNIX Release 11.0 are Year-2000 compliant only when the required Year-2000 patch set (Y2K-1020S800) is installed.

Features

Overview

WaveStar SNMS provides a set of standard and value-added features used to administer the WaveStar NEs. These are grouped into the following categories:

- Fault Management
 - Performance Management
 - Configuration Management
 - Security Management
 - Log Management
 - NE Event Handler
 - Cut-Through Capability
-

Fault management

Fault Management monitors alarms and conditions in the subnetwork. WaveStar SNMS receives autonomous alarm messages from NEs when alarm states are set or cleared. These alarm messages are processed and made available to the user through the GUI, or to other network surveillance systems. WaveStar SNMS supports the following Fault Management tasks:

- Alarm status indication on the network map for equipment, facility failures, and updates
 - Hierarchical alarm status indication at NE, bay, shelf, and circuit pack levels
 - Textual alarm summary report
 - Alarm provisioning at the NE level (via TL1 cut-through)
 - Alarm provisioning at the EMS level
 - Alarm synchronization
 - Autonomous alarm handling
 - Alarm correlation
 - Alarm aging
-

**Performance
management**

WaveStar SNMS collects Performance Monitoring (PM) data from NEs that have PM data collection activated. It stores collected PM data for a retention period set by the user (up to 30 days). WaveStar SNMS allows the user to view unprocessed PM data, or the data can be exported to an off-line system for more sophisticated analysis and reporting purposes.

**Configuration
management**

WaveStar SNMS has a Dynamic Network Operations (DNO) feature that retrieves the internal configurations of NEs and external connectivity relationships. This feature enables the system to discover, without manual intervention, the topology of subnetworks consisting of Lucent Technologies' NEs.

The GUI supports the following configuration management tasks:

Subnetwork configuration management

- ▶ Network Element/trail discovery/update/display
- ▶ Aggregate management/display

NE configuration management

- ▶ Equipage discovery/update/display
- ▶ Equipment provisioning and pre-provisioning
- ▶ Cross-connection provisioning/display
- ▶ Tributary reservation
- ▶ Manual path provisioning
- ▶ Protection switch management
- ▶ Port provisioning

Software management

- ▶ Software download to NEs
 - ▶ Software copy from one NE to another
 - ▶ Software install (activate) on NE
 - ▶ NE data backup and restore
-

**Security
management**

WaveStar SNMS maintains a set of connections to the NEs that are shared by all users. Administration of individual user logins and passwords is centralized on WaveStar SNMS rather than distributed across the large number of managed NEs.

All users are required to have a login and password to communicate with the system. The system administrator assigns users to the NEs they can use (Target Groups) and the actions they can perform (Command Groups). Target Groups and Command Groups can be set up according to the type of tasks users are performing, such as maintenance, provisioning, or monitoring.

WaveStar SNMS provides two levels of security management:

- ◆ EMS security management
 - defines EMS users (user id and password)
 - partitions the network into user-defined target groups
 - defines command groups
 - assigns EMS user to target groups and command groups
 - ◆ NE security management
 - provides services to manage NE user id and password
-

Log management

Log Management provides services to various system modules including:

- ◆ Writing log messages to database tables
- ◆ Retrieving log messages from database tables
- ◆ Displaying information on selected activities

These log messages are helpful for keeping track of information regarding system performance and actions. The information can be filtered to suit the user's needs.

NE event handler

The NE Event Handler process is a passive distributor of non-alarm autonomous messages emitted by the NEs. It registers with the Southbound interface for database change messages from TL1 NEs and with Q3 gateway for CMISE NEs.

The main functions of the NE Event Handler (NEH) are the following:

- ◆ Receive non-alarm autonomous messages (TL1 from Southbound and CMISE from Q3 gateway)
 - ◆ Distribute the received messages to the user
 - ◆ Log by invoking the Log Manager
-

**Cut-through
capability**

In order for the user to execute NE TL1 commands that may not be explicitly supported, a cut-through capability is available. WaveStar SNMS allows the user access only to the NEs and associated commands defined by the Target and Command Groups for which the user is assigned.

Hardware Architecture

Overview

WaveStar SNMS consists of a Hewlett-Packard (HP) host processor, and GUI workstations (PC/Sun) connected via an Ethernet LAN, with the option to interface via a Wide Area Network (WAN).

A WAN/PSN is recommended for large, geographically dispersed configurations to concentrate access from SNMS to the managed subnetworks. The same WAN/PSN can also be used to access other network management systems or other hosts. Every SNMS installation requires data connections to each managed subnetwork. The southbound WAN from SNMS to the NEs must support an OSI/LAN interface and/or an IP/LAN interface. If FT-2000 LCT NEs are to be managed an X.25 PSN is required.

Host platform

The system hardware architecture consists of two main components:

- ▶ HP K-class or N-class server running HP-UX version 11.0 (Nov. 1999) with associated peripherals (console, terminals, and printers)
 - ▶ PC running Windows NT[®] 4.0 (Service Pack 4) or
 - ▶ Sun Solaris workstation Version 2.6 or 2.7.
-

GUI workstation

The recommended platform for the Java GUI client is a personal computer running Windows NT 4.0 with Service Pack 4. The Java GUI software is installed on the PC as a standalone application. Transaction requests are issued by the GUI software to the EMS host. The host returns responses associated with these transactions back to the PC. The interface to the PC is via an 802.3 LAN link. The GUI application messages and GUI cut-through data traffic are transported using this interface.

System redundancy options

The EMS system redundancy option provides multiple levels of application and host redundancy for backup support and disaster recovery in the event of failure. The local and geographic redundancy configurations require two similarly equipped hosts that operate in an active/standby arrangement. The two host computers are linked via a TCP/IP WAN segment and employ data replication to provide near real-time database synchronization of the standby host with the currently active host.

Under normal operating conditions, the SNMS application is running on the active host, with that host actively monitoring all network elements in the management

domain. The backup host is in a hot-standby state, maintaining data connections to the network, and using data replication from the active host to keep its database current. In the event of a primary host failure, there is automatic switch-over with the local redundancy configuration, while a manual command is needed to initiate the switch-over with the geographical redundancy configuration. Upon switch-over, the standby host assumes active control of the network.

The SNMS redundancy options include:

- host redundancy
- local redundancy
- geographic redundancy
- dual redundancy

Host redundancy

Host redundancy provides component redundancy within a single host where there is no backup host available (Figure 9-1). Recovery relies on switching control to another resource on the same host such as a backup LAN card or mirrored disk.

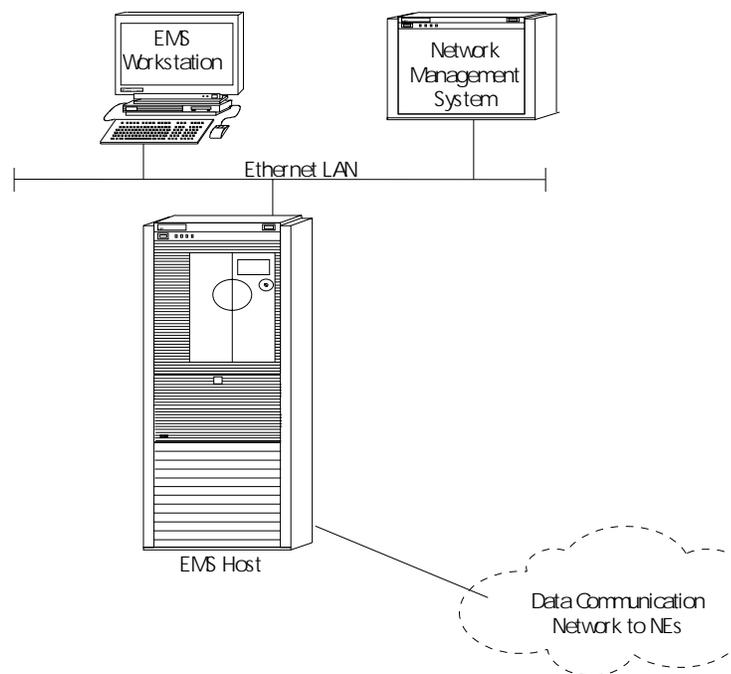


Figure 9-1. EMS Basic Host Redundancy Configuration

Local redundancy

Local redundancy employs two similarly equipped hosts located in the same building (Figure 9-2). Each host is configured with redundant hardware components. Should the primary host fail, the backup host is activated automatically without user intervention.

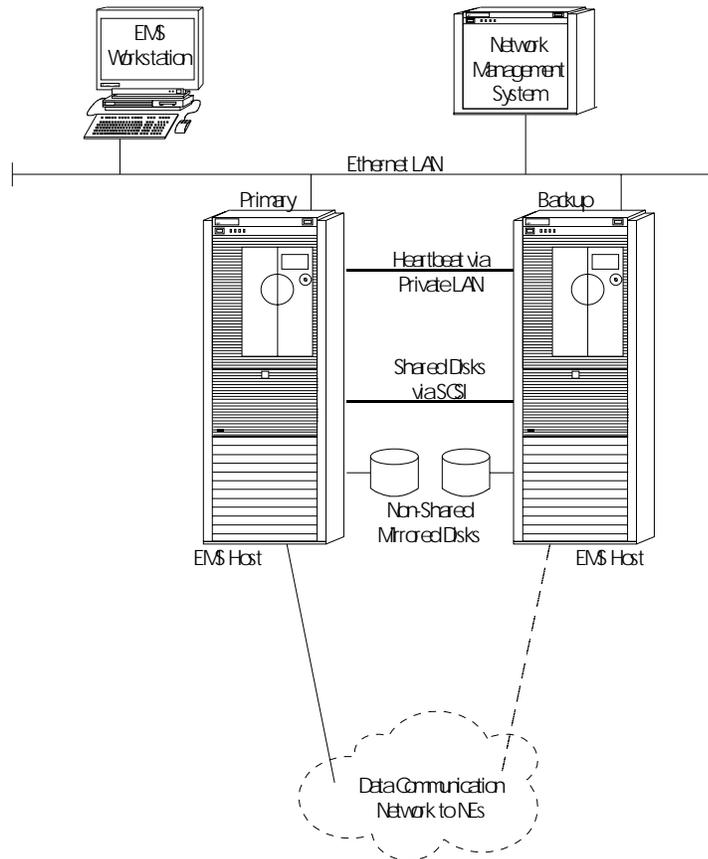


Figure 9-2. EMS Local Redundancy Configuration

Under normal operating conditions, the WaveStar SNMS Host is in service (or “active”) on the primary host monitoring all network elements in the database. The backup host exists in a passive (or “standby”) mode with the WaveStar SNMS application running in a “read only” mode. Although the “standby” host is logged into all network elements, it does not initiate any event to the network or react to any notifications from the network. Database synchronization is handled using Informix Enterprise Replication, FTP file transfer, and event forwarding from the “active” host. In the event of a primary host failure, control is automatically

switched from the primary to the backup host, changing the WaveStar SNMS application from “standby” to “active” service without user intervention. Once the primary host failure is repaired, manual intervention is required to synchronize the database and switch control back to the primary host.

Geographic redundancy

Geographic redundancy employs two similarly equipped hosts located in different geographical locations (like Atlanta, GA, and Denver, CO (Figure 9-3). Each host is configured with redundant hardware components, and resides on a TCP/IP WAN segment. Data replication and event forwarding via WAN are used to maintain EMS database and UNIX file system synchronization.

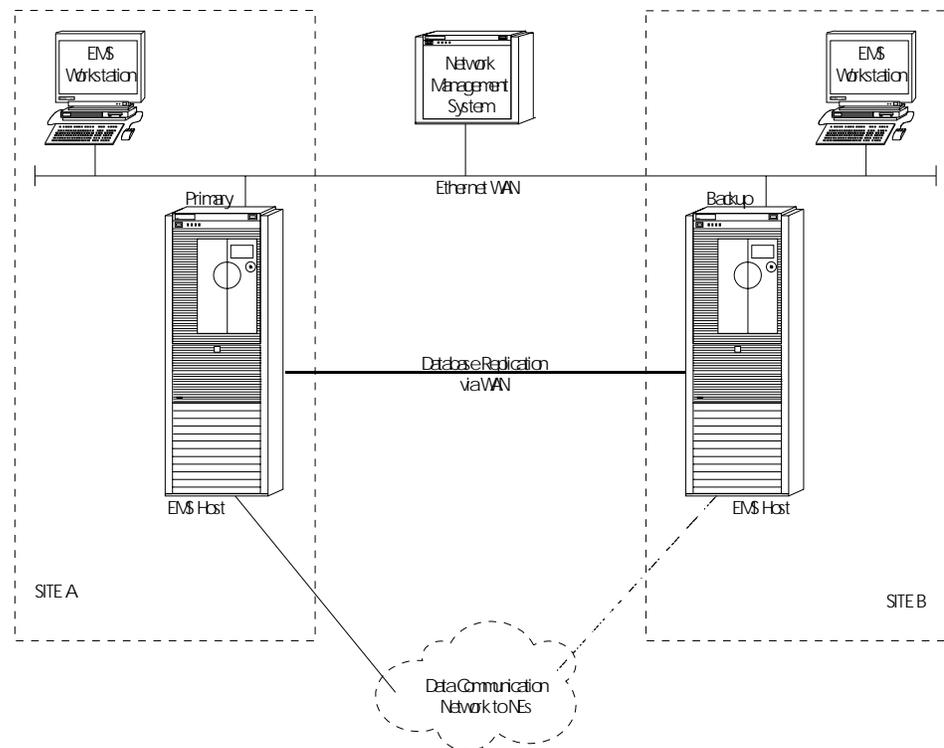


Figure 9-3. EMS Geographic Redundancy Configuration

Under normal operating conditions, the WaveStar SNMS application is in service (or “active”) on the primary host monitoring all network elements in the database. The backup host exists in a passive (or “standby”) mode with the WaveStar SNMS application running in a “read only” mode. Although the “standby” host is logged

into all networks, it does not initiate any event to the network or react to any notification from the network. Database synchronization is handled using Informix Enterprise Replication, FTP file transfer, and event forwarding from the “active” host. In the event of a primary host failure, control can be manually switched from the primary to the backup host changing the WaveStar SNMS application from “standby” to “active” service.

Unlike local redundancy, which is automated, geographic redundancy requires an external command to invoke a switch over. This external command can be issued via a UNIX command line by the WaveStar SNMS system administrator, or by association from a Network Management System. Once the primary host failure is repaired, manual intervention is required to synchronize the database and switch control back to the primary host

Dual redundancy

In dual redundancy, both local and geographic strategies are combined to provide an additional level of reliability. As shown in Figure 9-4, both Site A and B have two hosts that can be employed to monitor the network.

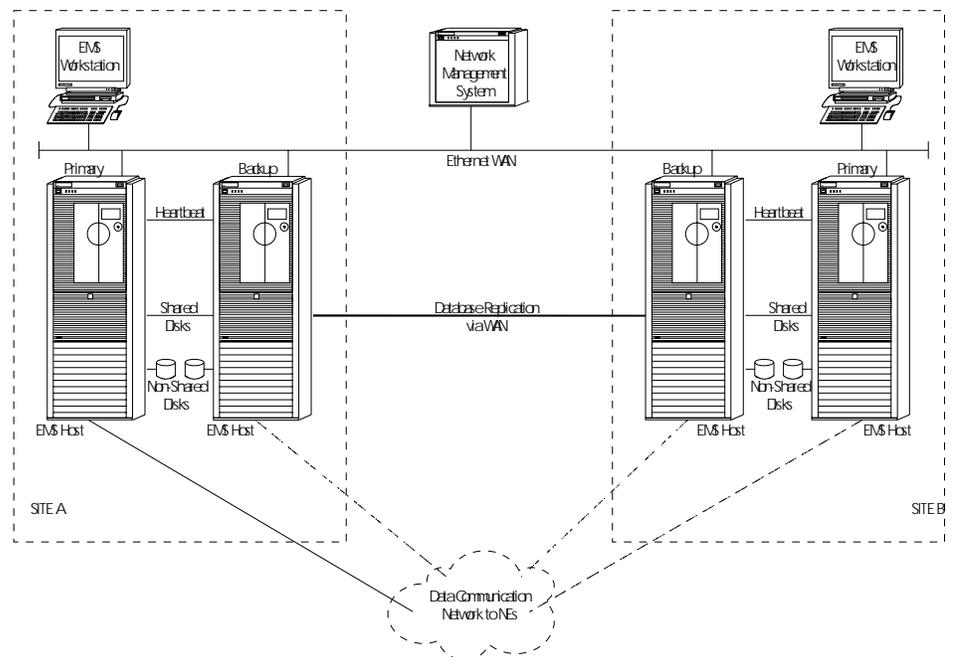


Figure 9-4. EMS Dual Redundancy Configuration

The following redundancies are implemented using the architecture shown in Figure 1-4.

- Local redundancy is implemented at Site A identifying a primary and backup host. Both hosts are brought on-line (one active, one standby) as described in local redundancy.
- Local redundancy is implemented at Site B identifying a primary and backup host. Both hosts are initially left in a “down” state, however, with neither running the WaveStar SNMS application.
- Geographic redundancy is implemented to designate the primary host at Site B as the backup host to the primary host at Site A. The primary host at Site B is then brought on-line in “standby” mode as described in geographic redundancy. Thus, the primary host at Site A replicates its database to both the backup host at Site A and the primary host at Site B, keeping all three synchronized.

In the event of a primary host failure at Site A, control automatically switches to the backup host at Site A (for example, local redundancy). In addition, the backup host at Site A now begins replicating its database to the primary host in Site B to maintain synchronization (e.g., geographic redundancy). At this point, the user has two options:

9. If the expected time to repair the failed host at Site A is short, the system can be run in geographic redundancy mode until the failed host is repaired.
10. If the expected time to repair the failed host at Site A is lengthy, the backup host at Site B can be brought on-line in “standby” mode and synchronized with the active host at Site A.

In the event there is a complete failure of Site A (both primary and backup hosts), the primary host at Site B can be “activated” and a local redundancy configuration at Site B can be used.

Once the affected site is repaired, a manual procedure must be used to synchronize the primary host at Site A. Only then can database replication be enabled at Site B to fully synchronize the primary host at Site A. Once fully synchronized, a manual switchover must be initiated to switch control back to the primary host at Site A and re-enable dual redundancy.

Software Architecture

Overview

The software architecture can be divided into the following major subsystems:

- ✦ Configuration Management
 - ✦ Fault Management
 - ✦ NE Event Handler
 - ✦ EMS Security Management
 - ✦ Southbound Management Interface
 - X.25-based protocol layer
 - OSI-based protocol layer
 - OSI over TCP/IP-based protocol layer
 - TL1 Manager
 - Connection Manager
 - Gateway process
 - QA process (CMISE only)
 - SONET Directory Service (SDS)
 - ✦ Log Management
 - ✦ Operation, Administration, and Maintenance
 - Log and trace
 - Scheduler
 - ✦ JAVA-based GUI
-

Supported Network Elements

Overview

WaveStar SNMS R4.2 provides element management support for the following NEs and their software releases. The information is the best available at the time of publication of this document and is subject to change based on the availability of the NE releases.

Table 9-1. Network Elements Supported by WaveStar SNMS R4.2

Managed NEs	Supported Releases
WaveStar BWM	R1.2, R1.3, R2.0, R3.0
WaveStar OLS 400G	R2.0, R3.0, R4.0
WaveStar NCC	R3.0, R3.1, R3.2, R4.0
WaveStar 2.5G/10G	R2.0, R3.0, R4.0 (10G shelf option available beginning in R3.0)
WaveStar OC-192 4-Fiber	R1.0, R1.1, R2.0
STM-64	R1.0, R1.1, R2.0, R2.1
FT-2000 LCT	R4.0
LambdaRouter	R1.0

System Interfaces

Overview

The WaveStar SNMS southbound communication interface connects with NEs, and supports OSI and OSI over TCP/IP communications with the NEs.

- ▶ OLS 400G supports both an OSI and OSI over TCP/IP interface.
 - ▶ BWM and 2.5G only support an OSI interface. However, since the NCC acts as a transport bridge, WaveStar SNMS also supports an OSI over TCP/IP interface to BWM and 2.5G NEs via a transport bridge.
 - ▶ NCCs support both OSI and OSI over TCP/IP interfaces, much like the 400G.
-

Southbound interface

The WaveStar SNMS Southbound interface contains the required functionality to connect to the NEs, to manage these connections, and to forward and receive the messages between the NEs and WaveStar SNMS, for all supported communication protocols.

Connection Manager Process

The Connection Manager (CM) process centralizes the functions of sending, receiving, routing, and processing the connections needed for responses and autonomous messages going in, and coming from, the CMISE and TL1 Southbound subsystems. CM handles the following functions:

- ▶ At start-up, load external configurative parameters from a configuration file.
- ▶ Create and terminate associations to all NEs.
- ▶ Perform association requests in a staggered manner to minimize the impact of the connection processes on the network.
- ▶ Implement association recovery mechanisms.
- ▶ Receive connection-related indication messages from TL1 and CMISE Southbound subsystems, update association status in memory, and forward notifications to WaveStar SNMS.
- ▶ Create/modify/delete NEs, store and forward related information.
- ▶ Send notification to WaveStar SNMS for any incorrect NE types.

CMISE Southbound

The CMISE Southbound subsystem is made of two processes for the support of Lucent Technologies' WaveStar 400G NEs.

• Gateway (GW) process

- serves as a bridge process between the Management Functional Area (MFA) and the Q3 Manager
- receives requests from MFA and the Connection Manager, and sends them down to the Q3 Manager through a socket interface
- receives responses and autonomous notifications coming from NE via socket. Sends them to MFA or the Connection Manager as required.
- logs Command and Responses, via the Log Server and Log library.

• Q3 Adaptor process

The Q-Adaptor maintains a representation of the managed object instances of the managed object classes defined in the information model and converts Common Management Information Service Element (CMISE) requests into the non-TMN format of the underlying OS or NE. It also converts the non-TMN notifications received from a non-TMN OS or NE and converts them to CMISE notifications.

TL1 Southbound

TL1 Southbound is supported by the TL1-Manager process, which is responsible for command/response handling.

SONET Directory Services

The SONET Directory Services (SDS) subsystem resides in the Southbound of the system. All system applications access the shared memory contained in SDS to retrieve information. The shared memory contains the status, last update time, and various directory information. WaveStar SNMS employs two agents to manage this information: the Directory Services Agent (DSA) and the Directory User Agent (DUA). The DSA maintains the Directory Information Base and the DUA retrieves and gives information to and from it.

The DSA organizes network elements into a structure known as the Directory Information Base (DIB). The DUA accesses the DSA for any new NEs registered in the MIT and notifies other WaveStar SNMS processes of the existence of the new NE. WaveStar SNMS then logs into the new NE and via the Dynamic Network Operations (DNO) process gathers the internal configuration and external connectivity relationships from the NE. This ensures that the WaveStar SNMS management functions operate using the actual network configuration.

**Northbound
interface to
WaveStar NMS**

WaveStar SNMS supports a northbound interface to the WaveStar Network Management System (WaveStar NMS). WaveStar NMS is a part of a telecommunications management network that provides comprehensive and integrated management of an entire transport network. WaveStar NMS manages network elements through an interface with WaveStar SNMS. WaveStar SNMS exchanges NE alarm information, configuration information, and performance monitoring data with WaveStar NMS, through a standard CORBA interface.

There are two WaveStar NMS interfaces supported by WaveStar SNMS. The first interface is a server to server interface and the other interface is a GUI to GUI interface.

The server to server interface is responsible for passing NE information from SNMS to WaveStar NMS. The interface is called the northbound TL1 interface in SNMS jargon and the southbound interface in NM terminology. The interface takes place over a socket connecting the WaveStar NMS server to the WaveStar SNMS server.

The GUI to GUI cut-through allows WaveStar NMS to invoke WaveStar SNMS GUI screens from the WaveStar NMS GUI. This feature is called the F-interface in both WaveStar NMS and WaveStar SNMS terminology. Both GUIs must be installed on an NT Terminal Server and be properly configured to talk to one another. The interface supports a one-to-many configuration where one WaveStar NMS GUI can talk to many WaveStar SNMS GUIs of different versions.

Introduction

Purpose

This chapter provides general information about the WaveStar SNMS Graphical User Interface (GUI), the Cut-Through feature for issuing TL1 commands to network elements, and the graphical display of equipment in the system.

Objectives

This chapter explains how to do the following:

- ▶ How to use the mouse buttons to perform various GUI functions
- ▶ Log into and log out of the WaveStar SNMS GUI
- ▶ Identify and use the different parts of the WaveStar SNMS Map window
- ▶ Display and use the WaveStar SNMS help documentation
- ▶ Use GUI lists and tables
- ▶ Issue TL1 commands in Cut-Through mode
- ▶ Build a TL1 command file
- ▶ Broadcast TL1 commands to one or more network elements
- ▶ Identify how equipment configurations for various network elements are represented graphically on the WaveStar SNMS equipment display
- ▶ Determine the presence and level of alarms on the equipment display

Contents

This chapter discusses the following topics:

- [The WaveStar SNMS Graphical User Interface](#) [10-3](#)
 - [Using the Mouse](#) [10-4](#)
 - [Manipulating Fields and Text](#) [10-5](#)
 - [Logging Into WaveStar SNMS](#) [10-6](#)
 - [Logging Out of WaveStar SNMS](#) [10-9](#)
 - [The WaveStar SNMS Map Window](#) [10-10](#)
 - [Network Element Explorer](#) [10-29](#)
 - [Window Buttons](#) [10-31](#)
 - [Using Lists](#) [10-35](#)
 - [Sorting Tables](#) [10-41](#)
 - [Cut-Through](#) [10-44](#)
 - [Equipment Display](#) [10-46](#)
-

The WaveStar SNMS Graphical User Interface

Overview

The WaveStar SNMS Graphical User Interface (GUI) is a Java-based, multilevel windowing environment that provides fault, provisioning, configuration, and security management functions and allows you to graphically monitor the status of the network. The WaveStar SNMS GUI is designed to be an intuitive, consistent, easy-to-use interface. Status bar messages and windows keep you informed of the outcome of an operation. The GUI offers point-and-click, menu-driven operation, as well as a cut-through interface to issue TL1 commands to connected NEs. Several types of on-line help are available to assist you in performing any task.

The GUI runs on PCs. Once a GUI session is started, the GUI server can support multiple platform-independent GUI client connections simultaneously.

Using the Mouse

Introduction

The mouse is used to move a pointer around the screen. A mouse usually has three buttons, two of which are used to select items on the display.

Diagram

The following diagram shows the different mouse buttons, as configured for a right-handed person. To reconfigure the mouse buttons for a left-handed person, consult the mouse and workstation documentation. The mouse for your workstation or PC may only be equipped with two buttons, so consult the hardware documentation.

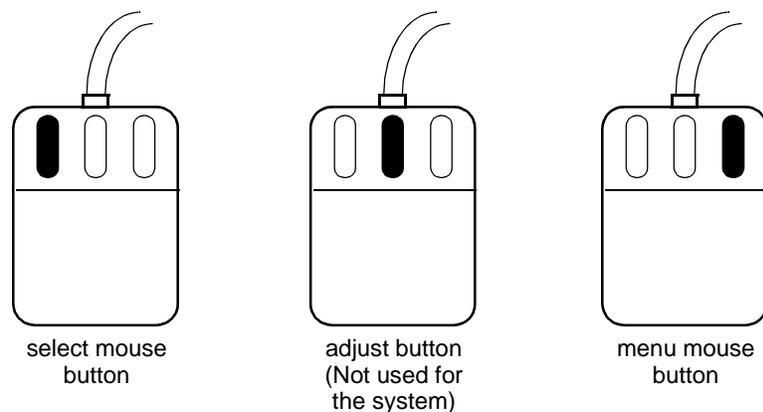


Figure 10-1. Mouse Buttons

Select mouse button

The select mouse button, which is the leftmost button on the mouse, is used to select an item in WaveStar SNMS. To do a click or select operation, position the mouse pointer over the desired list item, NE/aggregate icon, button, field, or menu, and click the select mouse button.

Menu mouse button

The menu mouse button, which is the rightmost button on the mouse, is used to bring up (activate) a pop-up menu.

To activate a pop-up menu, position the mouse pointer over the object (like an NE or aggregate icon on the Map pane or Subnetwork Explorer), and single-click the menu mouse button.

Manipulating Fields and Text

Entering text

The following guidelines explain how to enter text in windows that contain text fields:

- Press the **Tab** key to enter text that you have typed in a field. Pressing the **Tab** key in a text field accepts the data in the text field and moves the cursor focus to the next field that accepts input. If the cursor is positioned in the last enterable field on the window, pressing the **Tab** key moves the cursor to the first button on the bottom of the window.
 - Use the **Tab** key for field-to-field navigation within a window.
 - Use the **Backspace** key to delete text field input.
 - You can cut and paste text between text fields and/or text areas using the standard cut and paste hot keys for Microsoft Windows and HP Vue.
-

Logging Into WaveStar SNMS

Introduction

To start up an instance of the GUI on your PC or workstation, click on the desktop or menu bar icon representing the WaveStar SNMS application. When you click on this icon, a command is sent to the WaveStar SNMS host machine to start up the application.

Click on the same icon/menu item to start up another instance and log into the same host. Click on a separate icon/menu item to start up a GUI instance and log into a different host.

The WaveStar SNMS Login window is then displayed for logging into WaveStar SNMS.

To log into WaveStar SNMS, you must enter a valid user ID (login) and password that you been supplied to you by your WaveStar SNMS system administrator.

When you log into WaveStar SNMS for the first time with a new user login, you must change your password from the default password given for the login. A pop-up window is displayed, indicating that you must change your password before being allowed to log into WaveStar SNMS. You are given the option of continuing the session or exiting the system at this point. If you choose to continue the login session, the Change Password window is displayed, prompting you to change your password from the default password. The system validates your new password. If it is valid, the system re-displays the Login window to re-enter your user ID and your new password.

Successful login

If the user ID and password that you entered are valid, WaveStar SNMS displays an advisory message, the Alarm Notification window and Map window are displayed.

Unsuccessful login attempts

If you cannot log into WaveStar SNMS the first time, because you entered an invalid user login or password, the system allows you to retry a certain number of times (as defined by the system administrator) before you are denied access. You must enter a valid user ID (login) and valid password. See the [Valid user ID](#) and [Valid password](#) sections in this chapter for definitions of a valid user ID and password.

Password expiration

Passwords must be changed after a period of time, as defined by the system administrator. If you attempt to log into WaveStar SNMS with a password that is about to expire, the system informs you of this via a pop-up window and asks if you want to change your password. If you choose to change your password at this

time, the Change Password window is displayed. If you choose not to change your password at this time, but the password expiration period has not yet been reached, you can continue to log into the system. If the password has expired, and you do not change it, the login session will be terminated.

Related information

[Log Into WaveStar SNMS](#) in the [Getting Started](#) chapter describes how to log into WaveStar SNMS.

[Change Your User Password](#) in the *WaveStar SNMS Administration Guide* describes how to change your user password.

[Globally Provision User Login/Password Parameters \(Global Security Provisioning Feature\)](#) in the *WaveStar SNM Administration Guide* describes how the system administrator sets up certain aspects of login/password procedures enforced by WaveStar SNMS, such as the password expiration period and the number of login attempts allowed.

Valid user ID

A valid User ID (login) is 3-10 alphanumeric characters in any combination. Special characters (such as ; * & @) are not allowed.

Valid password

A valid password is 6-10 characters. A password must include at least two uppercase and/or two lowercase letters, at least one numeric, and at least one special character (!#\$%^&*()-+_=?). The following special characters are not permitted (;,;).

Alarm notification window Once you have logged in and the GUI is running, the Alarm Notification window is displayed. The Alarm Notification window displays a running tally of the number of Critical, Major, Minor alarms, Not Alarmed (which represents Standing Condition events that require clearing), and Communication alarms for SONET, or Prompt, Deferred alarms, No Alarms (which represents Standing Condition events that require clearing), and Communication alarms for SDH. The number displayed below the box for each alarm severity increases by one whenever a new alarm of that severity occurs. You can click on any of the severity type boxes to display the Alarm List window, filtered for that severity type. If you click on the Communications alarms box, a list of NEs that are currently not communicating with the system is displayed. The Alarm List window is only displayed if there is one or more active alarms or standing condition events in the selected alarm severity category. Once displayed, the Alarm Notification window remains open during the GUI session. When a new alarm is received by WaveStar SNMS, the Alarm Notification window is brought to the forefront of the GUI display to signal the arrival of the new alarm.

GUI application not running If the WaveStar SNMS host is successfully contacted, but the application and/or GUI server is not functioning on the host, a pop-up message window is displayed, indicating that the WaveStar SNMS application is not currently running on the host machine.

Multiple GUI instances If the WaveStar SNMS host machine is successfully contacted, and the application is running, but no more GUI instances can be started by the GUI server, a pop-up warning message window is displayed, informing you that no more GUIs can be connected to the host machine, and to retry later.

Session time out When you do not use a GUI session for 15 minutes (or another time interval specified by the system administrator), a pop-up window is displayed, stating that the GUI session will time out in 60 seconds and asking if you want to exit WaveStar SNMS at this time. If you choose Yes or make no choice, you are automatically logged out of WaveStar SNMS. If you choose No, the GUI session keeps running and the session timeout clock is reset.

Logging Out of WaveStar SNMS

Introduction

When you log out of WaveStar SNMS, all open windows associated with the current session are closed and the GUI client/server sessions are terminated.

Changes made during GUI session

If you have made changes during the GUI session to certain settings, such as user-specified preferences for the GUI or NE positions, a pop-up window is displayed, asking if you want to save the settings. Choose Yes if you want to save the settings or No if you do not want to save them.

Related information

See [Log Out of WaveStar SNMS](#) in [Chapter 10, Getting Started Concepts](#) for specific instructions on how to log out of WaveStar SNMS.

The WaveStar SNMS Map Window

Introduction

After you have logged into WaveStar SNMS, the Map window is displayed. This window provides access to all of the WaveStar SNMS functions and features.

The Map window

The following figure shows the WaveStar SNMS Map window.

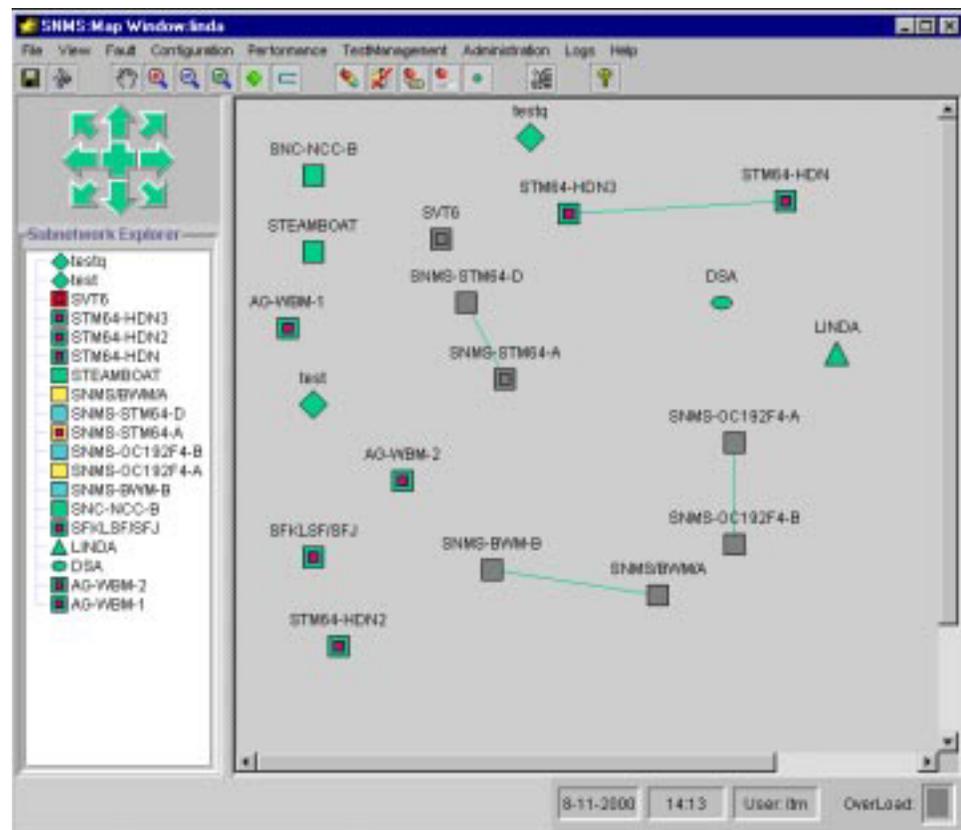


Figure 10-2. The Map Window

Parts of the Map window

The Map window is divided into several different but interrelated areas. It consists of:

- ▶ A main menu bar— located just below the Map window label, it provides access to all the main WaveStar SNMS functions. The main functions are summarized in [The Map window menu](#).
- ▶ A toolbar— a series of buttons just below the main menu bar that control the Map view and provide a shortcut way of accessing some of the WaveStar SNMS functions. For more details, see the [Map Window toolbar](#) section.

- ▶ A status bar—a text bar at the bottom of the window that displays messages related to system activity, the current date/time, and the User ID of the user currently logged in.
- ▶ An Alarm Directional button—an icon used to indicate that an alarm exists in some portion of the map that is currently not visible.
- ▶ The Subnetwork Explorer—an explorer tree that is used to show a textual list of the aggregates and NEs in a subnetwork, along with the subnetwork's hierarchy.
- ▶ The Map pane—the portion of the Map window that provides a graphical representation of the network, displaying the NEs, aggregates, and trails between them.

There are three buttons in the upper-right hand corner, in the label portion of the Map window. These buttons are, from left to right:

- ▶ the window minimize button
- ▶ the window restore button
- ▶ the window close button

The Map window menu

All of the main WaveStar SNMS functions are accessed through the main menu bar on the Map window. When you select a main functional menu (for example, Configuration), this displays an associated drop-down menu, which lists a series of related options for you to select.

The following summarizes each of the main functional menu categories:

- ▶ **File**—this menu provides access to a set of options for saving, restoring, and copying user preferences, constructing a TL1 Macro Builder File, and logging out of WaveStar SNMS.
- ▶ **View**—this menu provides access to a set of options for setting Alarm Severity and Alarm Indications, for viewing the Trail Alarm List, for clearing the Map window status line, for viewing the Alarm Tally window, for zooming in/out of the Map view, and for setting user preferences.
- ▶ **Fault**—this menu provides access to the set of Fault Management options for monitoring alarms and conditions in the network.
- ▶ **Configuration**—this menu provides access to the set of Configuration Management options for viewing and/or modifying Network Element, port, and line parameters.
- ▶ **Performance**—this menu provides access to the set of options for collecting and viewing Performance Monitoring (PM) data.

- ▶ **Test Management**—this menu provides access to a set of functions for creating, viewing, and deleting cross-connection loopbacks for testing purposes.
 - ▶ **Administration**—this menu provides access to the set of options for Security Management and Network Element administration.
 - ▶ **Logs**—this menu provides access to the set of options for viewing logs generated by WaveStar SNMS that track network and EMS performance and activity.
 - ▶ **Help**—this menu provides access to the set of online Help options.
-

Map Window toolbar

These series of buttons allow you to control the Map view and provide a quick way to access many of the frequently used GUI functions. The toolbar, from left to right, provides a:

- Save Preferences button—details about this function are provided in [Save Preferences/Map Positions](#) in [Chapter 1, Getting Started](#)
- Preferences button—details about this function are provided in [Modify User Preferences](#) in [Chapter 1, Getting Started](#)
- Map Pan button—this button is used to enable or disable use of the Map Pan feature to reposition the Map view. Single-click on this toolbar button to enable manual “panning” or maneuvering of the map view in the Map pane. Single-click this toolbar button again to disable Map panning.
- Zoom In button—to zoom into a portion of the Map pane display, position the mouse pointer over this button and single-click the mouse select button.
- Zoom Out button—to display an enlarged view of the portion of the Map pane display, position the mouse pointer over this button and single-click the mouse select button.
- Zoom Reset button—to reset the Map pane view, position the mouse pointer over this button and single-click the mouse select button.
- Add an Aggregate button—details about this function are provided in [Add an Aggregate](#) in [Chapter 6, Traffic Provisioning](#).
- Clear Message Line button—details about this function are provided in [Clearing status messages](#) in this chapter.

- Alarm Severity button—click on this button to change the severity level of active alarms displayed on the Map window. The number and the color of the balls shown on the toolbar button indicate the type and severity of alarms currently being displayed on the Map window. You can also change the alarm severity level of displayed alarms using the Preferences function. For details, see [Modify User Preferences](#) in [Chapter 1, Getting Started](#).
- Audible Alarms button—details about this function are provided in [Audible alarms](#) in this chapter.
- Global Acknowledge button—to acknowledge all active alarms for an NE or aggregate, single-click on this button. A Choose an NE/Aggregate window is displayed. Double-click on the NE or aggregate in the list to select it and click the OK button. All active alarms for the selected NE or aggregate are acknowledged. For more details about this function, refer to [Acknowledge/Unacknowledge All Alarms for an NE](#) and the [Alarm indication and acknowledgement](#) section in the *WaveStar SNMS Maintenance Guide*.
- Global Unacknowledge button—to unacknowledge all active alarms for an NE, single-click on this button. A Choose an NE/Aggregate window is displayed. Double-click on the NE or aggregate in the list to select it and click the OK button. All active alarms for the selected NE or aggregate are unacknowledged. For more details about this function, refer to [Acknowledge/Unacknowledge All Alarms for an NE](#) and the [Alarm indication and acknowledgement](#) section in the *WaveStar SNMS Maintenance Guide*.
- Transient Condition Event Browser—to display a list of transient condition (TC) events that occur in the host's NE network. Transient events do not require a clear message by the NE because they do not change the NE's condition over an extended period of time. For more details about this function, refer to [Display the Transient Condition Event Browser](#) in the *WaveStar SNMS Maintenance Guide*.
- Status Dialog button—details about this function are provided in [Status window](#) in this chapter.
- Help button—single-click on this button to bring up an on-line help window which explains the Map window.

To access a toolbar function, position the mouse pointer over the button and single-click the mouse select button.

Alarm directional button

A monitored network can be larger than can be viewed on the Map pane at any one time and alarms can occur on network objects that are not currently being displayed. The Alarm Directional button, which is located in the left-hand portion of the Map window, above the Subnetwork Explorer, shows the relative location and highest severity alarm of the area not visible. When an alarm exists, an arrow

point is lit with the color of the alarm level, showing the direction to go on the Map pane to view the map item in an alarm state.

The subnetwork explorer

The Subnetwork Explorer, located in the left-hand portion of the Map window, is a tree diagram that shows the content and hierarchical relationship of aggregates and NEs in the portion of the network currently being viewed on the Map pane.

Improving the display of the subnetwork explorer

If the TID/alias of one or more NEs/aggregates in the Explorer is obscured, use the scroll bars below and to the right of the Explorer to view the complete TID/alias of the item. If the display of the Explorer list is still obscured by Map pane, position the mouse pointer on the window bar just to the right of the Explorer. A two-sided arrow is displayed in place of the mouse's arrow pointer. Click and hold the left (select) mouse button, and drag the two-sided arrow symbol to the right until the desired view of the Explorer is obtained. Then, release the mouse button. If the NE TID/alias listing is in complete view, the scroll bars disappear. You can adjust the display by clicking and dragging the bar between the Map pane and the Explorer to the left or right, as desired.

Element labels

NEs and aggregates are labeled by their Target Identifier (TID), by default. The label format can be changed through the Preferences option from the View menu on the Map window menu bar.

Selecting an item

To select an item on the Subnetwork Explorer, position the mouse pointer on the item and click the mouse select button. The selected item is highlighted.

Expanding/collapsing an item

To expand an item (such as an aggregate) in the Subnetwork Explorer, single-click on the plus ("+") sign next to the item.

To collapse the item, single-click on the minus ("-") sign next to the expanded item.

Pop-Up menu

A pop-up menu of WaveStar SNMS functions for the NE or aggregate can be accessed by positioning the mouse pointer and clicking the menu mouse button.

Map pane display

Any change on the Subnetwork Explorer, such as expansion or contraction of an aggregate, causes a corresponding change in the network display on the Map pane.

Related Tasks

[Select an Item in the Subnetwork Explorer in Chapter 1, Getting Started](#) explains how to select an item in the Subnetwork Explorer portion of the Map window.

[Expand or Collapse an Item in the Subnetwork Explorer in Chapter 1, Getting Started](#) explains how to expand or collapse an item (such as an aggregate) in the Subnetwork Explorer portion of the Map window.

The Map pane

The Map pane displays a graphical representation of the network automatically when you log into WaveStar SNMS and the Map window is brought up.

Map pane preferences

The system defaults for different characteristics of the Map pane display, such as NE symbol sizes, shapes, alarm colors, and NE/aggregate labels, can be changed through the Preferences option on the View menu. See [Map preferences](#) for more information on changing characteristics of the Map pane display.

Network elements

Each square on the Map pane represents an NE in your Target Group. A square is the default shape for NEs. The shape used to represent NEs can be changed through the Shapes panel on the Preferences window.

By positioning the mouse pointer over a specific NE symbol on the Map pane, you can display the NE type and alias of the NE. If tooltips help is enabled via the Preferences option, the NE type and alias is displayed as a callout and in the status bar at the bottom of the Map window. If tooltips help is disabled, the NE type and alias are just displayed in the status bar on the Map window.

[Modify User Preferences in Chapter 1, Getting Started](#) explains how to select or change certain characteristics of the Map window display, such as enabling or disabling tooltips help.

Aggregates

The diamond-shaped symbols on the Map pane represent aggregates. The diamond shape is the default for aggregates; this can be changed through the Shapes panel of the Preferences window. Aggregates are collections of NEs that do not necessarily correspond to any physical connectivity or other NE attributes. An aggregate can consist of a group of related NEs, such as a subnetwork, or a group of co-located NEs that are not necessarily in the same subnetwork. An aggregate can be moved under another parent aggregate on the Map pane or Subnetwork Explorer by selecting it and then dragging it to the parent aggregate symbol.

Non-managed devices

A non-managed device is an NE or other telecommunications entity that is part of the network of NEs that communicate with WaveStar SNMS but is not managed by the system. These NE types are treated as “non-managed devices” and appear on the Map pane display as circles (the default shape) about the same size as the squares that represent managed NEs.

Non-managed devices that are discovered are added to the WaveStar SNMS database to complete the network map and to avoid retries by WaveStar SNMS to log into a non-managed device.

Certain non-managed devices can only be manually added using the Add an NE window on the GUI, specifying it as a non-managed device, when WaveStar SNMS is not communicating with the NE. You can also change the NE type to a non-managed device through the Modify an NE window. Once a non-managed device has been added, WaveStar SNMS does not attempt to log into it.

EMS alarm icon

The Map window pane contains an additional square-shaped icon, labeled with the WaveStar SNMS host name, that displays the highest severity alarm present on the host. Although this icon looks similar to the NE symbols, it cannot be included in an aggregate or have trails connected to it.

The EMS Alarm icon receives alarms from various application processes and monitors the communication links between the WaveStar SNMS host and the NEs. It indicates, for example, whether a file system has exceeded capacity, whether there are remote printer problems, or whether the UNIX message queues are getting full. The icon is shown with the machine name of the host that is running the EMS application.

Like NEs and aggregates, colors are used on the EMS Alarm icon to show the current state of the application or its communications links. The default colors are the same as for NEs (see the [Alarms](#) section). The icon shows the current highest severity alarm for the application. Alarm clearing methods used for NEs and aggregates also apply to the EMS application alarms.

DSA icon

If the EMS-based DSA feature has been enabled, the upper right portion of the Map window pane contains an oval-shaped icon, below the EMS Alarm icon, that represents the Directory Services Agent (DSA) providing NE directory information to WaveStar SNMS. An oval shape is the default; it can be changed through the Shapes panel of the Preferences window. This icon is labeled “DSA”. This icon cannot be included in an aggregate or have trails connected to it.

The only pop-up menu function that is available for the DSA icon is the manual DNO feature for Subnetwork Discovery on the DSA.

Like NEs and aggregates, colors are used on the DSA icon to show the current alarm state. The default colors are the same as for NEs (see the [Alarms](#) section). The icon shows the current highest severity alarm for the application. Alarm clearing methods used for NEs and aggregates also apply to the DSA alarms.

Trails

The lines that run between NEs and/or aggregates represent trails. Trails are physical links between NEs or aggregates. If there is more than one trail between two NEs, the phrase “Multiple Trails” is displayed when you position the mouse cursor on the trail line in the Map pane.

Alarms

The color of a map item symbol or trail indicates the level of the most severe active alarm. The default alarm colors for the Map pane display are:

Alarm Color (default)	Alarm Severity Level (SONET)	Alarm Severity Level (SDH)
Red	Critical	Prompt
Yellow	Major	Deferred
Cyan	Minor	
Gray	Throttled	
Green	No Active Alarms	
Magenta	Loss of Communications	
White	Not Alarmed state	Not Alarmed state

The center of an NE symbol may show a different color than the border of an NE/aggregate symbol. When more than one alarm type has occurred, the NE symbol shows the highest severity alarm that has occurred. Communication alarms are always top priority and always color the center of the NE symbol; the border shows the next highest severity alarm. If alarms are being throttled for an NE, the throttled alarm color (gray) is always shown in the center of the symbol, with the color indicating the severity of the last occurring alarm shown in the border. If automatic alarm throttling is enabled, the alarm throttling color is not displayed until the alarm throttling threshold has been passed.

When the color of an NE is white on the Map window (the default color), this indicates that the NE is in a “Not Alarmed” state, or has received one or more Standing Condition (SC) events which require clearing by the NE. This can occur, for example, during an NE data restore operation (see [Restore NE Data](#) in [Chapter 8, Software Upgrade](#) for more details). SC events which occur against the NE are counted in the alarm tallies on the Alarm Notification window. When

the SC event has been cleared by the NE, the color of the NE returns to green, indicating that there are not active alarms present and the NE is communicating.

The default Alarm display colors shown in the above table can be modified through the Preferences option of the View menu on the Map window main menu bar. For more details, see [Modify User Preferences](#) in [Chapter 1, Getting Started](#).

A flashing (blinking) NE symbol indicates that there are one or more unacknowledged alarms against that NE or aggregate. See the [Alarm indication and acknowledgement](#) section for more details about alarm acknowledgement/unacknowledgement.

Audible alarms

A speaker-shaped symbol in the middle of the toolbar on the Map window indicates whether the Audible Alarm feature is enabled or disabled. This symbol has a slash through it if the Audible Alarm feature is disabled. To enable the Audible Alarms feature, click on the symbol. The slash is removed from the symbol. To disable the Audible Alarm feature, click on the symbol again. A slash appears on the speaker-shaped symbol.

The Audible Alarm feature can also be enabled or disabled by selecting **Fault** from the main menu bar on the Map window and then selecting **Audible** from the displayed sub-menu. If the Audible Alarm feature is currently enabled, selecting **Audible** disables the feature. If the Audible Alarm feature is currently disabled, selecting **Audible** enables the feature.

When the Audible Alarm feature is enabled, an audible sound is triggered each time a new alarm occurs on the network. Once triggered, the audible alarm will sound for a short time and then repeat until the alarm is cleared or it is silenced through the GUI. The sound characteristics of the audible alarm correspond to the most severe prevailing alarm condition (Critical, Major, Minor). A Critical alarm beeps three times. A Major Alarm beeps twice. A Minor Alarm beeps once. See the [Audible alarms/events](#) section for more details about the Audible Alarms feature.

Selecting NEs and aggregates

To select a single NE or aggregate on the Map pane, position the mouse pointer over the NE or aggregate icon and click the select mouse button.

To select one or more NEs or aggregates on the Map pane:

1. Position the mouse pointer over a portion of the background adjacent to the items to be selected.

2. Click the mouse select button and drag the mouse pointer. As you drag the mouse pointer, an outlined box appears over the selected area. As items in the Map pane are selected, they change color. Release the mouse select button. The items are selected.

To deselect a selected item in the Map pane, position the mouse pointer over the item and single-click the mouse select button. To deselect a group of items, position the mouse pointer within the boxed region and single-click the mouse select button. Any item in the box that is already selected becomes deselected.

Pop-Up menus

A pop-up menu of WaveStar SNMS functions for the NE or aggregate can be accessed by positioning the mouse pointer on the Map pane icon and clicking the menu mouse button.

Moving NEs and aggregates

To move a single NE or aggregate on the Map pane:

1. Position the mouse pointer over the icon to move.
2. Press and hold the select mouse button.
3. Drag the icon to the new position.
4. Release the select mouse button.

To move a group of NEs or aggregates on the Map pane:

1. Select a group of NEs or aggregates by positioning the mouse pointer in an area of the background adjacent to the items, clicking the left (select) mouse button and dragging the mouse pointer (a solid box appears) to surround the items, and release the mouse select button. The chosen items are highlighted.
2. Position the mouse pointer on one of the selected items. Press and hold the left (select) mouse button.
3. Drag the icons to the new position.
4. Release the left (select) mouse button.

Expanding and collapsing aggregates

To expand an aggregate and show its member NEs on the Map pane, position the mouse pointer over the aggregate symbol and click the left (select) mouse button to select the aggregate. Then, click the right (menu) mouse button. A pop-up menu is displayed. Select **Expand** from the displayed pop-up menu. The aggregate is expanded to show the member NEs on the Map pane.

To collapse the expanded aggregate, select one of the member NEs and double-click on it. The aggregate is collapsed and the aggregate symbol replaces the member NEs on the Map pane display.

Moving an NE to the TOP aggregate level

To move an NE out of an aggregate to the TOP level (which includes all NEs), make sure the aggregate is expanded and then select the NE. Once the NE is selected, click the right (menu) mouse button to display a pop-up menu. Choose **Return to TOP**. The NE is brought to the TOP aggregate level and is taken out of the aggregate.

Zooming the Map view

The GUI allows you to zoom into (enlarge) a portion of the network on the Map pane to focus on a few NEs or aggregates, or zoom out of the Map pane to show more of the network. The Zoom functions are available through the View menu on the Map window main menu bar.

See [Zoom the Map View](#) in [Chapter 1, Getting Started](#) for specific instructions on zooming the Map view.

Related tasks

[Select an Item in the Map Pane](#) in [Chapter 1, Getting Started](#) explains how to select a single item or group of items on the Map pane portion of the Map window.

[Move an Item on the Map Pane](#) in [Chapter 1, Getting Started](#) explains how to move a single item or group of items on the Map pane portion of the Map window.

[Expand or Collapse an Item in the Subnetwork Explorer](#) in [Chapter 1, Getting Started](#) explains how to expand or collapse an aggregate on the Map pane portion of the Map window.

[Zoom the Map View](#) in [Chapter 1, Getting Started](#) explains how to zoom the Map pane view in or out on the Map window.

Overload indicator WaveStar SNMS has an Overload Indicator box, located in the bottom right hand corner of the Map window, that indicates when the system is in an overload condition.

An overload condition occurs when the number of alarm messages generated by an NE, as during an alarm storm, or high performance monitoring activity exceeds the capacity of the system to process these type of messages. When this happens, the Overload Controller process in the system issues a notification that the system is in overload and suspends the following activities:

- the processing of Threshold Crossing Alerts (TCAs) during an alarm storm
- the updating of the Transient Condition Event Browser
- collection of new PM data and display of historical PM data

The system also suspends the processing of certain user-initiated transactions that involve multiple data transfers, such as NE data backups, software downloads, DNOs, data transfers to other OSs and periodic maintenance functions such as database and file purges.

The Overload Indicator box on the Map window provides a visual indication of when the system is in an overload condition.

The following figure shows the Overload Indicator box on the Map window.

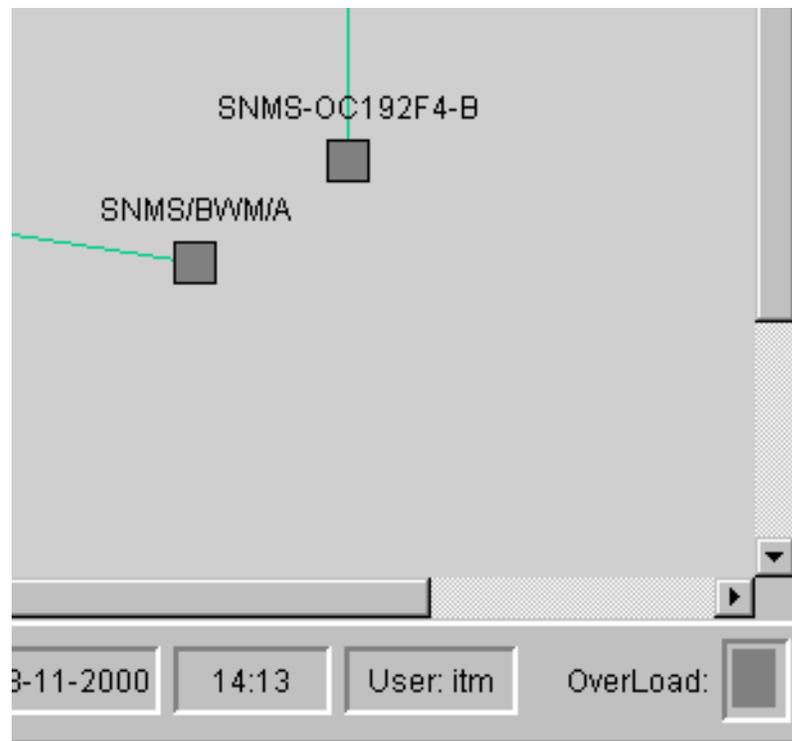


Figure 10-3. Overload Indicator Box on Map Window

The definition of when the system is in an overload condition is determined by the setting of certain limits for the Fault Management module. See the *WaveStar SNMS Maintenance Guide* for details about these limits for Fault Management processing of alarms/TCAs.

When the system is no longer in an overload condition, it resumes processing of alarms and user-specified transactions (both on-demand and scheduled).

Related information

For more information about how WaveStar SNMS behaves during high load conditions, see the following sections:

- ▶ [Scheduling Tasks](#) in [Chapter 17, Software Upgrade Concepts](#)
- ▶ [Dynamic Network Operations](#) in [Chapter 11, Management Communications Setup Concepts](#)
- ▶ [Software Management](#) in [Chapter 17, Software Upgrade Concepts](#)

Finding a Network Element

WaveStar SNMS assists you in locating an NE on the Map window if you cannot find it on the Map pane display or Subnetwork Explorer.

To find an NE:

1. Select **View** from the main menu bar on the Map window. A sub-menu is displayed.
2. Select **Find an NE** from the displayed sub-menu. The Find an NE window is displayed.
3. Enter the TID and/or alias of the NE.
4. Click the OK or Apply button.

The Map pane display is repositioned to show the NE and the NE is selected in the Map pane and Subnetwork Explorer. If more than one match is found, a list of network elements that match the criteria is displayed. If you select one of the NEs from the displayed list, the NE is highlighted in the Subnetwork Explorer and the Map pane. If the NE is contained in an unexpanded aggregate, the aggregate is expanded and the NE is highlighted in the Map pane.

Related tasks

[Find a Network Element](#) in [Chapter 1, Getting Started](#) reviews how to use the Find an NE function as a shortcut way to locate NEs on the Map window.

Clearing status messages

Status messages that are displayed in the status bar on the Map window can be cleared at any time.

To clear the status bar message display, select **View** from the main menu bar on the Map window and then select **Clear Status Line** from the View menu. The

message area in the status bar is cleared. The Status line can also be cleared by using the Clear Message Line button on the Map window toolbar.

Related tasks

[Clear Status Messages](#) in [Chapter 1, Getting Started](#) reviews how to clear status messages from the status bar portion of the Map window.

Map preferences

There are system defaults for how map items are displayed. WaveStar SNMS allows you to change certain characteristics of the Map pane display, such as NE size, NE labels, NE/aggregate shapes, and alarm colors, to suit your own needs. The appearance of Map items on the Map pane can be changed through the Preferences option on the View menu. Preferences are stored on a per-user basis.

The Map Preferences window can be accessed through the View options menu on the main menu bar of the Map window or by clicking the Map Preferences button on the Map window toolbar.

[Modify User Preferences](#) in [Chapter 1, Getting Started](#) explains how to change user preferences for the Map window display.

The Preferences window has six categories:

Nodes & Lines	Allows you to choose NE size and thickness of trail lines between NEs
Labels	Allows you to choose the size, content, and alignment of Map item labels
Colors	Allows you to choose colors associated with alarms and cross-connections
Shapes	Allows you to choose the shapes used for Map items
Fault	Allows you to set preferences associated with how alarms are displayed in the Map and Alarm Notification windows. You can select the severity level of alarms displayed and the definition of alarm levels as Critical/Major/Minor (SONET) or Prompt/Deferred/Information (No Alarm) (SDH).
Other	Allows you to turn tooltips on and off, to set the date format for items in the Map, alarm lists, and tallies to mm-dd-yyyy or dd-mm-yyyy format, and to set the display of Bidirectional Line Switched Ring (BLSR) Protected Port Groups on the Cross-Connect View window to be singly or in pairs (Note: the BLSR display option is currently not supported).

Saving and restoring user preferences

Your chosen preferences for the Map pane display can be saved or restored for each time you log into WaveStar SNMS and bring up the Map window.

Save Preferences/Map Positions in Chapter 1, Getting Started explains how to save user preferences.

Restore Preferences/Map Positions in Chapter 1, Getting Started explains how to restore previously saved user preferences.

Copying user preferences

Map display preferences can be copied from another user.

Copy Preferences/Map Positions in Chapter 1, Getting Started describes how to copy user preferences and/or Map positions from another user.

Restoring defaults for the Map display

User defaults for the Map window display can be restored from the View Preferences window by clicking the Get Defaults button in the window and then applying them to the current GUI session or saving them. See Restore Preferences/Map Positions in Chapter 1, Getting Started for complete instructions on setting user preferences for the Map display.

Saving the Map view

WaveStar SNMS allows you to save the positions of NEs and aggregates on the Map pane and/or user preferences for characteristics of the Map display, such as node size, labels, line size, and alarm colors. You can also restore previously saved settings or copy settings from another user. Map positions and preferences are saved on a per-user basis.

Save Preferences/Map Positions in Chapter 1, Getting Started describes how to save user preferences and/or Map positions.

User preferences can also be saved directly from the Preferences window by clicking the Save button in the window. See Modify User Preferences in Chapter 1, Getting Started for complete instructions on setting user preferences for the Map display.

Restore Preferences/Map Positions in Chapter 1, Getting Started describes how to restore previously saved user preferences and/or Map positions.

Printing the Map window

You can print one or more copies of the Map window display. To print the Map window, choose **File** from the main menu bar. The File sub-menu is displayed. Choose **Print** from the File sub-menu. A pop-up Print window is displayed, which allows you to select the printer destination, number of copies to print, and other

print parameters. When you are finished making your selections, click the OK button on the Print pop-up window. The copy(ies) of the Map window displayed is printed to the selected printer destination.

Status window

WaveStar SNMS provides a Status window, which allows you to check on the status of on-demand functions you requested to be performed by the system, such as a manual DNO on an NE or manual addition of an NE. The status dialog window is also displayed after the completion of certain GUI functions.

The Status window can be accessed at any time, by clicking the Status Dialog toolbar button on the Map window toolbar, or by selecting **View** from the main menu bar on the Map window, and then selecting **Status Window** from the View sub-menu.

The following figure shows an example of the Status Dialog window.

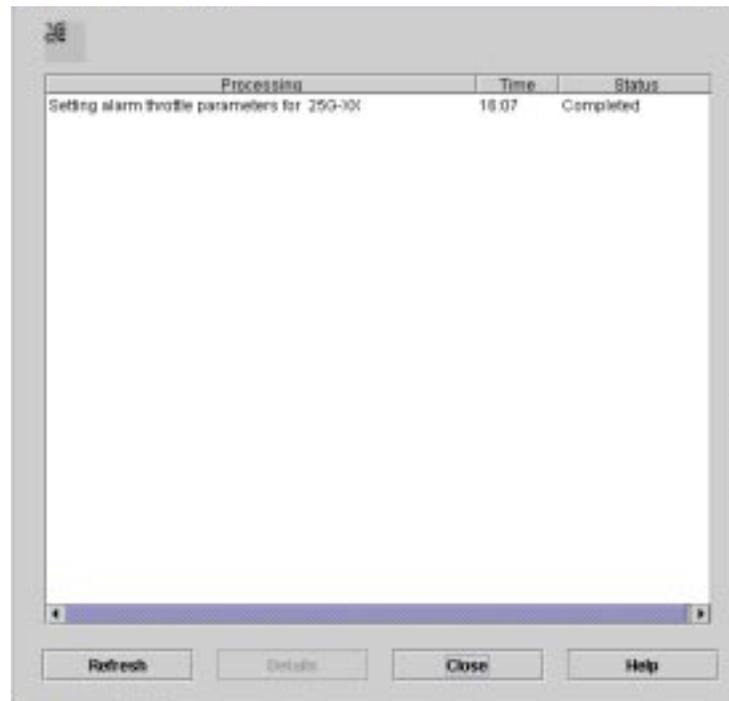


Figure 10-4. Example of Status Window

The Status window is a single table with three columns:

- Processing—this column contains a text string which describes the function that is being performed.
- Time—this column indicates the host time, in hours/minutes, that the function was requested.
- Status—this column indicates the status of the requested function. The status of a function is labeled as shown in the following table:

Status	Meaning
Working	A simple operation is still in progress. When the request has finished processing, the status of the operation changes to show the result, as Completed, Incomplete, or Failed.
Completed	The function has completed successfully. If it is a multi-step function, such as a backup or restore, the percentage of the function completed successfully is shown. Example: 25%
Incomplete	The function is still in the process of being completed, or the function did not complete due to non-communicating NE or another problem.
Failed	The function did not complete successfully due to some problem or error.
Aborted	The function was aborted by the user.

Items on the Status window are shown in the order requested, with the most recent function requested shown at the top of the list. Successfully completed items are removed from the list when you click the Close or Refresh button on the window. Click the Close button to close the Status window.

Many of the functions in WaveStar SNMS can be performed on a single NE or a group of NEs, including aggregates. To view the status of a function being performed on a group of NEs, double-click on the row in the Status Dialog window table that refers to the aggregate or group of NEs. A second window is displayed, which shows the status of operations for individual NEs in the aggregate or group.

Help

WaveStar SNMS provides various types of online information to assist you in using the system's functions and features. The types of help available are:

- Tooltips help
- Window help
- Online documentation
- Product information

Tooltips help

Tooltips help assists you in identifying a toolbar button on the Map window toolbar, the function of a window button, or the alias and NE type of a network element on the Map window pane.

To identify a toolbar button, window button, or network element, position the mouse button on the item. The item is identified either by a message in the status bar or a message callout to the right of the item.

Tooltip help can be enabled or disabled through the Preferences option accessible through either the Map window toolbar or through the **View** option on the main menu. See [Modify User Preferences](#) in [Chapter 1, Getting Started](#) for instructions on how to enable/disable tooltip help.

Window help

Window help provides specific information about the window's purpose or function.

Window help is accessed by clicking the Help button on any functional window in WaveStar SNMS.

On-line documentation

Complete on-line versions of the *Provisioning Guide*, *Maintenance Guide*, *Administration Guide*, and *Installation Guide* are available to view online through Adobe Acrobat Reader.

An on-line version of any of the WaveStar SNMS documents is accessed by selecting **Help** from the main menu bar on the Map window and then selecting **the appropriate Guide** from the Help sub-menu.

Product information

General information about WaveStar SNMS, including the full product name, copyright information, the product release number, and other related information is available at any time from a pop-up window that is accessed by selecting **Help** from the main menu bar on the Map window and then selecting **About the EMS** from the Help sub-menu.

To close the Product Information window, click the OK button.

Network Element Explorer

Introduction

The Network Element Explorer is a tool displayed on the Port Provisioning, Cross-Connections, and Equipment Configuration windows that provides a graphical, step-down, hierarchical view of the equipment to be provisioned. The Network Element Explorer consists of a tree diagram that shows the configurable hardware that comprises the Network Element, and the relationship between each hardware component.

Using the network element explorer

The purpose of the Network Element Explorer is to graphically display the desired hardware component and then select it for provisioning purposes.

Equipment hierarchy

The following simple diagram shows the possible equipment levels that can be displayed and configured on the Network Element Explorer.

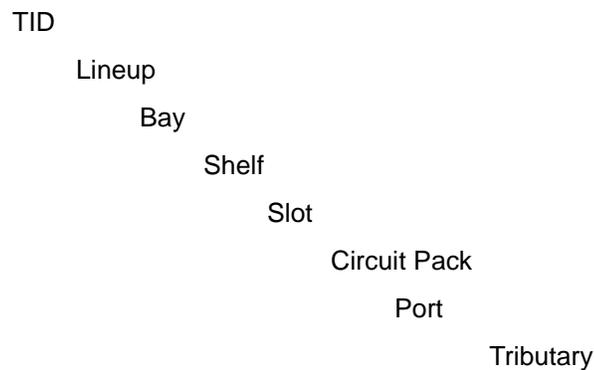


Figure 10-5. Equipment Hierarchy on Network Element Explorer

The content and relationship of equipment shown on the explorer varies by NE type. Not every NE contains every level of the hierarchy. Generally, access to a shelf provides access to circuit packs that exist on the shelf. Ports exist on circuit packs, which are placed in slots. Slots are in shelves, shelves are in bays, and bays are in NEs.

Selecting an item

To select an equipment component on the Network Element Explorer, position the mouse pointer on the equipment component and click the mouse select button. The selected item is highlighted.

**Expanding/
collapsing an
equipment
component level**

There are two ways of expanding or collapsing an equipment component level on the Network Element Explorer:

1. A select mouse button click on the plus (“+”) or minus (“-”) sign causes the branch associated with the component level to expand (“+”) or collapse (“-”).
 2. A double-click on any equipment level selects it and expands to show the component parts. For example, if you double-click on a shelf in the explorer, the diagram expands to show the associated slots, by number.
 3. A double-click on the next higher component collapses it back to that level, or just single-click on the minus (-) sign of the next higher component.
-

**Equipment view
display**

Any change on the Network Element Explorer, such as expansion or collapse of the equipment level, causes a corresponding change on the Equipment View window.

Window Buttons

Types of window buttons

All of the windows in WaveStar SNMS from which you perform a function have standard buttons that work the same way regardless of the function.

The following table lists the standard window buttons and their function on windows.

Table 10-1. Standard Window Buttons

Button	Function
OK	Accepts input on the window, validates the input, initiates the requested operation, and closes the window.
Apply	Accepts input on the window, validates the input, initiates the requested operation, but leaves the window open.
Cancel	Cancels the operation and dismisses the window. Any insertions or changes made during the use of the window are not saved.
Help	Accesses online help for information about a particular window, function, feature, or task.
Close	Closes the window without performing an operation.

Greyed-out buttons

If a button is greyed out (dimmed) on a window, it means that a function is not available. In some cases, an item has to be selected or specified on the window before the dimmed button is activated.

Exclusive choice buttons

Exclusive choice buttons in WaveStar SNMS let you choose one item or setting from a list of two or more settings. When you change an exclusive choice setting, the previous setting is automatically deactivated.

Exclusive choice buttons are also called "radio buttons" because they work like car radio preset buttons that let you change stations with the press of a button.

To change an exclusive choice setting, click the mouse select button with the pointer positioned on the button. Your choice is activated when the button is darkened.

Example: exclusive choice buttons

The following figure shows a window where one of the exclusive choices (radio buttons) has been selected.



Figure 10-6. Example of Exclusive Choice Button Selection

Push buttons

Some of the function windows in WaveStar SNMS have push buttons that are used to transfer one or more items (such as NEs) between lists on the window.

The following table shows each push button label, its name, and its purpose.

**Push buttons
(cont.)****Table 10-2. Push Buttons on List Windows**

Push Button Label	Push Button Name	Purpose
>	Push Right	When this button is clicked, the selected item is transferred to the list on the right and removed from the list on the left
>>	Push All Right	When this button is clicked, all items on the corresponding list on the left are transferred to the corresponding list on the right
<	Push Left	When this button is clicked, the selected item is transferred to the list on the left and removed from the list on the right
<<	Push All Left	When this button is clicked, all the items on the corresponding list on the right are transferred to the corresponding list on the left

Example: push buttons

The following figure shows a sample window where push buttons are used to transfer items between lists.

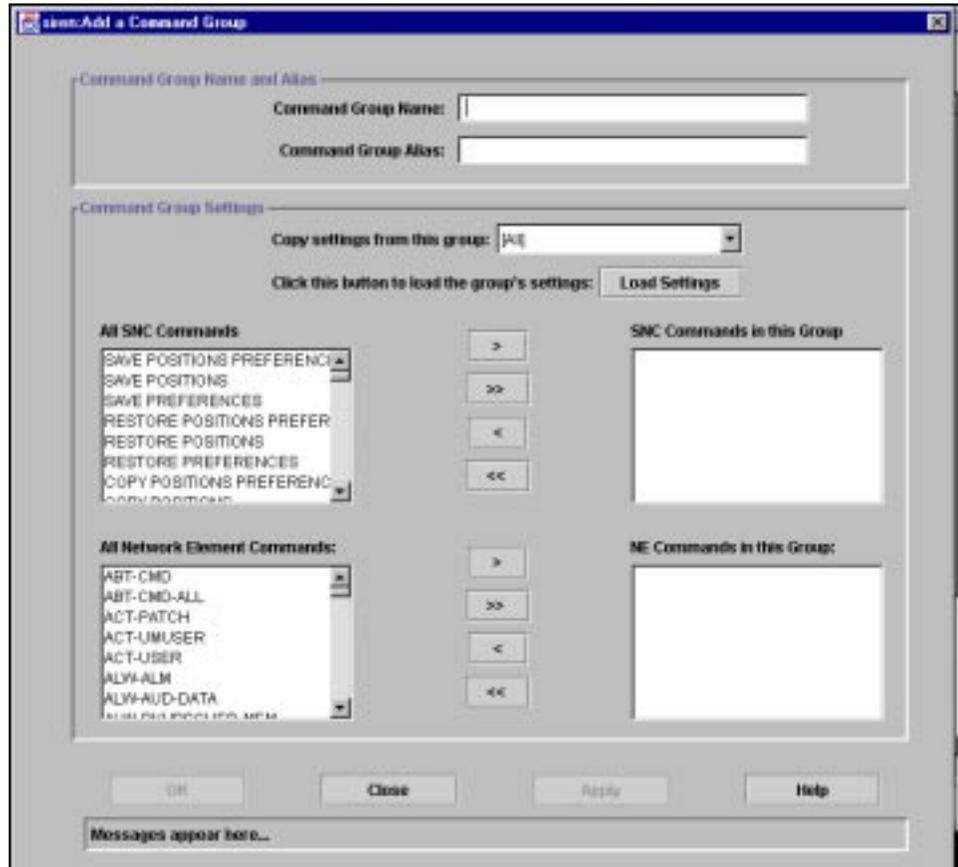


Figure 10-7. Example of Push Buttons on Window

Using Lists

Introduction

A majority of the WaveStar SNMS functions are performed by picking a function to perform (for example, Cut-Through) and then selecting the item (such as a specific NE) on which to perform the function, from a list of similar items.

To select an item from a list, position the mouse pointer over the item(s) and click the select mouse button. The selected item(s) is highlighted. On the type-ahead lists, it may be necessary to double-click the select mouse button to select the item and perform the operation.

WaveStar SNMS provides different methods of locating items on lists to narrow the search to only the item(s) you want. These methods are:

- ▶ Scrollable lists
- ▶ A filtering/sorting function
- ▶ A type ahead field

Scrollable lists

When a window in WaveStar SNMS cannot display all of the information available to you, the information is presented in a scrollable list. The information that you cannot see is available by paging through the scrollable list.

**Example:
scrollable list
window**

The following figure shows an example of a scrollable list window in WaveStar SNMS.

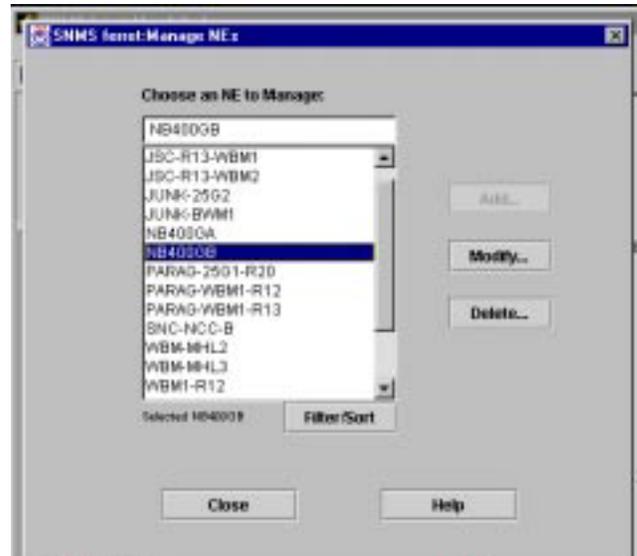


Figure 10-8. Example of a Scrollable List

**Using a scrollable
list**

The vertical bar on the right side of the window is the scroll bar. The scroll bar consists of an up-arrow, a down-arrow, and an elevator box between the two arrows. The scroll bar on the window works as follows:

To:	Do this:
Display the next page	Put the mouse pointer under the elevator box and click the mouse select button.
Display the next line	Put the mouse pointer on the down-arrow and click the mouse select button.
Display the previous page	Put the mouse pointer above the elevator box and click the mouse select button.

To:	Do this:
Display the previous line	Put the mouse pointer on the up-arrow and click the mouse select button.
Display the bottom of the list	Put the mouse pointer on the elevator box, hold down the mouse select button, move the mouse downward (dragging the elevator box to the bottom of the scroll bar), and release the mouse select button.
Display the top of the list	Put the mouse pointer on the elevator box, hold down the mouse select button, drag the elevator box to the top of the scroll bar, and release the mouse select button.

You can select a single item from a scrollable list by positioning the mouse pointer over the item and clicking the mouse select button. This causes the item to become highlighted and indicates your selection.

Filtering and sorting items

WaveStar SNMS has a filter/sort function to further narrow a list to only the item(s) you want. This function allows you to:

- ◆ Narrow a list by filtering out all items on the list that do not match all or part of the filename, NE/aggregate name, TID, or alias you supply.
- ◆ Sort a list by placing the items in ascending or descending order.

WaveStar SNMS allows you to filter and/or sort the list. Many of the scrollable list windows in WaveStar SNMS provide this function.

Example: filter/sort function

The following figure shows an example of a scrollable list window with the filter/sort function.

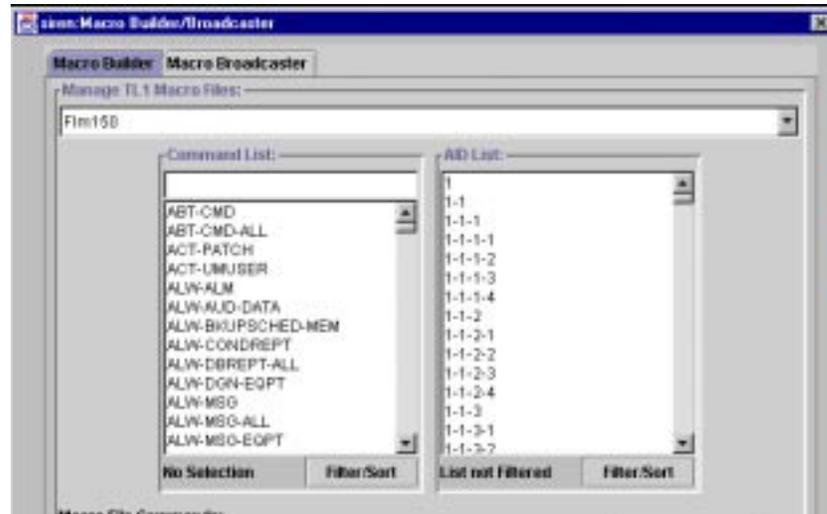


Figure 10-9. Example of Scrollable List Window with Filter/Sort Function

When you click the Filter/Sort button on a list window, a Filter and Sort Options window is displayed to allow you to filter and/or sort the list according to the criteria you specify.

Filter/sort window

The following figure shows a sample Filter and Sort Options window.

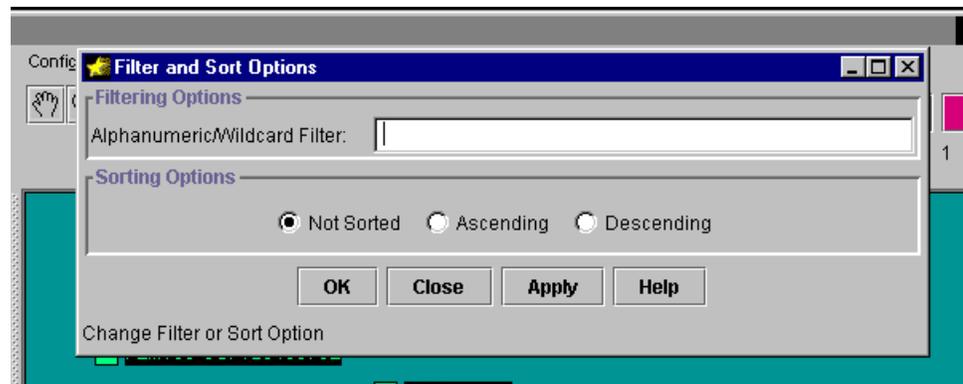


Figure 10-10. Example of Filter/Sort Window

You would fill in the following fields as needed:

- **Alphanumeric/Wildcard Filter**—This is a text field for entering all or part of the name/label to narrow the list to only those items that match these criteria. An asterisk (*) can be used as a wildcard character to match one or more characters in the name or label. Use the Backspace key to erase what you have entered in this field.
- **Sorting Option buttons**—These exclusive choice buttons are used to determine the sort order of the list. Click on the Ascending button to display the list in ascending order. Click on the Descending button to display the list in descending order. Click on the Not Sorted button to leave the list as it is.
- **OK**—After making your filtering/sorting choices, click on the OK button to apply your criteria to the list and close the Filter/Sort window.
- **Close**—Click on this button to close the window without applying any filtering/sort criteria to the list.
- **Apply**—After making your filtering/sorting choices, click the Apply button to apply your criteria to the list and leave the Filter and Sort Options window open.
- **Help**—Click on the Help button to obtain online help for the Filter and Sort Options window.

Type ahead field

Many of the list windows have a “type ahead” field. This is a text field which is usually located above the first item in the list. As you start to type the item name or label in this field, the system automatically selects an item from the list that matches what you have typed. An asterisk (*) can be used in the type ahead field as a wildcard character to match one or more characters of the item name or label. You can also enter the entire name of the item in the type ahead field to expedite the search and selection of an item on the list.

If you select an item from the list, the name of the item appears in the type ahead field.

The status bar on the list window indicates whether the list has also been filtered.

Example: type ahead list

The following figure shows an example of a list where the type ahead field has been used to expedite the search for an item on the list.

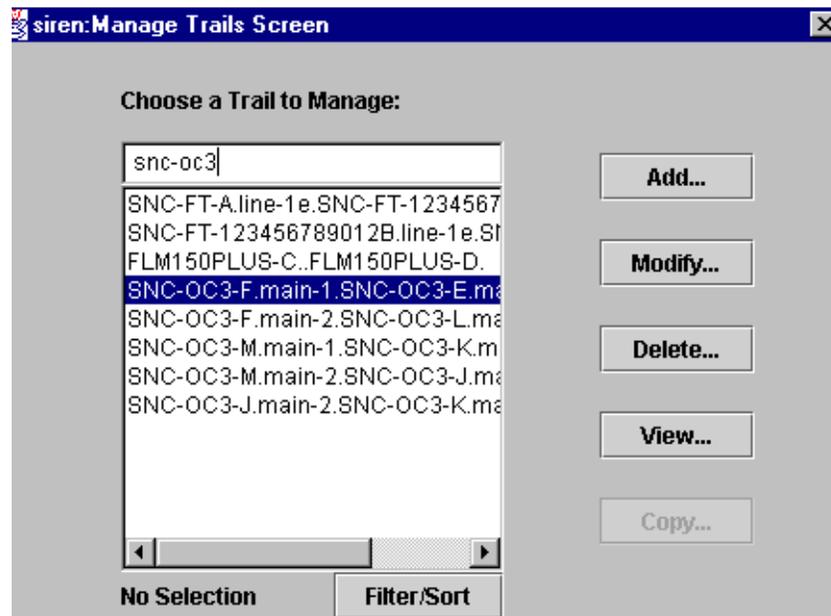


Figure 10-11. Example of Type Ahead List

Sorting Tables

Introduction

Some of the data that WaveStar SNMS retrieves from its managed NEs, such as alarm data, is displayed in multi-column tables. Data is displayed in table format on many windows, including the:

- Alarm Summary
- Trail Alarm Summary
- Alarm List
- Trail Alarm List
- Scheduled Activity Lists

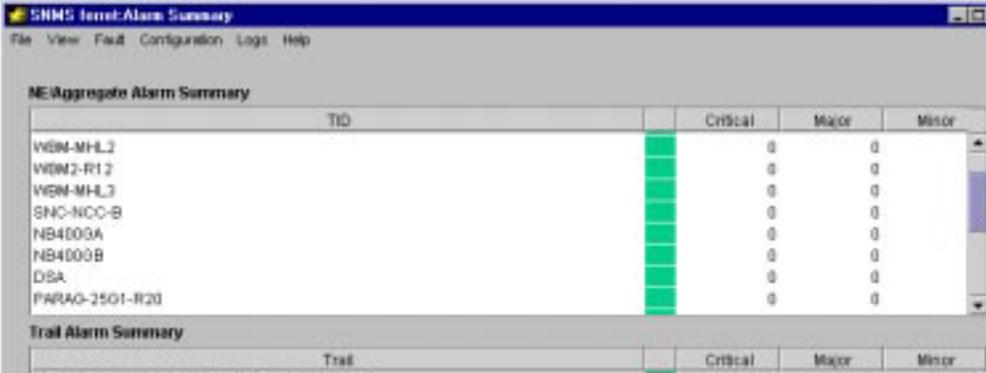
WaveStar SNMS allows you to sort and display data displayed in tables in the exact order that you need it.

Moving and dragging table columns

To change the display order of columns in a table, position the mouse pointer on a column heading, click and hold the select (left) mouse button, and drag the column to a different position in the table.

Example: sorting a table

The following figure shows a sample Alarm Summary window where you may want to change the order of the alarm summary data.



NE Aggregate Alarm Summary			
TID	Critical	Major	Minor
WBN-MHL2	0	0	0
WBN2-R12	0	0	0
WBN-MHL3	0	0	0
SNC-NCC-B	0	0	0
NB4009A	0	0	0
NB4009B	0	0	0
DSA	0	0	0
PARAQ-25G1-R20	0	0	0

Trail Alarm Summary			
Trail	Critical	Major	Minor

Figure 10-12. Example of Alarm Summary Window

The default order for data on the Alarm Summary window to be displayed is by Critical, Major, and Minor alarms. To change the sort order in which alarm data is displayed on this type of window, you would click on one of the column headers or select the Sort option on the View sub-menu for the Alarm Summary window.

Either action brings up a Sort window. The following figure shows an example of the Sort window.

Example: sort window

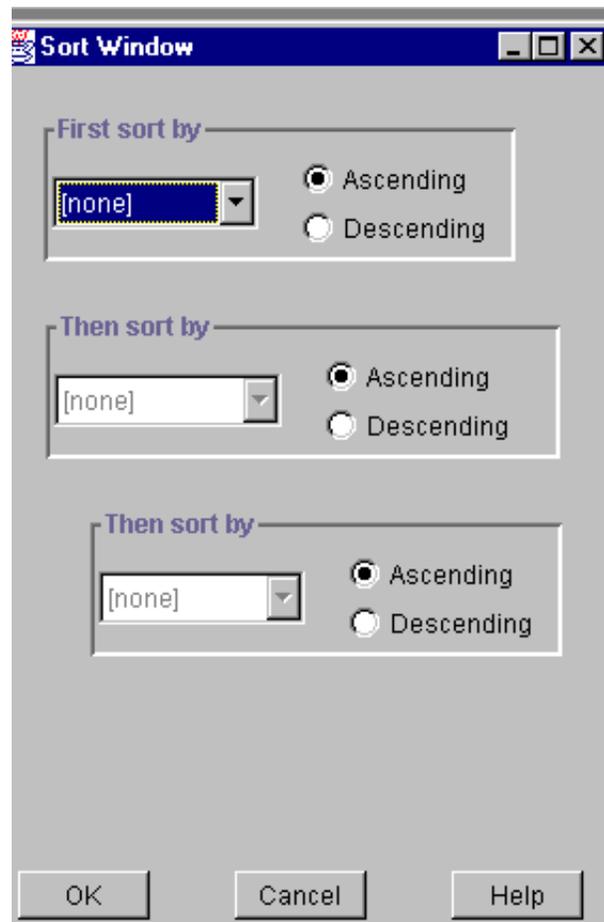


Figure 10-13. Example of Sort Window

The Sort window allows you to select three categories from the table list on which to sort. Each category consists of a drop-down list that contains all of the column names (in column order) from the table list on which to sort, and two exclusive choice radio buttons, labeled Ascending and Descending.

To sort a table, choose a column name from the “First sort by” drop-down list. The item you select becomes the primary sort key for the table list. Then, click the Ascending radio button next to the first drop-down list to sort the table by this item in ascending order or click the Descending radio button to sort by this item in descending order. Ascending order is the default.

To further sort the table data, choose an item from the first **Then Sort By** drop down list and then the second **Then Sort By** drop down list. Choose **none** from the drop down list to indicate no sort at this level. For each level, choose whether to sort the item in Ascending or Descending order. Ascending order is the default.

Cut-Through

Overview

In order for the user to execute NE native commands that may not be explicitly supported by a particular release of WaveStar SNMS, a cut-through capability has been developed. In addition, with the command builder and broadcaster, TL1 cut-through gives the user powerful capabilities. See [Perform Cut-Through Commands](#), [Build TL1 Commands](#), and [Broadcast TL1 Commands](#) in [Chapter 1, Getting Started](#) for instructions on performing TL1 functions. Two additional points to remember are:

- ▶ WaveStar SNMS allows the user access to only the NEs and associated commands defined by the Target and Command groups for which the user is validated.
- ▶ Not all TL1 commands displayed in the Cut-Through window can be executed. The capability to execute commands depends on the subnetwork equipment. If the equipment uses CMISE, such as the OLS 400G, Cut-Through is not available.

Instructions about actual TL1 commands are beyond the scope of this user documentation (which focuses on the GUI and its administration), but see your Lucent Technologies account representative for operations guides that contain complete information about all TL1 commands.

Initiating an NE cut-through session

The NE Cut-Through window allows you to access and communicate with an NE, using the TL1 command set. You can submit TL1 cut-through commands to the NE directly. (For specific NE command information, see the appropriate NE documentation.)

Commands such as *rlogin* and *act-user* are disabled, but they are not needed since WaveStar SNMS is already logged into the NEs.

Related information

See [Perform Cut-Through Commands](#) in [Chapter 1, Getting Started](#) for how to initiate and perform cut-through.

**Building TL1
commands**

The TL1 macro builder allows you to create a TL1 command file to assist in performing maintenance and provisioning activities on one or more NEs (such as download of standard configuration), without having to manually enter a set of TL1 command strings. This feature both reduces the amount of manual entry needed to create TL1 command strings and allows for the reuse, at a later time, of the commands built on the same NE or other NEs of the same type.

Related information

See [Build TL1 Commands](#) in [Chapter 1, Getting Started](#) for how to build TL1 commands.

**Broadcasting TL1
commands to NEs**

The broadcasting TL1 commands feature allows you to perform maintenance and provisioning activities (such as download of standard configuration) on one or more NEs, utilizing the TL1 command files created by the TL1 macro builder feature, and broadcasting those files to multiple NEs of the same type. This feature saves you time by performing similar tasks on multiple NEs in one step, and by reducing the manual entry required in the creation of TL1 command strings.

Related information

See [Broadcast TL1 Commands](#) in [Chapter 1, Getting Started](#) for how to broadcast TL1 commands.

Equipment Display

Overview

Different NE types are of varying complexity and configurability, ranging from single-shelf NEs at a single location to multi-bay and multi-shelf NEs that are flexible in their arrangements and may be distributed between rooms and floors of a central office or even distributed across central office locations and remote sites. The equipment window gives a set of hierarchically arranged equipment views. The shelf view is the lowest level view. There may also be a system view and a bay/line-up view, depending on how large and complex the NE is. The Equipment Configuration window also allows you to “drill down” into the NE equipment hierarchy.

Equipment graphical display

To graphically depict the varying NE types effectively, WaveStar SNMS decomposes them into different numbers of hierarchically arranged graphical displays. For example, with a single-shelf system only a single display at the shelf level is needed, and this shelf level display is also a system-level display. WaveStar SNMS displays the bay/shelf equipment hierarchy for all types of NEs. On the other hand, a system such as the WaveStar BWM is composed of multiple bays containing multiple shelves, and the bays are typically arranged into multiple aisles. To effectively depict the WaveStar BWM requires several levels of display: system (one or more line-ups), line-ups (one or more adjacent bays, with each bay containing one to three shelves), and shelves (each containing many circuit packs).

LambdaRouter equipment configuration

The LambdaRouter is an optical cross-connect (OXC) product that can contain two or three bays. The two-bay layout contains one Optical Interface (OXI/OXF) bay and one System Controller (SYSCTL) bay and supports a 128-channel configuration. The three-bay layout contains two OXI/OXF bays and an SYSCTL bay and supports a 256-channel configuration. The OXI/OXF bay houses the OXI shelf, the HVDAC shelf, and the Switch shelf. The SYSCTL bay is equipped with a single SYSCTL shelf. The OXI shelf handles incoming and outgoing customer traffic and contains the OXI and OSWIC circuit packs. The HVDAC shelf supports the HVDAC circuit packs that supply the control voltages required to steer the individual mirrors found in the Switch shelf's mirror arrays. The Switch shelf is an optical switch fabric. Information about bays in the LambdaRouter are inferred from the System Controller information (two-bay or three bay layout) returned by the NE. WaveStar SNMS The two-bay layout contains one Switch shelf and one Optical Interface shelf. The three-bay configuration contains two Switch Fabric shelves and two Optical Interface shelves. Also, determination of whether a circuit pack in the Optical Interface shelf is an OXI or OSWIC circuit pack is inferred from the prefix of the entity's AID retrieved from the NE by WaveStar SNMS.

Circuit packs on equipment display

If WaveStar SNMS does not recognize a circuit pack on the requested shelf, the window shows that slot filled with unknown equipment. Circuit packs may not be recognized when the vendor firmware is nonstandard or when the board is a new release that is not yet supported.

Several NE types allow pre-provisioning of slots in the shelf through WaveStar SNMS to accept a certain type of circuit pack and provision the physically absent circuit pack to accept a certain type of service. This is referred to as pre-provisioning, or establishing of equipment through WaveStar SNMS.

In a shelf view on the Equipment View window, WaveStar SNMS graphically indicates, through a combination of colors, stripes and slanted lines the presence or absence of circuit packs and whether the circuit pack has been pulled or is not communicating. The shelf view may show:

- ◆ an unequipped slot, not provisioned
- ◆ an unequipped slot, pre-proviioned
- ◆ a slot equipped with a provisioned circuit pack
- ◆ a slot from which a circuit pack has been pulled or contains a non-communicating circuit pack

The following table summarizes the various slot/circuit pack states and how they are represented graphically on the Equipment View window in the shelf view.

Slot/circuit pack state	Graphical representation
unequipped slot, not provisioned	slot is dark grey with lighter grey vertical stripes
unequipped slot, provisioned	image of circuit page faceplate with thin grey diagonal lines
slot equipped with circuit pack	image of circuit pack faceplate
slot with pulled circuit pack	circuit pack faceplate with red-colored notch and diagonal lines

Slot/circuit pack state	Graphical representation
slot with non-communicating circuit pack	circuit pack faceplate with round dot indicating, by color, that an alarm has been generated and the level of alarm
area of shelf that does not accept equipment or report information	shelf area is light grey and not labeled
standby circuit pack of two-pack configuration (for LambdaRouter SYSCTL shelf). The active circuit pack automatically switches over to the standby circuit pack in the event of failure	standby circuit pack faceplate with thin grey lines slanted to left

Alarm status on equipment display

WaveStar SNMS indicates whether an alarm has been generated by a bay, shelf, or slot (circuit pack) in the NE on the graphical display of equipment, and what level of alarm it is.

The status of slot/circuit pack alarms is updated dynamically in the Equipment View window and propagated to the higher equipment levels in the equipment hierarchy, so the indication of the alarm status graphically on the slot/circuit pack level is also reflected at the bay/shelf level in the Equipment View. On the Equipment View window, a round dot is displayed on the selected piece of equipment with the color indicating the alarm state. The color of the dot indicates the level of alarm that has been issued by the selected equipment component, or if there have been no alarms issued. The default colors for the alarm levels are:

Alarm Color (default)	Alarm Severity Level (SONET)	Alarm Severity Level (SDH)
Red	Critical	Prompt
Yellow	Major	Deferred
Cyan	Minor	
Green	No Active Alarms	No Active Alarms

The default Alarm display colors shown in the above table can be modified through the Preferences option of the View menu on the Map window main menu bar. For more details, see [Modify User Preferences](#) in [Chapter 1, Getting Started](#).

**Related
information**

See [View NE Equipment](#) in [Chapter 1, Getting Started](#) for instructions on how to view NE equipment on the Equipment View window.

Introduction

Purpose

This chapter provides general information about setting up communications with network elements managed by WaveStar SNMS and manually adding network elements using WaveStar SNMS GUI functions and the Dynamic Network Operation (DNO) feature for subnetwork discovery and database update.

Objectives

This chapter explains how to do the following:

- Set up communications with network elements managed by WaveStar SNMS and manually add network elements to the WaveStar SNMS GUI Map window to reflect the physical network
 - Use the Dynamic Network Operation (DNO) feature
-

Contents

This chapter discusses the following topics:

- [Network Element Administration](#) [11-2](#)
 - [Dynamic Network Operations](#) [11-34](#)
-

Network Element Administration

Overview

The WaveStar SNMS system administrator inputs subnetwork and network element information so the GUI Map window reflects the physical network. With this information, the WaveStar SNMS application constructs a network model, which is its working view of the physical network.

Subnetworks

A subnetwork is a group of interconnecting and interrelated network elements. The most common connotation is a SONET subnetwork, in which the network elements have Data Communications Channel (DCC) connectivity. For Dense Wavelength Division Multiplexer (DWDM) NEs, this connectivity is established through the NE's Supervisory Channel.

The Network Model

Creating a network model allows the Element Management System (EMS) to communicate with the network and each of its components. When network elements are configured through the EMS configuration windows, the network model is assembled dynamically by the EMS Dynamic Network Operations (DNO) feature.

Network elements

A network element (NE) is the basic telecommunications entity managed by WaveStar SNMS. An NE is a grouping of physical equipment that provides communications services over a network. An NE is both a node in a larger network of NEs and a complex network system itself. The software in an NE must manage both the physical (equipment) components of the NE and the network system provided by the NE.

NEs can be added, modified, or deleted through the WaveStar SNMS GUI. When any NE changes to the network are made, DNO must be run to update the WaveStar SNMS database. For information about the DNO feature, refer to the [Dynamic Network Operations](#) section.

Types of NEs

NEs vary by size, equipage, function, communications protocol supported, signalling/transmission rates, interoperability, number and types of physical/electrical interfaces (ports), and cross-connection capabilities.

The NE/device types supported by this EMS include:

- ◆ Lucent Technologies WaveStar OLS 400G
- ◆ Lucent Technologies WaveStar Bandwidth Manager (BWM)

- ▶ Lucent Technologies WaveStar 2.5G
 - ▶ Lucent Technologies WaveStar TDM 10G (STM-64)
 - ▶ Lucent Technologies FT-2000 Large Capacity Terminal (LCT)
 - ▶ Lucent Technologies Network Communications Controller (NCC)
 - ▶ Lucent Technologies LambdaRouter
-

Data communications interfaces

The WaveStar SNMS communication interface is partitioned into two parts: one that connects with NEs (southbound) and one that connects with external OSs (northbound).

Northbound communications

The northbound communication provides a connection for an external OS to communicate with WaveStar SNMS. All northbound communication is via the Common Management Information Service Element (CMISE) and CORBA over TCP/IP.

Southbound communications

The southbound interface supports Open System Interconnect (OSI) over TCP/IP, X.25, OSI, and pure TCP/IP connections to NEs.

WaveStar NEs support X.25, OSI, an OSI over TCP/IP-based network interface (via a transport bridge), or a direct TCP/IP interface with WaveStar SNMS.

WaveStar SNMS supports concurrent X.25 and OSI-based communications with NEs. Depending on the NE types, the communications can be either X.25 or LAN-based TCP/IP over OSI, but not at the same time, to the same subnetwork.

X.25-based communications

WaveStar SNMS supports both X.25 direct and remote terminal (RT) network connections to FT-2000 LCT NEs. While direct X.25 connectivity is supported, WaveStar SNMS to NE communications are generally done through an NE in a subnetwork serving as the Gateway Network Element (GNE), over an X.25 Packet Switched Network (PSN). The customer chooses the type of link concentration equipment which forms the X.25 PSN necessary for communications with the GNEs. WaveStar SNMS supports a TL1 over X.25 southbound interface that uses an assigned GNE to provide the protocol conversion from TL1 over an X.25 short stack to encapsulated TL1 over the 7-layer OSI stack using the SONET DCC.

Gateway network element for X.25-based communications

A Gateway Network Element (GNE) is an NE that acts as the “gateway” or intermediary node for establishing communications between WaveStar SNMS and the other NEs in a subnetwork. The GNE has X.25-based communications with the WaveStar SNMS host. When a message is received from the WaveStar SNMS host, the GNE sets up OSI associations with its associated NEs and forwards the addressed message to the intended NE. The GNE is also used by WaveStar SNMS to autodiscover all NEs in the OSI-based subnetwork with DCC connectivity.

User-definable virtual circuits

When you add a GNE using WaveStar SNMS, or delete an NE and re-add it back into the WaveStar SNMS host database as a GNE, you can select up to three supported three X.25 virtual circuits (VCs) for communications between the host machine and the GNEs.

Each of the VC connections may be set up as a permanent virtual circuit (PVC) or switched virtual circuit (SVC). You can also specify the purpose of each VC. The recommended configuration is two VCs—one for autonomous messages and one for command/response messages.

When the choice is to use three VCs, a separate VC can be configured for:

- ◆ command/response messages
- ◆ autonomous maintenance messages and alarm messages
- ◆ autonomous database change messages and provisioning commands/responses

**NOTE:**

The NE has to be provisioned the same way as WaveStar SNMS

Either or both the autonomous maintenance message and autonomous database change/provisioning functions may share the command/response VC.

Cost-effective SVCs (instead of PVCs) can be configured for non-critical command/response functions.

The GNE maps its OSI associations to each of the subtending NEs so that they use the same VCs for the same functions as are used for the GNE. For example, if one VC is used for command/response messages to the GNE and another VC is used for autonomous messages from the GNE, those same VCs are used for messages to and from the NEs.

X.25 Subnetwork Discovery

When a GNE is added to the database and DNO is performed on the GNE, WaveStar SNMS sends a TL1 RTRV-NEIGHBOR command (or its NE--based equivalent) to the GNE to discover any NEs that are connected to the GNE. If the GNE reports connections to any NEs that are not currently in the WaveStar SNMS database, WaveStar SNMS adds the NEs under *that* GNE and queries the newly discovered NEs recursively until all NEs with DCC connectivity are discovered to complete the network topology.

Any NEs that are not discovered through the DNO process or non-Lucent Technologies NEs must be manually added to the WaveStar SNMS database to complete the network model.

Non-managed devices

NEs that are not managed by WaveStar SNMS are treated as “non-managed devices” and are added during the autodiscovery process to complete the network model and to avoid repeated attempts by WaveStar SNMS to log into these NEs. If WaveStar SNMS automatically discovers a non-managed device by identifying a discovered NE with an NE type that is not on the managed NE list in its database, the system stops any further login attempts and displays it on the Map window with a default icon (or any shape selected by the user via the Preferences option) for non-managed devices without any further processing.

Dual GNEs

WaveStar SNMS can support a second, optional physical connection to a subnetwork for added reliability. For each subnetwork of NEs, a WaveStar SNMS administrator can add multiple GNEs and then identify a GNE association, consisting of a primary and secondary GNE pair of compatible GNEs, which operate in an active/standby arrangement. The secondary GNE takes over communications with the EMS host if there is a loss of communications with the primary GNE. WaveStar SNMS monitors the status of its X.25 links and virtual circuit connections to each GNE. WaveStar SNMS automatically transfers communications to the standby GNE whenever an X.25 link to the active GNE is down.

The WaveStar SNMS administrator can also manually switch the active and standby GNEs.

The backup GNE in an association cannot have any RNEs assigned to it. If there are RNEs assigned to the backup GNE, they must be reassigned to another GNE in the subnetwork before designating the GNE as a backup in a GNE association.

GNE association management

The WaveStar SNMS administrator can add or delete GNE associations as needed. The administrator can also manually swap the primary GNE and secondary GNE in the association.

Deletion of GNE associations

The WaveStar SNMS administrator can remove the association (relationship) between GNEs. To delete either GNE in a GNE association, the administrator must delete the association first. When a GNE association is deleted, the RNEs in the subnetwork remain connected to the currently active GNE.

Multiple active GNEs

WaveStar SNMS also supports multiple active GNEs (or multiple primary/secondary GNE associations) to avoid potential data traffic congestion in large X.25-based subnetworks with up to 256 NEs. Functions in the WaveStar SNMS GUI allow an administrator to manually add multiple GNEs to a subnetwork and then manually reassign the NEs in the subnetwork to GNEs for load balancing. A GUI function allows an administrator to display the GNE/RNE relationships and move RNEs between GNEs of a subnetwork to redistribute the data traffic load.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

OSI-based communications

The WaveStar SNMS IAO-LAN interface provides an OSI standard, higher-speed communications path to NEs. It enables the reduction of performance bottlenecks by providing faster communications between the EMS and NEs. The OSI/LAN interface provides up to three high bandwidth communication paths, or OSI associations, to NEs. This communication model is based on the standard 7 layer OSI stack reference model.

For increased system availability, WaveStar SNMS supports IAO-LAN redundancy. WaveStar SNMS is connected to a subnetwork of NEs via two separate IAO-LAN connections/hubs. Both connections are active. In the event that one IAO-LAN connection fails, WaveStar SNMS detects the failure and automatically switches to the other connection.

OSI-Connected NEs and subnetwork discovery

When any NE with a direct OSI/LAN connection to WaveStar SNMS is manually added to the WaveStar SNMS database, it can be used as the "seed NE" through which WaveStar SNMS can automatically discover NEs in the subnetwork to complete the network model. When the NE is added and DNO is executed, the EMS issues a command to the NE and discovers all Lucent Technologies NEs and other devices connected to the network. WaveStar SNMS obtains the NE type from the device; in some cases, the device may be a router or similar equipment not managed by WaveStar SNMS.

WaveStar BWM NEs are either autodiscovered through the SONET Directory Services (SDS) feature or manually added to the WaveStar SNMS database.

Any NEs that are not discovered through the DNO process or non-Lucent Technologies NEs must be manually added to the WaveStar SNMS database to complete the network model.

The EMS can send messages to NEs that are not part of the same network as the “seed NE” by virtue of the TARP method of broadcasting messages and routing tables that are contained in each NE.

Non-managed devices

NEs that are not managed by WaveStar SNMS are treated as “non-managed devices” and are added during the autodiscovery process to complete the network model and to avoid repeated attempts by the EMS to log into these NEs. If WaveStar SNMS automatically discovers a non-managed device by identifying a discovered NE with an NE type that is not on the managed NE list in its database, the system stops any further login attempts and displays it on the Map window with a default icon (or any shape selected by the user via the Preferences option) for non-managed devices without any further processing. If a Directory Services Agent (DSA) is defined for SONET Directory Services (SDS), any of the PF2000 NEs (such as DDM-2000 or FT-2000) not managed by WaveStar SNMS can be registered with the DSA with an NE type of “T5GW” in the local or remote Directory Information Base (DIB) if T5 Gateways exist in the network. WaveStar SNMS changes the NE type to “Non-managed device” if the NE is discovered. For more details about the SDS feature, refer to the [SONET directory services](#) section in this chapter.

TCP/IP-based communications (RFC1006)

WaveStar SNMS supports OSI connections with NEs over a TCP/IP backbone network. In OSI over TCP/IP communications, a Network Communication Controller (NCC) device or OLS 400G NE is required to perform OSI protocol conversion, as a transport bridge, for messages/responses handled to/from the EMS and the NEs. NEs with a direct TCP/IP interface with do not require a transport bridge device.

If a WaveStar NE has a direct OSI/LAN connection with the EMS and is not communicating over a TCP/IP network, a transport bridge is not needed.

Network communication controller

A Network Communication Controller (NCC) is an Intel Pentium-based single-board computer running Microsoft Windows NT. It has no video display, keyboard, or mouse. The system is equipped with an on-board hard disk drive as the primary Non-Volatile Memory (NVM), and a removable PCMCIA disk for use in loading software, backup, and restore. An NCC uses a single 10BaseT LAN connection for both OSI and TCP/IP.

In other cases, the NCC is a single board computer residing in a Multi-Function Server (MFS) shelf. The MFS shelf comprises a card cage supporting 8-12 single board computers (SBCs) in a vertical slot arrangement, with shared power supplies, shared fan unit(s), and one alarm unit. Only power, ground, and fault/ alarm signals cross segments.

An NCC can be provisioned to serve two main functions:

- ▶ Directory Services Agent (DSA) for SONET Directory Services (SDS)
- ▶ Transport bridge for TCP/IP to OSI protocol conversion for OSI-connected WaveStar NEs communicating with WaveStar SNMS over a TCP/IP backbone network

An NCC can be designated as a DSA and/or transport bridge.

Security management

The NCC has basic local security features similar to an NE. It has user logins, passwords, privileges, a user activity log, and detection of security violations.

Function activation

Each NCC can handle a variety of functions that can be provisioned through the GUI or via the CIT by a system administrator. These functions include:

- ▶ T1.245 DSA
- ▶ T1.245 Registration Manager (RM)
- ▶ TCP/IP transport bridge
- ▶ MFS Alarm Monitor
- ▶ Notification of directory additions/deletions

Directory system agent

SONET Directory Services (SDS) provides for name/address resolution for WaveStar NEs communicating with WaveStar SNMS through an OSI or OSI over TCP/IP network. An NCC provisioned as the Directory Services Agent (DSA) or the EMS-based DSA provides the directory of NEs to WaveStar SNMS.

Before WaveStar SNMS can communicate with the NE, the NSAP address of the NE's system controller is provisioned through the Craft Interface Terminal (CIT), and the NE is registered in the T1.245 directory. The NCC serving as the DSA or the EMS-based DSA stores the T1.245 directory. If an NCC is serving as the DSA, it also performs the Registration Manager (RM) function. If the DSA is EMS-based, and an OLS 400G is present, the 400G can be provisioned to have RM functionality. WaveStar SNMS, acting as the Directory User Agent (DUA), obtains the address information from the DSA for sending and receiving commands/ responses, instead of requiring manual provisioning of this information.

Transport bridge

An NCC or OLS 400G defined as a transport bridge allows associated NEs and WaveStar SNMS to communicate over a TCP/IP backbone network by performing TCP/IP to OSI protocol conversion in both directions. The selected NE or NCC bridges connection layers of OSI running over TCP/IP between the upper and lower layers of the OSI protocol stack.

If WaveStar SNMS has a direct OSI/LAN connection or an OSI/LAN to a Wide Area Network (WAN) connection with a WaveStar NE, transport bridges are not needed.

When a transport bridge is added to the network, it is set up to communicate via OSI over TCP/IP.

In the environment where transport bridges are needed, at least one transport bridge should be manually added, or, if the NCC/OLS 400G is autodiscovered when the DNO process is run, should be defined as a transport bridge via the Modify NE window in the GUI before the NEs it supports are added to the WaveStar SNMS database.

Port configuration for transport bridges

WaveStar SNMS uses a calling port number when initiating communications with the transport bridge and a listening port number as a responder from the transport bridge. These two port numbers are configurable during installation time (via the installation script) so the system can keep track of these port numbers in case the NE changes these numbers in the future.

Primary and secondary transport bridges

During the subnetwork discovery process, WaveStar SNMS automatically assigns NEs to a single primary transport bridge if the Routing Domain of each device's Network Service Access Point (NSAP) address is the same as that of the transport bridge. A secondary transport bridge can be manually assigned through the WaveStar SNMS GUI added to provide transport bridge redundancy. If communications are lost with the primary transport bridge, a secondary transport bridge can be designated to take over automatically.



NOTE:

In a large network of OLS 400G NEs, detection and automatic switchover to a secondary transport bridge may take a long time. If this is the case, tuning some of the "watchdog" (keep alive) function parameters may aid in detecting failure and performing automatic transport bridge switches earlier. The system's "watchdog" function periodically checks on the health of each NE managed by WaveStar SNMS by sending a keep-alive message at the

application level. The following watchdog parameters can be modified by editing the UNIX file */snc/etc/CM_Server.cfg*:

WDTIME—The frequency used to send watchdog requests. By making this number smaller, communication failures can be detected earlier, but increases the system activity if there are many NEs. If this number is too large, the system takes a long time to discover network and NE problems.

WDRETRYTIMES—This sets a retry interval for re-establishing an association in the event of communication failures. The default number of attempts is 3. The default is 0 minutes for the first attempt, and 3 minutes between the second and subsequent (user-specified) number of retries. Setting this parameter to 0 (minutes) invokes the system to detect failures earlier, but if the system becomes slow at some point, the watchdog function could timeout and the system will disconnect from the NE.

WDTIMEOUT—This parameter controls how long to wait for a watchdog response.

WDLOOKBACK—This parameter controls the time interval for the system to send a keep alive message to the NE to check on its health if there has been no active communication with the NE in this user-specified period. The default for this parameter is 10 minutes. This parameter should always be less than the WDTIME parameter. If there has been communication with the NE during the interval specified, no watchdog request is sent, the system considers the connection with the NE healthy and waits for the next specified watchdog interval.

⇒ NOTE:
Changes to the WDTIME, WDRETRYTIMES, WDTIMEOUT, and WDLOOKBACK parameters should be made by an experienced user, as there are performance consequences if the values for these parameters are changed.

A primary and secondary transport bridge can be initially assigned to the NE through the Add an NE window in the WaveStar SNMS GUI. Reassignment of transport bridges to NEs can be done through the Management Transport Bridges window in the WaveStar SNMS GUI.

⇒ NOTE:
A primary transport bridge must be reassigned manually to NEs to invoke an actual switch of the transport bridge. The switch of a primary transport bridge may cause the link from WaveStar SNMS and the target NE to go down and up, which can trigger automatic alarm re-synchronization.

Assigning transport bridges

When an NCC or OLS 400G is added to WaveStar SNMS, it can be designated as a transport bridge. If the NCC or 400G is added as a transport bridge, its IP address is required.

When a WaveStar NE is added, and it communicates with WaveStar SNMS over a TCP/IP backbone network, a primary (and, if desired, secondary) transport bridge needs to be assigned.

Managing transport bridges

Once all of the NEs and transport bridges have been added and/or defined and the network is brought up, the WaveStar SNMS system administrator can reassign NEs to transport bridges as needed to load balance the OSI over TCP/IP data traffic. WaveStar SNMS switches traffic for the target NE(s) to the newly assigned transport bridge(s) once the reassignment(s) is made.

The Manage Transport Bridges function is available as an Administration menu option in the WaveStar SNMS GUI.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

Direct TCP/IP communications

In a ring of “pure” TCP/IP-connected NEs, each NE can have an IP address and a direct TCP/IP network connection to WaveStar SNMS. Therefore, every NE in the ring may be accessed in the same way through the network and each NE could serve as a gateway network element for routing messages on behalf of the other NEs in the ring to/from WaveStar SNMS. However, a single NE in the ring can be designated as the GNE for the subnetwork, via the Add/Modify an NE window in the GUI. An TCP/IP-connected GNE supports a TID/NSAP mapper to allow for routing of messages to other NEs, and WaveStar SNMS uses TIDs in messages to designate the destination NEs. NSAP addresses are used within the OSI-based Supervisory channels between NEs in a directly connected TCP/IP ring.

When an NE is manually added to the WaveStar SNMS database, you can specify whether the NE communicates through direct TCP/IP connection with the system or via a GNE.

All of the GNE provisioning that applies to X.25-connected NEs is also available for TCP/IP-connected GNEs, such as primary/backup GNE associations and multiple GNE designations in the same subnetwork for load balancing assignment of NEs (see the [X.25-based communications](#) section). A major difference is that WaveStar SNMS does not automatically identify a discovered TCP/IP-connected GNE because each NE in an TCP/IP ring of NEs can have an IP address and

perform as a GNE. The TCP/IP-connected GNE(s) must be manually added as such to the WaveStar SNMS database or modified to be designated as a GNE.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

NE application services

All NEs, with the exception of the WaveStar OLS 400G, are managed by WaveStar SNMS through the issue and receipt of alarm, provisioning, and autonomous event messages in the form of TL1 commands.

The WaveStar OLS 400G sends and receives requests from the WaveStar SNMS application using Common Management Information Service Element (CMISE) application service requests in Common Management Information Protocol (CMIP) message format.

TL1 messages

For TL1-based communications, southbound TL1 command/responses from the EMS to the NEs are handled by the TL1 Manager.

CMISE/CMIP messages

For NEs that use CMISE services, such as the WaveStar OLS 400G, messages that are exchanged between the NE and WaveStar SNMS must be “mapped” to their Management Functional Area (MFA) service/request through the QA Adaptor process.

The Connection Manager process

The Connection Manager (CM) process centralizes the functions of sending, receiving, and routing messages, and managing the connections needed for responses and autonomous messages going in, and coming from, the CMISE and TL1 Southbound subsystems.

The Gateway process

The Gateway process receives requests from the Connect Manager and forwards them to the QA Adaptor process.

The Q-Adaptor process

For CMISE messages, the Q-Adaptor process identifies the object class or attribute contained in the CMISE message and translates it into the TID or AID of the NE or Alarm Issuing Point (AIP) and forwards the command to the NE. Responses from the NE to the EMS are also handled.

SONET directory services

WaveStar SNMS supports the SONET Directory Services (SDS) feature. This feature allows WaveStar SNMS to obtain directory/addressing information about a new NE through an intermediate device or “agent” with a centralized directory of NE data as soon as the NE is discovered, rather than having to contact the NE directly.

Components of the SDS feature

There are various processor roles performed by an NE, the EMS (WaveStar SNMS), or an NCC in the exchange of directory information during the SDS process. The various processor roles are:

- ▶ **Directory Services Agent (DSA)**—The DSA accesses the T1.245 Directory (the centralized directory of NE addressing information) on behalf of a “user”. In this case, the “user” is an NE registering with the T1.245 Directory or the EMS querying the T1.245 Directory.
- ▶ **Directory User Agent (DUA)**—The DUA represents the “user” during interactions with a DSA. In this case, the “user” is an NE registering with the T1.245 Directory or the EMS querying the T1.245 Directory.
- ▶ **Directory Information Base (DIB)**—A DIB is the set of information managed by the T1.245 Directory. Information is stored in the DIB as a tree structured database.
- ▶ **Registration Agent (RA)**—The RA is an application process that determines, from the Registration Manager (RM) process, the address of the appropriate DSA for registering with a T1.245 Directory, plus its T1.245 Directory DIB Prefix. The DIB Prefix is a sort of “area code” for locating and identifying the addresses of NEs in the T1.245 Directory. Via its associated DUA, the RA initiates registration with the appropriate DSA for entry into the T1.245 Directory.
- ▶ **Registration Manager (RM)**—The RM communicates with RAs in its OSI Level 1 area to provide the RA with the address of the appropriate DSA with which to register, plus its T1.245 DIB Prefix.

The DUA uses Directory Access Protocol (DAP) to contact the designated DSA to obtain directory information.

Designated DSA

An NCC or the WaveStar SNMS application itself can serve as the DSA. The DSA accesses the T1.245 Directory (DIB) for NE directory information.

Whether the T1.245 Directory with the DIB Prefix information resides in an NCC or WaveStar SNMS itself depends on which is going to be provisioned to serve as a DSA. The SDS process varies, depending on whether an NCC or the EMS itself is serving as the DSA. The processing details for each are provided in the [SDS with an NCC as DSA](#) and [SDS with WaveStar SNMS as DSA](#) sections that follow.

The WaveStar SNMS administrator has two choices for designating a DSA:

- An NCC with DSA functionality enabled
- An EMS-based DSA in the same WaveStar SNMS application

Overwriting NE directory information by SDS

If the NE directory information returned by the designated DSA (in response to an SDS query by WaveStar SNMS) includes an NE that has already been manually added to the WaveStar SNMS T1.245 DIB, WaveStar SNMS overwrites the Local DIB information for that NE with the directory information obtained by the DSA process.

The RA function

WaveStar SNMS currently does not support the RA function, which means that the DSA must be selected manually through the WaveStar SNMS GUI.

SDS with an NCC as DSA

This section describes how SDS works with an NCC serving as the DSA for obtaining NE directory information. The process described assumes an OSI-based network of NEs. However, the process would be similar in a TCP/IP-based network.

The process is as follows:

1. At least one NCC is installed and brought into service with DSA functionality enabled, using TL1 commands issued to the NCC through a Communications Interface Terminal (CIT). The T1.245 DIB is set up with its T1.245 DIB Prefix information and the DSA address information in the RM process, which resides in the NCC.
2. WaveStar SNMS is installed and brought into service with DSA disabled through an option in the installation program (for more details about installation procedures, refer to the *WaveStar SNMS Operations, Administration and Maintenance Guide*). It is provisioned with the T1.245 DIB Prefix information which is used to query the designated DSA.
3. A user adds the NCC/DSA into WaveStar SNMS using the Add an NE window in the GUI.
4. A user selects the NCC/DSA using the Provision DSA window in the WaveStar SNMS GUI to be used by WaveStar SNMS to obtain directory information from the T1.245 Directory.



NOTE:

The NCC/DSA must be manually selected through the GUI because WaveStar SNMS does not currently provide RA functionality.

5. As NEs are brought into service, the RM process in the NCC recognizes that a new NE has been added to the OSI Level 1 area.
6. The NCC, serving as the RM, communicates with the RA in the new NE and provides the NE's RA process with the appropriate DSA address.
7. The RA in the new NE uses its DUA process to communicate, using DAP, to communicate with the DSA/NCC and send the directory data to the NCC/DSA.
8. The DSA process in the NCC registers the NE in the NCC's T1.245 Directory (DIB). The NCC issues a REPT-DBCHG message to WaveStar SNMS, indicating that there has been a change to the DIB.
9. The DUA in WaveStar SNMS contacts the DSA/NCC using DAP and retrieves the directory information to store in its Local DIB.

The NCC/DSA periodically checks whether any new NEs have been discovered (registered) in the T1.245 DIB. If it discovers a new NE, the NCC/DSA notifies WaveStar SNMS that there has been an update to the T1.245 Directory. WaveStar SNMS, serving as a DUA, queries the NCC/DSA for the updated information. The NCC/DSA retrieves the updated information and sends it to WaveStar SNMS to store in its Local DIB. The EMS Local DIB contains the NEs from the NCC's T1.245 DIB which are associated with the EMS's DIB Prefix, as well as any NEs that have been manually added through the GUI.

NCC-based DSA alarms

Alarms generated by the NCC/DSA are the same as alarms generated by any other NE and are shown in the alarm summary for the NCC.

SDS with WaveStar SNMS as DSA

This section describes how SDS works when the designated DSA is the application residing in the WaveStar SNMS application itself and the T1.245 DIB containing directory information for registered NEs resides on the WaveStar SNMS host. The process described assumes an OSI-based network of NEs.

The process is as follows:

1. WaveStar SNMS is installed and brought into service. During installation, the WaveStar SNMS DSA is activated. The T1.245 Directory (DIB) residing with the WaveStar SNMS application is provisioned with the DIB Prefix information used to query the EMS-based DSA process for directory information.
2. The EMS-based DSA will be the default in the Provision DSA window in the WaveStar SNMS GUI to be used to obtain directory information about the NEs from the T1.245 Directory.

3. The administrator must provision one NE in an OSI Level 1 area serving as the RM with the EMS-based DSA address and the T1.245 DIB Prefix of the NE. WaveStar SNMS does not support RM functionality.
4. As NEs are brought into service, the RM process in an NE recognizes that a new NE has been added to the OSI Level 1 area.
5. The RM process in the designated Level 1 NE communicates with the RA application in the newly added NE(s) and provides the NE's RA process with the appropriate DSA address(es) (DIB Prefix) and the T1.245 DIB Prefix of the DSA for registration.
6. The RA in the new NE uses the DUA functionality co-resident in the NE to communicate with the DSA application in WaveStar SNMS to register the NE in the EMS-based T1.245 Directory (DIB).
7. The DUA in WaveStar SNMS contacts the DSA process in the EMS using DAP and sends the directory information to store in the WaveStar SNMS Local DIB.

The DSA process in the WaveStar SNMS application periodically checks whether any new NEs have been discovered (registered) in the T1.245 DIB. If it discovers a new NE, the DSA process detects the the DIB change and notifies the other appropriate subsystems in the application that there has been a change in the T1.245 DIB. WaveStar SNMS then queries the DSA process for the newly discovered NE(s) in the DIB using the T1.245 DIB Prefix in its directory. The information is sent to the DUA process of the EMS to update the EMS Local DIB. The Local DIB contains NE information discovered through the SDS process as well as any NEs that have been manually added through the WaveStar SNMS GUI.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

Manually adding NEs into the T1.245 directory

NEs can be manually added to the WaveStar SNMS T1.245 DIB. NE information can also be modified or deleted from the EMS-based DIB.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

EMS-based DSA and the Add an NE window

If the EMS-based DSA process is enabled, the Add an NE window in the GUI is disabled. In this case, NEs and associated directory information must be manually added into the WaveStar SNMS T1.245 DIB. FT-2000 LCT NEs are not added to

the T1.245 DIB through this process, but can be manually added through the GUI using the Add an NE window.

Subnetwork discovery and SDS

This section provides a high-level overview of the WaveStar SNMS Subnetwork Discovery and SDS capabilities. This section also provides a series of examples of how WaveStar SNMS can discover NEs that communicate with WaveStar SNMS via a variety of interfaces.

There are three methods that WaveStar SNMS can use to discover the subnetwork of NEs it manages:

- ▶ Discovery via SDS
- ▶ Discovery via Subnetwork Dynamic Network Operations (DNO)
- ▶ Manual addition of NEs

Under the SDS scenario, NEs automatically register with the SDS Directory Services Agent (DSA), are registered via another NE using T5GW functionality, or are manually added to the DSA. The DSA functionality can be located in a WaveStar Network Communications Controller (NCC) NE or in WaveStar SNMS itself.

The following table describes the DSA registration capabilities of each NE type supported by WaveStar SNMS. Note that these NE capabilities to register with a DSA apply to both an NCC-based and WaveStar SNMS-based DSA. Using its Directory User Agent (DUA) functionality, WaveStar SNMS queries the DSA to discover the NEs. WaveStar SNMS then logs into each discovered NE, inventories the NE via DNO, and discovers the network topology via Subnetwork DNO.

NE Type	Automatically Registers with DSA?	Manual Registration
BWM R. 1.1/1.2	No	Yes
BWM R. 1.3/2.0	Yes	Yes
NCC R. 1.0/3.0	Yes	Yes
OLS 400G R. 2.0/3.0	Yes	Yes

NE Type	Automatically Registers with DSA?	Manual Registration
2.5G R. 2.0	Yes*	Yes
10G (STM-64) R. 1.0	No	Yes
FT-2000 LCT R. 4.0	No	No

* Requires Registration Manager (RM) from another NE

Under the Subnetwork DNO scenario, the user manually adds one NE per subnetwork to WaveStar SNMS and WaveStar SNMS then automatically discovers the other NEs via its Subnetwork DNO capability. After the first NE is manually added to WaveStar SNMS, the system logs into that NE, inventories the NE via DNO, and discovers its neighbors via Subnetwork DNO. WaveStar SNMS then logs into the neighbors of the first NE, logs into those NEs, and repeats the process until all NEs within the subnetwork are discovered. This method does not work currently with BWM NEs because they do not return the System Controller NSAP to WaveStar SNMS. Thus, WaveStar SNMS must use TARP to obtain the proper NSAP address. Since TARP does not work with a TCP/IP network, WaveStar SNMS is unable to log into BWM NEs discovered via Subnetwork DNO.

Under the Manual Addition scenario, the user manually adds NEs to WaveStar SNMS via the Add an NE window in the GUI. As NEs are added, the user either can manually trails between the NEs or can invoke Subnetwork DNO to automatically discover trails.

It is possible to use a combination of each of the above three scenarios to fully discover all of the NEs managed by WaveStar SNMS.

Subnetwork discovery and NE password aging (BWM and TDM 10G/STM-64 NEs)

BWM and TDM 10G (STM-64) NEs have a password aging feature for security reasons. When a software upgrade is performed for one of these NE types, one of the default NE passwords used to log into the NE to perform the upgrade automatically expires upon first use, and must be changed by the CIT. These default NE passwords are used by WaveStar SNMS to log into the NE and obtain information during the subnetwork autodiscovery process. The default NE passwords changed by the CIT during the software upgrade may not be known by WaveStar SNMS. However, as long as the second default NE password remains the same, WaveStar SNMS will be able to use it to log into the NE during subnetwork autodiscovery.

Once WaveStar SNMS has been able to log into a BWM or TDM 10G (STM-64) NE using the unchanged default NE password, you should use the Global Password Administration feature described in this task to manually change the NE password of the Super User Login that was changed by the CIT during installation. Then, WaveStar SNMS has access to both Super User NE logins/ passwords to log into BWM and TDM 10G (STM-64) NEs.

If one or both passwords that WaveStar SNMS used to successfully log into a BWM or TDM 10G (STM-64) NE expire, WaveStar SNMS issues an *ed-PID* command to change the passwords of the NE Super User logins to SNC+01 and WBM+01.

If both NE passwords have been changed through the CIT, and you do not know what the new NE passwords are, use the Modify an NE window in the WaveStar SNMS GUI to change/modify the NE passwords. You do not have to know the existing passwords that were defined through the CIT.

The password aging feature for BWM and TDM 10G (STM-64) NEs can be turned off via the CIT or by issuing the appropriate TL1 command through the WaveStar SNMS Cut-Through feature. Refer to the NE hardware documentation for the TL1 command needed to turn off the password aging feature.

Southbound communications

Southbound communications refers to the interface between WaveStar SNMS and the NEs it manages. The type of Southbound communications interface used can affect the WaveStar SNMS Subnetwork Discovery procedures.

WaveStar SNMS supports four types of Southbound interfaces

- ▶ Pure (7-layer) Open System Interconnection (OSI)
- ▶ OSI over Transmission Control Protocol/Internet Protocol (TCP/IP)
- ▶ Pure TCP/IP
- ▶ X.25

The following table indicates, by NE type, the interfaces supported to an operations system (OS).

NE Type	Pure OSI	OSI over TCP/IP	Pure TCP/IP	X.25
BWM R1.1 to 2.0	Yes	Yes*	No	No
NCC R.1.0/3.0	Yes	Yes	No	No
OLS 400G R.2.0 to 3.0	Yes	Yes*	No	No
2.5G R. 2.0	Yes	Yes*	No	No
10G (STM-64) R. 1.0	No	Yes*	No	No
10G (OC-192 4-Fiber)	Yes (NE R. 1.0)	Yes (NE R. 1.0)	No	No
2.5G_10G	Yes (NE R. 3.0)	Yes (NE R. 3.0)	No	No
FT-2000 LCT R. 4.0	No	No	No	Yes

* Requires an external transport bridge (such as an NCC with Transport Bridge capability enabled)

Subnetwork discovery examples

The following subsections describe the steps needed for WaveStar SNMS to discover a subnetwork of NEs under various scenarios related to the type of Subnetwork Discovery coupled with the Southbound interface type.

SDS discovery using WaveStar SNMS-based DSA via OSI southbound interface

For the purposes of this example, it is assumed that each NE in the subnetwork can automatically register with the DSA.

1. Using the NE Craft Interface Terminal (CIT), NEs are configured with the minimum system configuration, including the NSAP address.
2. WaveStar SNMS-based DSA is activated during installation and the Directory Information Base (DIB) Prefix is provisioned. The WaveStar SNMS-based DSA is provisioned as the designated DSA for this WaveStar SNMS application using the Provision DSA window in the GUI.

3. The OSI Data Communications Network (DCN) is provisioned and WaveStar SNMS is connected to one or more NEs in each NE subnetwork.
4. One Registration Manager (RM) in an NE is activated per OSI Level 1 area. The RM is provisioned with the DSA address of WaveStar SNMS (the WaveStar SNMS NSAP address) and the same DIB Prefix as provisioned in WaveStar SNMS.
5. The RM communicates with the Registration Agent (RA) functionality in each of the NEs in its OSI Level 1 area, and provides them with the DSA address (the WaveStar SNMS NSAP) and the DIB Prefix. Each NE registers with the WaveStar SNMS-based DSA under the DIB Prefix provided by the RM. Each NE registers with information including its TID and NSAP address.
6. The WaveStar SNMS DUA queries the WaveStar SNMS-based DSA for all NEs under the DIB Prefix provisioned within WaveStar SNMS. The WaveStar SNMS-based DSA responds with information on each NE that has registered the appropriate DIB Prefix.
7. WaveStar SNMS establishes an association with each discovered NE and logs into each NE. Upon successful login, WaveStar SNMS inventories the NE using DNO and discovers the neighbors of the NE via Subnetwork DNO. The NE neighbor information is used to automatically discover trails between the NEs because the DSA information does not include any network topology information.

SDS discovery using NCC-Based DSA via OSI southbound interface

For the purposes of this example, it is assumed that each NE in the subnetwork can automatically register with the DSA.



NOTE:

TDM 10G (STM-64) NEs currently cannot automatically register with the DSA. You must manually add this type of NE to the T1.245 directory; the WaveStar SNMS database is periodically resynched with the NE information in the T1.245 directory. OLS 400G NEs can be autodiscovered through an NCC-based DSA if the NCC is also serving as a transport bridge in an OSI over TCP/IP backbone network or if they communicate via straight OSI with no OLS 400G NE serving as a transport bridge.

1. Using the NE CIT, NEs are configured with the minimum system configuration, including the NSAP address.
2. The DSA function is enabled in one NCC NE in the subnetwork. A DIB Prefix is provisioned in the NCC-based DSA, where this DIB Prefix is the same as the one used by the WaveStar SNMS DUA (see step 4).
3. The OSI DCN is provisioned and WaveStar SNMS is connected to one or more NEs in each NE subnetwork.

4. The NCC with DSA enabled is manually added to WaveStar SNMS using the Add an NE window in the GUI. This NCC is also designated as DSA for this WaveStar SNMS application by the user via the Provision DSA window in the GUI. WaveStar SNMS is provisioned with the same DIB Prefix as used in the NCC DSA.
5. One RM in an NE is activated per OSI Level 1 area. The RM is provisioned with the DSA address of the NCC with DSA enabled (the NCC NSAP address) and the same DIB Prefix as provisioned in the NCC DSA.
6. The RM communicates with the RA functionality in each of the NEs in the its OSI Level 1 area, and provides them with the DSA address (the NcC NSAP) and DIB Prefix. Each NE registers with the NCC-based DSA under the DIB Prefix provided by the RM. Each NE registers with information, including its TID and NSAP address.
7. The NCC sends WaveStar SNMS a *REPT-DBCHG* TL1 message indicating that there has been a change to the NCC-based DSA (specifically, one or more new NEs have registered with the NCC-based DSA).
8. The WaveStar SNMS DUA queries the NCC-based DSA for all NEs under the DIB Prefix provisioned within WaveStar SNMS. The NCC-based DSA responds with information on each NE that has registered under the appropriate DIB Prefix.
9. WaveStar SNMS establishes an association with each discovered NE and logs into each NE. Upon successful login, WaveStar SNMS inventories the NE using the DNO and discovers the neighbors of the NE via Subnetwork DNO. The NE neighbor information is used to automatically discover trails between the NEs because the DSA information does not include any network topology information.

SDS discovery using WaveStar SNMS-Based DSA via OSI over TCP/IP southbound interface

The RM in BWM R. 1.1 through R. 1.3 NEs cannot be provisioned with both the NSAP address of the transport bridge and the IP address of WaveStar SNMS. If a BWM NE is set up as an RM, BWM NEs registration will only work with WaveStar SNMS-based DSA if they communicate through straight OSI (with no transport bridge).



NOTE:

TDM 10G (STM-64) NEs currently cannot be automatically register with the DSA. You must manually add this type of NE to the T1.245 directory; the WaveStar SNMS database is periodically resynched with the NE information in the T1.245 directory.

1. Using the NE CIT, NEs are configured with the minimum system configuration, including the NSAP address.

2. The transport bridge function is enabled in one or more OLS 400G or NCC NEs in the subnetwork.
3. WaveStar SNMS-based DSA is activated during installation and the DIB Prefix is provisioned. The WaveStar SNMS-based DSA is provisioned as the designated DSA for this WaveStar SNMS application via the Provision DSA window in the GUI.
4. The TCP/IP DCN is provisioned and WaveStar SNMS is connected to one or more transport bridge NEs in each NE subnetwork.
5. At least one of the transport bridge NEs is manually added to WaveStar SNMS using the Add an NE window in the GUI.
6. One RM in an NE is activated per OSI Level 1 area. The RM provisioned with the DSA address of WaveStar SNMS (the WaveStar SNMS IP address and a transport bridge NE NSAP address) and the same DIB Prefix as provisioned in WaveStar SNMS.
7. The RM communicates with the RA functionality in each of the NEs in its OSI Level 1 area and provides them with the WaveStar SNMS-based DSA address and the DIB Prefix. Each NE registers, via a transport bridge, with the WaveStar SNMS-based DSA under the DIB Prefix provided by the RM. Each NE registers with information including its TID and NSAP address.
8. The WaveStar SNMS DUA queries the WaveStar SNMS-based DSA under the DIB Prefix provided by the RM. Each NE registers with information including its TID and NSAP address.
9. WaveStar SNMS establishes an association with each discovered transport bridge NE and adds that NE to a list of transport bridge NEs.
10. For non-transport bridge NEs, WaveStar SNMS automatically assigns a primary transport bridge to each NE using the rule that the NE should be in the same Routing Domain as its transport bridge. WaveStar SNMS establishes an association with each discovered NE, via its primary transport bridge, and logs into each NE. Upon successful login, WaveStar SNMS inventories the NE using DNO and discovers the neighbors of the NE via Subnetwork DNO. The NE neighbor information is used to automatically discover trails between the NEs because the DSA information does not include any network topology information.
11. The user can manually change primary transport bridge assignments in WaveStar SNMS via the GUI for load-balancing purposes. For reliability purposes, the user can also manually add a secondary transport bridge to some or all of the NEs. It is noted that WaveStar SNMS does not automatically assign secondary transport bridges to any NEs.

Subnetwork DNO discovery via OSI over TCP/IP southbound interface (no DSA)

This scenario cannot be used to automatically discover BWM NEs because the NSAP address reported for BWM NE neighbors is the NSAP address of the BWM input/output (I/O) shelf, not of the BWM System Controller; thus, WaveStar SNMS is not able to log into BWM NEs discovered as a neighbor of the NE. Because WaveStar SNMS cannot log into the BWM NEs discovered in this manner, these BWM NEs have a non-communicating NE status (shown on the WaveStar SNMS GUI network map as an NE icon color of magenta) and the Subnetwork DNO process is halted.

1. Using the NE CIT, NEs are configured with the minimum system configuration, including the NSAP address.
2. The transport bridge function is enabled in one or more OLS 400G or NCC NEs in the subnetwork.
3. The TCP/IP DCN is provisioned and WaveStar SNMS is connected to one or more transport bridge NEs in each NE subnetwork. If the NE is located in a different subnetwork than the WaveStar SNMS host, a router is needed between the NE and WaveStar SNMS host.
4. One NE in each subnetwork is manually added to WaveStar SNMS via the Add an NE window in the GUI. This includes manual assignment of a primary transport bridge to the NE.
5. WaveStar SNMS establishes an association via the primary transport bridge with that NE and logs into the NE. Upon successful login, WaveStar SNMS inventories the NE using DNO and discovers the neighbors of the NE via Subnetwork DNO.
6. WaveStar SNMS assigns a primary transport bridge NE to each NE neighbor of the first NE using the rule that the NE should be in the same Routing Domain as its transport bridge, establishes an association via the primary transport bridge with each NE, and logs into each NE. Upon successful login, WaveStar SNMS inventories the NEs and invokes Subnetwork DNO again to find new NE neighbors.
7. If an NE neighbor of the first NE is a transport bridge, WaveStar SNMS adds that NE to the list of transport bridge NEs.
8. The process continues until no new NE neighbors are discovered via the Subnetwork DNO process.
9. The user can manually change primary transport bridge assignments in WaveStar SNMS via the GUI for load-balancing purposes. For reliability purposes, the user can also manually add a secondary transport bridge to some or all of the NEs. Note that WaveStar SNMS does not automatically assign secondary transport bridges to any NEs.

Subnetwork DNO discovery via pure TCP/IP southbound interface (no DSA)

This scenario currently applies only to “pure” TCP/IP-connected NEs.

1. Using the NE CIT, NEs are configured with the minimum system configuration, including the NSAP address.
2. The pure TCP/IP DCN is provisioned and WaveStar SNMS is connected to one or more NEs in each NE subnetwork. If the NE is located in a different subnetwork than the WaveStar SNMS host, a router is needed between the NE and WaveStar SNMS host.
3. One NE in each subnetwork is manually added to WaveStar SNMS using the Add an NE window in the GUI, including the NE’s IP address. This NE is defined as a Gateway Network Element (GNE).
4. WaveStar SNMS establishes an association with the GNE and logs into the GNE. Upon successful login, WaveStar SNMS inventories the GNE using DNO and discovers the neighbors of the GNE via Subnetwork DNO.
5. WaveStar SNMS associates these NE neighbors (called Remote Network Elements [RNEs]) with the GNE, establishes an association via the GNE with each neighbor of the GNE and logs into each RNE. Upon successful login, WaveStar SNMS inventories the RNEs and invokes Subnetwork DNO again to find new NE neighbors.
6. The process continues until no new NE neighbors are discovered via the Subnetwork DNO process.

To simplify the above scenario, a single GNE is assumed per subnetwork. For reliability purposes, multiple GNEs can be assigned to each subnetwork where some RNEs communicate with WaveStar SNMS via one GNE and other RNEs communicate with WaveStar SNMS via another GNE. If one GNE loses communications with WaveStar SNMS, the RNEs using that failed GNE can communicate using the other GNE.

Subnetwork DNO discovery via X.25 southbound interface (no DSA)

This scenario currently only applies to FT-2000 LCT NEs.

1. Using the NE CIT, NEs are configured with the minimum system configuration, including the NSAP address.
2. The X.25 DCN is provisioned and WaveStar SNMS is connected to one or more NEs in each NE subnetwork. This WaveStar SNMS-to-NE connection can be via X.25 Permanent Virtual Circuits (PVCs) or X.25 Switched Virtual Connections (SVCs).
3. One NE in each subnetwork is manually added to WaveStar SNMS via the Add an NE window in the GUI, including assignment of one or more PVCs or SVCs to the NE. This NE serves as the GNE.

4. WaveStar SNMS uses an SVC or PVC to communicate with the GNE and logs into the GNE. Upon successful login, WaveStar SNMS inventories the GNE using DNO and discovers the neighbors of the GNE via Subnetwork DNO.
5. WaveStar SNMS associates these NE neighbors (called Remote Network Elements [RNEs]) with the GNE, establishes an association via the GNE with each neighbor of the GNE and logs into each RNE. Upon successful login, WaveStar SNMS inventories the RNEs and invokes Subnetwork DNO again to find new NE neighbors.
6. The process continues until no new NE neighbors are discovered via the Subnetwork DNO process.

NSAP address entry

The following table lists the NSAP address fields, indicates field defaults, character widths, and which fields are editable in the GUI.

Field Name	Notes	NE(s)	Default	Octet Size	Editable?
AFI	Area Format Identifier.	All	0x39	1	Yes
IDI + pad	Initial Domain Part.	All	0x840 0xF	2	Yes
DFI	Domain Format Identifier. Specifies format for rest of address.	All	0x80	1	Yes
Operator ID		All	0x000000	3	Yes
Reserved	Currently not used. Reserved for future use.	All	0x0000	2	No
Routing Domain	NSAP unique Routing Domain within an administrative domain.	NCC,BWM, OLS 400G	0x0000	2	Yes

Field Name	Notes	NE(s)	Default	Octet Size	Editable?
Area	NSAP Area Identifier. Identifies NEs in the same area.	All	0x0000	2	Yes
System ID	System Identifier. This field is used to guarantee that NSAP address is globally unique.	All	no default	1	Yes
SEL	NSAP Selector. Used to differentiate multiple NSAP addresses associated with same End System.	All	0x1D*	1	No

*The value of the SEL field is 1D hex when TP4 is run over CLNP.

The System ID field is not defaulted, but is mandatory.



NOTE:

All of the NSAP address fields, except for the Reserved and SEL fields, are editable on the Add a Network Element to the DIB window in the GUI.

Non-managed devices

NEs that are not managed by the EMS are treated as “non-managed devices” and are added as such in the WaveStar SNMS database after the autodiscovery process to complete the network model and to avoid repeated attempts by the EMS to log into these NEs.

Network topology quick reference

This section summarizes the communication protocols, methods of adding NEs to the WaveStar SNMS database (manual addition, DNO subnetwork discovery, DSA) and Data Communications Network (DCN)/network design choices for NEs supported by WaveStar SNMS.

The following table summarizes which communication protocols are supported by each NE type. Note that not all NEs support all protocols. WaveStar SNMS can support one, all, or any combination of protocols as long as the necessary software and hardware have been installed.

OSI	TCP/IP (RFC 1006)	X.25	DSA Support
BWM		FT-2000 LCT	OLS 400G
OLS 400G	OLS 400G*		BWM
2.5G *	NCC		
10G* (STM-64, OC-192)			

*An OLS 400G NE needs to be set up as a transport bridge. A transport bridge performs TCP/IP to OSI protocol conversion.

Supported protocols southbound from WaveStar SNMS

See the above table for protocols supported for each NE type. Remember, WaveStar SNMS can support any combination of protocols or all protocols as long as the software and hardware is installed. For example, for X.25 communications, the MUX interface panel must be installed.

- ▶ OSI—Open Systems Inteconnection. This is the 7 layer stack protocol.
- ▶ TCP/IP (RFC 1006)—This is OSI over TCP/IP; in other words, OSI encapsulated into a TCP/IP packet.
- ▶ X.25—this is a Switched Virtual Circuit (SVC) or Permanent Virtual Circuit (PVC)

Is the SONET Directory Service (SDS)/Directory Services Agent (DSA) method going to be used?

DSA=NO If the SDS/DSA method is **not** going to be used, then you have to manually add the point of attachment (POA) NE and discover the rest of the NEs via subnetwork discovery. Subnetwork discovery is done when DNO is performed automatically when the POA NE is manually added to the WaveStar SNMS database. You can also perform subnetwork discovery through the POA NE by right-clicking on this NE in the Map window and selecting the Subnetwork Discovery option.

DSA=YES If the SDS/DSA method **is** going to be used, then when the NEs have been provisioned (registered under the same DIB Prefix as the WaveStar SNMS-based DSA or NCC-based DSA), the NEs are automatically displayed on the WaveStar SNMS GUI Map window. One NE is provisioned as the RM for the OSI OSI Level 1 area and registers all the NEs in its area in the DSA's directory. WaveStar SNMS, via the DSA, retrieves this information from the RM and automatically databases the NEs. The DSA can be either local (WaveStar SNMS) or via an NCC. The DSA registers each NE with:

- ▶ The DSA's IP or NSAP address

- The same DIB Prefix (Country, Org, SubOrg). For example: Country=US, Org=Lucent, SubOrg=NID

Network element provisioning

Each NE offers choices for setting up a Data Communications Network (DCN) and communicating with WaveStar SNMS. Each scenario is dependent on the type of NE and the available communications protocol(s) (see the above table.)

- OSI without DSA—for the point of attachment NE, you have to configure the NSAP address (Org, Routing Domain, Area, and Level 1 or 2 Router)
 - TCP/IP without DSA—this DCN requires a transport bridge (for OLS 400G NEs). If you want to use TCP/IP to communicate with a BWM or 2.5G/10G NE, you need an NCC set up as a transport bridge, located on the same LAN segment as the BWM or 2.5G/10G NE. For BWM and 2.5G/10G NEs, you select the NCC as the primary transport bridge when you are databasing the NE. When WaveStar SNMS attempts to communicate with these NE types, it sends the request to the NCC via TCP/IP. The NCC (or transport bridge) converts the message to OSI and passes the request to the NE.
 - OSI with DSA—the NE provisioned to be the Registration Manager (RM) in an OSI Level 1 area has to be configured with the NSAP address of the WaveStar SNMS-based or NCC-based DSA (Org, Routing Domain, Area, and Level 1 or 2 Router). The RM NE has to be set up under the same DIB Prefix as provisioned for the DSA. The DSA's NSAP address must be configured (either the MAC address of the NCC or the MAC address of the WaveStar SNMS southbound LAN card).
 - TCP/IP with DSA—a transport bridge is needed for OLS 400G NEs. If you want to use TCP/IP to communicate with a BWM or 2.5G/10G NE, you need an NCC set up as a transport bridge, located on the same LAN segment as the BWM or 2.5G/10G NE. For BWM and 2.5G/10G NEs, you select the NCC as the primary transport bridge when you are databasing the NE. When WaveStar SNMS attempts to communicate with these NE types, it sends the request to the NCC via TCP/IP. The NCC (or transport bridge) converts the message to OSI and passes the request to the NE.
 - The NE provisioned to be the Registration Manager (RM) in an OSI Level 1 area has to be configured with the NSAP address of the WaveStar SNMS-based or NCC-based DSA (Org, Routing Domain, Area, and Level 1 or 2 Router). The RM NE has to be set up under the same DIB Prefix as provisioned for the DSA. The DSA's NSAP address must be configured (either the MAC address of the NCC or the MAC address of the WaveStar SNMS southbound LAN card).
-

**PF-3000/PF-2000
interworking**

WaveStar SNMS supports and recognizes mixed networks consisting of both WaveStar NEs (also referred to as the "PF-3000" class of NEs) and the "PF-2000" class of NEs, which include the DDM-2000 OC-3, DDM-2000 OC-12, FT-2000 and FiberReach. WaveStar SNMS does not manage the PF-2000 class of NEs, but recognizes them to provide a more comprehensive view of a customer's network.

The type of mixed network currently supported by WaveStar SNMS is based on a subnetwork of WaveStar NEs and another subnetwork of PF-2000/FLM NEs. WaveStar SNMS is able to support OSI or OSI over a TCP/IP backbone for the WaveStar NEs while supporting OSI for the PF2000 NEs.

A group of PF2000 NEs can be discovered through a "sponsor" WaveStar NE when it is manually added to the WaveStar SNMS database or when the PF2000 NEs are registered in the DSA through the SDS feature.

When WaveStar SNMS discovers a "sponsor" WaveStar NE, it issues the TL1 command RTRV-MAP-NEIGHBOR to obtain information about NEs and trails in the associated group of PF-2000 NEs. The WaveStar NE's response to the RTRV-MAP-NEIGHBOR command contains only neighbor PF-2000 NE NSAPs (for OSI-connected NEs). The PF-2000 NEs' response to the RTRV-MAP-NEIGHBOR command may contain the TIDs and NSAPs of the neighbor NEs. There is no neighbor port ID information passed by the PF-2000 NEs for constructing trails between the WaveStar NE and PF-2000 NEs.

If the PF-2000 NEs are registered in the DSA as a "T5GW" NE type (provided T5 Gateways exist in the network), WaveStar SNMS discovers the NEs from the DSA, recognize them as the "T5GW" NE type, and change the NE type to "Non-managed device".

PF-2000 NEs discovered through a WaveStar NE or through the DSA are treated as non-managed devices and placed on the Map to complete the network topology. The WaveStar SNMS user can manually add trails between WaveStar NEs and non-managed PF-2000 NEs on the Map window, but WaveStar SNMS does not attempt to log into these NEs and no alarm/event information is collected.

Adding NEs

The following table shows the information that must be identified before adding an NE to the EMS, by communication type.

Table 11-1. Required Information for Adding an NE

OSI-Connected NE	OSI over TCP/IP	X.25 (via GNE)	X.25 GNE	TCP/IP (via GNE)	TCP/IP GNE
TID	TID	TID	TID	TID	TID
Alias (optional)	Alias (optional)	Alias (optional)	Alias (optional)	Alias (optional)	Alias (optional)
NE Type	NE Type	NE Type	NE Type	NE Type	NE Type
Valid NE login/password	Valid NE login/password	Valid NE login/password	Valid NE login/password	Valid NE login/password	Valid NE login/password
Valid backup NE login/password	Valid backup NE login/password	Valid backup NE login/password	Valid backup NE login/password	Valid backup NE login/password	Valid backup NE login/password
Number and Type of OSI Associations	Number and Type of OSI Associations	GNE TID	X.25 interface	GNE TID	IP address
NSAP Address	NSAP Address		Subnetwork		Subnetwork
	Primary and secondary transport bridges		Remote NE Login/Password • same as GNE • default for RNEs • default for GNE type		Remote NE Login/Password • same as GNE • default for RNEs • default for GNE type
	IP address for transport bridge				

Selecting communications for an NE type

The following table shows which communication types are available for each NE type. The communication type is selected in the Communicate Via field on the Add/Modify an NE window in WaveStar SNMS.

NE Type	Available Communication Type (Communicate Via Field on Add/Modify an NE window)
FT-2000 LCT	PSN, GNE
OLS 400G	OSI, OSI over TCP/IP*
BWM	OSI, OSI over TCP/IP*
2.5G	OSI, OSI over TCP/IP*
TDM 10G (STM-64)	OSI, OSI over TCP/IP*
LambdaRouter	TCP/IP

* A transport bridge is needed for protocol conversion between TCP/IP and OSI using the RFC 1006 method. An NSAP address is needed for the OSI portion of the connection.

Running DNO and manually adding NEs

DNO must be run to update the WaveStar SNMS database with complete information about a newly added NE. When manually adding an NE, WaveStar SNMS prompts if you want to perform DNO on the newly added NE to update the database. You can run DNO immediately, initiate DNO manually, or schedule DNO to be performed at a later time, to update the database for the added NE.

Related information

See the related tasks in the [Management Communications Setup](#) chapter.

Modifying NEs

Some of an existing NE's parameters can be modified in the WaveStar SNMS database. The following table shows which fields can be modified, by NE communications type.

Table 11-2. Modify NE Fields

OSI-Connected NEs	OSI over TCP/IP-connected NEs	X.25-connected NEs	TCP/IP-connected NEs
Alias	Alias	Alias	Alias
NE logins/ passwords	NE logins/ passwords	NE logins/ passwords	NE logins/ passwords
Time zone	Time zone	Time zone	Time zone
number of OSI associations	number of OSI associations		
	Transport bridge setting		
NSAP address (except for Reserved and SEL fields)			

Related task

See the [Modify a Network Element](#) task in the [Management Communications Setup](#) chapter.

Deleting NEs

An NE should be deleted only when it is to be physically removed from the network. To “hide” an NE from a group of users, you can remove the NE from the users’ Target Groups. Removing an NE from a Target Group causes the NE to be removed from the Map window, Alarm Summary window, and other windows that are used by the Target Group users, but the NE remains in the EMS database and is accessible to other Target Groups.

If you are deleting an NE designated as the GNE for a group of NEs, and the GNE currently has remote network elements (RNEs) assigned to it, you must first delete all RNEs from the WaveStar SNMS database or reassign all of the associated RNEs to another GNE in the same subnetwork before deleting the GNE.

Related task

See the [Delete a Network Element](#) task in the [Management Communications Setup](#) chapter.

Dynamic Network Operations

Overview The Dynamic Network Operations (DNO) feature performs two major functions in WaveStar SNMS:

- Subnetwork discovery
- Database synchronization

Subnetwork discovery The DNO feature retrieves the internal configurations of NEs and external connectivity relationships. This allows the system to discover all NEs in a subnetwork as well as the trails between NEs where available. As a result, the subnetwork topology (NEs and trails) is automatically displayed on the Map window as soon as it is discovered.

When the subnetwork discovery aspect of DNO is executed on a per-NE basis, the neighbors of the target NE are also discovered. The system uses the DNO feature to query the SONET Directory Service (SDS) to discover these node types. When subnetwork discovery is initiated with the SDS, the system queries the DSA of the chosen SDS for discovering NEs, then sends commands to neighboring NEs for discovering trails.

Database synchronization The DNO feature synchronizes the system database with current configuration data from the NEs. The information that DNO gathers from NEs includes:

- NE parameters
- NE equipment inventory
- NE port parameters
- NE port protection groups
- NE cross-connections
- NE tributary reservation data (for WaveStar BWM NEs only)
- Optical associations (OLS 400G NEs only)

As part of subnetwork discovery, the system retrieves an NE's current equipment configuration and stores this information in the system database. NE equipment data can include bays, shelves, and circuit packs.

For certain NEs, such as the WaveStar BWM, you can select an NE and any single bay or shelf within the NE through the Network Element Explorer on the Manual DNO window, and then invoke DNO to retrieve the NE's current equipment configuration for that bay or shelf to update the system database. For a single bay or shelf, you can update the database for equipment or NE port

parameters. This simplifies DNO when bays and shelves are added to an existing WaveStar NE such as the BWM.

Log-Based Synchronization (OLS 400G only)

The Log-Based Synchronization method (LBS) is used for WaveStar SNMS database synchronization when the EMS loses communication with the NE. LBS retrieves the NE log data that contains the history of the database change notifications. Using this, the EMS database can be resynchronized locally instead of sending TL1 retrieval commands to the NE database to synchronize data. This allows a more efficient DNO operation.

The LBS method applies only to OLS 400G and runs automatically under the following conditions:

- ▶ The communication to the target NE was lost and restored again.
- ▶ Control of the log-based DNO has been enabled.



NOTE:

The automatically triggered DNO operation can be enabled or disabled by setting a parameter in a configuration flat file. The setting of this control is primarily done by the WaveStar SNMS customer technical support team. It is not recommended that this parameter setting be done by a WaveStar SNMS user.

Once the LBS is enabled, it consists of the following steps:

1. Record the last notification before the link went down.
2. Retrieve the NE History Log that contains the database change notifications.
3. Determine the usability of the NE Log for recovery of the lost notifications.
4. Assure the chronological order of the retrieved logged notifications.
5. Update database based on both logged and received real-time notifications.

Ways to initiate DNO

There are three ways that the DNO feature is initiated in the system:

- ▶ Automatically—The DNO subnetwork discovery/database synchronization process is initiated automatically when an NE is discovered or added manually to the WaveStar SNMS database.
- ▶ Manually—The DNO subnetwork discovery/database synchronization process is executed for the NE, when you request it. When you request a manual DNO for an aggregate, DNO is executed for all NEs in the aggregate.

- ◆ Scheduled—You can schedule DNO to be performed for one or more NEs on a daily, weekly, or monthly basis.
-

DNO options

You can invoke DNO to perform automatic subnetwork discovery or database synchronization for one or more of the following: NE parameters, equipment inventory, port parameters, port protection groups, cross-connections, reservations. You can also invoke DNO to perform subnetwork discovery and resynchronize the system database for all data types.

Load management and DNO requests

WaveStar SNMS has a Load Manager process that determines how the system behaves during high load conditions. The Load Manager coordinates the processing of transactions initiated by WaveStar SNMS users that involve multiple data transfers and performs acts as a “gatekeeper” that intercepts command notifications to the appropriate backend process that actually performs the data transfer.

The Load Manager checks whether the average CPU utilization (at that instant) exceeds a set value or whether there is an overload condition in effect. If either of these condition is true, new commands are delayed until the CPU utilization is below the set value or the system is no longer in overload.

The Load Manager checks the following activities:

- ◆ NE backups
- ◆ NE software downloads
- ◆ DNOs
- ◆ Data transfers to other OSs
- ◆ Periodic maintenance activities (such as database and file purges)

If the average CPU utilization exceeds a Delay Threshold of 70% of the total CPU capacity (the pre-set default), any/all of the above activities are suspended until this is no longer true and the system is not in overload.

The system resumes processing of transactions, on a first-in, first-out basis, in the following order:

1. All transactions requested by users in “ad hoc” (on demand) mode
 2. All scheduled NE data backups
 3. All other scheduled tasks.
-

Related tasks

See the related tasks in the [Management Communications Setup](#) chapter.

Introduction

Purpose This chapter provides general information about provisioning system parameters, network element ports, and network element equipment in WaveStar SNMS.

Objectives This chapter explains how to do the following:

- Provision or pre-provision network element equipment
- Provision network element ports

Contents This chapter contains the following topics:

- [Equipment Provisioning](#) [12-2](#)
- [Port Provisioning](#) [12-4](#)

Equipment Provisioning

Overview	Older generation NE types have little or no configurability of their equipment entities (their bays, shelves, slots, or circuit packs). New generations of NEs, however, can be expected to have an increasing amount of configurability in this area. SNMS supports equipment provisioning as needed for each NE type.
Introduction	Different NE types are of varying complexity and configurability, ranging from single-shelf NEs at a single location to multi-bay and multi-shelf NEs that are flexible in their arrangements and may be distributed between rooms and floors of a central office or even distributed across central office locations and remote sites. The equipment window gives a set of hierarchically arranged equipment views. The shelf view is the lowest level view. There may also be a system view and a bay/line-up view, depending on how large and complex the NE is. The Equipment Configuration window also allows you to “drill down” into the NE equipment hierarchy.
Equipment discovery and inventory maintenance	Upon discovery of an NE, WaveStar SNMS automatically retrieves an NE’s current equipment configuration and maintains this information in its database. This is the automatic discovery portion of DNO. An NE’s equipment includes any item that it is able to report; for example, bays, shelves, and circuit packs. For network elements managed via TL1, the network element’s current equipment configuration is obtained through TL1 RTRV-EQPT commands. For network elements managed using CMISE, the network element’s current equipment is obtained through CMISE M-GET commands. In addition to the equipment information (bays, shelves, slots, and circuit packs), the OLS 400G NE also provides information on the set of equipment associations required to specify optical channels and the equipment connections for optical lines. WaveStar SNMS retrieves and maintains these optical channel and line associations in its database.
Control point and scan point parameters (OLS 400G)	As part of equipment inventory management for OLS 400G NEs, WaveStar SNMS retrieves and maintains in its database the NE’s current attribute values for control and scan points. Control points are used to control external devices associated with the managed system, while scan points are used to monitor external conditions related to the managed system.

Provisioning of BWM, 2.5G, and OLS 400G equipment

Some of the attributes reported on WaveStar BWM equipment are provisionable. In addition, the WaveStar BWM, 2.5G, and OLS 400G NEs allow users to manually provision new bays, shelves, and circuit packs. The WaveStar BWM therefore has establish and remove functions that apply to bays, shelves, and circuit packs; and attribute modification functions for shelves, slots, and circuit packs. New bays and shelves are created by specifying and provisioning new bay and shelf IDs. New circuit packs are created by associating a circuit pack type and/or circuit pack qualifier with a circuit pack slot. New bays are also implicitly created by creating new shelves with Shelf IDs that imply a bay that does not currently exist. For example, if a shelf with ID 10-1 is added and there is not currently a bay with the Bay ID 1 in the system, that bay is automatically created and reported by the WaveStar BWM.

Provisioning of LambdaRouter equipment

The LambdaRouter allows you to establish (pre-provision) a shelf, circuit pack, or port. Pre-provisioning of bays is not available.

Related information

For instructions on viewing NE equipment configurations, see [T 306, Provision NE Equipment Information](#) (Display Equipment Provisioning Information).

Port Provisioning

Overview	Lucent Technologies NEs can change the state of ports without issuing a <i>rept-dbchg</i> message. WaveStar SNMS therefore cannot detect these changes. To ensure that you receive an accurate list of available Access Identifiers (AIDs) when selecting ports to provision, first do a manual DNO on the single NE or group of NEs that you plan to provision (see information about the DNO feature, refer to the Dynamic Network Operations section in Chapter 11, Management Communications Setup Concepts).
Cross-connections and the port provisioning list	When cross-connections are added or deleted, the AID list in the port provisioning window is not updated automatically. To ensure that the AID list information is accurate, perform a manual DNO on the NEs that have had cross-connections added or deleted prior to any port provisioning.
Port configuration discovery	<p>There is generally a fixed relationship between circuit packs and their number and type of ports. Upon discovery of an NE, for ports of a fixed type, WaveStar SNMS may automatically retrieve an NE's current set of ports and their type, or it may automatically retrieve an NE's current equipment and derive the set of ports and their type. (This is the automatic discovery portion of DNO.) Deriving the port information from the equipment is the preferred method. Regardless of the method of obtaining the information, the system maintains the ports and their type in its configuration management database.</p> <p>For NEs managed via TL1, obtaining the port information directly from the NE is done via TL1 RTRV-<i>rr</i> commands (where <i>rr</i> represents the various port types). For NEs managed using CMISE, the NE's current port configuration is obtained via CMISE M-GET commands. The responses to these commands include the NE's current ports and their attributes.</p>
Port configuration provisioning	WaveStar SNMS provides a GUI-based function to enable you to select an NE and port or tributary, and view the current values of that port's or tributary's attributes.
Related information	For instructions on provisioning ports, see T 305, Provision NE Ports .

Introduction

Purpose This chapter provides general information about the definition of aggregates and trails in WaveStar SNMS.

Objectives This chapter explains how to do the following:

- define aggregates for display on the Map window and alarm monitoring purposes
- define trails between managed and non-managed network elements in WaveStar SNMS

Contents This chapter discusses the following topics:

- [Aggregates](#) [13-2](#)
- [Trails](#) [13-4](#)

Aggregates

Overview

An aggregate is a collection of related NEs that is user-defined as needed to streamline system monitoring and other management functions. Aggregate definition allows a large number of NEs to be concisely displayed and monitored on the Map window's graphical representation of the network. Aggregates can "own" or contain other aggregates. All users using the same GUI client server can share aggregates. User access to certain NEs are defined by Target Groups. For information about Target Groups, see the .

Aggregate management

Aggregates can be added, modified, or deleted. To create an aggregate, you assign a name and an alias to the aggregate and then add NEs or other aggregates to the newly created one, using functions on the WaveStar SNMS GUI.

Aggregate alarms

The color shown in the center of an aggregate icon displayed on the Map window pane or Subnetwork Explorer indicates the highest severity alarm of a member NE or aggregate. If any member NE has the Alarm Throttling feature enabled, and the number of alarms has passed the Alarm Throttling level, then the color in the icon reflects the level of alarms being throttled, with the last known highest severity alarm color shown in the aggregates's border.

Map window symbol for aggregates

The diamond-shaped symbols on the Map pane represent aggregates. The diamond shape is the default for aggregates; this can be changed through the Shapes panel of the Preferences window. Aggregates are collections of NEs that do not necessarily correspond to any physical connectivity or other NE attributes. An aggregate can consist of a group of related NEs, such as a subnetwork, or a group of colocated NEs that are not necessarily in the same subnetwork. An aggregate can be moved under another parent aggregate on the Map pane or Subnetwork Explorer by selecting it and then dragging it to the parent aggregate symbol.

Aggregates can be displayed on the Map pane display and can be expanded on the Map window pane or Subnetwork Explorer whenever necessary to display all of its members. You can generate aggregate-specific alarm summaries, alarm logs, and command/response logs.

Related tasks

Modify User Preferences describes how to modify user preferences for display of items on the Map window, including the symbol used for aggregates.

describes how to add an aggregate and how to add or change the members of the aggregate.

Modify an Aggregate in Chapter 4, Topology Management describes how to change an aggregate's alias.

Delete an Aggregate in Chapter 4, Topology Management describes how to delete an aggregate and reassign its members to another aggregate.

Trails

Overview	Trails are physical links between NEs or aggregates. They are represented graphically on the Map window pane display of the network as solid lines between the NE/aggregate symbols.
Autodiscovery of trails	Most optical trails between identical Lucent Technologies NEs are configured automatically by the DNO feature and autodiscovered when the network topology is displayed on the Map window after DNO is run. Creation of the network model—identifying the NEs, deriving the trails between them, and retrieving the internal configuration information—is performed automatically by WaveStar SNMS through communication with the NEs.
User-defined trails	If the DNO process does not automatically discover trails between NEs, the trails must be manually entered through the GUI. User trails can be manually added between any two trail termination points (TTPs) on any type of NE. Generally, there are many more TTPs on all NE types than those for which trails are automatically discovered. For an OLS 400G, a trail can only be manually added to another 400G.
Trails between managed and non-managed NEs	If there is DCC connectivity between a managed WaveStar NE and an NE/device not managed by the EMS (for example, a DDM-2000), the trail can still be added manually even if the AIDs of the non-managed device are not known or available to WaveStar SNMS.
Representation of trails on the Map window	The lines that run between NEs and/or aggregates represent trails. Trails are physical links between NEs or aggregates. If there is more than one trail between two NEs, the phrase “Multiple Trails” is displayed when you position the mouse cursor on the trail line in the Map pane.
Deletion of trails	Autodiscovered trails cannot be deleted manually. Autodiscovered trails are deleted automatically if the link is physically disconnected in the network. User-defined trails have to be manually deleted through the GUI. However, if an NE at one end of a user-defined trail is deleted, the trail is removed from the Map window display but remains in the WaveStar SNMS database. In this case, the

trail should be deleted; otherwise, the related NE information may still appear on the View Trail List window.

Trail alarms

Trails can generate alarms. When Access Identifiers (AIDs) for equipment in the NE are provided by WaveStar SNMS or selected when a trail is manually added, WaveStar SNMS receives alarms from the trail. Trail alarm data is available through the Trail Alarm Summary window and the Trail Alarm List.

Trail alarm data is not available for trails manually added between a managed NE and an NE not managed by WaveStar SNMS.

Related tasks

[Modify User Preferences](#) in [Chapter 1, Getting Started](#) describes how to modify user preferences for display of items on the Map window, including trails.

[Add a Trail](#) in [Chapter 4, Topology Management](#) describes how to manually add a trail.

[Delete a Trail](#) in [Chapter 4, Topology Management](#) describes how to manually delete a trail.

Introduction

Purpose

This chapter provides general information about synchronizing the date and time setting of network elements with the date/time settings of the WaveStar SNMS host.

Objectives

This chapter explains how to do the following:

- Manually set date/time synchronization for an NE.
 - Make adjustments for the time zone and Daylight Savings Time in date/time synchronization
 - Set up on-demand, automatic, and scheduled date/time synchronization for an NE
-

Contents

This chapter discusses the following topic:

- [Date/Time Synchronization](#) [14-2](#)
-

Date/Time Synchronization

Overview

Periods of time when an NE is out of service, as during a software upgrade, can cause the NE's date/time setting to be out of sync with the WaveStar SNMS host and the other NEs in the network. Lack of date/time synchronization can create problems in determining the order in which alarms occurred on the network.

WaveStar SNMS uses the Network Time Protocol (NTP) to ensure the accuracy of its internal clock. WaveStar SNMS, in turn, provides centralized remote date/time synchronization between its internal clock and those of its managed NEs. Synchronization can be performed on a single NE, on an aggregate of NEs, or on all of the NEs in a user's Target Group. Synchronization can be performed on demand or set up on a periodic schedule using the SNMS Scheduler. The transition from standard time to daylight savings time is also supported as a user selected option.

NE time zone

As part of the date/time synchronization feature, WaveStar SNMS can take into account whether the NE is located in a different time zone from the system host.

The Time Zone parameter is one of the fields that can be defined or changed for an NE through the Add an NE window or Modify an NE window.

Related tasks

[Add a Network Element—X.25 Communications](#)

[Add a Network Element—OSI Communications](#)

[Add a Gateway Network Element—X.25 Communications](#)

[Modify a Network Element](#)

Standard time and daylight savings time

You can use the Fall Back/Spring Forward option to have WaveStar SNMS automatically make time adjustments for Daylight Savings Time (Spring Forward) and standard time (Fall Back) when doing date/time synchronization for an NE, a group of NEs, an aggregate, or all NEs under system control, 20 NEs at a time or more, depending on system load. The Fall Back/Spring Forward option can be enabled or disabled, as needed. This option is enabled, by default. If the option is disabled for an NE, the NE's time is always set to standard time.

The Spring Forward/Fall Back option should be set by the system administrator.

Related information

[Enable Fall Back and Spring Forward](#) in [Chapter 5, Timing Provisioning](#) describes how to enable or disable the Fall Back/Spring Forward option for date/time synchronization.

Ways to perform date/time synchronization

NE Date/time synchronization can be performed in three ways:

- ▶ **Scheduled**—NE date/time synchronization can be scheduled to be performed on a daily, weekly, or monthly basis. A scheduled date/time synchronization will only be done if the time difference between the NE and the system host is more than 15 seconds.
- ▶ **Automatically**—You can have the system automatically perform date/time synchronization on an NE when it is manually added or autodiscovered by the system, or when communications between the NE and the system host are lost and then regained. Automatic date/time synchronization will be performed on an NE only if the time difference between the NE and system host is more than 15 seconds, or the drift threshold set via the Set Date/Time Synchronization Drift window. The drift threshold is the maximum time difference allowed (in seconds) between the NE and the EMS host before date/time synchronization is performed automatically. Automatic date/time synchronization can be enabled or disabled; the default is enabled.
- ▶ **Manually**—Date/time synchronization can be performed on demand for an NE, a group of NEs, an aggregate, or all NEs under system control, up to 20 NEs at a time or more, depending on system load.

Automatic date/time synchronization

The NE date/time synchronization feature sets up the NE's date/time to match the date/time of the WaveStar SNMS host. The WaveStar SNMS system administrator, or a user with a privileged login, can enable or disable the Automatic Date/Time Synchronization feature. When this feature is enabled, the system performs date/time synchronization automatically when:

- ▶ An NE is added to the network or an NE is autodiscovered by WaveStar SNMS for the first time
- ▶ Re-establishing communications with the NE after the communications link is down

Automatic date/time synchronization changes the date/time on the NE only if the time difference between the NE and WaveStar SNMS is more than 15 seconds.

This feature can be enabled or disabled through the GUI. It is enabled, by default, to enable/disable automatic date/time synchronization.

Automatic date/time synchronization should be enabled/disabled by the WaveStar SNMS system administrator or a user with a privileged login.

Related tasks

Scheduling Tasks in Chapter 14, Timing Provisioning Concepts provides additional information about scheduling NE date/time synchronizations.

Enable/Disable Automatic Date/Time Synchronization in Chapter 5, Timing Provisioning describes how to enable/disable automatic date/time synchronization.

Set Drift Threshold for Date/Time Synchronization in Chapter 5, Timing Provisioning describes how to set the drift threshold for automatic date/time synchronization.

Set Network Element Date/Time Synchronization in Chapter 5, Timing Provisioning describes how to manually initiate date/time synchronization.

Introduction

Purpose

This chapter provides general information about cross-connections, optical associations, and optical connections, which can be defined through WaveStar SNMS for network element traffic.

Objectives

This chapter explains how to do the following:

- Define optical associations and connections for OLS 400G NEs
 - View and provision cross-connections through the WaveStar SNMS GUI
 - Define cross-connect loopbacks for testing port/tributary signal integrity
-

Contents

This chapter discusses the following topics:

- [Optical Associations](#) [15-2](#)
 - [Cross-Connections](#) [15-4](#)
-

Optical Associations

Overview

Unlike other WaveStar NEs where physical ports correspond to the transmission interface they support (including the rate and format), the WaveStar OLS 400G NE interface corresponds to optical physical interface ports, optical channel frequencies, and optical lines.

WaveStar SNMS allows you to provision the optical equivalent of physical interface ports on an OLS 400G NE, or make a logical *association* between the physical interface and the optical lines, optical channels, optical interface ports (low speed broadband and optical interfaces) and the supervisory channel, including the type/purpose of the optical component in signal transport.

Optical interface ports for OLS 400G NEs

The optical physical interface port units for the OLS 400G are:

- ◆ Optical Translator Unit (OTU)—SONET/SDH or low speed broadband (LSBB) signals are translated to optical channel wavelengths
- ◆ Optical Demultiplexing Unit (ODU)—a single optical line is separated into individual SONET/SDH LSBB signals
- ◆ Optical Multiplexing Unit (OMU)—individual SONET/SDH LSBB signals are combined into a single optical line
- ◆ Optical Amplifier (OA)—device used to amplify optical wavelength signal

Association types supported

Association types supported by NE type and node type are:

Association Type	NE Type	Node Type
Add	OLS 400G	All types
Drop	OLS 400G	All types
Terminal Add	OLS 400G R. 3.0	All types
Terminal Drop	OLS 400G R. 3.0	All types
External Add	OLS 400G R. 3.0	All types
External Drop	OLS 400G R. 3.0	All types
Terminal	OLS 400G R. 2.0 - 2.1	All types

Capabilities

WaveStar SNMS allows you to add or delete optical associations.

Optical connections

Optical associations in WaveStar SNMS can be provisioned in groups to form *connections*.

Connection types supported

Connection types supported by NE type and node type are:

Connection Type	NE Type	Node Type
Add	OLS 400G	All types
Drop	OLS 400G	All types
Single OTU Thru and Two OTU Thru	OLS 400G	<ul style="list-style-type: none"> ➤ 2-Fiber Full Add/Drop Ring terminal 40 ➤ 4-Fiber Add/Drop Ring terminal 40 ➤ 2-Fiber Full Add/Drop Ring terminal 80 ➤ 4-Fiber Full Add/Drop Ring terminal 80
Compatible Optics Add	OLS 400G	All types
Compatible Optics Drop	OLS 400G	All types

Capabilities

WaveStar SNMS allows you to add optical connections.

Related tasks

See the related tasks in [Chapter 6, Traffic Provisioning](#) for instructions on adding or deleting optical associations and connections.

Cross-Connections

Overview

WaveStar SNMS provides a graphical means of viewing and provisioning NE cross-connections via the Cross-Connection window. This window is designed to display connection termination points and cross-connections for a selected NE. This section provides information about cross-connection functionality and the Cross-Connection window.

Cross-connection functionality

WaveStar SNMS provides the following major functions associated with the provisioning of cross-connections:

- ▶ Perform Dynamic Network Operation (DNO) on discovering NE.
- ▶ Discover cross-connections as part of DNO.
- ▶ Include cross-connections as part of the system database.
- ▶ Provision cross-connections on demand from the GUI.
- ▶ Provision cross-connections to and from all tributaries in a 2-fiber/4-fiber Bi-directional Line Switched Ring (BLSR) port protection group or Unidirectional Path Switched Ring (UPSR)/Subnetwork Connection Protection (SNCP) topology (applies to both service tributaries and protection tributaries).
- ▶ Provision cross-connections from service tributaries in 1+1 line-protected port protection groups
- ▶ Display status of cross-connections on the GUI.
- ▶ List cross-connections, including input and output tributaries, topology of the cross-connection, and the presence or absence of reservations.
- ▶ Provision specific identifying parameters when adding cross-connections (cross-connection application, cross-connection number) through the GUI to simplify retrieval, modification, and deletion of multiple cross-connections that have established using the same set of input and/or output tributaries
- ▶ Modify cross-connections on demand from the GUI.
- ▶ Delete cross-connections on demand from the GUI.
- ▶ Establish, delete, modify, and retrieve tributary reservations on the GUI.
- ▶ Update the database upon receiving autonomous database messages from the NE on addition, deletion, and modification of cross-connections.
- ▶ Log all requests/responses and autonomous database update messages.
- ▶ Provide user access from the GUI.

The Cross-Connection window

The Cross-Connection window provides the user with access to all cross-connection features. It contains an interface tailored to the large, modern cross-connection fabrics now supported by the system. The window consists of a menu bar, a toolbar, a status bar, a network element explorer, and a main view. The main view area is further broken down into four (or eight) port areas. This window is used for all cross-connection operations, including viewing, adding, modifying, and deleting cross-connections.

Toolbar

The Cross-Connection window contains a toolbar (starting at the upper left portion of the window) that contains a series of buttons used for specifying different types of cross-connections or tributary reservations. If you are unsure of the operation that a certain toolbar button will perform, point at it with the cursor and after 2 seconds a tooltip is displayed, showing the operation of that button. This information is also displayed in the status bar.

After the cross-connection buttons, the next button in the toolbar is used to delete an existing cross-connection. (It is disabled until the user chooses a cross-connection that can be deleted.)

The next button is used to modify a cross-connection. (It is disabled until the user chooses a cross-connection that can be modified.)

The next button is used to roll an existing cross-connection. For additional instructions on how to use the Roll button to roll a cross-connection, see [Roll a One-Way Cross-Connection](#) or [Roll a Two-Way Cross-Connection](#) in the [Traffic Provisioning](#) chapter.

The next button is used to switch the working and protection legs of a path-protected cross-connection. For additional instructions on how to use the Switch button, see [Switch the Working and Protection Legs of a Path-Protected Cross-Connection](#) in the [Traffic Maintenance](#) chapter.

The next button is used for the Reservation feature. Click this button after you have chosen a tributary to reserve. The system displays a pop-up window for selection of tributary parameters for the reservation. (The Reservation feature is only available for BWM NEs.)

The next button is used for the show/hide mode. Click this button to show cross-connection lines - click it again to hide the cross-connection lines.

The next button is used to obtain a list of existing cross-connections. If you click on the NE's TID in the explorer portion of the window, and click this button, a complete listing of all cross-connections for the NE is displayed. The listing shows the source and destination tributary AIDs, the cross-connect type, the rate, the TID of the source NE and the TID of the destination NE. Clicking on any equipment level in the explorer (such as a specific shelf or port), and then clicking this button, displays a list of cross-connections for the selected equipment in the NE.

The next button is for the Cancel function. Click this button when you have started a cross-connection and want to terminate the operation. (This button is disabled until you select a cross-connection type.)

The next button is for Toggle View. Click this button to change the number of port areas displayed in the view panel. Initially the view is set to Toggle to Four, which shows four port areas (and the contents of the pop-up menus in the explorer accommodate all four ports). When you click the Toggle View button, the view changes to Toggle to Eight, which shows eight port areas (and the contents of the pop-up menus in the explorer accommodate eight ports).

Status bar

The status bar, at the bottom of the Cross-Connections window, provides the following information to the user:

- ▶ The source and destination AID and the cross-connection type of a selected cross-connection in the cross-connection view area.
- ▶ The cumulative information about a cross-connection being added, as it is selected by the user.
- ▶ Information about the status of add/delete/modify operations that have been requested.

When a port tributary is displayed in the Main View of the Cross-Connection window, and you position the mouse cursor on the tributary block, a message is displayed next to the tributary address in the status bar identifying it as a “Source” or “Destination” tributary. The “Source” and “Destination” literal displayed in the status bar is used to indicate whether the tributary could act as a “Source” or “Destination” , or both, for additional cross-connections.

Displaying ports

Ports are displayed on the Cross-Connection window between the arrow buttons surrounding the main view area. Top and Bottom port areas appear between the left and right arrow buttons, while Left and Right port areas appear between the up and down arrow buttons.

NOTE:

Cross-connection prerequisites for some NE types may prevent the user from provisioning a cross-connection to or from a tributary *only* if the port unit slot containing the tributary has already been provisioned (or pre-provisioned) with information that determines the number of ports and the rate of the ports in the port unit slot.

Tributary/port group blocks

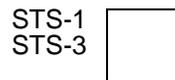
Ports that are selected for cross-connection groups always expand into one of the following tributary/port group building blocks.

- ▶ STS-1—contains only a single STS-1 worth of signal, with no access to lower-rate cross-connections
- ▶ STS-3—contains only a single STS-3 worth of signal, with no access to lower-rate cross-connections.
- ▶ STS-3/STS-1—this building block contains an STS-3 and allows access to the corresponding STS-1s that are accessible through that STS-3.
- ▶ STS-12/STS-3—this building block contains an STS-12 worth of signal, and allows access to both the STS-12 and the corresponding STS-3s. No access to the STS-1s is available.
- ▶ STS-12/STS-3/STS-1—this building block is the same as the previous, except access to the corresponding STS-1s is allowed.

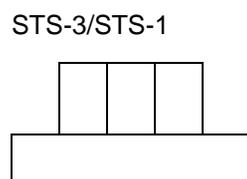
Any building block that contains multiple layers has each layer of the building block as mutually exclusive to the layers above and below it. This means that if the building block is an STS-1/VT1.5, then the existence of a VT1.5 cross-connection makes the STS-1 unavailable, and any STS-1 cross-connection makes *all* of the VT1.5s unavailable.

Furthermore, in the STS-12/STS-3/STS-1 building block, an STS-12 cross-connection disables all STS-3 and STS-1 ports. An STS-3 cross-connection disables the STS-12 and the three STS-1s that are part of the cross-connected STS-3. Any STS-1 cross-connection disables the entire STS-12 and the single STS-3 of which the STS-1 is a part.

The following explains how these various tributary building blocks are represented graphically on the Cross-Connection window: They are defined as follows:



This tributary group displays a single STS-1 or STS-3 for cross connection. The would be used when, for example, the port chosen supports only some number of STS-1 or STS-3 cross connection, but not a combination of the two.



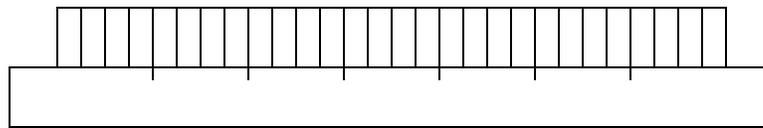
This tributary group is seen more often, and is used to display any STS-3 tributary that contains STS-1 tributaries that can also be cross connected. The larger box at the bottom of the graphic represents a single STS-3. The three smaller boxes on top each represent a single STS-1. This graphic is used whenever an STS-3 tributary can be cross connected

at either STS-3 or as three STS-1s.

Note: All of the tributary groups that contain more than one level (as does the one above) represent two different rates of cross connections within a single tributary

group. This means that the two different levels (the STS-3 and the STS-1, in this case), are mutually exclusive. You can **either** cross connect the STS-3 tributary, **or** the three STS-1 tributaries, but not both.

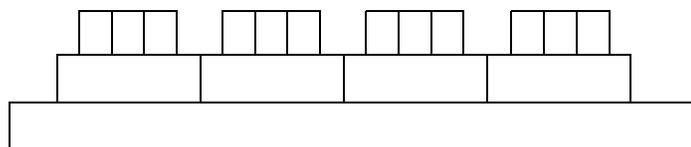
STS-1/VT1.5



This graphic is used whenever a tributary can be cross connected

at the STS-1 or VT1.5 rate. The large box at the bottom represents a single STS-1, and the 28 smaller boxes on top each represent a single VT1.5. A single tributary group (m-1, for instance) is dragged into the View Area and this graphic is displayed.

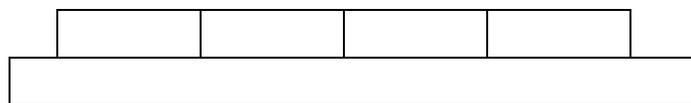
STS-12/STS-3/STS-1



This is the most complex of the graphics used in the cross connection window. The bottom box represents a

single STS-12 tributary. The four boxes in the middle each represent a single STS-3 tributary. And the smaller boxes on top of each STS-3 each represent a single STS-1 tributary. This graphic is used to show an STS-12 tributary that can be cross connected at either STS-12, as four STS-3s or as a combination of STS-3s and STS-1s. This graphic will be shown when an STS-12 tributary is selected in a network element that allows cross-connections at all three rates.

STS-12/STS-3



This graphic is similar to the above graphic, but does not contain the STS-1 boxes. The bottom

box represents a single STS-12 tributary and the four smaller boxes on top each represent single STS-3 tributaries. This graphic will be shown when an STS-12 tributary is selected and the network element only allows cross connections at the STS-12 and STS-3 rates.

The graphics are designed to provide an immediate visual indication of what is cross connected already and what is available for cross connection. Boxes that are yellow do not contain any cross connections. Boxes that are dark blue do contain cross connections. Boxes that are grey are not available for cross-connection.

For SDH configurations:

- An STS-1 building block is used for a VC-3 tributary.
- An STS-12/STS-3/STS-1 blocks are used for STM-4/STM-1/VC-3 or STM-1 ports/tributaries
- An STS-3/STS-1 blocks are used for STM-1/VC-4 ports/tributaries.

For SDH ports/port groups:

- A SONET DS-3 circuit pack can be used for SDH. In this case, the circuit pack supports 8 ports at the VC-3 cross-connection rate. Therefore, 8 STS-1 building blocks are displayed.
- An STM-16 is equal to an OC-48. You can make 4 VC-4/4c cross-connections (equal to STS-12), 16 VC-4 cross-connections (equal to STS-3) or 48 VC-3 cross-connections (equal to STS-1). Consequently, the breakdown to building blocks for an STM-16 is the same as the breakdown for the OC-48.
- An STM-4 is equal to an OC-12. You can make 1 VC-4/4c cross-connection (equal to STS-12), 4 VC-4 cross-connections (equal to STS-3), or 12 VC-3 cross-connections (equal to STS-1). Consequently, the breakdown to building blocks for an STM-4 is the same as the breakdown for the OC-12.
- An STM-1 is equal to an OC-3. You can make one VC-4 or 3 VC-3 cross-connections. The breakdown to building blocks for the STM-1 is the same as the breakdown for the OC-3.

Any building block that contains multiple layers has each layer of the building block Color conventions

Color conventions

Listed in the following table are the default color conventions used to represent cross connection and tributary properties. These colors may be changed through the Preferences window (see [T 111, Modify User Preferences](#)).

Table 15-1. Color Conventions for Cross Connection and Tributary Properties

Color	Representation
Green	Tributary is selected as a source for cross-connection
Magenta	Cross connection destination(s) (shows when selected)
Red	Cross connection line whose redline property is enabled
Dashed line	Standby cross connection
Orange	Cross connection on tributary is in the process of a pending operation (such as creation, deletion, modification).
Light yellow	Tributary which is not being used for any cross connection or reservation
Blue	Tributary which is being used for a cross connection
Dark blue	Tributary changes to this color when a cross-connection is created. Also indicates a reserved tributary.
Purple	Tributary which is a destination tributary for a cross-connection
Dark green	Tributary which is uni-directional
Grey	Tributary not available for cross-connection

A grey box is also displayed when:

- ◆ A multiple level graphic is displayed and there are cross connections at a lower rate than the highest rate in the graphic. For example, the graphic showing both STS-3 and STS-1 tributaries may have a grey STS-3 box if any of the STS-1 boxes are blue (already cross-connected in both directions).
- ◆ A multiple level graphic is displayed and for some reason the network element will not allow cross connection at a particular rate in the graphic. This will sometime occur when a specific setting in the network element is made to disable a certain rate.

For network element which allow cross-connections at multiple rates within a single tributary, for which no graphic exists (such as STS-3/STS-1/VT1.5), the explorer will allow the user to drag and drop either the STS-3 tributary, or the STS-

1 tributary to the View Area. In all other cases, only the bottom most level of tributaries shown in the explorer can be dragged to the View Area.

Entering cross-connections

The general steps for entering cross-connections on the Cross-Connection window in the GUI are as follows:

1. Find the tributaries that are to be cross connected together and display them in the view area.
2. Choose the box that represents the source tributary for the cross connection by clicking on the box. The box will turn green. The cross connection type buttons on the toolbar will become enabled, but only those that can use the tributary chosen as a source.
3. Choose a cross connection type by clicking on the button in the toolbar for that cross connection type.
4. Choose the box that represents the destination tributary for the cross connection by clicking on it. Both the source and destination boxes will now turn orange (an operation is pending on these tributaries).
5. If it is necessary to provide further information before the cross connection can be completed, an additional information (Cross-Connect Attributes) window is opened. It contains parameter names and lists of values for each parameter. Choose the parameter values for this cross connection and choose OK.
6. Confirm entry of the cross connection when the confirmation window is displayed.

The cross-connection command is now sent to the network element. When the command has completed (either correctly or with errors), the orange color is removed from the chosen tributaries. If the cross connection was created in the network element, the tributaries will turn blue. If the command failed, they will revert to their original colors.

Related information

See the related tasks in [Chapter 6, Traffic Provisioning](#).

Cross-connection topologies

Cross-connection topologies supported by the system include the following:

- One-way point-to-point cross-connection

**NOTE:**

A one-way cross-connection can be created using the same tributary as source and destination (often referred to as a “loopback”).

- ✦ Two-way point-to-point cross-connection
- ✦ One-way Dual Ring Interworking (path protected) for FT-2000 LCT R. 4.0 NEs
- ✦ Multicast cross-connection. Also encompasses bridge cross-connections. A bridge cross-connection allows the addition of a second leg to an existing one-way point-to-point cross-connection, resulting in a 1:2 one-way cross-connection from one input tributary to two output tributaries.
- ✦ Roll a cross-connection: this refers to the operation of moving the input of a one-way point-to-point cross-connection from the current input tributary to a new input tributary, while leaving the output unchanged. (For BWM R. 1.2/1.3 and later and TDM 10G/(STM-64 NEs.)
- ✦ Path-switching and dual ring interworking cross-connections
- ✦ Path-protected cross-connections to support Dual Ring Interworking (DRI) for FT-2000 LCT, 2.5G (R. 2.0 or later), 2.5G_10G NEs or Dual Node Interworking (DNI—SDH equivalent of DRI) for TDM 10G (STM-64) NEs; or Unidirectional Path-Switched Ring (UPSR)/Subnetwork Connection Protection (SNCP) topologies for BWM (R. 3.0 or later) and TDM 10G (STM-64-R. 2.0 or later) NEs
- ✦ Redlining: this refers to the ability to mark a cross-connection and prevent it from being deleted (for 2.5G NEs)
- ✦ Cross-connect loopback: a cross-connect loopback is created from an input tributary to the output of the same tributary for testing purposes. A loopback cross-connection can be set up on any logical tributary, whether or not there are cross-connections to that tributary. A loopback cross-connection is a temporary cross-connection; after it is removed, any pre-existing cross-connections that were affected are automatically re-established in the NE.

The system also provides the ability to provision cross-connections at VC-4/STS-3 ports between tributaries on SDH and SONET ports.

Cross-connections by NE type

The following highlights the cross-connection capabilities for NE releases. Cross-connections available for an earlier NE release are also available for a later release of the same NE type.

BWM R. 1.2

- ✦ SDH support (VC-3/VC-4 cross-connections)
- ✦ STS-3 cross-connections

- ✦ Cross-connections at VC-4/STS-3 between tributaries on SDH and SONET ports
- ✦ Reservations at the STS-1 level
- ✦ Roll (applicable from BWM R. 1.0)
- ✦ Loopback cross-connection (SONET and SDH rates)

2.5G R. 2.0

- ✦ STS-3 cross-connections
- ✦ Path-protected cross-connections (DRI)
- ✦ Redline
- ✦ Loopback cross-connection (SONET rates)

2.5G/10G R. 3.0

- ✦ STS-3 cross-connections
- ✦ Path-protected cross-connections (DRI)
- ✦ Redline
- ✦ Loopback cross-connection (SONET rates)

BWM R. 2.0

- ✦ VC-4-4c cross-connections (fixed rate)
- ✦ STS-12 cross-connections (fixed rate)
- ✦ Tributaries on STM-64 port

TDM 10G (STM-64) R. 1.0

- ✦ 1-way and 2-way cross-connections
- ✦ Path-protected cross-connections (Dual Node Interworking)
- ✦ VC-3, VC-4-4c cross-connections (fixed)
- ✦ Roll
- ✦ Loopback cross-connection (SONET rates)

FT-2000 LCT R. 4.0

- ✦ STS-3 cross-connections
- ✦ STS-12 cross-connections
- ✦ 1-way, 2-way, and 1-way Dual Ring Interworking (DRI) (1-way path protected) cross-connections
- ✦ Pre-provisioning of cross-connections

Adjunct path-protected cross-connections

WaveStar SNMS supports the establishment of adjunct path-protected cross-connections. An adjunct path-protected cross-connection is established when you create a cross-connection from the same input tributary as an existing path-protected cross-connection, so that both cross-connections have adjunct working legs, but to different output tributaries. The adjunct cross-connection differs from the existing path-protected cross-connection in that it is not established with assignment to a path protection group and depends on the existence of the path-protected cross-connection.

This combination of a path-protected cross-connection with adjunct cross-connections off the same protected input tributary to different output tributaries can serve the following applications:

- A connection between two UPSR rings (SONET) or SNCP rings (SDH). This type of connection requires path selection to drop the circuit from the first ring and bridging to add the circuit into the second ring.
- Dropping traffic at many tributary interfaces in a UPSR/SNCP ring for applications such as video distribution. The path-selected signal is dropped to multiple ports.

The following simple diagram compares how WaveStar SNMS identifies the input and output legs of a path-protected cross-connection with its adjunct cross-connection.

Atomic Cross-Connection Topologies



Path-Protected

consists of:

path protection group
working leg (In1-Out)
protection leg (In2-Out)

reported leg or leg-pair*:

1wayPS,W
1wayPS,P

Adjunct Path-Protected

consists of:

adjunct working leg (In1-Out)
adjunct protection leg (In2-Out)

reported leg or leg-pair:

1wayPA,W
1wayPA,P

* Note: In TL1 messages, there are no commas or dashes in the parameter values.

When you display a path-protected cross-connection textually, by clicking the List Cross Connections toolbar button on the Cross-Connection window, each output leg is displayed and identified as either working (PSW) or protection (PSP). When an adjunct cross-connection is displayed on the List Cross Connections window (by clicking the List Cross Connections toolbar button on the Cross Connections window), each output leg is displayed and identified as either working (PAW) or protection (PAP).

Compound cross-connections

WaveStar SNMS supports the establishment of compound cross-connections between input and output tributaries in a network element, which may be needed in a network element for some network application.

The following example of the Cross-Connection window shows multiple cross-connections that have been created (1-way path protected, 1-way adjunct, 1-way point-to-point) using the same set of tributaries.

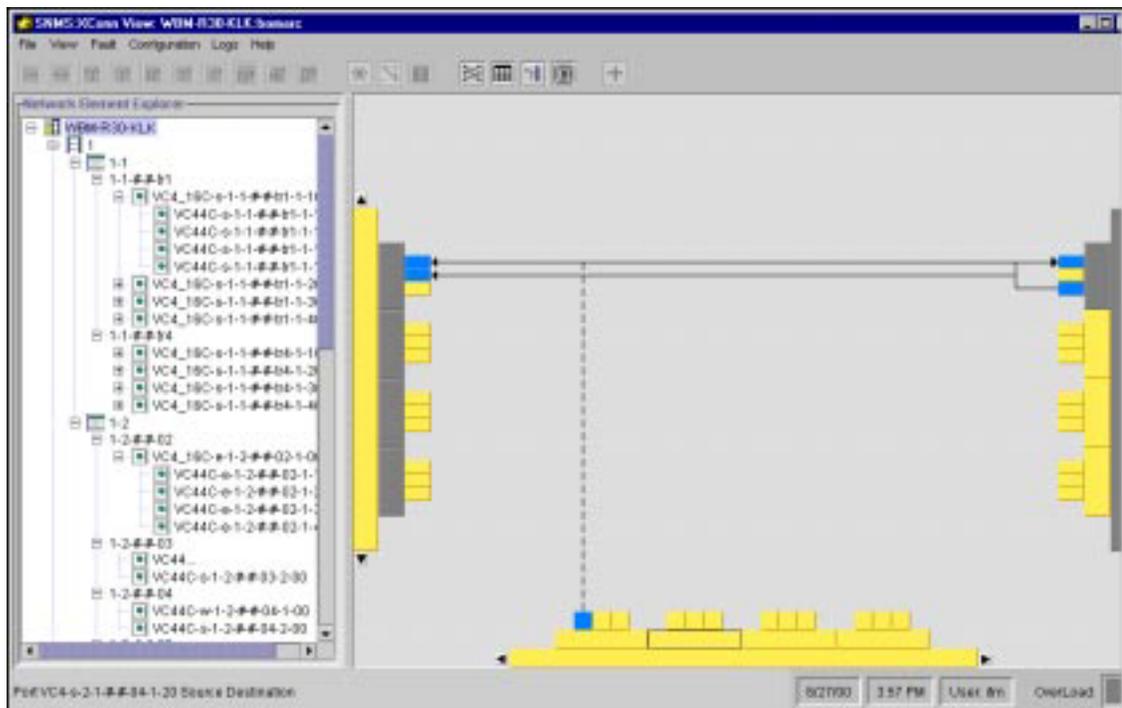


Figure 15-1. Example of compound cross-connections on Cross-Connection Window

To make it easier to identify an individual cross-connection's function in a compound arrangement, and to facilitate retrieval of information about cross-connections with associated legs and leg pairs, WaveStar SNMS allows you to assign a Cross-Connection Application and Cross-Connection Number to each cross-connection when it is being added.

Cross connection application

The Cross-Connection Application is a parameter that can be assigned to a cross-connection to identify the cross-connection type. This parameter can be modified for the cross-connection. The following application (cross-connection types) can be optionally assigned when creating or modifying a cross-connection:

- 2-Way Point-to-Point
- 1-Way Point-to-Point
- 1-Way Path-Protected
- 1-Way Adjunct Path-Protected

Cross connection number

The Cross-Connection Number is a parameter that can be assigned to a cross-connection to associate all atomic cross-connections being established in one step, so the associated legs and leg-pairs with the same Cross-Connection can be retrieved and displayed together on the List Cross-Connections window. When you add a cross-connection or compound cross-connections from the same output tributary, WaveStar SNMS populates the Cross-Connection Number drop-down list for this field with a Cross-Connection Number for each of the atomic cross-connections with the same value. The number is a 9-digit number based on the AID of one of the logical output tributaries.

On the List Cross-Connection window (which is accessed by clicking the List Cross Connections toolbar button on the Cross-Connection window), if you select a leg of a cross-connection with the same Cross-Connection Number that has been assigned to associated legs in compound cross-connections, you can modify or delete all legs of compound cross-connections with the same Cross-Connection number.

Related information

See [T 312, Display the Cross-Connection Window](#), [T 313, Display Ports on the Cross-Connection Window](#), [T 314, View NE Cross-Connections—Textual](#), [T 315, Add a Single NE Cross-Connection](#), [T 316, Roll a One-Way Cross-Connection](#), [T 317, Roll a Two-Way Cross-Connection](#), [T 318, Add a Path-Protected Cross-Connection](#), [T 320, Add an Adjunct Path-Protected Cross-Connection](#), [T 321, Add an NE Multi-Cast Cross-Connection](#) for instructions on adding cross-connections.

See [T 327, Add a Cross-Connect Loopback](#), [T 328, View Cross-Connect Loopbacks](#), and [T 329, Delete a Cross-Connect Loopback](#) for instructions on adding, viewing, and deleting loopback cross-connections.

Deleting cross-connections

WaveStar SNMS denies the request to delete (remove) a cross-connection in the following scenarios, unless some modification is made to the cross-connection to be deleted:

1. A request to remove redlined cross-connections. The modification necessary to delete a redlined cross-connection is to change the redline status of the cross-connections.

2. A request to remove a cross-connection from a tributary also being used in a loopback cross-connection. The modification necessary to remove this type of cross-connection is to remove the loopback cross-connection.
3. A request to remove a cross-connection from a tributary used in a test access connection. The modification necessary to remove this type of cross-connection is to take the tributary out of test access mode using the proper TL1 command (see the vendor NE's documentation for the appropriate TL1 command/syntax to perform this action).
4. A request to remove a path-protected cross-connection that has an adjunct cross-connection associated with the same input tributary. In this case, the adjunct cross-connection associated with the same input tributary as the path-protected cross-connection must be deleted before the path-protected cross-connection can be deleted.

Related information

See the related tasks in [Chapter 6, Traffic Provisioning](#).

Modifying cross-connections

The system allows you to modify various cross-connection information, including the source TID, destination TID, cross-connection application, cross-connection number, and source NE.

For the 2.5G and 2.5G_10G NEs, the system also allows you to modify the "redline" status of an existing cross-connection. If the "redline" status is set to "yes" on a given cross-connection leg, the cross-connection associated with that leg cannot be deleted. If a tributary associated with the cross-connection has an existing loopback for testing, the "redline" status cannot be modified.

The working and protection legs of a path-protected cross-connection can be modified by being switched.

For compound cross-connections from the same set of input and output tributaries, WaveStar SNMS allows you to change the cross-connection application of the cross-connection.

Related information

See the related tasks in [Chapter 6, Traffic Provisioning](#) for instructions on modifying cross-connections.

Reservations

WaveStar SNMS provides you with the option of "reserving" any tributaries on any transmission interface for future cross-connections. Tributaries can be reserved to:

- reduce the completion time for making a cross-connection

- support subsequent cross-connections involving BLSR interfaces by a Network Monitoring System (NMS) that does not have all the information needed to make such cross-connections. This type of cross-connect may be needed to “squench” or protect a circuit from a disconnect if the node that adds or drops the circuit from a BLSR cross-connection becomes isolated due to some failure condition.

**NOTE:**

The Reservation feature is currently available for WaveStar BWM NEs only at the STS-1 rate.

Making a reservation

WaveStar SNMS allows you to reserve a single tributary.

A reservation of a tributary creates a two-way connection for that tributary between the transmission interface and the interface to the main cross-connect fabric (the “switch interface” or “SWIF”), but not through the main cross-connect fabric.

If tributaries at both ends of a desired cross-connection have these established/reserved connections, then a subsequent request to make a cross-connection between the reserved tributaries only needs to operate on the main cross-connect fabric. The “to” and “from” port shelf tributaries are already reserved for the cross-connection. Use of reservations in this way reduces the time to complete a cross-connection.

See [T 338, Add a Reservation](#) for instructions on how to establish a reservation.

Reservations and cross-connections

Reservations can only be established on a tributary without an existing cross-connection or tributary reservation. Any tributary that is being used for a cross-connection is displayed as light blue on the Cross-Connect window. Any tributary that has an existing reservation is displayed as dark blue on the Cross-Connect window.

Parameter values that are entered with the subsequent cross-connection override the set reservation parameters.

If a cross-connection is deleted, the tributary reservation and its set attributes remain.

A pass-through cross-connection cannot be made on tributaries with existing reservations.

Reservation restrictions

Reservations should not be made on:

- an existing cross-connection or reservation on the tributary.
- protection tributaries of a 1+1 line protected port protection group.
- protection tributaries of a 1xN equipment electrical interface port protection group.
- a DS3 port set to only transmit or receive data (since a reservation creates a two-way connection for the tributary).
- a tributary with a cross-connect loopback.
- a tributary with a test access cross-connection.

Reservation data and DNO

When an NE is discovered automatically or manually added to the WaveStar SNMS database, reservation data for the NE is updated through the DNO feature.

A manual DNO can be performed on demand or scheduled to update just tributary reservation data for an NE.

For more details about the DNO feature, see the [Dynamic Network Operations](#) section in [Chapter 11, Management Communications Setup Concepts](#).

Modifying a reservation

WaveStar SNMS allows you to modify the AID, TID, and signal rate of the reserved tributary. You cannot modify a reserved tributary that has an existing cross-connection or test access connection.

See [Add a Reservation](#) in [Chapter 6, Traffic Provisioning](#) for instructions on how to modify a reservation.

Deleting reservations

WaveStar SNMS allows you to delete a tributary reservation. A reservation cannot be deleted if the reserved tributary has an existing cross-connection.

See [Delete a Reservation](#) in [Chapter 6, Traffic Provisioning](#) for instructions on how to delete a reservation.

Introduction

Purpose This chapter provides general information about maintaining network element traffic using WaveStar SNMS, such as the setting up of network element protection groups and provisioning protection switches.

Objectives This chapter explains how to do the following:

- ▶ Define, modify, and delete network element protection groups
- ▶ Provision protection switches for protected equipment and ports
- ▶ View the protection switch status for protected equipment and ports

Contents This chapter discusses the following topics:

- ▶ [Protection Groups](#) [16-2](#)
- ▶ [Protection Switch Management](#) [16-7](#)

Protection Groups

Overview

Protection group management can include both equipment and port protection groups. There are several types of protection strategies, including:

- 1+1 protection (where a service entity and a protection entity serve as a pair, with only one of them active at any given time)
- 1xN equipment protection (where a single protection entity is shared by multiple service entities)
- 4-fiber BLSR protection (for SONET)
- 4-fiber MS-SPRing protection (for SDH)
- 2-fiber BLSR protection (for SONET)
- 2-fiber MS-SPRing protection (for SDH)
- Path/DRI for TDM 10G (STM-64) and 2.5G NEs
- Unprotected entities (0x1 protection)

WaveStar SNMS allows you to retrieve an NE's current protection configuration for its transmission interfaces and to configure, at NE level, the rate, member ports, and attributes of its protection groups. Protection group modifications are done per NE for its associated protection groups. WaveStar SNMS also provides the capability to select a protection group and then to provision a protection switch between the working and protection entities in that group.

The types of electrical and optical interfaces and protection types supported by WaveStar SNMS are shown in the following table by the earliest NE release.

Interface	Type of Protection	SNMS/ BWM Rel.	SNMS/ 2.5G Rel.	SNMS/ STM-64 Rel.
DS3 Port Unit	1XN Equipment Protection	R2.1-/R1.0-	R2.1-/R2.0	
EC1 Port Unit	1XN Equipment Protection	R2.1-/R2.0-		
STM1E Port Unit	1XN Equipment Protection			R3.0-/R1.0-
E4 Port Unit	1XN Equipment Protection			
OC-3 Port Unit	1+1 Line Protection	R2.1-/R1.2-	R2.1-/R2.0	
STM-1o Port Unit	1+1 Line Protection	R2.1-/R1.2-		R3.0-/R1.0-
OC-12 Port Unit	1+1 Line Protection	R2.1-/R1.2-	R2.1-/R2.0	
STM-4o Port Unit	1+1 Line Protection	R2.1-/R1.3-		

Interface	Type of Protection	SNMS/ BWM Rel.	SNMS/ 2.5G Rel.	SNMS/ STM-64 Rel.
OC-48 Port Unit	1+1 Line Protection 2-Fiber BLSR Protection 4-Fiber BLSR Protection	R3.0-/R2.0- R3.0-/R2.0- R1.1-/R1.0-	N/A R2.1-/R2.0 N/A	
STM-160 Port Unit	1+1 Line Protection 2 Fibre MS-SPRing 4-Fiber MS-SPRing	R2.1-/R1.3- Future R2.1-/R1.2-		R3.0-/R1.0- R3.0-/R1.0- N/A
OC-192 Port Unit	1+1 Line Protection 2-Fiber BLSR Protection 4-Fiber BLSR Protection	N/A Future R3.0-/R2.0-		
STM-64o Port Unit	1+1 Line Protection 2 Fibre MS-SPRing 4-Fiber MS-SPRing	N/A R3.0-/R2.0- R3.0-/R2.0-		N/A R3.0-/R1.0- N/A
Tributary	PATHDRI		R2.1-/R2.0	R3.0-/R1.0-

Protection group discovery

WaveStar SNMS retrieves an NE's current protection group data for transmission interfaces and stores this information in its database when DNO is performed upon discovery of the NE or update of this information is requested while performing a manual DNO on the NE. For NEs with multiple bays/shelves, such as the WaveStar BWM, DNO can be performed to update protection group data for a selected single bay or shelf.

Provisioning protection groups

Protection groups can be added, modified, or deleted from an NE. You can also view the member ports and attributes for a protection group in an NE.

To add a new protection group for an NE, you select a protection group type from a list of available protection group types for the NE type, pick the rate of the protection group, assign a user-specified protection group ID which is associated with the selected bay and shelf, choose the members (ports) of the protection group, and provision the attributes for the group. In creating or modifying protection groups, WaveStar SNMS enforces that all members (ports) of the group are within the same shelf and bay and of the same transmission rate. When you select the first member port on the shelf, the first port becomes the reference port for the other members of the protection group and the remaining allowable choices are other ports on the same shelf.

The following table shows the available protection group types and the operations that can be performed on each one.

Protection Group Type	Operation	NE Release
4F BLSR/MS-SPRing	Establish, Modify, Delete	BWM R. 1.0
2F BLSR/MS-SPRing	Establish, Modify, Delete	2.5G R. 2.0, BWM, R. 2.0, 10G (STM-64) R. 1.0
1+1 Optical	Establish, Modify, Delete	BWM R. 1.2, 2.5G R. 2.0, 10G (STM-64) R. 1.0
1xN Electrical	Modify	BWM R. 1.0, 2.5G R. 2.0, 10G (STM-64)
Path/DRI	Modify	2.5G R. 2.0, 10G (STM-64) R. 1.0

For the optical interfaces, protection switching provides protection against both equipment and facility (line) failures. For the WaveStar NEs, one universal constraint is that all the entities, service and protection, must be within the same shelf.

Modifying protection groups

Once a protection group has been added for member ports in an NE, you can modify the given attributes of a protection group or swap ports in certain protection group types as shown in the following table.

Protection Group Type	Swap
1+1 Optical	Working and Protection Ports
2-Fiber BLSR/MS-SPRing	East and West Ports
4-Fiber BLSR/MS-SPRing	East Working and Protection Ports West Working and Protection Ports

When modifying a protection group, the type, rate, and member ports of the group cannot be changed.

Deleting protection groups

Deleting a protection group removes it from an NE.

Provisioning a protection switch

A protection switch in a protection group occurs automatically when a signal failure, signal degradation, equipment failure, or similar cause prompts a switch from the working entity in a protection group to the protection entity. WaveStar SNMS also allows you to provision a protection switch on demand through a GUI-based function on the Protection Group Management window. To provision a protection switch, you specify the protection group type, protection group AID, protection switch type (command), and the destination of the entity that should be active after the protection switch is activated. In some types of protection groups (for example, 2-Fiber BLSR), the protection switch is made between the working and protection ports, while in equipment protection groups (for example, 1xN Electrical), the protection switch is made between working and protection circuit packs.

Occurrence of a protection switch

Whenever a protection switch automatically occurs in the network, a protection switch dialog window is displayed, indicating that a protection switch has occurred in a specific protection group, the AID of the entity for which the protection switch occurred, and the reason for the switch (if any).

The following figure shows an example of a protection switch dialog window that may be displayed when a protection switch has occurred.

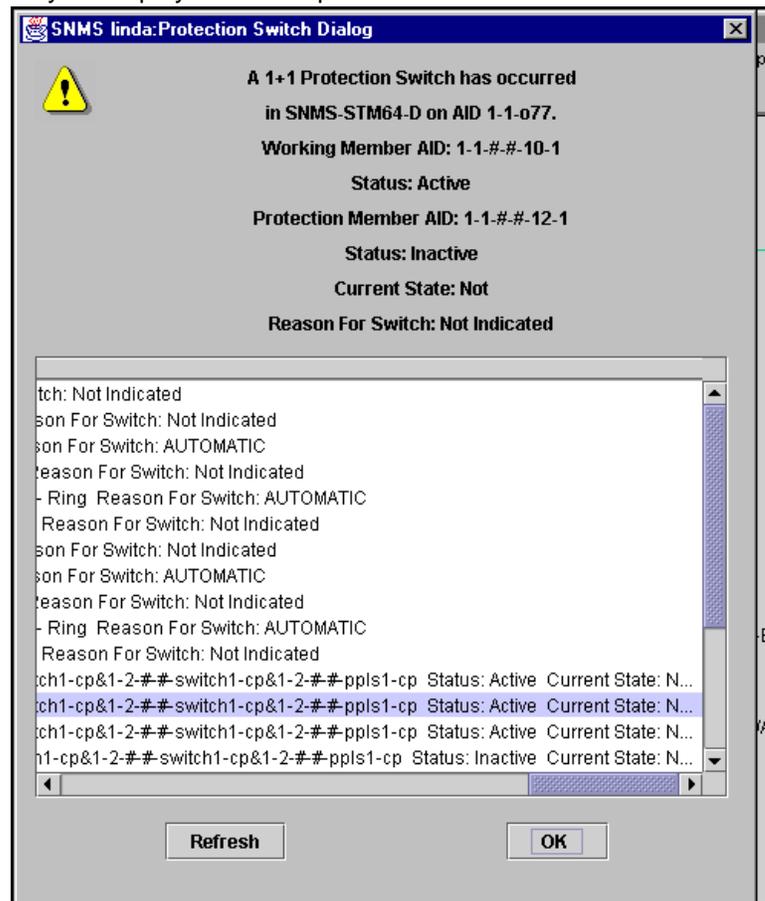


Figure 16-1. Example of protection switch dialog window for automatic protection switch

Click the Refresh button to clear the window. Click the OK button to close the window.

Related information

See the related tasks in [Chapter 7, Traffic Maintenance](#).

Protection Switch Management

Overview

WaveStar SNMS has the capability to monitor and control protection switches that can occur as a result of a fiber cut, signal degradation, equipment failure, or loss of signal, thereby provoking a switch from the working to the protection facility. Protection switches can occur automatically or be manually provisioned by the user.

Protection switch status information is generated by NEs for:

- ▶ ports involved in 1+1 optical line protection
 - ▶ circuit packs involved in 1xN equipment protection
 - ▶ ports involved in 2-fiber BLSR/2-fiber MSSPRing protection
 - ▶ ports involved in 4-fiber BLSR/4-fiber MSSPRing protection
 - ▶ signal rates that are path protected
 - ▶ optical ports involved in optical channel path protection
-

Protection switch management functions

The protection switch management functions provided by WaveStar SNMS are:

- ▶ monitoring the messages generated by the NE in response to protection switch requests that occur automatically due to incoming signal failure, incoming signal degrade, circuit pack failure, or similar cause
- ▶ maintaining the status of protection switches in the WaveStar SNMS database based on the protection switch messages received by the system
- ▶ provisioning protection switches for a given protection group type, while viewing autonomous messages received about protection switch activity for that protection group type, from the Protection Status Management window (see
- ▶ logging all autonomous and user-generated (CIT/WaveStar SNMS) protection switch requests and NE messages generated in response to switch requests. Protection switch requests and resulting messages can be viewed through the Network Notification Log (see [Display and Use the Network Notifications Log](#) in *WaveStar SNMS Maintenance Guide*.)
- ▶ notifying the user of a protection switch status change
- ▶ displaying the current protection switch status for a protection type for one or more NEs on demand
- ▶ displaying the history of protection switch status changes for a protection type for one or more NEs on demand
- ▶ operating a protection switch

Related information

See the related tasks in [Chapter 7, Traffic Maintenance](#)

Occurrence of a protection switch

Whenever a protection switch automatically occurs in the network, a protection switch dialog window is displayed, indicating that a protection switch has occurred in a specific protection group, the AID of the entity for which the protection switch occurred, and the reason for the switch (if any).

The following figure shows an example of a protection switch dialog window that may be displayed when a protection switch has occurred.

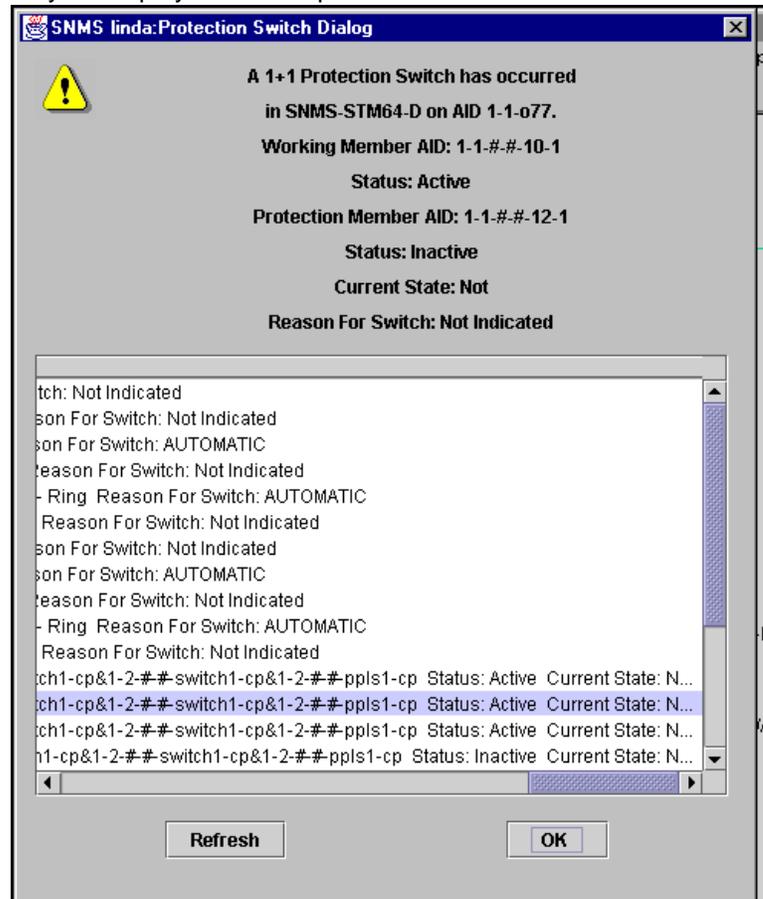


Figure 16-2. Example of protection switch dialog window for automatic protection switch

Click the Refresh button to clear the window. Click the OK button to close the window.

Introduction

Purpose

This chapter provides general information about managing and upgrading network element software for NEs managed by WaveStar SNMS, both on an on-demand and scheduled basis.

Objectives

This chapter explains how to do the following:

- Transfer the NE software from media to the WaveStar SNMS host
 - Download NE software from the WaveStar SNMS host to the NE
 - Copy NE software from one NE to another NE
 - View NE software descriptive information
 - Activate NE software on an NE
 - Delete a specific NE software release from WaveStar SNMS
 - Back up NE provisioning data
 - Restore NE provisioning data from backup
 - Scheduling tasks (such as software management functions) through WaveStar SNMS
-

Contents

This chapter discusses the following topics:

- ▶ [Software Management](#) [17-3](#)
 - ▶ [Scheduling Tasks](#) [17-16](#)
-

Software Management

Overview

The WaveStar SNMS Software Management feature provides a set of functions that automates the process of transferring NE software from Digital Access Tape (DAT) or CD-ROM to the WaveStar SNMS host machine, and downloading, activating, and copying software to NEs. The Software Management functions assist you in doing a generic software upgrade of a given NE type in the network by providing the ability to download NE software to NEs. The Software Management features also provides backup and restore functions to protect against NE data loss. Software management functions can be performed on demand or scheduled to be performed at a later time.

Software management functions

The following functions are provided:

Executables

- ▶ NE Software Transfer (Import Software to the EMS)
- ▶ NE Software Download
- ▶ NE Software Copy (OLS 400G only)
- ▶ NE Software Activate
- ▶ NE Software Delete

Data

- ▶ NE Software Backup
- ▶ NE Software Restore

Software Release Information

- ▶ View software release descriptive information
-

Ways to perform software management functions

Some of the Software Management functions can be performed either on-demand or scheduled. Scheduled tasks are set up to be performed once or periodically at a certain time. As with other scheduled tasks, you can specify the number of times to retry a failed or incomplete Software Management activity, as well as the time interval between attempts.

The following table indicates how the various Software Management functions can be performed.

Table 17-1. Methods of Performing Software Management Function

Software Management Function	On-Demand	Scheduled
NE Software Transfer	✓	
NE Software Download	✓	✓
NE Software Copy	✓	✓
NE Software Activate	✓	✓
NE Software Delete	✓	
NE Software Backup	✓	✓
NE Software Restore	✓	

Related information

For details about how to schedule Software Management functions, see the following tasks:

- ▶ [T 623. Schedule NE Data Backup](#)
- ▶ [T 624. Schedule NE Software Download](#)
- ▶ [T 625. Schedule NE Software Copy](#)
- ▶ [T 626. Schedule NE Software Activation](#)
- ▶ [T 627. Modify a Scheduled Task](#)
- ▶ [T 628. Delete a Scheduled Task](#)

Software transfer via removable media

For file transfer from Digital Access Tape (DAT), the WaveStar SNMS hosts are configured so that all the user has to do is physically mount the tape and then use the WaveStar SNMS application to transfer the files to the WaveStar SNMS file system. For file transfer from CD-ROM, the user must both physically load the CD-ROM and use UNIX utilities to mount the file system for the CD-ROM. Once the CD-ROM has been inserted and mounted, a user can use the EMS GUI application to transfer the files from the CD-ROM to the EMS file system.

**NOTE:**

It is also possible to use other commonly available tools and applications to get software files into the EMS file system (for example, use file transfer software, such as File Transfer Protocol (FTP), to transfer software to WaveStar SNMS over a network).

Viewing descriptive information for an NE software release

Prior to transferring a new software release or after the software transfer, WaveStar SNMS provides a function for viewing descriptive information for all software releases that are currently maintained on the WaveStar SNMS host machine for a given NE type.

Maximum number of software releases on WaveStar SNMS host

The maximum number of software releases for a given NE type that can reside on the WaveStar SNMS host machine varies with the host type.

The following table shows the maximum number of NE software release copies by host type.

Table 17-2. Maximum Number of NE Software Copies by Host Type

Host Type	Number of NE Software Release Copies Per NE Type
K580	3
K460	3
K360	2
K380	3

If the host limit is exceeded, and you attempt to transfer a new software release, WaveStar SNMS informs you of this and instructs you to delete at least one of the existing software releases. You can use the NE Software Delete function to do this. See [T 350, Delete NE Software](#) for instructions on how to delete NE software from WaveStar SNMS.

Related Information

[T 346, Import Software to the EMS](#) describes how to import NE software from DAT or CD-ROM to the WaveStar SNMS host for eventual downloading to for an NE type.

**NE software
download**

The Software Download function allows you to download a specific software release from the WaveStar SNMS host to a specified NE. Software downloads are done by specifying the NE type and the software release to download. Software downloads are performed by WaveStar SNMS via an NE LAN interface using File Transfer Access Method (FTAM) protocol.

Verifying software downloads

When a software download is performed WaveStar SNMS checks if the release identified for the download is older than or the same version currently running on the NE, or if it is a release that is not supported by WaveStar SNMS. If any of these conditions occur, WaveStar SNMS informs you of this, and asks if you want to proceed with the software download anyway. You have the option of continuing with the software download or cancelling it. WaveStar SNMS informs you of the status of the download. If the software download fails for some reason, WaveStar SNMS issues an error message.

Maximum number of software downloads

Only one software download should be performed at a time. A software download may take up to two hours due to data communications and the size of the software being downloaded.

The WaveStar NE Software Download Process

The following figure illustrates the software download/activation process for WaveStar NEs.

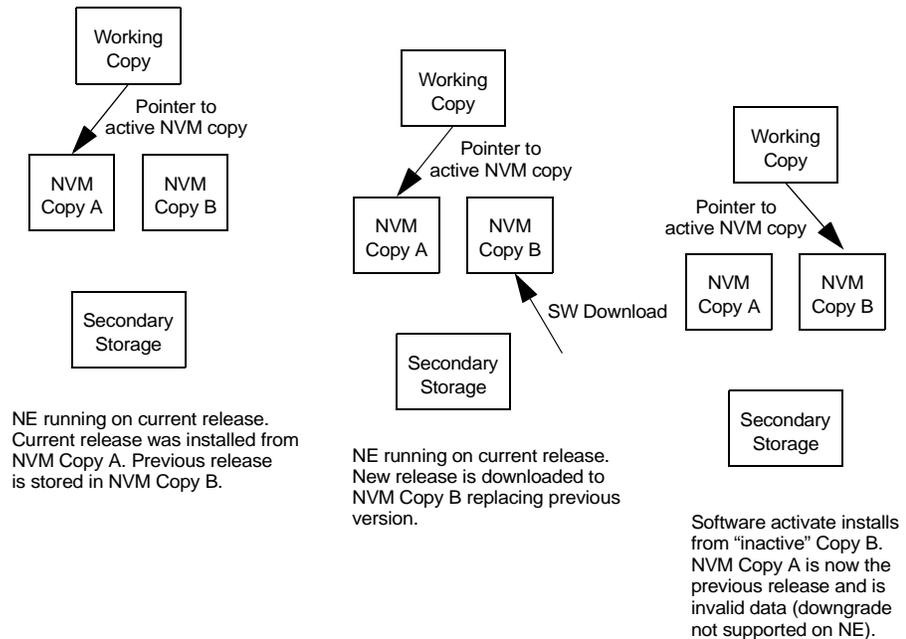


Figure 17-1. WaveStar NE Software Download/Activation Process

When software is downloaded from WaveStar SNMS to a WaveStar NE, it replaces the non-working copy in the NE's Non-Volatile Memory (NVM). When you perform a software download and click the Apply button on the Software Download to NE window, the currently non-working release is activated and becomes the active version. The software release that it replaces in working memory remains in the NVM and becomes the previous software version.

Related information

[T 347, Download NE Software](#) describes how to use the Software Download function.

NE software copy The Software Copy function allows you to copy software from a Lucent Technologies NE to one or more Lucent Technologies NEs of the same type.

Verifying software copies

When a software copy is performed, WaveStar SNMS checks if the release identified for the copy is older than or the same version currently running on the destination NE(s). If either of these conditions occur, WaveStar SNMS informs you of this, and asks if you want to proceed with the software copy anyway. You have the option of continuing with the software copy or cancelling it. WaveStar SNMS informs you of the status of the copy. If the software copy fails for some reason, WaveStar SNMS issues an error message.

Maximum number of software copies

The maximum number of simultaneous software copies from a given source NE allowed is 4.

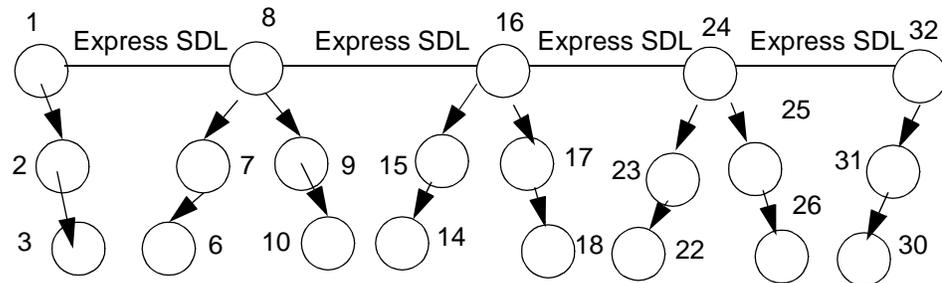
The maximum number, in total, of simultaneous remote copies within an open or closed ring of NEs allowed is 8.

WaveStar SNMS software upgrade process

The process of upgrading NEs with the latest software through WaveStar SNMS is a combination of the Software Download, Software Copy, and Software Activate functions requested by the user that are executed by the system in a certain order or sequence.

The software upgrade process is performed on one open or closed ring of NEs at a time.

Refer to the following figure that shows a sample 32 node open ring configuration when following the sequence of events for a software upgrade by WaveStar SNMS.



1. WaveStar SNMS downloads the software to all NEs within the open or closed ring that have the Express Software Download (SDL) terminated.
2. Once all software downloads in step 1 are completed, WaveStar SNMS remote copies the software from the NEs downloaded in step 1 to those NEs' neighbors.
3. Once all remote copies in step 2 are completed, WaveStar SNMS remotely copies the software from the NEs that have just received the remote copies from the source NEs in step 2 to those NEs' neighbors.

The express software downloads are terminated at nodes 1, 8, 16, 24, and 32.

The process continues until all NEs contain the desired software load.

4. NEs should then have the active/inactive partition swapped and reset, starting from the NE furthest away and working towards the NE connected to WaveStar SNMS.

Related information

[T 348. Copy Software from NE to NE](#) describes how to use the Software Copy function.

NE software activate

The Software Activate function allows you to activate a specific software release on an NE. When new software is downloaded to an NE, it is placed in “standby” until it is activated; it then replaces the old software.

Software activation for the WaveStar NEs

WaveStar NEs maintain two copies of software in Non-Volatile Memory (NVM), one of which corresponds to the installed and working software and the other is typically the previous version that was replaced by the current working version. When a new version is downloaded using the Software Download function, it replaces the old version in the NE’s NVM. When a software activation is performed, the new software release is installed from the NVM and current running version becomes the standby version in NVM.

Verifying software activations

When a software activation is performed, WaveStar SNMS checks if the software being activated is the same as the current version, older than the current version, or is currently not supported by ITM SNC. If either of these conditions exist, WaveStar SNMS informs you of this, and asks if you want to continue with the software activation anyway. You have the option of continuing with the software activation or cancelling it.

Software activation failures

When WaveStar SNMS is unable to complete an on-demand request to activate NE software on one or more NEs because some of the NEs rejected the software activation request, WaveStar SNMS displays an error message for each failed NE request.

Loss of communications

When WaveStar SNMS loses its connection to the NE as a result of a software activation request, and determines that the activation request was unsuccessful upon re-establishment of the connection with the NE, a failure message is logged in the Activity Log and WaveStar SNMS issues a failure message in the status bar for failed on-demand requests.

Related information

[T 349, Activate NE Software](#) describes how to use the Software Activate function.

NE software delete

The Software Delete function allows you to delete a specific software release from WaveStar SNMS for an NE type.

When software is deleted from WaveStar SNMS, it is not recoverable. The only way to get the software back into WaveStar SNMS is to reload it from a tape on CD-ROM. WaveStar SNMS informs you of this prior to actually deleting the software. You have the option of continuing with the software deletion anyway or cancelling the deletion.

Related task

[T 350, Delete NE Software](#) describes how to use the NE Software Delete function.

NE data backup

The NE Software Backup feature lets you perform an on-demand backup of an NE's provisioning data. The provisioning data includes port parameters and cross-connections.

To avoid unnecessary redundant backups of NE data that has not changed since the last backup, WaveStar SNMS checks the selected NE to make sure a backup is necessary. If there is no change in the NE's configuration status since the last backup, a backup is not necessary and you are informed of this and given a choice of performing the backup anyway or cancelling it. If you choose to do a backup anyway, all data is backed up.

Storage of backup data

NE backup data is stored in flat ASCII files with header information, including the NE type, software release, NE's TID, equipment/slot information, the ID of the user performing the backup, date/time of the backup, and the system release that created the backup.

Simultaneous backups

The number of simultaneous NE backups (either on-demand or scheduled) that can be performed depends on the WaveStar SNMS host type. The following table indicates the number of simultaneous backups that can be performed by host type.

Table 17-3. Simultaneous NE Backups Allowed by Host Type

Host	NE Simultaneous Backups
K580 (6 CPU)	6
K580 (4 CPU)	6
K580 (2 CPU)	6
K460	6
K360/K380	4

If you attempt to perform more than the maximum number of simultaneous backups than can be performed for the WaveStar SNMS host type, the new backup is not accepted and WaveStar SNMS informs you that no more backups can be performed at the current time.

Backups/Restorals for the WaveStar NEs

Some of the WaveStar NEs and NCCs have both a primary NVM that mirrors the current working memory configuration and a local secondary storage device that provides a local memory backup and restore capability. WaveStar SNMS supplements the local memory backup and restore, by both managing the local backup and restore capability and providing additional capabilities to back up and restore NE configuration data to/from WaveStar SNMS as is done for other NE types.

The WaveStar NEs Memory Backup and Restore Process

The following figure illustrates the basic memory backup and restoral scheme for the WaveStar NEs.

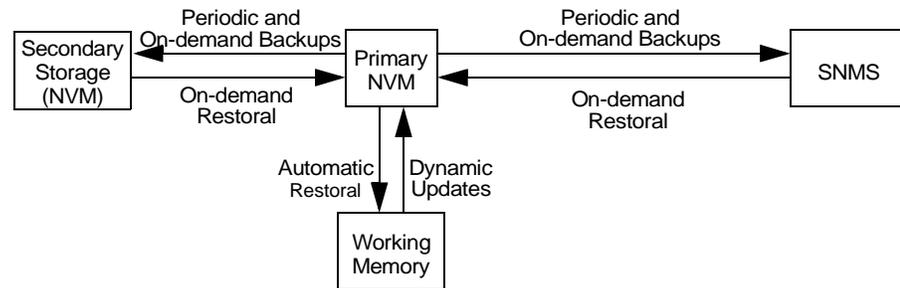


Figure 17-2. The WaveStar NEs Memory Backup and Restore Process

Data transfers between the NE's primary NVM and secondary storage use local file system copy functions. WaveStar SNMS allows you to choose whether to back up the NE data to WaveStar SNMS memory or the NE's local secondary storage.

Alarms present during backups

If an on-demand NE backup is performed on an NE with alarms present, you are informed of this and given a choice of proceeding with the backup anyway or cancelling it.

Related task

[T 351, Back Up NE Data](#) describes how to use the NE Software Backup function.

NE data restore

The NE Restore function allows you to restore NE data that was backed up using the NE Backup function.

When a backup or restore is in progress, WaveStar SNMS prevents the execution of any command that may change the settings of NE parameters until the backup or restore is completed.

When a restore is requested, WaveStar SNMS compares the NE type, software release, and equipment of the NE with the data in the selected backup file. If the NE type or software release does not match, a message is issued and you are given the option of continuing with the restore anyway.

Regular restore

WaveStar SNMS performs a regular restore. This means that the system restores all backup data from the selected NE file, including parameters set to the default settings.

Restoring NE backup data

The files that are created by the NE Backup function are accessible through the NE Restore function. WaveStar SNMS stores up to seven files for each NE. When seven backup files exist and another backup file is created, the oldest backup file is removed.

Verifying NE restorals

WaveStar SNMS keeps you informed about the status of the NE restoral in progress. If the restoral fails for some reason, WaveStar SNMS informs you of the problem via a pop-up message window.

Related Information

[T 352. Restore NE Data](#) describes how to use the NE Restore function.

Load management and software management functions

WaveStar SNMS has a Load Manager process that determines how the system behaves during high load conditions. The Load Manager coordinates the processing of transactions initiated by WaveStar SNMS users that involve multiple data transfers and performs acts as a “gatekeeper” that interprets command notifications to the appropriate backend process that actually performs the data transfer.

The Load Manager checks whether the average CPU utilization (at that instant) exceeds a set value or whether there is an overload condition in effect. If either of these condition is true, new commands are delayed until the CPU utilization is below the set value or the system is no longer in overload.

The Load Manager checks the following activities:

- ▶ NE backups
- ▶ NE software downloads
- ▶ DNOs
- ▶ Data transfers to other OSs
- ▶ Periodic maintenance activities (such as database and file purges)

If the average CPU utilization exceeds a Delay Threshold of 70% of the total CPU capacity (the pre-set default), any/all of the above activities are suspended until this is no longer true and the system is not in overload.

The system resumes processing of transactions, on a first-in, first-out basis, in the following order:

1. All transactions requested by users in “ad hoc” (on demand) mode
 2. All scheduled NE data backups
 3. All other scheduled tasks.
-

Scheduling Tasks

Overview Many of the administrative functions that are performed on demand can also be scheduled to be done periodically, and/or a specific time through the GUI.

Tasks that can be scheduled The following tasks can be scheduled:

- ▶ DNO
- ▶ NE Date/Time Synchronization
- ▶ NE Software Download
- ▶ NE Software Activate
- ▶ NE Software Copy (OLS 400G only)
- ▶ NE Backup

Scheduling methods Tasks can be scheduled to be performed periodically (daily, weekly, monthly, once every x months) or as a one time event.

NE software downloads, NE software copies, and NE software activations are scheduled as one time events. DNOs, NE date/time synchronizations, and NE backups are scheduled to be performed periodically.

Retrying scheduled tasks The Scheduler software allows you to specify the number of times to automatically retry a scheduled task that did not complete or failed due to loss of communications with the NE or some other reason.

You can also specify the timer interval between retries. The retry interval timer starts on receipt of the failure response by the scheduled task server for the task type. The system attempts to complete the failed scheduled task the number of specified times.

Each failed scheduled task is logged in a task-specific error log in the `$SCHLOG` directory.

Scheduling simultaneous tasks The number of tasks that can be scheduled simultaneously depends on the task type and the WaveStar SNMS host server size.

If the number of tasks that you schedule to be performed in the same timeframe exceeds the maximum number allowed, WaveStar SNMS informs you of the next available timeslot for scheduling the task. The system calculates the next available timeslot based on the number of tasks already scheduled and the process duration of each task type. The process duration can vary with the NE type for which the task is being performed. For example, a DNO for most NE types takes approximately 30 minutes. Depending on the size and equipment of an NE, however, a DNO can take up to 180 minutes.

Modifying and deleting scheduled tasks

You can also modify and delete scheduled tasks. However, if a scheduled task is already in progress, you cannot modify it.

For scheduled software downloads and DNOs, if you attempt to delete a task that is already in progress, a warning message is issued, asking if you want to continue with the deletion. If you indicate that you want to delete the in-progress job, the job is terminated and is removed from the scheduled list.



CAUTION:

Deleting scheduled DNO requests can result in database discrepancies between the EMS database and the network configuration.

Load management and scheduled tasks

WaveStar SNMS has a Load Manager process that determines how the system behaves during high load conditions. The Load Manager coordinates the processing of transactions initiated by WaveStar SNMS users that involve multiple data transfers and performs acts as a “gatekeeper” that intercepts command notifications to the appropriate backend process that actually performs the data transfer.

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The Load Manager checks the following activities:

- ▶ NE backups
- ▶ NE software downloads
- ▶ DNOs
- ▶ Data transfers to other OSs
- ▶ Periodic maintenance activities (such as database and file purges)

If the average CPU utilization exceeds a Delay Threshold of 70% of the total CPU capacity (the pre-set default), any/all of the above activities are suspended until this is no longer true and the system is not in overload.

The system resumes processing of transactions, on a first-in, first-out basis, in the following order:

1. All transactions requested by users in “ad hoc” (on demand) mode
2. All scheduled NE data backups
3. All other scheduled tasks.

**Related
information**

For specific information on scheduling tasks, refer to the following tasks in the *User Tasks Manual*:

- ▶ [T 621, Schedule NE Date/Time Synchronization](#)
- ▶ [T 622, Schedule DNO](#)
- ▶ [T 623, Schedule NE Data Backup](#)
- ▶ [T 624, Schedule NE Software Download](#)
- ▶ [T 625, Schedule NE Software Copy](#)
- ▶ [T 626, Schedule NE Software Activation](#)
- ▶ [T 627, Modify a Scheduled Task](#)

Introduction

Purpose

This chapter provides a glossary of terms and a list of acronyms related to WaveStar SNMS.

Contents

This chapter contains the following:

- ▶ [Glossary](#) [18-2](#)
- ▶ [Abbreviations and Acronyms](#) [18-34](#)

Glossary

Overview

The following is a glossary of terms that are related to WaveStar SNMS.

Numerics

0×1 Line Operation

0×1 means unprotected operation. The connection between network elements has one bidirectional line (no protection line).

1+1 Line Protection

A protection architecture in which the transmitting equipment transmits a valid signal on both the working and protection lines. The receiving equipment monitors both lines. Based on performance criteria and OS control, the receiving equipment chooses one line as the active line and designates the other as the standby line.

1×N Equipment Protection

1×N protection pertains to N number of circuit pack/port units protected by one circuit pack or port unit. When a protection switch occurs, the working signals are routed from the failed pack to the protection pack. When the fault clears, the signals revert to the working port unit.

1×N Multi-Cast Cross-Connection

Consists of N one-way cross-connections from an input tributary to N output tributaries. 1:N Multi-cast (for N>2) is most commonly associated with providing video services.

A

Absent (ABS)

Used to indicate that a given circuit pack is not installed.

Access Identifier (AID)

A technical specification for explicitly naming entities (both physical and logical) of an NE using a grammar comprised of ascii text, keywords, and grammar rules.

Active (ACT)

Used to indicate that a circuit pack or module is in-service and currently providing service functions.

Active Path

The path that is currently carrying the service in a circuit that is protected at the path level.

Add/Drop Multiplexer (ADM)

The term for a synchronous network element capable of combining signals of different rates and having those signals added to or dropped from the stream.

Aggregate

A user-defined grouping of NEs. It most commonly consists of NEs located in a central office (CO) and the subnetworks to which they belong.

Alarm

Visible or audible signal indicating that an equipment failure or significant event/condition has occurred.

Alarm Correlation

The search for a directly-reported alarm that can account for a given symptomatic condition.

Alarm Cut-Off (ACO)

A button on the user panel used to silence audible alarms.

Alarm Cut-Off and Test (ACO/TST)

The name of a pushbutton on the user panel used to silence audible alarms.

Alarm Indication Signal (AIS)

A code transmitted downstream in a digital network that indicates that an upstream failure has been detected and alarmed if the upstream alarm has not been suppressed.

Alarm Severity

An attribute defining the priority of the alarm message. The way alarms are processed depends on the severity.

Alarm Suppression

Selective removal of alarm messages from being forwarded to the GUI or to network management layer OSs.

Alarm Throttling

A feature that automatically or manually suppresses autonomous messages that are not priority alarms.

Alternate Mark Inversion (AMI)

A line code that employs a ternary signal to convert binary digits, in which successive binary ones are represented by signal elements that are normally of alternative positive and negative polarity but equal in amplitude and in which binary zeros are represented by signal elements that have zero amplitude.

American Standard Code for Information Interchange (ASCII)

A standard 7-bit code that represents letters, numbers, punctuation marks, and special characters in the interchange of data among computing and communications equipment.

Association

A logical connection between manager and agent through which management information can be exchanged.

Asynchronous

The essential characteristic of time-scales or signals such that their corresponding significant instants do not necessarily occur at the same average rate.

Asynchronous Transfer Mode (ATM)

A high-speed transmission technology characterized by high bandwidth and low delay. It utilizes a packet switching and multiplexing technique which allocates bandwidth on demand.

Attribute

Alarm indication level: critical, major, minor, or no alarm.

Autolock

Action taken by the system in the event of circuit pack failure/trouble. System switches to protection and prevents a return to the working circuit pack even if the trouble clears. Multiple protection switches on a circuit pack during a short period of time cause the system to autolock the pack.

Automatic (AUTO)

One possible state of a port or slot. When a port is in the AUTO state and a good signal is detected, the port automatically enters the IS (in-service) state. When a slot is in the AUTO state and a circuit pack is detected, the slot automatically enters the EQ (equipped) state.

Automatic Protection Switch

A protection switch that occurs automatically in response to an automatically detected fault condition.

Autonomous Message

A message transmitted from the controlled Network Element to the ITM-SC which was not a response to an ITM-SC originated command.

B**Backup**

The backup and restoration features provide the capability to recover from loss of NE data because of such factors as human error, power failure, NE design flaws, and software bugs.

Bandwidth

The difference in Hz between the highest and lowest frequencies in a transmission channel. The data rate that can be carried by a given communications circuit.

Baud Rate

Transmission rate of data (bits per second) on a network link.

Bidirectional Line

A transmission path consisting of two fibers that handle traffic in both the transmit and receive directions.

Bidirectional Line-Switched Ring (BLSR)

A bidirectional ring in which protection switching is accomplished by switching working traffic into protection time slots in the line going in the opposite direction around the ring.

Bidirectional Ring

A ring in which both directions of traffic between any two nodes travel through the same network elements (although in opposite directions).

Bidirectional Switch

Protection switching performed in both the transmit and receive directions.

Bipolar 3-Zero Substitution (B3ZS)

A line coding technique that replaces three consecutive zeros with a bit sequence having special characteristics accomplishing two objectives: First, this bit sequence accommodates the ones density requirements for digital T3 carrier; Second, the sequence is recognizable at the destination (due to deliberate bipolar violations) and is removed to produce the original signal.

Bipolar 8-Zero Substitution (B8ZS)

A line coding technique that replaces eight consecutive zeros with a bit sequence having special characteristics accomplishing two objectives: First, this bit sequence accommodates the ones density requirements for digital T1 carrier; Second, the sequence is recognizable at the destination (due to deliberate bipolar violations) and is removed to produce the original signal.

Bit

The smallest unit of information in a computer, with a value of either 0 or 1.

Bit Error Rate (BER)

The ratio of error bits received to the total number of bits transmitted.

Bit Error Rate Threshold

The point at which an alarm is issued for bit errors.

Bit Interleaved Parity-N(BIP-N)

A method of error monitoring over a specified number of bits (BIP-3 or BIP-8).

Blank (BLK)

The status of a circuit pack slot that contains a bus extender (blank) circuit pack.

Board Controller Local Area Network (BCLAN)

The internal local area network that provides communications between the line and board controllers on the circuit packs associated with a high-speed line.

Bridge Cross-Connection

The setting up of a cross-connection leg with the same input tributary as that of an existing cross-connection leg. This forms a 1:2 bridge from an input tributary to two output tributaries.

Broadband Communications

Voice, data, and/or video communications at greater than 2 Mb/s rates.

Building Integrated Timing Supply (BITS)

A single clock that provides all the DS1 and/or composite clock timing reference to all other clocks in that building.

Byte

Refers to a group of eight consecutive binary digits.

C**C-Bit**

A framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3. This format provides for enhanced performance monitoring of both near-end and far-end entities.

Cell Relay

Fixed length cells. For example, ATM with 53 octets.

Central Office (CO)

A building where common carriers terminate customer circuits.

Channel

A sub-unit of transmission capacity within a defined higher level of transmission capacity.

Channel State Provisioning

A feature that allows a user to suppress reporting of alarms and events during provisioning by supporting multiple states (automatic, in-service, and not monitored) for VT1.5 and STS-1 channels.

Circuit

A set of transmission channels through one or more network elements that provides transmission of signals between two points, to support a single communications path.

Clear Channel (CC)

A digital circuit where no framing or control bits are required, thus making the full bandwidth available for communications.

Closed Ring Network

A network formed of a ring-shaped configuration of network elements. Each network element connects to two others, one on each side.

Coding Violation (CV)

A performance monitoring parameter indicating bipolar violations of the signal have occurred.

Collocated

System elements that are located in the same location.

Command Group

An administrator-defined group that defines commands to which a user has access.

Concatenation

A procedure whereby multiple virtual containers are associated one with each other, resulting in a combined capacity that can be used as a single container across which bit sequence integrity is maintained.

Consultative Committee for the International Telephone and Telegraph (CCITT)

International Telephone and Telegraph Consultative Committee — An international advisory committee under United Nations' sponsorship that has composed and recommended for adoption worldwide standards for international communications. Recently changed to the International Telecommunications Union Telecommunications Standards Sector (ITU-TSS).

Co-Resident

A hardware configuration where two applications can be active at the same time independently on the same hardware and software platform without interfering with each others functioning.

Correlation

A process where related hard failure alarms are identified.

Craft Interface Terminal (CIT)

The user interface terminal used by craft personnel to communicate with a network element.

Critical (CR)

Alarm that indicates a severe, service-affecting condition.

Cross-Connection

Path-level connections between input and output tributaries or specific ports within a single NE. Cross-connections are made in a consistent way even though there are various types of ports and various types of port protection. Cross-Connections are reconfigurable interconnections between tributaries of transmission interfaces.

Crosstalk

An unwanted signal introduced into one transmission line from another.

Current Value

The value currently assigned to a provisionable parameter.

Cut-Through

A capability that allows a user to utilize a network element's native command set (CIT or TL1 as appropriate) to communicate with network elements in the ITM SNC domain.

D**Data**

A collection of system parameters and their associated values.

Database Administrator

A user who administers the database of the application.

Data Communications Channel (DCC)

The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

Data Communications Equipment (DCE)

The equipment that provides signal conversion and coding between the data terminating equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

Data Terminating Equipment (DTE)

The equipment that originates data for transmission and accepts transmitted data.

DDM-1000

Lucent Technologies' Dual DS3 Multiplexer — A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or a 90 Mb/s or 180 Mb/s optical signal.

DDM-2000

Lucent Technologies SONET-ready network multiplexer that can function as a lightwave terminal. It is designed primarily for loop feeder and interoffice applications that work in existing asynchronous as well as the emerging SONET networks. This equipment multiplexes DS1, DS3, or EC-1 inputs into EC-1, OC-1, OC-3, or OC-12 outputs.

Default

An operation or value that the system or application assumes, unless a user makes an explicit choice.

Default Provisioning

The parameter values that are preprogrammed as shipped from the factory.

Defect

A limited interruption of the ability of an item to perform a required function. It may or may not lead to maintenance action depending on the results of additional analysis.

Demultiplexer

A device that splits a combined signal into individual signals at the receiver end of transmission.

Demultiplexing

A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

Dense Wavelength Division Multiplexing (DWDM)

Transmitting two or more signals of different wavelengths simultaneously over a single fiber.

Deprovisioning

The inverse order of provisioning. To manually remove/delete a parameter that has (or parameters that have) previously been provisioned.

Digital Cross-Connect Panel (DSX)

A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

Digital Multiplexer

Equipment that combines by time-division multiplexing several digital signals into a single composite digital signal.

Digital Signal Levels 0, 1, 3 (DS0, DS1, DS3)

An ANSI-defined signal or service level corresponding to the following: DS0 is 64 Kb/s, DS1 is 1.544 Mb/s (equivalent to T1), and DS3 is 44.736 Mb/s (equivalent to 28 T1 channels or T3).

Directory Service Network Element (DSNE)

A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses [NSAPs (network service access points)] in an OSI subnetwork. There can be one DSNE per ring. A DSNE can also be a GNE.

Dispersion

Time-broadening of a transmitted light pulse.

Dispersion Shifted Optical Fiber

1330/1550 nm minimum dispersion wavelength.

Divergence

When there is unequal amplification of incoming wavelengths, the result is a power divergence between wavelengths.

Doping

The addition of impurities to a substance in order to attain desired properties.

Downstream

At or towards the destination of the considered transmission stream, for example, looking in the same direction of transmission.

Drop and Continue

A circuit configuration that provides redundant signal appearances at the outputs of two network elements in a ring. Can be used for Dual Ring Interworking (DRI) and for video distribution applications.

Drop-Down Menu

A menu that is displayed from a menu bar.

DS1 Signal

Signal with a data rate of 1.544 Mb/s.

DS3 Format

Specifies the line format of a DS3 interface port, such as M13 or C-bit parity.

DS3 Idle Signal

A signal that can be applied to any output port that is not cross-connected to an input port. This signal lets downstream network elements know that the facility is operating normally even though it is not sending a normal DS3 signal.

DS3 Signal

A logical or electrical B3ZS signal with a data rate of 44.736 Mb/s.

DSX-1, 2, 3

Digital cross-connect used to interconnect equipment, provide patch capability, and provide test access at the DS1, DS2, or DS3 level.

Dual Ring Interworking (DRI)

A topology in which two rings are interconnected at two nodes on each ring and operate so that inter-ring traffic is not lost in the event of a node or link failure at an interconnecting point.

E**Electrical Carrier, Level 1 (EC-1)**

An electrical interface signal at the SONET rate of STS-1.

Electromagnetic Compatibility (EMC)

A measure of equipment tolerance to external electromagnetic fields.

Electromagnetic Interference (EMI)

High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

Electronic Industries Association (EIA)

A trade association of the electronic industry that establishes electrical and functional standards.

Electrostatic Discharge (ESD)

Static electrical energy potentially harmful to circuit packs and humans.

Entity

A specific piece of hardware (usually a circuit pack, slot, or module) that has been assigned a name recognized by the system.

Entity Identifier

The name used by the system to refer to a circuit pack, memory device, or communications link.

Equipped (EQ)

Status of a circuit pack or interface module that is in the system database and physically in the frame, but not yet provisioned.

Erbium

A soft rare earth element used in metallurgy and nuclear research.

Erbium Doped Fiber Amplifier (EDFA)

An amplifier that performs by having a light signal pass through a section of erbium-doped fiber and using the laser pump diode to amplify the signal.

Errored Seconds (ES)

A performance monitoring parameter. ES "type A" is a second with exactly one error; ES "type B" is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

Establish

A user initiated command, at the WaveStar CIT, to create an entity and its associated attributes in the absence of certain hardware.

Event

A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Event Driven

A required characteristic of network element software system: NEs are reactive systems, primarily viewed as systems that wait for and then handle events. Events are provided by the external interface packages, the hardware resource packages, and also by the software itself.

Externally Timed

An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency.

Extra traffic

Unprotected traffic that is carried over protection channels when their capacity is not used for the protection of working traffic.

F**Facility**

A one- or two-way circuit that carries a transmission signal.

Failures in Time (FIT)

Circuit pack failure rates per 10^9 hours as calculated using the method described in *Reliability Prediction Procedure for Electronic Equipment*, BellCore Method I, Issue 5, September 1995.

Far End (FE)

Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

Far-End Block Error (FEBE)

An indication returned to the transmitting node that an errored block has been detected at the receiving node. A block is a specified grouping of bits.

Far-End Receive Failure (FERF)

An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI.

Fault

Term used when a circuit pack has a hard (not temporary) fault and cannot perform its normal function.

Fault Management

Collecting, processing, and forwarding of autonomous messages from network elements.

Fiber Distributed Data Interface (FDDI)

Fiber interface that connects computers and distributes data among them.

Flash EPROM

A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

Folded Rings

Folded (collapsed) rings are rings without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Forced

Term used when a circuit pack (either working or protection) has been locked into a service-providing state by user command.

Frame

The smallest block of digital data being transmitted.

Frame Relay (FR)

A form of packet switching that relies on high-quality phone lines to minimize errors. It is very good at handling high-speed, bursty data over wide area networks. The frames are variable lengths and error checking is done at the end points.

Framework

An assembly of equipment units capable of housing shelves, such as a bay framework.

Free Running

An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000 ADR

Lucent Technologies' OC-48 rate Add/Drop Rings lightwave Terminal for 2-fiber BLSRs. It is designed primarily for interoffice applications. It supports adds, drop, and through connections for DS3/EC-1, OC-3, IS-3, and OC-12.

G**Gateway Network Element (GNE)**

A network element that passes information between other network elements and management systems through a data communication network.

Gateway Network Element (GNE)

A Network Element that provides a means of communication between an OS and remote Network Elements over the SONET DCC.

In a primary/secondary GNE pair:

The active GNE is the GNE (primary or secondary) that is currently serving as the GNE for the subnetwork.

The primary GNE is the first GNE associated with a subnetwork that initially serves as the GNE for the subnetwork.

The secondary GNE is the second GNE that is associated with the primary GNE for a subnetwork, and can take over communications in the event there is a failure in the communications via the primary GNE.

The standby GNE is the GNE (primary or secondary) that is currently serving as the backup GNE for the subnetwork in the event there is a failure in communications via the active GNE.

H**Hard Failure**

An unrecoverable nonsymptomatic (primary) failure that causes signal impairment or interferes with critical network functions, such as DCC operation.

High Level Data Link Control (HDLC)

OSI reference model datalink layer protocol.

Holdover

An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

Host

The host is an HP 9000/800 series platform running HP-UX.

Hot Standby

A circuit pack ready for fast, automatic placement into operation to replace an active circuit pack. It has the same signal as the service going through it, so that choice is all that is required.

Human Machine Language (MML)

A standard language developed by the ITU for describing the interaction between humans and dumb terminals.

I**Idle**

An output port not cross-connected to an input port.

Idle Code

A signal transmitted downstream automatically from an idle output port. It can also be transmitted downstream by a manual command from a cross-connected output port.

Insert

To physically insert a circuit pack into a slot, thus causing a system initiated restoral of an entity into service and/or creation of an entity and associated attributes.

In-Service (IS)

A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

Integrated Transport Management Network Module (ITM NM)

Lucent Technologies' integrated network management system that provides a broad end-to-end view of the SONET network.

Integrated Transport Management SubNetwork Controller (ITM SNC)

Lucent Technologies' SONET element management layer system that provides fault, configuration, and security functions through the use of a GUI.

Intelligent Alarm Filtering

The filtering of symptomatic alarms and events that are associated with a reported root-cause or symptomatic condition.

Interconnect Signal-3 (IS-3)

The logical equivalent to an OC-3 signal that uses a proprietary interface that allows short-range operation at a lower cost than an OC-3.

Interface Capacity

The total number of STS-1 equivalents (bidirectional) tributaries in all transmission interfaces with which a given transmission interface shelf can be equipped at one time. The interface capacity varies with equipage.

InterLATA

Circuits that cross outside the LATA and to an interexchange carrier.

IntraLATA

Circuits with both end-points within the LATA.

J**Jitter**

Short term variations of amplitude and frequency components of a digital signal from their ideal position in time.

L**Lead Time**

The time interval between placement of a product order and receipt of the product.

Lightguide Build-Out (LBO)

An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

Line

A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

Line Build Out (LBO)

An equalizer network that guarantees the proper signal level and shape at the DSX panel.

Line Controller Local Area Network (LCLAN)

The internal local area network that provides communications between the controlled circuit packs.

Line Protection

The optical interfaces can be protected by line protection. Line protection switching protects against failures of line facilities, including the interfaces at both ends of a line, the optical fibers, and any equipment between the two ends. Line protection includes protection of equipment failures.

Line Timing

Refers to a network element that derives its timing from an incoming OC-N signal.

Link

The mapping between in-ports and out-ports. It specifies how components are connected to one another.

Literal Character

A letter, digit, or symbol that is entered in a command. The first hyphen in UNIT-{1-64} is a literal character; the braces and the second hyphen are not literal characters.

Local Area Network (LAN)

A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

Location

An identifier for a specific circuit pack, interface module, interface port, or communications link.

Lockout of Protection

The WaveStar CIT command that prevents the system from switching traffic to the protection line from a working line. If the protection line is active when a "Lockout of Protection" is entered – this command causes the working line to be selected. The protection line is then locked from any Automatic, Manual, or Forced protection switches.

Lockout State

The Lockout State shall be defined for each working or protection circuit pack. The two permitted states are: None – meaning no lockout is set for the circuit pack, set meaning the circuit pack has been locked out. The values (None & Set) shall be taken independently for each working or protection circuit pack.

Loopback

Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

Loop Timing

A special case of line timing. It applies to network elements that have only one OC-N/STM-N interface. For example, terminating nodes in a linear network are loop timed.

Loss Budget

Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

Loss of Frame (LOF)

A failure to synchronize to an incoming signal.

Loss of Pointer (LOP)

A failure to extract good data from a signal payload.

Loss of Signal (LOS)

The complete absence of an incoming signal.

M

M23-Format

A standard framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3 (sometimes referred to as M13 format, without C-bit parity).

Management Functional Area (MFA)

A category of service provided by the Network Management system, such as Fault Management, Configuration Management, Performance Management, or Security Management.

Major

Indicates a service-affecting failure, main or unit controller failure, or power supply failure.

Maintenance Condition

An equipment state in which some normal service functions are suspended, either because of a problem or to perform special functions (copy memory) that cannot be performed while normal service is being provided.

Manual Switch State

A protection group shall enter the Manual Switch State upon the initiation and successful completion of the Manual Switch command. The protection group leaves the Manual Switch state by means of the Clear or Forced Switch commands. While in the Manual Switch state the system may switch the active unit automatically if required for protection switching.

Mapping

The logical association of one set of values, such as addresses on one network, with quantities or values of another set, such as devices or addresses on another network.

Mediation Device (MD)

Allows for exchange of management information between Operations System and Network Elements.

Mid-Span Meet

The capability to interface between two lightwave network elements of different vendors. This applies to high-speed optical interfaces.

Minor (MN)

Indicates a non-service-affecting failure of equipment or facility.

Miscellaneous Discrete Interface

Allows an operations system to control and monitor equipment collocated within a set of input and output contact closures.

Multiplexer

A device (circuit pack) that combines two or more transmission signals into a combined signal on a shared medium.

Multiplexing

The process of combining multiple signals into a larger signal at the transmitter by a multiplexer. The large signal is then split into the original smaller signals at the receiver by a demultiplexer.

N**Network Element (NE)**

A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

Network Monitoring and Analysis (NMA)

An operations system designed by Bellcore which is used to monitor network facilities.

Network Service Access Point (NSAP) Address

Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

Node

A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Preemptible Protection Access (NPPA)

Non-preemptible protection access increases the available span capacity for traffic which does not require protection by a ring, but which cannot be preempted.

Non-Revertive Switching

In non-revertive switching, an active and stand-by line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the stand-by line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Volatile Memory (NVM)

Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

No Request State

This is the routine-operation quiet state in which no external command activities are occurring.

Not Monitored (NMON)

A provisioning state for equipment that is not monitored or alarmed.

O**Open Ring Network**

A network formed of a linear chain-shaped configuration of network elements. Each network element connects to two others, one on each side, except for two network elements at the ends which are connected on only one side. A closed ring can be formed by adding a connection between the two end nodes.

Open Systems Interconnection (OSI)

Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

Operations Interface

Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, WaveStar CIT, office alarms, and all telemetry interfaces.

Operations Interworking (OI)

The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SONET network or from a centralized operations system.

Operations System (OS)

A central computer-based system used to provide operations, administration, and maintenance functions.

Operations System for Intelligent Network Elements (OPS/INE)

A Bellcore configuration management operations system.

Operator

A user of the system with operator-level user privileges.

Optical Carrier N (OC-N)

An optical carrier signal at the SONET rate of N, where n equals 1, 3, 12, 48, or 192. The basic rate of an OC-1 signal is 51.84 Mb/s, equivalent to an STS-1, with other values of N direct multiples of this basic rate.

Optical Channel

A OC-N wavelength within an optical line signal. Multiple channels, differing by 1.5 μ in wavelength, are multiplexed into one signal.

Optical Demultiplexer Unit (ODU)

A circuit pack responsible for receiving the optical line signal and separating it into the original number of OC-N/STM-N signals.

Optical Line Signal

A multiplexed optical signal containing multiple wavelengths or channels.

Optical Multiplexer Unit (OMU)

A circuit pack responsible for combining multiple signals into one signal. The combined signal is called the Optical Line Signal.

Optical Translator (OT)

A system feature used in conjunction with WaveStar OLS that concatenates multiple OLS terminals, regenerates signals in the 1.3 and 1.5 μ ranges, prevents wavelength blocking via wavelength interchange, provides wavelength add/drop (WAD) capabilities, and establishes open interfaces with multi-vendor signal compatibility.

Optical Translator Port Module (OTPM)

A circuit pack that can electrically regenerate incoming OC-12/STM-4 and OC-3/STM-1 signals into specific outgoing signals of the same type.

Optical Translator Unit (OTU)

A circuit pack that can electrically regenerate incoming OC-N/STM-N signals (1.3 or 1.5 μ ranges) into specific outgoing signals of the same type.

Orderwire (OW)

A dedicated voice-grade line for communications between maintenance and repair personnel.

Original Value Provisioning

Preprogramming of a system's original values at the factory. These values can be overridden using local or remote provisioning.

Outage

A disruption of service that lasts for more than one second.

Out-of-Service

The circuit pack is not providing its normal service function (removed from either the working or protection state) either because of a system problem or because the pack has been removed from service.

P**Packet Assembler/Disassembler (PAD)**

An interface between a device and an X.25 packet-switched network. The PAD converts the protocol used by the device and the X.25 protocol used by the network, allowing terminals to exchange data with other packet mode terminals and hosts.

Packet-Switched Network (PSN)

An X.25 network that transmits groups of bits as a unit through the network. Packets usually include data and control information such as addressing, identification, and error-control fields.

Parameter

A variable that is given a value for a specified application. A constant, variable, or expression that is used to pass values between components.

Parity Check

Tests whether the number of ones (or zeros) in an array of binary bits is odd or even; used to determine that the received signal is the same as the transmitted signal.

Pass-Through

Paths that are cross-connected directly across an intermediate node in a network.

Path

A logical connection between the point at which a standard frame format for the signal at the given rate is assembled, and the point at which the standard frame format for the signal is disassembled.

Path Overhead (POH)

Informational bytes assigned to, and transported with the payload until the payload is demultiplexed. It provides for integrity of communication between the point of assembly of a virtual container and its point of disassembly.

Path Terminating Equipment

Network elements in which the path overhead is terminated.

Performance Monitoring (PM)

Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

Peripheral Control and Timing Facility Interface (PCTFI)

A proprietary physical link interface supporting the transport of 21×2 Mb/s signals.

Platform

A family of equipment and software configurations designed to support a particular application.

Plesiochronous Network

A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant.

Polarization Mode Dispersion (PMD)

Output pulse broadening due to random coupling of the two polarization modes in an optical fiber.

Port (also called Line)

The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between network elements. The words “port” and “line” may often be used synonymously. “Port” emphasizes the physical interface, and “line” emphasizes the interconnection. Either may be used to identify the signal being carried.

Port State Provisioning

A feature that allows a user to suppress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service, and not monitored) for low-speed ports.

Preprovisioning

The process by which the user specifies parameter values for an entity in advance of some of the equipment being present. These parameters are maintained only in NVM. These modifications are initiated locally or remotely by either a CIT or an OS. Preprovisioning provides for the decoupling of manual intervention tasks (for example, install circuit packs) from those tasks associated with configuring the node to provide services (for example, specifying the entities to be cross-connected).

Proactive Maintenance

Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect.

Protection

Extra capacity (channels, circuit packs) in transmission equipment that is not intended to be used for service, but rather to serve as backup against equipment failures.

Protection Access

To provision traffic to be carried by protection tributaries when the port tributaries are not being used to carry the protected working traffic.

Protection Group Configuration

The members of a group and their roles, for example, working protection, line number, etc.

Protection Path

One of two signals entering a path selector used for path protection switching or dual ring interworking. The other is the working path. The designations working and protection are provisioned by the user, whereas the terms active path and standby path indicate the current protection state.

Protection State

When the working unit is currently considered active by the system and that it is carrying traffic. The "active unit state" specifically refers to the receive direction of operation — since protection switching is unidirectional.

Provisioned (PROV)

Indicating that a circuit pack is ready to perform its intended function. A provisioned circuit pack can be active (ACT), in-service (IS), standby (STBY), provisioned out-of-service (POS), or out-of-service (OOS).

Provisioning

The modification of certain programmable parameters that define how the node functions with various installed entities. These modifications are initiated locally or remotely by either a CIT or an OS. They may arrive at the node via the IAOLAN, CIT port, or any DCC channel. The provisioned data is maintained in NVM and/or hardware registers.

Q**Quad Optical Translator Unit (QOTU)**

A unit that provides functions similar to an Optical Translator Unit (OTU), except that a QOTU provides the equivalent functionality of four OTUs in a package that is only twice the size of an OTU.

R**Reactive Maintenance**

Refers to detecting defects/failures and clearing them.

Receive-Direction

The direction towards the Network Element.

Regeneration

The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

Reliability

The ability of a software system performing its required functions under stated conditions for a stated period of time. The probability for an equipment to fulfill its function. Some of the ways in which reliability is measured are: MTBF (Mean Time Between Failures) expressed in hours; Availability = $(MTBF)/(MTBF+MTTR)(\%)$ [where MTTR = mean time to restore]; outage in minutes per year; failures per hour; percentage of failures per 1,000 hours.

Remote Defect Indication (RDI)

An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure. [Previously called far-end-receive failure (FERF).]

Remote Failure Indication (RFI)

A signal that alerts upstream STS-1 path terminating equipment that a downstream failure has been alarmed along the STS-1 path. This action prevents multiple alarms from being activated for the same failure and ensures that a technician is dispatched to correct the failure. (Previously called yellow signals.)

Remote Network Element

Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

Return to Zero

A code form having two information states (termed zero and one) and having a third state or an at-rest condition to which the signal returns during each period.

Revertive

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the working equipment is active, and the protection equipment is standby) after any failure conditions that caused a protection switch to occur, clear, or after any external switch commands are reset. (See "Non-Revertive Switching.")

Revertive Switching

In revertive switching, there is a working and protection high-speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service "reverts" to the working line.

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over the protection capacity.

Router

An interface between two networks. While routers are like bridges, they work differently. Routers provide more functionality than bridges. For example, they can find the best route between any two networks, even if there are several different networks in between. Routers also provide network management capabilities such as load balancing, partitioning of the network, and troubleshooting.

S**Section**

The portion of a transmission facility, including terminating points, between a terminal network element and a line-terminating network element, or two line-terminating network elements.

Section Layer

The second of the four levels in a standard SONET signal, used to transport an STS frame across a physical medium. This layer uses the photonic layer to form the physical transport.

Self-Healing

A network's ability to automatically recover from the failure of one or more of its components.

Server

Computer in a computer network that performs dedicated main tasks which generally require sufficient performance.

Serving Area

A user-defined grouping of Network Elements. It most commonly consists of Network Elements located in a central office (CO) and the subnetworks to which they belong.

Severely Errored Seconds (SES)

This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

Service

The operational mode of a physical entity that indicates that the entity is providing service. This designation will change with each switch action.

Signal-to-Noise Ratio (SNR)

The relative strength of signal compared to noise.

Signal Rate

An attribute that defines the bit-rate and format of the signal. The signal rate is defined by the STS-N path-level signal bit-rate and format including the presence or absence of concatenation.

Single-Ended Operations

Provides operations support from a single location to remote Network Elements in the same SONET subnetwork. With this capability you can perform operations, administration, maintenance, and provisioning on a centralized basis. The remote Network Elements can be those that are specified for the current release.

Single-Mode Fiber (SM)

An 8- μ diameter low-loss, long-span optical fiber typically operating at either 1310 nm, 1550 nm, or both.

Site Address

The unique address for a Network Element.

Slot

A physical position in a shelf designed for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

Software Backup

The process of saving an image of the current network element's databases, which are contained in its NVM, to a remote location. The remote location could be the WaveStar CIT or an OS.

Software Download

The process of transferring a generic (full or partial) or provisioned database from a remote entity to the target network element's memory. The remote entity may be the WaveStar CIT or an OS. The download procedure uses bulk transfer to move an uninterpreted binary file into the network element.

Software ID

Number that provides the software version information for the system.

Span

An uninterrupted bidirectional fiber section between two network elements.

Span Growth

A type of growth in which one wavelength is added to all lines before the next wavelength is added.

Squelch Map

This map contains information for each cross-connection in a ring and indicates the source and destination nodes for the low-speed circuit that is part of the cross-connection. This information is used to prevent traffic misconnection in rings with isolated nodes or segments.

Standby

The circuit pack is in service but is not providing service functions. It is ready to be used to replace a similar circuit pack either by protection or by duplex switching.

Standby Path

One of two signals entering a constituent path selector, the standby path is the path not currently being selected.

State

The state of a circuit pack indicates whether it is defective or normal (ready for normal use).

Status

The indication of a short-term change in the system.

STS-1E

Now referred to as EC-1. A signal typically carried by coaxial cables from one equipment location to another. The term EC-1 refers to the organization and data rate of the signal and also to the voltage template the signal must conform to and the impedances for which the voltage template is valid.

STS-1

The basic building block logical signal in the SONET standard with a data rate of 51.84 Mb/s.

Subnetwork

A group of interconnected/interrelated Network Elements. The most common connotation is a synchronous network in which the Network Elements have Data Communications Channel (DCC) connectivity.

Supervisory Signal

An optical signal originating with the telemetry circuit pack that is used to communicate maintenance information.

Suppression

A process where service-affecting alarms that have been identified as an "effect" are not displayed to a user.

Symptomatic Alarm

An alarm that is not indicative of an actual failure itself, but rather of a secondary manifestation.

Synchronization Messaging

Synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

Synchronous

The essential characteristic of time scales or signals such that their corresponding significant instances occur at precisely the same average rate, generally traceable to a single Stratum-1 source.

Synchronous Digital Hierarchy (SDH)

A hierarchical set of digital transport structures, standardized for the transport of suitable adapted payloads over transmission networks.

Synchronous Network

The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

Synchronous Optical Network (SONET)

The North American standard for the rates and formats that defines optical signals and their constituents.

Synchronous Payload

Payloads that can be derived from a network transmission signal by removing integral numbers of bits from every frame. Therefore, no variable bit-stuffing rate adjustments are required to fit the payload in the transmission signal.

Synchronous Payload Envelope (SPE)

The combined payload and path overhead of an STS-1, STS-3c, STS-12c or STS-48c signal.

Synchronous Transport Signal (STS, STS-N)

The basic logical building block signal for SONET with a rate of 51.84 Mb/s for an STS-1 signal and a rate of N times 51.84 Mb/s for an STS-N signal.

Synchronous Transport Signal, Level N, Concatenated (STS-Nc)

A concatenated SONET payload signal at the STS-N rate, where N equals 3, 12, or 48. For example, an STS-3c signal is constructed by concatenating three STS-1 signals into a signal that uses a single path overhead, rather than three.

T**T1**

A carrier system that transmits at the rate of 1.544 Mb/s (a DS1 signal).

T2

A carrier system that transmits at the rate of 6.312 Mbps (a DS2 signal).

T3

A carrier system that transmits at the rate of 44.736 Mbps (a DS3 signal).

Target Group

An administrator-defined group that defines to which Network Elements a user has access.

Target Identifier (TID)

A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up to 20 characters where the characters are letters, digits, or hyphens (-).

Telemetry Feed-Through

Operations capability for 4-fiber applications which allows the DCC to go from one OLS End Terminal (one subnetwork) through to the other collocated end terminal (separate subnetwork), thereby extending the OLS operations domain.

Through (or Continue) Cross-Connection

A cross-connection within a ring, where the input and output tributaries have the same tributary number but are in lines opposite each other.

Threshold-Crossing Alert (TCA)

A message type sent from a Network Element that indicates that a certain performance monitoring parameter has exceeded a specified threshold.

Through Timing

Refers to a network element that derives its transmit timing in the east direction from a received line signal in the east direction and its transmit timing in the west direction from a received line signal in the west direction.

Time Division Multiplexing (TDM)

A technique for transmitting a number of separate data, voice, and/or video signals simultaneously over one communications medium by interleaving a portion of each signal one after another.

Time Slot Assignment (TSA)

A capability that allows any tributary in a ring to be cross-connected to any tributary in any lower-rate, non-ring interface or to the same-numbered tributary in the opposite side of the ring.

Time Slot Interchange (TSI)

The ability of the user to assign cross-connections between any tributaries of any lines within a Network Element. Three types of TSI can be defined: Hairpin TSI, Interring TSI (between rings), and Intraring TSI (within rings).

Transaction Language One (TL1)

A machine-to-machine communications language that is a subset of ITU's human-machine language.

Transmit-Direction

The direction outwards from the Network Element.

Tributary

A path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth, for example, an STS-1 tributary within an OC-N port.

True Wave™ Optical Fiber

Lucent Technologies' fiber generally called non-zero dispersion-shift fiber, with a controlled amount of chromatic dispersion designed for amplified systems in the 1550/1310 nm range.

Two-Way Point-to-Point Cross-Connection

A two-legged interconnection, that supports two-way transmission, between two and only two tributaries.

Two-Way Roll

The operation which moves a two-way cross-connection between tributary i and tributary j to a two-way cross-connection between the same tributary i and a new tributary k with a single user command.

U**Unavailable Seconds (UAS)**

In performance monitoring, the count of seconds in which a signal is declared failed or in which 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

Upstream

At or towards the source of the considered transmission stream, for example, looking in the opposite direction of transmission.

User Privilege

Permissions a user must perform on the computer system on which the system software runs.

User-to-Network Interface (UNI)

The specifications for the procedures and protocols between a user and the Asynchronous Transfer Mode (ATM) network.

V**Value**

A number, text string, or other menu selection associated with a parameter.

Variable

An item of data named by an identifier. Each variable has a type, such as int or Object, and a scope.

Violation Monitor and Removal (VMR)

A provisionable mode for DS3 output that causes parity violations to be monitored and corrected before the DS3 signal is B3ZS encoded.

Virtual

Refers to artificial objects created by a computer to help the system control shared resources.

Virtual Circuit

A logical connection through a data communication (for example, X.25) network.

Virtual Tributary (VT)

A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

Virtual Tributary Group (VT-G)

A 9-row by 12-column structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte interleaved with the VT-organized synchronous payload envelope.

Voice Frequency (VF) Circuit

A 64 kilobit per second digitized signal.

Volatile Memory

Type of memory that is lost if electrical power is interrupted.

VT1.5 Tributary

A SONET logical signal with a data rate of 1.728 Mbps. In the nine-row structure of the STS-1 SPE, a VT1.5 occupies three columns. VT-structured STS-1 SPEs are divided into seven VT groups. Each VT group occupies twelve columns of the nine-row structure and, for VT1.5s, contains four VTs per group.

W**Wait-to-Restore (WTR)**

Applies to revertive switching operation. The protection group enters the WTR state when all Equipment Fail (EF) conditions are cleared, but the system has not yet reverted back to its working line. The protection group remains in the WTR state until the Wait-to-Restore timer completes the WTR time interval.

Wait to Restore Time (WRT)

Corresponds to the time to wait before switching back after a failure has cleared, in a revertive protection scheme. This can be between 0 and 15 minutes, in increments of one minute.

Wavelength Add/Drop (WAD)

The process of adding and dropping wavelengths to provide more efficient transmission.

Wavelength Division Multiplexing (WDM)

A means of increasing the information-carrying capacity of an optical fiber by simultaneously transmitting signals at different wavelengths.

Wavelength Interchange

The ability to change the wavelength associated with an OC-N signal into another wavelength.

WaveStar™ Optical Line System

Lucent Technologies' lightwave transmission system. Utilizing DWDM technology, the system combines multiple signals of different wavelengths, transmits the resulting signal over a single fiber, and then demultiplexes the signal at the receive end.

Wide Area Network (WAN)

A communication network that uses common-carrier provided lines and covers an extended geographical area.

Wideband Communications

Voice, data, and/or video communication at digital rates from 64 kb/s to 2 Mb/s.

Working

Label attached to a physical entity. In case of revertive switching the working line or unit is the entity that is carrying service under normal operation. In case of non-revertive switching the label has no particular meaning.

Working State

The working unit is currently considered active by the system and that it is carrying traffic.

X**X.25 Interface/Protocol**

The ITU packet-switched interface standard for terminal access that specifies three protocol layers: physical, link, and packet for connection to a packet-switched data network.

X-Terminal

Workstation that can support an X-Windows interface.

Z**Zero Code Suppression**

A technique used to reduce the number of consecutive zeros in a line-coded signal (B3ZS, B8ZS).

Abbreviations and Acronyms

Overview

The following is a list of abbreviations and acronyms related to WaveStar SNMS.

A

ABN

Abnormal (condition)

ABS

Absent

AC

Alternating Current

ACO

Alarm Cut-Off

ACT

Active

ADM

Add/Drop Multiplexer

ADR

Add/Drop Ring

AGNE

Alarm Gateway Network Element

AID

Access Identifier

AIS

Alarm Indication Signal

AIP

Alarm Issuing Point

AITs

Acknowledged Information Transfer Service: Confirmed mode of operation of the LAPD protocol.

AMI

Alternate Mark Inversion

ANSI

American National Standards Institute

- APD
Avalanche PhotoDiode
- APS
Automatic Protection Switch
- ASAP
- Alarm Severity Assignment Profile
- AS&C
Alarm, Status, and Control
- APSD
Automatic Power Shutdown
- ASCII
American Standard Code for Information Interchange
- ASN.1
Abstract Syntax Notation 1
- ATM
Asynchronous Transfer Mode
- AUTO
Automatic
- AVAIL
Available
- B**
- B3ZS
Bipolar 3-Zero Substitution
- B8ZS
Bipolar 8-Zero Substitution
- BCLAN
Board Controller Local Area Network
- BDFB
Battery Distribution and Fuse Bay
- BER
Bit Error Rate
- BITS
Building Integrated Timing Supply

BLK
Blank

BLSR
Bidirectional Line-Switched Ring

BOC
Bell Operating Company

C

CAC
Circuit Access Code

CCITT
Comité Consultatif International Télégraphique & Téléphonique

CCT
Cross-Connection Type

CDRH
Center for Devices and Radiological Health

CEPT
Conférence Européenne des Administrations des Postes et des
Télécommunications

CID
Circuit Identifier

CIT or CIT-PC
Craft Interface Terminal

CL
Clear

CLEI
Common Language Equipment Identifier

CLLI
Common Language Location Identifier

CM
Communications Module

CMIP
Common Management Information Protocol. OSI standard protocol for
OAM&P information exchange.

CMISE
Common Management Information Service Element

- CO
Central Office
- COV
Central Office Video
- CP
Circuit Pack
- CPE
Customer Premises Equipment
- CR
Critical (alarm)
- CSMA/CD
Carrier Sense Multiple Access with Collision Detection
- CS&O
Lucent Technologies Customer Support and Operations
- CSU
Channel Service Unit
- CTIP
Customer Training and Information Products
- CTS
Customer Technical Support within Lucent Technologies
- CV
Coding Violation

D

- DACS/DCS
Digital Access Cross-Connect System
- dB
Decibels
- DC
Direct Current
- DCC
Data Communications Channel
- DCE
Data Communications Equipment

DCN
Data Communications Network

DPLL
Digital Phase Locked Loop

DRI
Dual Ring Interworking

DRAM
Dynamic Random Access Memory

DRIP
Dual Ring Interworking on Protection

DS0, DS1, DS3
Digital Signal Levels 0, 1, 3

DS-N
Digital Signal, Level N

DS-NE
Directory Service Network Element

DSX
Digital Cross-Connect Frame

DTCU
Distant Terminal Channel Unit

DTE
Data Terminating Equipment

DTMF
Dual Tone Multifrequency

DWDM
Dense Wavelength Division Multiplexing

E

EBER
Equivalent Bit Error Rate

EC
Echo Celler

EC-1, EC-N
Electrical Carrier, Levels 1 and N

ECI	Equipment Catalog Item
EEPROM	Electrically Erasable Programmable Read-Only Memory
EF	Equipment Fail
EIA	Electronic Industries Association
EM	Event Management
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EMS	Element Management System
EPROM	Erasable Programmable Read-Only Memory
EPT	Event-per-Time
EQ	Equipped
EQPT	Equipment
ES	Errored Seconds
ESD	Electrostatic Discharge
ESF	Extended Super Frame (DS1 signal format)
ETSI	European Telecommunications Standards Institute
EVT	Event
EXM	Extended Switching Module

F**FCC**

Federal Communications Commission

FDA

Food and Drug Administration

FDDI

Fiber Distributed Data Interface

FE

Far End

FEBE

Far End Block Error

FEPROM

Flash EPROM

FIT

Failure in Time

G**GB**

Gigabytes

Gb/s

Gigabits per second

GHz

Gigahertz

GNE

Gateway Network Element

GR-XXX

Bellcore General Requirement-XXX

H**HDLC**

High-Level Data Link Control

HS

High Speed

HW

Hardware

Hz

Hertz

I**IAF**

Intelligent Alarm Filtering

IAO LAN

Intraoffice Local Area Network

ID

Identifier

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronics Engineers

I/O

Input/Output

INTFC

Interface

IS

In Service

IS-3

Interconnect Signal-3

ISDN

Integrated Services Digital Network

ITCO

Independent Telephone Company

ITM

Integrated Transport Management

ITM-NM

Integrated Transport Management Network Module

ITM SNC

Integrated Transport Management SubNetwork Controller

ITU

International Telecommunications Union

ITU-R

International Telecommunications Union — Radio standardization sector. Formerly known as CCIR: Comité Consultatif International Radio; International Radio Consultative Committee.

ITU-T

International Telecommunications Union — Telecommunication standardization sector. Formerly known as CCITT: Comité Consultatif International Télégraphique & Téléphonique; International Telegraph and Telephone Consultative Committee.

IXC

Interexchange Carrier

K**Kbps**

Kilobits per second

L**LAN**

Local Area Network

LATA

Local Access and Transport Area

LBC

Laser Bias Current

LBFC

Laser Backface Currents

LBO

Lightguide Build-Out

LBP

LAN Bridge Port

LCN

Local Communications Network

LCT

Large Capacity Terminal

LEC	Local Exchange Carrier
LED	Light-Emitting Diode
LGX	Lightguide Cross-Connect
LMP	LAN Management Port
LNE	Logical Network Element
LOF	Loss of Frame
LOP	Loss of Pointer
LOS	Loss of Signal
LPBK	Loopback
LS	Low Speed
LTE	Line Terminating Equipment

M

μ	Microns
μm	Micrometer
MB	Megabytes
Mbps	Megabits per second
MCOND	Maintenance Condition

MDSMetallic Digital ServerMDSCUMetallic Digital Server Channel Unit

MEM

Memory

MFA

Management Functional Area

MIPS

Millions of Instructions Per Second

MJ

Major (alarm)

MML

Human-Machine Language

MN

Minor (alarm)

ms

Millisecond

MTBF

Mean Time Between Failures

MTBMA

Mean Time Between Maintenance Activities

MTTR

Mean Time To Repair

N

NA

Not Applicable

NCC

Network Communication Controller

NE

Network Element

NEBS

Network Equipment-Building System

nm	Nanometer (10 ⁻⁹ meters)
NMA	Network Monitoring and Analysis System
NMA-F	Network Monitoring and Analysis-Facility
NMON	Not Monitored
NMS	Network Management System
NORM	Normal
NPPA	Non-Preemptible Protection Access
NRZ	Nonreturn to Zero
NSA	Non-Service Affecting
NSAP Address	Network Service Access Point Address (used in the OSI network layer 3)
NTF	No Trouble Found
NVM	Non-Volatile Memory

O

O&M	Operation and Maintenance
OA	Optical Amplifier
OALAN	Overhead Access Local Area Network
OAM&P	Operations, Administration, Maintenance, and Provisioning

OC, OC-N	Optical Carrier
OC-1	Optical Carrier, Level 1 Signal (51.84 Mb/s)
OC-3	Optical Carrier, Level 3 Signal (155.52 Mb/s)
OC-3c	Optical Carrier, Level 3 Concatenated Signal (155.52 Mb/s)
OC-12	Optical Carrier, Level 12 Signal (622.08 Mb/s)
OC-48	Optical Carrier, Level 48 (2488.32 Mb/s) (2.5 Gb/s)
OC-192	Optical Carrier, Level 192 (9953.28 Mb/s) (10 Gb/s)
ODU	Optical Demultiplexing Unit
OI	Operations Interworking
OILU	Optical Line Interface Unit
OLS	Optical Line System
OMU	Optical Multiplexing Unit
OOF	Out-of-Frame
OOS	Out-of-Service
OPS/INE	Operations System for Intelligent Network Elements
ORM	Optical Remote Module
OS	Operations System
OSI	Open Systems Interconnect

OSMINE
Operations Systems Modifications for the Integration of Network Elements

OT
Optical Translator

OTCTL
Optical Translator Controller

OTPM
Optical Translator Port Module

OTU
Optical Translator Unit

OW
Orderwire

P

PAD
Packet Assembler/Disassembler

PCB
Printed Circuit Board

PCM
Pulse Code Modulation

PDH
Plesiochronous Digital Hierarchy

PM
Performance Monitoring

PMD
Polarization Mode Dispersion

POH
Path Overhead

POP
Point of Presence

POTS
Plain Old Telephone Service

PRI
Primary

PROTN
Protection

PROV
Provisioned

PSDN
Public Switched Data Network

PSN
Packet-Switched Network

PSTN
Public Switched Telephone Network

PTE
Path Terminating Equipment

PTY
Parity

PVC
Permanent Virtual Circuit

PWR
Power

PWR ON
Power On

Q

QOS
Quality of Service

QOTU
Quad Optical Translator Unit

QRSS
Quasi-Random Signal Source

R

RAM
Random Access Memory

RCV
Receive

RCVR
Receiver

RDI
Remote Defect Indication

RF
Radio Frequency

RFI
Remote Failure Indication

RPP
Reliability Prediction Procedure

RT
Remote Terminal

RTAC
Regional Technical Assistance Center

RTRV
Retrieve

RTV
Remote Terminal Video

RZ
Return to Zero

S

SA
Service Affecting

SDH
Synchronous Digital Hierarchy

SDS
Standard Directory Service based on ANSI recommendation T1.245

SEC
Secondary

SES
Severely Errored Seconds

SF
Super Frame (DS1 signal format)

SLN	A 12-character circuit pack serial number
SNR	Signal-to-Noise Ratio
SOH	Section Overhead
SONET	Synchronous Optical Network
SPE	Synchronous Payload Envelope
STBY	Standby
STS	Synchronous Transport Signal
STS-1, STS-N	Synchronous Transport Signal, Levels 1 and N
STS-3	Synchronous Transport, Level 3
STS-3c	Synchronous Transport, Level 3 Concatenated Signal
STS-12	Synchronous Transport, Level 12
STS-12c	Synchronous Transport, Level 12 Concatenated Signal
SVC	Switched Virtual Circuit
SYNC	Synchronizer

T

TA	Technical Advisory
TABS	Telemetry Asynchronous Byte Serial (Protocol)

TARP
Target Identifiers Address Resolution Protocol

TBD
To Be Determined

TBOS
Telemetry Byte-Oriented Serial (Protocol)

TCA
Threshold-Crossing Alert

TDM
Time Division Multiplexing

THz
TeraHertz (10^{12} Hz)

TID
Target Identifier

TIRKS
Trunks Integrated Records Keeping System

TL1
Transaction Language 1

TR
Technical Requirement

TSA
Time Slot Assignment

TSI
Time Slot Interchange

TSO
Technical Support Organization

TU
Tributary Unit

U

UAS
Unavailable Seconds

UITS
Unacknowledged Information Transfer Service. Unconfirmed mode of LAPD operation.

UNEQ
Path Unequipped

UPSR
Unidirectional Path-Switched Ring

USAM
User-Settable Alarm Monitoring

V

V
Volts

VAC
Volts Alternating Current

VDC
Volts Direct Current

VF
Voice frequency

VM
Violation Monitor

VMR
Violation, Monitor, and Removal

VRT
Virtual Remote Terminal

VT
Virtual Tributary

VT1.5
Virtual Tributary, Level 1.5

VT-G
Virtual Tributary Group

W

WAD
Wavelength Add/Drop

WAN
Wide Area Network

WaveStar™ OLS 40G/80G/400G
WaveStar Optical Line System 40G/80G/400G

WBS
Wideband Shelf

WDCS
Wideband Digital Cross-Connect System

WDM
Wavelength Division Multiplexing

X

X.25
An ITU standard defining the connection between a terminal and a public packet-switched network
