

**Lucent Technologies**  
Bell Labs Innovations



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

190-224-123  
Release 4.2  
Issue 1.0  
December 2000

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Release 4.2**

Document Number: *190-224-123 Issue 1.0*

Publication Date: *December 2000*

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# About This Information Product

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## **Introduction**

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### **Summary**

This chapter describes the structure and organization of the Installation Guide.

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### **Contents**

This chapter discusses the following topics:

- Purpose of this Information Product
  - Using this Information Product
  - How to Comment on User Documents
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## **Purpose of This Information Product**

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**Purpose**

This document provides application information for the installation, turn-up and configuration of the WaveStar™ Subnetwork Management System (SNMS).

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**Intended audience**

The manual is intended primarily for use by the system administrator or operations personnel responsible for the installation and administration of WaveStar SNMS. The user should have thorough knowledge of the UNIX® operating system and should be familiar with administering computers that run the UNIX operating system and the HP-UX® operating system. It is also helpful to have a knowledge of Local Area Networks (LANs) for installation and administration of the system.

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**Reason for issue**

This Installation Guide, Issue 1, is a new document that supports WaveStar SNMS Release 4.2.

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## Using This Information Product

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### Introduction

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

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### Conventions

This document uses the following conventions:

- The names of commands, text entered by the user, and selections made by the user are shown in **boldface type**.
  - The names of directories, files, screens, and menu items are shown in *italics*.
  - Messages that appear on a screen are shown in `monospace type`.
  - Keyboard keys that you press to enter text or issue commands are shown as follows: `Return`
- 

### Chapter descriptions

This document is organized by chapter and covers the following:

- Chapter 1 Host Computer Operating System Installation.
  - Chapter 2 WaveStar SNMS Application Installation.
  - Chapter 3 GUI Client Installation on Supported Platforms.
  - Chapter 4 Redundancy Installation and Operations.
  - Chapter 5 System Introduction.
  - Chapter 6 Application Installation Concepts.
  - Chapter 7 Redundancy Concepts.
  - Glossary
  - Index
-

## **How to Comment on User Documents**

### **Introduction**

Customer satisfaction is extremely important to Lucent Technologies and Lucent welcomes your comments. All users are encouraged to provide feedback on the WaveStar SNMS documents.

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### **Customer comment form**

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

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# Host Computer Operating System Installation

# 1

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## Introduction

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**Summary** This chapter describes the procedures by which to install the host computer operating system.

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**Contents** This chapter is divided into the following topics:

■ Installing HP-UX R11.0	2
■ HP-UX Multi-User License Installation (Optional)	6
■ HP-UX 100MB LAN Card Drivers Installation (Optional)	8
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■ HP-UX X.25/ACC Software Installation (Optional - Supports LCT NEs)	12

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## Installing HP-UX R11.0

**Description** Use this procedure to install the HP-UX 11.0 operating system.

**Procedure** Perform the following steps to install HP-UX R11.0.

Step	Action
1	Power on the computer.
2	<p>Insert the <b>HP-UX Install and Recovery CD</b> into the CD-ROM drive.</p> <p> <b>NOTE:</b> The processor boots from the first available device.</p> <p>To discontinue, press any key within ten seconds.</p>
3	<p>Press any key to abort the autoboot procedure when you see the following prompt:</p> <p><i>To discontinue, press any key within 10 seconds.</i></p>
4	<p>At the prompt, enter <b>in memory</b>.</p> <p><b>Result:</b> This instructs the computer to display internal memory information.</p>
5	<p>Verify that the correct amount of memory is configured.</p> <p> <b>NOTE:</b> See Table 5-2 and Table 5-3 in Chapter 5 of this document for the amount of memory required for your particular server model.</p>
6	<p>Enter <b>in bootinfo</b> and verify that <code>Autoboot</code> is set to <b>ON</b>. Also verify that the <code>Primary boot path</code> is set to the first hard drive on the chain</p>
7	<p>Enter <b>display</b>.</p> <p><b>Result:</b> The current menu is displayed.</p>

Step	Action (Contd)
8	Enter <b>search IPL</b> .  <b>Result:</b> This instructs the computer to search for all bootable devices.  The system needs to set its alternate boot path to the CD ROM drive. There are two ways to find the address of the CD ROM drive: <ul style="list-style-type: none"> <li>— Look on the label that is on the inside of the front door on the host</li> <li>— After the <b>search IPL</b> command completes, look for the line that has the Device Path reading SE SCSI.2</li> </ul>
9	Enter the appropriate <b>device type</b> (for example, <b>path alt 10/12/52.0</b> )
10	Enter <b>boot alt</b> .  <b>Result:</b> This instructs the computer to boot from the CD-ROM drive.
11	At the following prompt, enter <b>N</b> . Interact with IPL (Y or N)?  <b>Result:</b> <i>The Welcome to Ignite-UX!</i> screen is displayed.
12	(Tab) to the <i>Install HP-UX</i> field and press (Return).  <b>Result:</b> The <i>User Interface and Media Options</i> screen is displayed.
13	For <i>Source Location Options</i> , select <b>Media only installation</b> by placing the cursor over this selection and pressing the spacebar.
14	For <i>User Interface Options</i> , select <b>Advanced Installation</b> by placing the cursor over this selection and pressing the spacebar.
15	Tab to the <b>OK</b> field and press (Return).  <b>Result:</b> A <i>Configuration</i> screen is displayed with the following tabs appearing at the top: <i>Basic</i> <i>Software</i> <i>System</i> <i>File System</i> <i>Advanced</i>
16	Select the <i>System</i> tab by pressing the right arrow key or (Tab) and press (Return).  <b>Result:</b> Initial line will contain the field Final System Parameters.

Step	Action (Contd)
17	<p>Tab to each field and set the parameters for <i>Hostname</i>, <i>IP Address</i>, <i>Subnet Mask</i>, <i>Time</i>, <i>Day</i>, <i>Month</i>, <i>Year</i>, <i>Set Time Zone</i>, <i>Network Service</i>, and <i>Set Root Password</i>. For <i>Set Time Zone</i>, <i>Network Service</i>, and <i>Set Root Password</i>, once the field is highlighted, press <b>Return</b>.</p> <p> <b>NOTE:</b> The host name must conform to the following:</p> <ul style="list-style-type: none"> <li>■ must be eight (8) characters or less</li> <li>■ the first character must be lower case alphabetic</li> <li>■ the intermediate characters must be lower case alphabetic, digit, or an underscore (_)</li> </ul>
18	<p>Select the <i>File System</i> tab by pressing the right arrow key or <b>Tab</b> to place the cursor there and press <b>Return</b>.</p> <p><b>Result:</b> This tab displays a screen that enables you to do a variety of file-system and disk-configuration tasks. The screen will differ in appearance, depending on whether you previously selected LVM or whole disk, on the <i>Basic</i> tab screen.</p>
19	<p>To add or change any configurations on the display of file systems:</p> <ol style="list-style-type: none"> <li>a. Enter the information in an appropriate field below the display</li> <li>b. Select one of the buttons to the right</li> <li>c. To see more information on the file system display, use the horizontal scroll bar or resize the screen</li> <li>d. The <i>Avail:</i> indication shows how much space is unallocated in the volume group of the highlighted volume.</li> </ol> <p> <b>NOTE:</b> The following three steps require you to reference Tables 6-1 through 6-3 in Chapter 6 of this document. These tables should be used to appropriately size the following file systems: <i>/</i>, <i>/stand</i>, <i>/opt</i>, <i>/var</i>, <i>/usr</i>, <i>/home</i>, <i>/tmp</i>, (<i>swap1</i>), and (<i>swap2</i>).</p>
20	<p>Use the arrow keys to move up and down the list of file systems. To change the size of a file system, highlight it and press the <b>Tab</b> key until the cursor is on the <b>Size</b> field. Select the appropriate type and size.</p>
21	<p>Enter the new type and/or size for the file system and press the <b>Tab</b> key until <b>Modify</b> is highlighted. Press the <b>Return</b> key.</p>

<b>Step</b>	<b>Action (Contd)</b>
22	Repeat the previous steps to configure the file system sizes for the following file systems: <i>/, /stand, /opt, /var, /usr, /home, /tmp, (swap1), and (swap2).</i>
23	When finished, <b>(Tab)</b> to <b>Go</b> and press the <b>(Return)</b> key.  <b>Result:</b> The <i>Pre-Install Analysis</i> window is displayed.
24	Select <b>OK</b> and press the <b>(Return)</b> key.  <b>Result:</b> Messages are displayed indicating that file systems are being created.  Once the initial file systems are built, the HP-UX installation automatically continues. The system will be rebooted once the software load completes.  <b>Stop! End of Task.</b>

## HP-UX Multi-User License Installation (Optional)

**Description** Use this procedure to install the HP-UX multi-user license.

**Procedure** Perform the following steps to install the HP-UX multi-user license.

Step	Action
1	Insert the <b>HP-UX Applications CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <code>root</code> .
3	At the # prompt, enter the command:  <b>swinstall</b>  <b>Result:</b> The <i>Specify Source</i> screen is displayed.
4	Specify the <i>Source Depot Type</i> : <b>Local CDROM</b> .
5	Select <code>OK</code> and press the <code>(Return)</code> key.  <b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.
6	Select <code>OK</code> and press the <code>(Return)</code> key.
7	Use the right arrow key to select <b>Actions</b> and press the <code>(Return)</code> key. A drop down list is displayed. Press the down arrow to select <b>Add New Codeword</b> and press the <code>(Return)</code> key.  <b>Result:</b> The <i>Codeword Entry</i> screen is displayed.
8	Enter the <b>Customer ID</b> and <b>Codeword</b> for your system. (This information is provided by Hewlett-Packard.)
9	Select <code>OK</code> and press the <code>(Return)</code> key.  <b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.
10	Select the fileset <b>HP-UX 16-User License</b> by pressing the spacebar.
11	Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <code>(Return)</code> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <code>(Return)</code> key.  <b>Result:</b> A message is displayed regarding the software item selected.

Step	Action (Contd)
12	Select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> The <i>Install Analysis</i> screen is displayed.
13	When the status field has a value of <i>Ready</i> , select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.
14	Select <b>Yes</b> and press the <b>Return</b> key. <b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?
15	Select <b>Yes</b> and press the <b>Return</b> key. <b>Result:</b> The CD begins to be read. Installation of all 16 user filesets takes approximately three minutes to be completed. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i> .
16	Select <b>Done</b> and press the <b>Return</b> key. <b>Result:</b> A message is displayed that the system will be rebooted.
17	Select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> The system reboots automatically.
18	Remove the <b>HP-UX Application Software CD</b> from the CD-ROM drive. <b>Stop! End of Task.</b>

## HP-UX 100MB LAN Card Drivers Installation (Optional)

**Description** Use this procedure to install the HP-UX 100MB LAN card drivers.

**Procedure** Perform the following steps to install the HP-UX 100MB LAN card drivers.

Step	Action
1	Insert the <b>HP-UX application CD</b> (disk 1 of 4) into the CD-ROM drive.
2	At the Console Login prompt, login as <code>root</code> .
3	At the <code>#</code> prompt, enter the command:  <b>swinstall</b>  <b>Result:</b> The main <i>swinstall</i> screen is displayed.
4	Press the <code>(Return)</code> key to continue.  <b>Result:</b> The <i>Specify Source</i> screen is displayed.
5	Specify for the <i>Source Depot Type</i> : <b>Local CDROM</b> .
6	Select <code>OK</code> and press the <code>(Return)</code> key.  <b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.
7	Select <code>OK</code> and press the <code>(Return)</code> key.  <b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.
8	Scroll down the list and highlight the appropriate LAN card by pressing the spacebar.  <b>⇒ NOTE:</b> Check the model number on the LAN card to determine the correct selection.
9	Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <code>(Return)</code> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <code>(Return)</code> key.  <b>Result:</b> A message is displayed regarding the software item selected.

Step	Action (Contd)
10	Select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> The <i>Install Analysis</i> screen is displayed.
11	When the status field has a value of <i>Ready</i> , select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.
12	Select <b>Yes</b> and press the <b>Return</b> key. <b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?
13	Select <b>Yes</b> and press the <b>Return</b> key. <b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i> .
14	Select <b>Done</b> and press the <b>Return</b> key. <b>Result:</b> A message is displayed informing you that the system will be rebooted.
15	Select <b>OK</b> and press the <b>Return</b> key. <b>Result:</b> The system reboots automatically.
16	Remove the <b>HP-UX Application Software CD</b> from the CD-ROM drive. <b>Stop! End of Task.</b>

## HP-UX Patch Installation

### Description

Use this procedure to install all essential patches for the core operating system. Table 6-4 in Chapter 6 of this document lists all the essential patches.

### Procedure

Perform the following steps to install HP-UX patches.



#### NOTE:

The HP-UX 11.0 General Release bundle (3/2000) and the Hardware Enablement and Critical bundle (6/2000) from Hewlett-Packard must be installed prior to this procedure.

Step	Action
1	Insert the <b>Patch CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <b>root</b> .
3	At the # prompt, enter the command:  <b>swinstall</b>  <b>Result:</b> The <i>Specify Source</i> screen is displayed.
4	Specify for the <i>Source Depot Type</i> : <b>Local CDROM</b> .
5	Select <b>OK</b> and press the <b>(Return)</b> key.  <b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.
6	Select <b>OK</b> and press the <b>(Return)</b> key.  <b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.
7	Select <b>CDutil</b> by placing the cursor over the entry and pressing the spacebar.
8	Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <b>(Return)</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>(Return)</b> key.  <b>Result:</b> A message is displayed regarding the software item selected.
9	Once status is <i>Ready</i> , select <b>OK</b> and press the <b>(Return)</b> key.  <b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.

Step	Action (Contd)
10	Select <b>Yes</b> and press the <b>Return</b> key.  <b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?
11	Select <b>Yes</b> and press the <b>Return</b> key.  <b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Completed</i> .
12	Select <b>Done</b> and press the <b>Return</b> key.
13	Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the <i>swinstall</i> program.  <b>Result:</b> You will be placed at the UNIX root prompt.
14	At the # prompt, enter the following commands:  <b># cd /tmp</b> <b># ./installPatch</b>  <b>Result:</b> The host will be rebooted after the patch bundle is installed.
15	Remove Patch CD  <b>Stop! End of Task.</b>

## HP-UX X.25/ACC Software Installation (Optional - Supports LCT NEs)

**Description** Use this procedure to install the ACC X.25 fileset to support X.25 communications.

**Procedure** Perform the following steps to install X.25 software.

Step	Action
1	Insert the <b>Cold Start CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <code>root</code> .
3	At the # prompt, enter the following commands: <ul style="list-style-type: none"> <li>■ <code>mkdir /cdrom</code></li> <li>■ <code>pfs_mountd -v &amp;</code></li> <li>■ <code>pfsd &amp;</code></li> <li>■ <code>pfs_mount -o xlat=unix /dev/dsk/***/cdrom</code> (***=the device location)</li> </ul>
4	At the # prompt, enter the command:  <b>swinstall</b>  <b>Result:</b> The main <i>swinstall</i> screen is displayed.
5	Press the <input type="button" value="Return"/> key to continue.  <b>Result:</b> The <i>Specify Source</i> screen is displayed.
6	Specify for the <i>Source Depot Path</i> : <b>/cdrom</b> .
7	Select <input type="radio"/> and press the <input type="button" value="Return"/> key.  <b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.
8	Select <input type="radio"/> and press the <input type="button" value="Return"/> key.  <b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.
9	Scroll down to the bottom of the screen and select <b>Z7476AA, Z7478AA, and Z7486AA</b> which comprise the X.25/ACC Bundled Product fileset. This is done by clicking the <b>select/deselect</b> or by pressing the spacebar.

Step	Action (Contd)
10	<p>Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A message is displayed regarding the software item selected.</p>
11	<p>Once status is <i>Ready</i>, select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Install Analysis</i> screen is displayed.</p>
12	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.</p>
13	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?</p>
14	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i>.</p>
15	<p>Select <b>Done</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The system reboots.</p> <p><b>Stop! End of Task.</b></p>



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# WaveStar SNMS Application Installation

# 2

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## Introduction

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**Summary** This chapter describes the procedures for installing the WaveStar SNMS application.

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**Contents** The following procedures are discussed in this chapter:

■ Installing the ColdStart Fileset	2
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## Installing the ColdStart Fileset

### Description

The WaveStar SNMS ColdStart fileset is used to verify and configure a new host to support the WaveStar SNMS application. This includes Volume Groups, Logical Volumes, file systems, logins, groups, and various support files.

### Procedure

Perform the following steps to install the ColdStart fileset.

Step	Action
1	Insert the <b>ColdStart CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <b>root</b> .
3	At the # prompt, enter the following commands: <ul style="list-style-type: none"> <li>■ <b>mkdir /cdrom</b></li> <li>■ <b>pfs_mountd -v &amp;</b></li> <li>■ <b>pfsd &amp;</b></li> <li>■ <b>pfs_mount -o xlat=unix /dev/dsk/***/cdrom</b> (***=the device location)</li> </ul> <p><b>⇒ NOTE:</b> If you installed X.25 from the coldstart CD, you may get an error message about device being busy. If that is the case, HP 11.0 automatically mounted the CD for you. To verify, type <b>mount</b> and look for <i>/cdrom</i> listed as a filesystem.</p>
4	At the # prompt, enter the command: <p style="text-align: center;"><b>swinstall</b></p> <p><b>Result:</b> The main <i>swinstall</i> screen is displayed.</p>
5	Press the <b>Return</b> key to continue. <p><b>Result:</b> The <i>Specify Source</i> screen is displayed.</p>
6	Specify for the <i>Source Depot Path</i> : <b>/cdrom</b> .
7	Select <b>OK</b> and press the <b>Return</b> key. <p><b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.</p>

Step	Action (Contd)
8	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.</p>
9	<p>Select the fileset <b>ColdStart</b> by pressing the spacebar.</p>
10	<p>Tab to the Menu line and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A message is displayed regarding the software item selected.</p>
11	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Install Analysis</i> screen is displayed.</p>
12	<p>Once the status field changes to <i>Ready</i>, select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.</p>
13	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?</p>
14	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i>.</p>
15	<p>Select <b>Done</b> and press the <b>Return</b> key.</p>
16	<p>Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the <i>swinstall</i> program.</p>
17	<p>At the command line, enter the following command:</p> <p style="text-align: center;"><b>sam</b></p> <p><b>Result:</b> The HP system administration tool is displayed.</p>
18	<p>Select <b>Kernal Configuration</b>.</p>
19	<p>Select <b>Configurable Paramenters</b>.</p>
20	<p>Select <b>maxvgs</b> by depressing the spacebar.</p>

<b>Step</b>	<b>Action (Contd)</b>
21	Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Modify Configurable Parameter</b> and press the <b>Return</b> key.
22	Tab to <b>Formula/Value</b> and set to <b>40</b> .
23	Select <b>OK</b> and press the <b>Return</b> key.
24	Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the program
25	Select <b>Create a New Kernel Now</b> . Select <b>OK</b> and press the <b>Return</b> key.
26	Select <b>Move Kernel into Place and Shutdown/Reboot System Now</b> . Select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> A <i>Note</i> screen is displayed
27	Select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> The system will reboot.

Step	Action (Contd)
28	<p>Login as <code>root</code>. At the <code>#</code> prompt, enter the following commands:</p> <pre><b>cd /tmp</b> <b>./init_disk</b></pre> <p>A message prompts you to enter the command again.</p> <pre><b>./init_disk</b></pre> <p><b>Result:</b> <code>init_disk</code> first checks the hardware configuration required by EMS on your system and then configures the hard disk according to EMS requirements. Screen output is displayed and the user will have to respond to several prompts when they appear including the following:</p> <pre>Do you want this host to support PM configuration? (y/n) Did you set maxvgs (Max Number of volume group) to 40? (y/n/q) Is this a redundancy configuration? (y/n) Do you want to use the default disk template /startup/default_cfg for this machine? (y/n) Do you want to review /tmp/default_cfg? (y/n) Do you want to modify /tmp/default_cfg? (y/n) Update the master configuration file /startup/dsk_cfg file? (y/n) Done with configuration file? (y/n/q)</pre> <p><b>⇒ NOTE:</b> If <code>init_disk</code> is running for the very first time on your system, it will automatically verify and collect hardware information on your system and then configure the hard disk with little intervention from the user. The <code>init_disk</code> process saves the collected configuration data in the <code>/startup</code> directory for future use.</p> <p>In the event that <code>init_disk</code> is interrupted before its completion, or there is a need to run <code>init_disk</code> again, several choices are available. See the section titled Undo Disk in Chapter 6 of this document.</p> <p><b>Stop! End of Task.</b></p>

## Informix DynamicServer, OrbixMT, and OrbixNames Installation

**Description** This fileset will load the Informix and Orbix engines. The Serial Number and Key information must be entered by the user to validate the user license. Once Informix and Orbix are loaded and configured, the database partitions must be initialized and configured.

**Procedure** Perform the following steps to install the Informix and Orbix software. Informix must be installed separately before installing the Orbix software.

Step	Action
1	Insert the <b>ColdStart CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <b>root</b> .
3	At the # prompt, enter the following commands: <ul style="list-style-type: none"> <li>■ <b>cd /tmp</b></li> <li>■ <b>./pfsMount</b></li> </ul> <p><b>Result:</b> The CD will be mounted as /cdrom.</p> <p> <b>NOTE:</b> You may see a message stating <code>device /cdrom is busy</code>.</p>
4	At the # prompt, enter the command: <p style="text-align: center;"><b>swinstall</b></p> <p><b>Result:</b> The main <i>swinstall</i> screen is displayed.</p>
5	Press the <b>Return</b> key to continue. <p><b>Result:</b> The <i>Specify Source</i> screen is displayed.</p>
6	Specify for the <i>Source Depot Path</i> : <b>/cdrom</b> .
7	Select <b>OK</b> and press the <b>Return</b> key. <p><b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.</p>

Step	Action (Contd)
8	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.</p>
9	<p>Select <b>DynamicServer</b> by pressing the spacebar.</p> <p><b>⇒ NOTE:</b> Do not install all three packages (DynamicServer, ORBIXMT, and ITnames) at the same time. After installing DynamicServer, exit and run swinstall again to install ORBIXMT and ITnames. Installation of ITnames (OrbixNames) is optional and needed for Northbound interface only.</p>
10	<p>Tab to the Menu line and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A message is displayed regarding the software item selected.</p>
11	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Install Analysis</i> screen is displayed.</p>
12	<p>Once the status field changes to <i>Ready</i>, select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.</p>
13	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?</p>
14	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i>.</p>
15	<p>Select <b>Done</b> and press the <b>Return</b> key.</p>
16	<p>Deselect <b>Informix</b> and select <b>ITnames and ORBIXMT</b> by pressing the spacebar.</p>
17	<p>Tab to the Menu line and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A message is displayed regarding the software item selected.</p>

Step	Action (Contd)
18	Select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> The <i>Install Analysis</i> screen is displayed.
19	Once the status field changes to <i>Ready</i> , select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.
20	Select <b>Yes</b> and press the <b>Return</b> key.  <b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?
21	Select <b>Yes</b> and press the <b>Return</b> key.  <b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Completed</i> .
22	Select <b>Done</b> and press the <b>Return</b> key.
23	Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the <i>swinstall</i> program.
24	Enter the following commands before removing the CD.  <b>cd /tmp</b> <b>./pfsUmount</b>

Step	Action (Contd)
25	<p>At the # prompt, enter the following commands:</p> <pre><b>cd /tmp</b> <b>./coldStart</b></pre> <p><b>Result:</b> This command sets up all logins required by WaveStar SNMS and verifies the system, CPU, LAN Mux, and disks. It will rebuild the kernel and automatically restart the system. Screen output is displayed (see section titled ColdStart screen output in Chapter 6) and the user will have to provide information to several prompts when they appear including the following:</p> <ul style="list-style-type: none"> <li>■ Home Directory <i>/ems</i></li> <li>■ User Groups</li> <li>■ User Names</li> <li>■ Informix and Orbix License Information <ul style="list-style-type: none"> <li>Informix DynamicServer Serial Number</li> <li>Informix DynamicServer key</li> <li>OrbixMT License Code</li> <li>OrbixNames License Code</li> </ul> </li> <li>■ DNS Domain prompt (for Northbound only) <p>If a domain is added at DNS Domain prompt, add the entry to the host file with the entire domain. For example, if <i>/etc/host</i> file had a line that reads:</p> <pre>135.10.10.100 hosta</pre> <p>Add the domain so that it now reads:</p> <pre>135.10.10.100 hosta hosta.domain.com</pre> <p>(where <i>domain.com</i> is the domain added during the coldStart script).</p> </li> </ul> <p><b>⇒ NOTE:</b> In the event that coldstart is interrupted before its completion, or there is a need to run coldstart again, several options are available. See the chapter titled WaveStar SNMS Application Installation Concepts in this document.</p> <p><b>Stop! End of Task.</b></p>

## Generating X.25 Config Files

**Description** This procedure generates the *x25\_config.answ* and *x25\_config.0\** files in */tmp*.

**Procedure** Perform the following steps to generate the *x25\_config* files.

Step	Action
1	At the Console Login prompt, login as <code>root</code> .
2	At the # prompt, enter the following commands: <pre>cd /tmp ./x25_config.GEN</pre> <p><b>Result:</b> This command generates the <i>x25_config.answ</i> and <i>25_config.0*</i> files in <i>/tmp</i>. The output to this command prompts you for the number of PVCs and SVCs to be used per MUX interface port.</p> <ul style="list-style-type: none"> <li>■ How many PVC's per port (0-255)?</li> <li>■ How many SVC's per port (0-255)?</li> </ul>
3	Change directory to <i>/tmp</i> and move the <i>x25_config.answ</i> file using the following command: <pre>mv x25_config.answ /opt/acc/cfg</pre>
4	Move all of the other x25 files by entering the command: <pre>mv x25* /etc/x25</pre>
5	<pre>vi /opt/acc/cfg/zmasterd_list</pre> and change the value <i>loopback.tmem</i> on line 6 to <i>x25.tmem</i>  <b>Stop! End of Task.</b>

## HP Openview Installation (Optional - Supports OLS 400G NEs)

**Description** The following procedure is used to install HP Openview.

**Procedure** Perform the following steps to install HP Openview.

Step	Action
1	At the Console Login prompt, login as <code>root</code> and mount the HP OpenView CD.
2	<p>Enter the following commands:</p> <ul style="list-style-type: none"> <li>■ <code>mount /dev/dsk/** /SD_CDROM</code></li> <li>■ <code>cd /SD_CDROM</code></li> <li>■ <code>./install -x mount_all_filesystems=false</code></li> </ul> <p><b>Result:</b> Several prompts are displayed. Enter the following responses:</p> <ul style="list-style-type: none"> <li>■ Install DM Products <b>Y</b></li> <li>■ Install Bundled RFC1006 component <b>Y</b></li> <li>■ Installing the bundled RFC1006 product will automatically perform a reboot (this is normal). Continue <b>Y</b></li> <li>■ Install OTS Man pages <b>N</b></li> <li>■ Start OTS at boot time <b>N</b></li> </ul>
3	<p>When prompted with [Press Return to start the configuration tool], press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Set Configuration Mode</i> window is displayed.</p>
4	<p>Make no changes and press <b>Control F-4</b>.</p> <p><b>NOTE:</b> If using a system console, press the <b>F-4</b> key rather than <b>Control F-4</b>.</p> <p><b>Result:</b> The following message appears:</p> <p style="text-align: center;">Press the spacebar to continue.</p>

Step	Action (Contd)
5	Press the spacebar.  <b>Result:</b> The <i>RFC1006 Configuration (OSI over TCP/IP)</i> window appears.
6	Select <b>add</b> using the <b>Control F-4</b> key (Add, View/Modify, Delete).  <b>Result:</b> The <i>Add RFC1006 Subnetwork</i> window appears.
7	Enter the following information: <ul style="list-style-type: none"> <li>■ Input the <b>IP address</b> of the Host Machine (TCP/IP LAN) (for example, 135.17.13.198)</li> <li>■ TPDU size <b>2048</b></li> <li>■ Port Number <b>102</b></li> <li>■ Local network address (NSAP) <b>LEAVE THIS BLANK</b></li> </ul> Use <b>Perform task</b> to execute the changes.  <b>Result:</b> The following message appears:  <pre>Press the space bar to continue.</pre>
8	Press the spacebar.  <b>Result:</b> The <i>RFC1006 Configuration (OSI over TCP/IP)</i> window reappears.
9	Now select <b>Exit OSICONF</b> by pressing <b>Control F-8</b> .   <b>NOTE:</b> If using a system console, press the <b>F-8</b> key rather than <b>Control F-8</b> .  <b>Result:</b> The following message appears:  <pre>Press the space bar to continue.</pre>
10	Press the spacebar.  <b>Result:</b> The system will reboot and the following message will appear:  <pre>Your installation was successful. Refer to /var/ adm/sw/swagent.log.</pre>
11	At the Console Login prompt, login as <b>root</b> and mount the HP OpenView CD.

Step	Action (Contd)
5	Press the spacebar.  <b>Result:</b> The <i>RFC1006 Configuration (OSI over TCP/IP)</i> window appears.
6	Select <b>add</b> using the <b>Control F-4</b> key (Add, View/Modify, Delete).  <b>Result:</b> The <i>Add RFC1006 Subnetwork</i> window appears.
7	Enter the following information: <ul style="list-style-type: none"> <li>■ Input the <b>IP address</b> of the Host Machine (TCP/IP LAN) (for example, 135.17.13.198)</li> <li>■ TPDU size <b>2048</b></li> <li>■ Port Number <b>102</b></li> <li>■ Local network address (NSAP) <b>LEAVE THIS BLANK</b></li> </ul> Use <b>Perform task</b> to execute the changes.  <b>Result:</b> The following message appears: <pre>Press the space bar to continue.</pre>
8	Press the spacebar.  <b>Result:</b> The <i>RFC1006 Configuration (OSI over TCP/IP)</i> window reappears.
9	Now select <b>Exit OSICONF</b> by pressing <b>Control F-8</b> .   <b>Note:</b> If using a system console, press the <b>F-8</b> key rather than <b>Control F-8</b> .  <b>Result:</b> The following message appears: <pre>Press the space bar to continue.</pre>
10	Press the spacebar.  <b>Result:</b> The system will reboot and the following message will appear: <pre>Your installation was successful. Refer to /var/ adm/sw/swagent.log.</pre>
11	At the Console Login prompt, login as <b>root</b> and mount the HP OpenView CD.

Step	Action (Contd)
12	Enter the following commands: <ul style="list-style-type: none"> <li>■ <b>mount /dev/dsk/***/SD_CDROM</b></li> <li>■ <b>cd /SD_CDROM</b></li> <li>■ <b>./install</b></li> </ul> <p><b>Result:</b> The <i>Installation</i> window is displayed with several prompts.</p>
13	Enter the following information: <ul style="list-style-type: none"> <li>■ Enter the preferred Language <b>1) English</b> (Choices are English &amp; Japanese)</li> <li>■ For the products you wish to install, enter the choices one at a time. Select <b>1</b>, <b>2</b>, and <b>Q</b> for quit (DM TMN Agent Platform, DM TMN Agent Platform MAN pages).</li> </ul> <p><b>Result:</b> The <i>Installation</i> window is displayed with your choices.</p>
14	Enter <b>Y</b> at the following prompt: <pre style="margin-left: 40px;">Do you want to continue with this installation?</pre> <p><b>Result:</b> Patch PHSS_11842 will load automatically.</p>
15	Enter the following command to see if /dev/osipi was created properly: <pre style="margin-left: 40px;">ls -l /dev/osipi</pre> <p><b>Result:</b> If the file is created created properly you see:</p> <pre style="margin-left: 40px;">crw-rw-rw- 1 root  sys   72 0x00005a Nov 18 09:09 /dev/osipii</pre>
16	Enter the following commands: <ul style="list-style-type: none"> <li>■ <b>cd /tmp</b></li> <li>■ <b>./installPF3000</b></li> </ul> <p><b>Result:</b> This loads pmd patch PHSS_16027 and PHSS_21580.</p>
17	Enter the following commands: <ul style="list-style-type: none"> <li>■ <b>./opt/OV/bin/ov.envvars.sh</b> (. space /)</li> <li>■ <b>env   grep OV</b> (to verify the variables have been setup)</li> <li>■ <b>umount /SD_CDROM</b></li> </ul> <p><b>Result:</b> Sets up HP OpenView environment variables.</p>

Step	Action (Contd)
18	<p>To get the HP OV Host Target ID, Permanent ID &amp; SPU Target ID, enter the following command:</p> <ul style="list-style-type: none"> <li>■ <b>/opt/ifor/ls/bin/i4target -v</b></li> </ul> <p><b>Result:</b> Output similar to the following is displayed:</p> <pre>Permanent Target ID: f003d9 (Matches LAN 0) SPU Target ID: 37894361</pre>
19	<p>To add the permanent nodelock license (based on the SPU ID), perform the following:</p> <p>Edit the /var/opt/ifor/nodelock file. Enter the license obtained from HP (for example, 670985ac8b34.02.0f.02.71.2b.00.00.005rbjms7enwfvvmnd32au6 4isc48 "DM PERM 31 D EC 2020 1 M * N" "5.XPERM")</p>
20	<p>Using SAM, install LAN1 and verify with ifconfig lan1 that it is up before preceding. Use the 17.17.17.XXX (where XXX = any 3 numbers you use) on LAN1 Subnet=255.255.255.0</p> <p><b>⇒ NOTE:</b> The IP address of LAN1 must be on a separate subnet than the local TCP/IP Lan. This must be completed before you continue.</p>
21	<p>Perform the following:</p> <ul style="list-style-type: none"> <li>■ Select Networking and Communications</li> <li>■ Network Interface Cards</li> <li>■ Select LAN1</li> <li>■ Action Configure</li> </ul> <p><b>Stop! End of Task.</b></p>

## WaveStar SNMS Application Installation

**Description** The WaveStar SNMS application fileset will load the WaveStar SNMS application. The following procedure is used to install the WaveStar SNMS application.

**Procedure** Perform the following steps to install the WaveStar SNMS application.

Step	Action
1	At the Console Login prompt, login as <code>root</code> (directly, with no 'su') and mount the SNMS Application CD (#1 of 2).
2	<p>Enter the following commands:</p> <ul style="list-style-type: none"> <li>■ <code>nohup pfs_mountd -v &amp;</code></li> <li>■ <code>nohup pfsd &amp;</code></li> <li>■ <code>pfs_mount -o xlat=unix /dev/dsk/***/cdrom</code> (***=the device location)</li> </ul> <p> <b>NOTE:</b> Check whether pfs daemons are running by typing: <code>ps -eaf   grep pfs</code> Kill any pfs processes that are running.</p>
3	<p>If installing from a CD, enter the following command:</p> <ul style="list-style-type: none"> <li>■ <code>/tmp/loadCD</code> (This will automatically start pfs and will automatically mount the CD).</li> </ul> <p>If installing from a tape, enter the following command</p> <ul style="list-style-type: none"> <li>■ <code>/tmp/loadTape</code></li> </ul> <p><b>Result:</b> The loadEMS script begins. The following is the content of the loadEMS script:</p> <pre>swinstall -v -s /dev/rmt/0m -x mount_all_filesystems=false -x reinstall=true SNMS.snms-install</pre>

Step	Action (Contd)
4	<p>Continue with the following:</p> <ul style="list-style-type: none"> <li>■ Exit from root</li> <li>■ Log in as ems</li> <li>■ su root (don't use dash)</li> <li>■ Check if pfs is running (see Step #2). Kill pfs processes if running.</li> <li>■ Start pfs and mount CD via command: <b>/tmp/pfsMount</b></li> </ul>
5	<p>To begin installing the application, enter the following command:</p> <p style="text-align: center;"><b>installEms</b></p> <p><b>Result:</b> Installation begins. Screen displays with prompts asking for user input appear during the WaveStar SNMS application installation. See section titled WaveStar SNMS Application Installation in Chapter 6 for sample screen output.</p> <p> <b>NOTE:</b> The following responses and information are required to complete this procedure.</p> <ul style="list-style-type: none"> <li>■ Choose #3 <b>Install/upgrade ITM Software</b></li> <li>■ System prompts for DB Conversion (Y/N)</li> <li>■ Prompt: tape or CDROM</li> <li>■ Load SNMS application <b>Yes</b></li> <li>■ Informix database configuration</li> <li>■ SONENT Directory Services locally YES (if SNMS is going to be DSA)</li> <li>■ NE protocols (Default=7 CMISE, OSI, X.25)</li> <li>■ OSI configuration (Lancard, NSAP, Redundant)</li> <li>■ ATOS license</li> <li>■ Dib Information</li> <li>■ NSAP Address</li> <li>■ CMISE protocol setup (if CMISE selected)</li> <li>■ EMS name</li> </ul>

Step	Action (Contd)
6	<p>When the installation is done, you will see the following message:</p> <pre>Thank you for using 'installEms'!</pre>
7	<p>Enter the following commands:</p> <pre># cd /tmp # pfsUmount # exit # exit</pre> <p><b>Result:</b> This logs you out from the host.</p>
8	<p>Login as <b>ems</b> and enter the following command:</p> <pre>up</pre> <p><b>Result:</b> The following message is displayed:</p> <pre>Do you want to clear old logs before EMS startup, (y/n/q)? n</pre> <p><b>⇒ NOTE:</b> If you need to re-enter the ATOS license after installation, simply login as root and run askAtosLicense.</p> <p><b>Stop! End of Task.</b></p>

## Upgrading to SNMS R4.2

### Description

The following procedure is used to upgrade to SNMS 4.2 from earlier releases.

### Procedure

Use the following steps to upgrade to SNMS R4.2 from an earlier SNMS release.

Step	Action
1	Login as <b>ems</b> and execute  <b>get_dbmodel</b>  Write down the DB model information.
2	Bring SNMS down by executing the following command: <b>dn</b>
3	Backup flat files to tape as below:  <b>cd /ems</b> (cd /snc for SNMS 3.1 and prior)  For simplex system: <b>tar cvf /dev/rmt/0m \            .etc/SDSenv_rc \            .etc/duainit \            .dsa</b>  For redundant system: <b>tar cvf /dev/rmt/0m \            .etc/SDSenv_rc \            .etc/duainit \            .dsa \            .HA/LOC/config</b>

Step	Action (Contd)
4	<p>Backup databases to tapes as below:</p> <p>for SNMS 3.0 and prior:</p> <pre>dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$SNC_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$PM_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$NQ_DBNAME -ss</pre> <p>for SNMS 3.1:</p> <pre>dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$SNC_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$PM_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$NQ_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$NCI_DBNAME -ss</pre> <p>for SNMS 4.0:</p> <pre>dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$EMS_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$PM_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$NQ_DBNAME -ss dbexport -c -t /dev/rmt/0m -b 512 -s 2000000 \$NCI_DBNAME -ss</pre>
5	<p>Save your <i>installSnc.out</i> or <i>installEms.out</i> to a safe place. You will need this file later.</p>
6	<p>Install this host from scratch following the procedures in this document:</p> <ul style="list-style-type: none"> <li>■ HP-UX R11.0 Installation</li> <li>■ HP-UX Multiple-User License Installation (option)</li> <li>■ HP-UX 100MB Lan Card Drivers Installation (option)</li> <li>■ HP-UX Patch Installation</li> <li>■ HP-UX X.25/ACC Software Installation (option)</li> <li>■ WaveStar SNMS ColdStart Installation</li> <li>■ Informix DynamicServer, OrbixMT, OrbixNames Installation</li> <li>■ HP Openview Installation (option)</li> <li>■ WaveStar SNMS Application Installation</li> </ul>

Step	Action (Contd)
7	<p>After loading the application, answer <b>Yes</b> to Informix Database configuration.</p> <p>Follow the old <i>installSnc.out</i> or <i>installEms.out</i> to answer all the prompts.</p> <p>Logout from <code>root</code>, logout from <code>ems</code> and login as <code>ems</code> again.</p> <p>Verify informix and new space layout:</p> <p style="text-align: center;"><b>onstat -d</b></p> <p>and verify the tablespace number and name of output match the content of <i>/ems/etc/dbconfig.FULL</i> (COMPACT, SUPER, SUPREME or SUPREME-N depending on what you get from "get_dbmodel")</p>
8	<p>Restore flat files from tapes:</p> <p style="padding-left: 40px;">Login as <code>root</code> by "su -"</p> <p style="padding-left: 40px;"><b>cd /ems</b></p> <p>For simplex system:</p> <pre style="padding-left: 40px;">tar xvf /dev/rmt/0m \ /etc/SDSenv_rc \ /etc/duainit \ .dsa</pre> <p>For redundant system:</p> <pre style="padding-left: 40px;">tar xvf /dev/rmt/0m \ /etc/SDSenv_rc \ /etc/duainit \ .dsa \ .HA/LOC/config</pre>

Step	Action (Contd)
9	<p>Verify the files by the following command:</p> <p style="text-align: center;"><b>ls -lR /ems/etc/SDSenv_rc /ems/dsa /ems/duainit</b></p> <p><b>Result:</b> The output should at least contain the following: (where date and size should be different)</p> <pre> -rwxr-xr-x 1 ems    ems    3684 Jul 25 16:27 /ems/etc/SDSenv_rc -rwxr-xr-x 1 ems    ems    515 Jul 25 16:27 /ems/etc/duainit  /ems/dsa: total 4 drwxr-xr-x 2 ems    ems    1024 Jul 24 16:34 DB -rw-rw-r-- 1 ems    ems    29 Aug 11 16:45 isactive  /ems/dsa/DB: total 1186 -rwxr-xr-x 1 ems    ems    243 Aug 11 16:45 DB -rwxr-xr-x 1 ems    ems   25456 Aug 11 16:45 DB.att -rwxr-xr-x 1 ems    ems   49200 Jul 24 16:34 DB.crf -rwxr-xr-x 1 ems    ems   24020 Jul 24 16:34 DB.dsa -rwxr-xr-x 1 ems    ems    3136 Jul 24 16:34 DB.ncx -rwxr-xr-x 1 ems    ems  374912 Jul 24 16:34 DB.obc -rwxr-xr-x 1 ems    ems     13 Jul 24 16:34 DB.pfx -rwxr-xr-x 1 ems    ems   49200 Jul 24 16:34 aaaaaaaaa.iDB -rwxr-xr-x 1 ems    ems   24191 Jul 24 16:34 aaaaaaaaa.vDB -rwxr-xr-x 1 ems    ems   49200 Jul 24 16:34 baaaaaaaa.iDB </pre>

Step	Action (Contd)
10	<p>Logout from <code>root</code> and login as <code>ems</code> and restore database from tapes by:</p> <p>If old release is SNMS 3.0 and prior:  <b>dbimport snc_db -d snc_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport pm_db -d pm1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>if <code>get_dbmodel</code> is SUPERME or SUPREME-N:  <b>dbimport q3nb_db -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>otherwise:  <b>dbimport q3nb_db -d fm2_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p><b>db_logging -U snc_db</b>  <b>db_logging -U pm_db</b>  <b>db_logging -U q3nb_db</b></p> <p>if old release is SNMS 3.1:  <b>dbimport snc_db -d snc_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport pm_db -d pm1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>if <code>get_dbmodel</code> is SUPERME or SUPREME-N:  <b>dbimport q3nb_db -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport tmf_db -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>otherwise:  <b>dbimport q3nb_db -d fm2_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport tmf_db -d fm2_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p><b>db_logging -U snc_db</b>  <b>db_logging -U pm_db</b>  <b>db_logging -U q3nb_db</b>  <b>db_logging -U tmf_db</b></p> <p>if old release is SNMS 4.0:  <b>dbimport ems_db -d snc_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport pm_db -d pm1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>if <code>get_dbmodel</code> is SUPERME or SUPREME-N:  <b>dbimport q3nb_db -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport tmf_db -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p>otherwise:  <b>dbimport q3nb_db -d fm2_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b>  <b>dbimport tmf_db -d fm2_dbs -c -t /dev/rmt/0m -b 512 -s 2000000</b></p> <p><b>db_logging -U ems_db</b>  <b>db_logging -U pm_db</b>  <b>db_logging -U q3nb_db</b>  <b>db_logging -U tmf_db</b></p>

Step	Action (Contd)
11	<p>Convert databases to the new schema via the following:</p> <p>If old release is R3.0 and prior:  <b>export SNC_DBNAME=snc_db</b>  <b>export EMS_DBNAME=snc_db</b></p> <p>Do the following scripts from the old release #:  <b>SNMSDB2.0To2.1</b>  <b>SNMSDB2.1To3.0</b>  <b>SNMSDB3.0To3.1</b></p> <p> <b>NOTE:</b>  If the old release is 2.1 then execute  <b>SNMSDB2.1To3.0</b>  and  <b>SNMSDB3.0To3.1.</b></p> <p>The screen will show the release R4.0 when re-creating SNMS database. This is normal.</p> <p><b>export SNC_DBNAME=ems_db</b>  <b>export EMS_DBNAME=ems_db</b></p> <p><b>SNMSDB3.1To4.0</b>  <b>SNMSDB4.0To4.2</b></p> <p>If old release is R3.1:  <b>SNMSDB3.1To4.0</b>  <b>SNMSDB4.0To4.2</b></p> <p>If old release is R4.0:  <b>SNMSDB4.0To4.2</b></p> <p><b>Result:</b> If everything goes well, the upgrade is done.</p> <p> <b>NOTE:</b>  If you get any error message in any one of the steps, do</p> <p><b>drdb</b>  <b>drdb -d snc_db</b></p> <p>and restore DB from tapes (follow steps from 10).</p>

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<b>Step</b>	<b>Action (Contd)</b>
12	Bring SNMS up by typing the following command:  <b>up</b>  <b>Stop! End of Task.</b>

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# GUI Client Installation on Supported Platforms

# 3

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## Introduction

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**Summary** This chapter describes the procedure to install the GUI client on each of the supported platforms.

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**Contents** The following topics are discussed in this chapter:

■ GUI Installation on Microsoft NT 4.0	2
■ GUI Installation on Solaris Workstation	10
■ UNIX Thin Client Installation	15
■ NT Terminal Server Platform	21

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## **GUI Installation on Microsoft NT 4.0**

### **Description**

The platform for the WaveStar SNMS GUI running as a standalone application is a PC running Windows NT 4.0. This section describes how to install the GUI client onto the PC server.

### **SNMS server definition**

The following procedure is used to define the SNMS servers in the TCP/IP Hosts file used by the for the NT operating system.

<b>Step</b>	<b>Action</b>
1	<p>FTP the <i>/etc/hosts</i> file on the SNMS HP server and use this on the NT workstation.</p> <p> <b>NOTE:</b> Make sure to capture all predefined host entries before overwriting the file on the NT workstation.</p> <p>For a Windows NT system, the Hosts file is contained in the directory  <code>\\Winnt\system32\drivers\etc</code>                      or                      For an NT Terminal Server system, the Hosts file is contained in the directory  <code>\\WTSRV32\system32\drivers\etc</code></p> <p><b>Stop! End of Task.</b></p>

**User login creation** The following procedure is used to create user logins for the NT workstation.

**⇒ NOTE:**  
For NT workstations already in use by the customer, customer defined logins and passwords may already be available on the NT workstation. If the customer requests use of one of these accounts, the SNMS installer need not create a new account for SNMS users and the next step in GUI installation can proceed.

Step	Action
1	<p>Log in as <b>Administrator</b> and launch the <i>User Manager For Domains</i> application.</p> <p><b>⇒ NOTE:</b> This application can be reached from the Start button, via the following cascading menus:</p> <p style="padding-left: 40px;">Start button-&gt;Programs-&gt;Administrative Tools (Common)-&gt;User Manager For Domains</p> <p><b>Result:</b> A screen titled <i>User Manager</i> should be displayed. The screen should contain a menu bar and scrolled table showing all defined users.</p>
2	<p>To create a new user, access the <i>User</i> pull-down menu item and select the <b>New User...</b> menu item.</p> <p><b>Result:</b> This will result in a new screen titled <i>New User</i>.</p>
3	<p>On the new screen enter the following information:</p> <p style="padding-left: 40px;">Username - ems Full Name - EMS/NMS Manager Password - ems123 Confirm Password - ems123</p>

Step	Action
4	Put a check in the box labeled <i>Password Never Expires</i> and press the <b>Add</b> button. The screen should clear in preparation of adding another user.
5	Press the <b>Close</b> button on the screen titled <i>New User</i> in order to stop adding new users.
6	Once the ems user id is created, the User Manager application can be exited. Access the <i>User</i> pull-down menu and select the <b>Exit</b> menu item.  <b>Stop! End of Task.</b>

### Adobe Acrobat installation

The following procedure is used to install Adobe Acrobat for the NT workstation.

Step	Action
1	<p>The Adobe Acrobat installation file is named <b>ar40eng.exe</b>. To install Acrobat Reader, open the <i>My Computer</i> desktop icon and click on the CD-ROM disk drive.</p> <p><b>⇒ NOTE:</b> The Acrobat installation file is available on the SNMS installation disk. If the Service Pack 4.0 installation disk is still in the CD-ROM drive, you will need to switch disks.</p> <p><b>Result:</b> This will open a screen listing all the files on the CD-ROM.</p>
2	Double click on the <b>ar40eng.exe</b> file to launch the Acrobat installation program. Use the default configuration parameters to install the program.
3	<p>Install Adobe Acrobat under <i>C:\ProgramFiles\Adobe\Acrobat 4.0</i>.</p> <p><b>⇒ NOTE:</b> For NT Terminal Server systems, the default install directory is <i>M:\Program Files\Adobe\Acrobat 4.0</i>. Because the boot partition is very small, the installer must change the default drive directory from <i>M:</i> to <i>C:</i>. Therefore the default acrobat reader install directory must be changed to <i>C:\Program Files\Adobe\Acrobat 4.0</i>.</p> <p><b>Stop! End of Task.</b></p>

**Installation of  
Japanese Font Pack  
for Acrobat Reader**

The following procedure is used to install the Japanese font pack for the NT workstation. The Japanese font pack installation file is called **jpnfont.exe** and it upgrades Acrobat Reader for Japanese language support. It installs in the same directory as the Acrobat Reader program (C:\Program Files\Adobe\Acrobat 4.0).

**NOTE:**

If Japanese language support is not required for this installation, installation of the Japanese font set can be skipped.

Step	Action
1	Login as <b>administrator</b> .
2	Open the <i>My Computer</i> desktop icon and click on the CD-ROM disk drive.  <b>Result:</b> This will open a screen listing all the files on the CD-ROM.
3	Double click on the <b>jpnfont.exe</b> file to launch the Acrobat installation program. Use the default configuration parameters to install the program.  <b>Stop! End of Task.</b>

**GUI installation**

The following procedure is used to install the GUI application. Before installing the GUI application, the installer needs to determine the most appropriate disk to hold the GUI software. It is recommended that there be at least 1GB of free space for the application.

It is possible for more than one release of the GUI to be installed on a singlerkstation. For instance, a release 2.0 SNMS GUI, a release 3.0 GUI, and a release 4.0 GUI can co-exist on the same NT workstation. It is recommended that all versions of the GUI reside on the same disk.

Step	Action
1	Insert the SNMS installation disk in the CD-ROM drive.
2	<p>Open the <i>My Computer</i> desktop icon and click on the CD-ROM disk drive.</p> <p><b>Result:</b> A screen appears listing all the files on the CD-ROM.</p>
3	<p>Double click on the <b>snms.exe</b> file to launch the installation program. The installation program displays a Winzip screen requesting a directory for installation.</p> <p><b>⇒ NOTE:</b> In most cases, the GUI application should not reside on the same disk as the operating system. Therefore, the GUI software should be installed on either the D: or E: drive. To create a new logical disk, use the NT administrator utility Disk Administrator. This application can be reached from the start button via the following cascading menus:</p> <p>Start button-&gt;Programs-&gt;Administrative Tools (Common)-&gt;Disk Administrator</p> <p>Once launched, the disk administrator program will graphically depict the server disk formatting.</p> <p>For Terminal Server installations, the installation disk should always be the C: drive. Because ITM-NM and WaveStar SNMS share configuration files, both applications must reside on the same disk. The root directory of all ITM-NM files on the NT workstation is /jui.</p>
4	If a previous version of SNMS is already installed on the workstation, a warning message may be displayed indicating that files are about to be overwritten. Press the <b>Yes To All</b> button to continue the installation.
5	<p>The GUI installs in the root directory named \snmsR4.2.</p> <p><b>Stop! End of Task.</b></p>

**Configuration for  
WS-NMS****Updating the WS-NMS F-interface File**

The SNMS software contains a F-interface configuration file that helps WS-NMS locate different versions of SNMS software. The pathname of this file is:

*<GUI Root Directory>/snc/fint/sncFint.cfg.*

WS-NMS accesses a copy of this file from the directory

*\\juiljnm\itm\southbound\snc\sncfint*

If the *sncFint.cfg* file is not already present in that directory, a copy of the file must be put into

*\\juiljnm\itm\southbound\snc\sncfint*

The file format for the file *sncFint.cfg* is identical in every release of SNMS software.

**Updating the WS\_NMS Classpath**

The java classpath parameter identifies the source of java files executed by the GUI. The classpath variable for the SNMS GUI is automatically set, based on values in the *sncFint.cfg* file. However, the classpath for WS-NMS needs to be updated to point to any one version of the SNMS GUI client. In other words, the ITM-NM classpath variable needs to include either a *\snmsR3.0* or *\snmsR4.0* or ... directory in its list of classpath directories. The WS-NMS file that may need to be edited is

*\\juilbin\run\_jnm.bat*

Only one SNMS root directory needs to be included in the WS-NMS classpath variable.

---

**Configuring the SNMS server to allow WS-NMS login**

Starting with Release 4.2 of SNMS, WS-NMS uses its own login ids for login into SNMS. In order for SNMS to support this feature, CSL support must be enabled. To configure CSL support, perform the following:

Step	Action
1	Telnet into the SNMS server.
2	Login to the SNMS server using the ems login (the default password is ems123).
3	Edit the file: <code>\$GS_CONFIG_PATH</code> (e.g. <code>vi \$GS_CONFIG_PATH</code> )
4	Search for the CSL_ENABLE value. The default line in the file should be <code>CSL_ENABLE = 0</code>
5	Change the value zero to one. The change line should read <code>CSL_ENABLE = 1</code>
6	Save the file and close the editor.
7	Execute the command: <b>apprestart -n GUI_Server</b>
8	Log out of the SNMS server.  <b>Stop! End of Task.</b>

**Testing the GUI**

Once the GUI is installed and the SNMS server application is running on the HP server, you can test the GUI from an MS-DOS prompt.

Step	Action
1	An MS-DOS window can be launched using the start button, via the following cascading menus:  <b>Start button-&gt;Programs-&gt;Command Prompt</b>
2	At the MS-DOS prompt, change directory to the root directory of the GUI application.
3	To launch an SNMS GUI, execute the command:  <b>SNMS -host &lt;hostname&gt;</b>  <b>Stop! End of Task.</b>

**Creating a  
desktop shortcut**

A desktop shortcut can be created for each WaveStar SNMS host reachable from the NT workstation. An icon file is delivered on the CD-ROM installation disk for use as the shortcut icon.

<b>Step</b>	<b>Action</b>
1	Copy the icon file <b>starlogo.ico</b> from the CD-ROM disk to the Winnt\system32 directory.
2	Select the Windows desktop and use the right-hand mouse button to popup the desktop menu. Select the shortcut menu item from the following cascading menu items: <b>New-&gt;Shortcut</b>
3	This displays the <i>Create Shortcut</i> screen. The first screen prompt asks for the MS-DOS command line to invoke when opening the shortcut.
4	Enter the full path name of the snms.bat file and the corresponding command input options.
5	Click the <b>Next</b> button and the screen prompt requests the name of the shortcut. Enter the desired name for the shortcut and click the <b>Finish</b> button.
6	Select the shortcut on the desktop and use the right-hand mouse button to display its popup menu. Select the shortcut tab and customize the <i>Start In</i> and <i>Change icon</i> properties to reflect the appropriate data.
7	Press the <b>OK</b> button to save the changes and the desktop shortcut is created. <b>Stop! End of Task.</b>

## GUI Installation on Solaris Workstation

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**Description** The SNMS GUI for Solaris is delivered on the SNMS GUI UNIX installation CD.

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**Creation of EMS user login** The following procedure is used to create user logins for the Solaris workstation.

**⇒ NOTE:**  
No Solaris users are prevented from invoking a WaveStar SNMS GUI. Therefore, any Solaris user account may be used to launch the GUI. However, it is recommended that an EMS user account be created on the Solaris workstation, as default. Other users can run the GUI out of the EMS home directory.

Step	Action								
1	Login as <code>root</code> and execute the command: <b>admintool</b> .								
2	Admintool is a graphical user tool for creating user accounts. Use the add menu item to display the new user information dialog. The following parameters should be configured: <table style="margin-left: 40px; border: none;"> <tr> <td>User Name:</td> <td>ems</td> </tr> <tr> <td>Login Shell:</td> <td>Korn</td> </tr> <tr> <td>Create Home Directory:</td> <td>&lt;button pushed&gt;</td> </tr> <tr> <td>Path:</td> <td>/export/home/ems</td> </tr> </table>	User Name:	ems	Login Shell:	Korn	Create Home Directory:	<button pushed>	Path:	/export/home/ems
User Name:	ems								
Login Shell:	Korn								
Create Home Directory:	<button pushed>								
Path:	/export/home/ems								
3	Press the <b>OK</b> button to create the user account. Exit the tool when complete.  <b>Stop! End of Task.</b>								

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**Name resolution configuration** A Solaris workstation already in use, may already have domain name resolution properly configured. To determine proper name resolution and IP connectivity, use the **ping** command. If name resolution configuration appears correct, skip this step.

Step	Action
1	The definition of name servers is stored in the file <i>/etc/resolv.conf</i> . The following example <i>resolve.conf</i> file defines the IP domain name and defines two name servers:  <pre>domain    ho.lucent.com nameserver 135.17.1.12 nameserver 135.3.1.13</pre>
2	The file <i>/etc/nsswitch.conf</i> can be used to specify the order in which IP names are resolved. To specify that the <i>/etc/hosts</i> file should be checked before making a DNS query, find the line that begins with the <i>hosts:</i> flag and specify the following:  <pre>hosts: files dns</pre>
3	Both configuration files are text files and are editable using <i>vi</i> .  <b>Stop! End of Task.</b>

### Adobe Acrobat installation

The adobe acrobat installation file is contained on the WaveStar SNMS GUI installation disk. The file on the disk is called *solaris.arws-40.tar*.

If Adobe Acrobat 4.0 is already installed on the computer, this step can be skipped. You can check the version information on the Acrobat splash screen. The Acrobat reader executable is called *acroread*. The Acrobat reader software is installed under the */opt/Acrobat4* directory.

Step	Action
1	Log in as <b>root</b> , and then insert the disk into the CD-ROM drive. Solaris will automatically mount the disk under the directory <i>/cdrom/cdrom0</i> and display a graphical browser displaying the contents of the disk.
2	From the CDE tool-bar, launch a console window in order to get access to a shell prompt. At the shell prompt, make a temporary directory and copy the file <i>solaris.arws-40.tar</i> into the directory.
3	Unpack the tar file using the command,  <pre><b>tar -xvf solaris.arws-40.tar</b></pre>

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Step	Action
4	<p>Unpacking the tar file creates a directory called <i>SSOLRS.install</i>. Change directory into the <i>SSOLRS.install</i> directory and execute the INSTALL script. In other words, perform the following:</p> <pre>cd SSOLRS.install ./INSTALL</pre>
5	<p>For the install script, accept the end user agreement and install the software in the default directory. When the script is complete, execute the following command to allow the EMS user to access Acrobat reader:</p> <pre>ln -s /opt/Acrobat4/bin/acroread /usr/bin/acroread</pre>
6	<p>To clean up the Acrobat install files, delete the contents of the temporary directory.</p> <pre>cd / rm -rf &lt;temporary directory&gt;</pre> <p><b>Stop! End of Task.</b></p>

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**Installation of  
Japanese Font Pack  
For Acrobat  
Reader**

The Japanese font pack installation file is called *jpnfont.tar* and it upgrades Acrobat Reader for Japanese Language support. It installs in the same directory as the Acrobat Reader program. If Japanese language support is not required for this installation, this procedure can be skipped.

Step	Action
1	At the shell prompt, make a temporary directory and copy the file <i>/cdrom/cdrom/0/jpnfont.tar</i> into the directory. Unpack the tar file using the following command:  <b>tar -xvf jpnfont.tar</b>
2	Unpacking the tar file creates a directory called <i>JPNKIT</i> . Change directory into the <i>JPNKIT</i> directory and execute the <i>INSTALL</i> script. In other words, perform the following:  <b>cd JPNKIT ./INSTALL</b>
3	For the install script, accept the end user agreement and install the software in the default directory. After the script completes, clean up the Japanese support kit by deleting the contents of the temporary directory:  <b>cd / rm -rf &lt;temporary directory&gt;</b>  <b>Stop! End of Task.</b>

**GUI installation**

The following procedure is used to install the GUI application.

Step	Action
1	<p>At the shell prompt, copy the WaveStar SNMS tar file from the CD-ROM to the EMS home directory. Once the copy is complete, set global permissions on the tar file in the EMS home directory.</p> <p>The commands to copy and set permissions of the SNMS GUI are:</p> <pre><b>cp /cdrom/cdrom0/snmsR*.tar /export/home/ems</b> <b>chmod 777 /export/home/ems/snmsR*.tar</b></pre>
2	<p>When complete, eject the CD-ROM from the disk drive using the command:</p> <pre><b>eject cdrom0</b></pre>
3	<p>Log out as root and log in as the EMS user. To unpack the GUI tar file, use the command:</p> <pre><b>tar -xvf snmsR*.tar</b></pre> <p>Unpacking the tar file will create a subdirectory with all the java files in their proper location.</p> <p><b>Stop! End of Task.</b></p>

**Testing the GUI**

Once the GUI is installed and the WaveStar SNMS server application is running on the HP server, you can test the GUI from the shell prompt.

Step	Action
1	<p>Change directory to the root directory of the GUI application. For example, to change to the root directory of a release 4.0 SNMS GUI, execute the command:</p> <pre><b>cd snmsR40</b></pre>
2	<p>To launch a WaveStar SNMS GUI, execute the command:</p> <pre><b>snms.sh -host &lt;hostname&gt;</b></pre> <p><b>Stop! End of Task.</b></p>

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## **UNIX Thin Client Installation**

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### **Background**

Thin client software can be used to access an NT Terminal Server from a UNIX workstation. The thin client software, called Independent Computing Architecture (ICA), treats the UNIX workstation as a dumb terminal with desktop access equivalent to an NT Terminal Server. The thin client software is delivered on the SNMS UNIX installation disk.

ICA software is supported on three different varieties of UNIX:

- SOLARIS 2.6+
- HPUX 10.20 +
- AIX 4.1+

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### **Creation of EMS user login**

The following procedure is used to create user logins for the UNIX workstation.

Step	Action																
1	<p><b>For Solaris:</b></p> <p>To create a user account on a Solaris system, log in as <code>root</code> and execute the command: <b>admintool</b>.</p> <p>Admintool is a graphical user tool for creating user accounts. Use the add menu item to display the new user information dialog. The following parameters should be configured:</p> <table> <tr> <td>User Name:</td> <td>ems</td> </tr> <tr> <td>Login Shell:</td> <td>Korn</td> </tr> <tr> <td>Create Home Directory:</td> <td>&lt;button pushed&gt;</td> </tr> <tr> <td>Path:</td> <td>/home/ems</td> </tr> </table> <p>Press the <b>OK</b> button to create the user account. Exit the tool when complete.</p> <p><b>For HP-UX:</b></p> <p>To create a user account on an HP-UX system, log in as <code>root</code> and execute the command: <b>sam</b>.</p> <p>SAM is a graphical user tool for administering the HP-UX workstation. Double click on the icons “<i>Accounts for Users and Groups</i>” and “<i>Local Users</i>” to reach the user account management screen. Under the Actions menu item, use the <b>add button</b> to add a user account. The following parameters should be configured:</p> <table> <tr> <td>Login Name:</td> <td>ems</td> </tr> <tr> <td>Start-up program:</td> <td>/usr/bin/ksh</td> </tr> <tr> <td>Create Home Directory:</td> <td>&lt;button pushed&gt;</td> </tr> <tr> <td>Home Directory:</td> <td>/home/ems</td> </tr> </table> <p>Press the <b>OK</b> button to create the user account. Exit <b>sam</b> when complete.</p> <p><b>For AIX:</b></p> <p>To create a user account on an AIX system, log in as <code>root</code> and execute the command: <b>smit</b></p> <p><b>Stop! End of Task.</b></p>	User Name:	ems	Login Shell:	Korn	Create Home Directory:	<button pushed>	Path:	/home/ems	Login Name:	ems	Start-up program:	/usr/bin/ksh	Create Home Directory:	<button pushed>	Home Directory:	/home/ems
User Name:	ems																
Login Shell:	Korn																
Create Home Directory:	<button pushed>																
Path:	/home/ems																
Login Name:	ems																
Start-up program:	/usr/bin/ksh																
Create Home Directory:	<button pushed>																
Home Directory:	/home/ems																

**Copy ICA file  
from the NT  
terminal server**

The ICA installation file is contained on the SNMS GUI installation disk for the NT platforms. There are three different versions of the ICA software for different UNIX platforms:

solaris.ica.tar	ICA files for Solaris 2.6 and 2.7 systems
hp.ica.tar	ICA files for HP-UX 10.20 and HP-UX 11.0
aix.ica.tar	ICA files for AIX 4.1 and 4.2

Step	Action
1	Login to the NT Terminal server using the appropriate login (e.g. <code>ems</code> or <code>administrator</code> ) and launch an MS-DOS window:  Start button -> Programs -> Command Prompt
2	In the MS-DOS window, change directory to the CD-ROM drive (it should be labeled D) and open an FTP session to the target workstation. To launch ftp, type the command:  <b>ftp</b> <IP address of workstation>
3	When prompted for a login identification, use <code>root</code> and the root password. Next, using binary transfer, put the correct ICA tar file into the home directory of root. This is done by executing the two commands:  <b>bin</b> <b>put</b> <ica tar file>
4	End the ftp session by typing <b>exit</b> and log out of the NT Terminal server.  <b>Stop! End of Task.</b>

**Unpack the tar file** The following procedure is used to unpack the tar file.

Step	Action
1	Log in as <code>root</code> .
2	<p>To unpack the tar file, execute the command:</p> <pre style="text-align: center;"><b>tar -xvf I{solaris/hp/aix}.ica.tar</b></pre> <p><b>Result:</b> This will create the directory <code>/usr/add-on/ui/tools/ICA</code> that contains all the ICA files.</p> <p><b>Stop! End of Task.</b></p>

### Configure the ICA software

The script `/usr/add-on/ui/tools/ICA/setup_ems.sh` is used to configure the ICA client to launch the SNMS GUI application on the NT Terminal Server. The `setup_ems.sh` script can also be configured to ICA to launch an NT desktop interface.

To Configure the ICA client, you will need the following information:

- The IP address of the NT Terminal Server.
- The NT Terminal Server disk and directory contains the SNMS GUI software.
- The name of the SNMS host.
- The type of GUI (i.e., SNMS)

The options on the `setup_ems.sh` command are:

<b>-h</b> <SNMS host name>	Identifiers the SNMS host name. It is used for IP address resolution and the name must be defined in the NT Terminal Server's file M:\{WTSRC\WINNT}\System32\drivers\etc\hosts file
<b>-d</b> <directory of GUI software>	The disk and directory of the GUI software
<b>-t</b> <IP address of NT Terminal Server>	The IP address of the NT Terminal Server
<b>-snms</b>	Flag indicating SNMS GUI
<b>-nt</b>	Flag indicating NT desktop

Step	Action
1	<p>To configure ICA to launch an SNMS GUI, located in directory <code>c:\snms4.0</code>, on a host called <code>dino</code> for an NT Terminal Server with IP address <code>135.17.95.127</code>, execute the following command:</p> <p style="text-align: center;"><b>setup_ems.sh -host dino -d c:\snms4.0 -t 135.17.95.127 -snms</b></p>
2	<p>For some users, system administration needs to be supported from the UNIX workstation. Therefore, login access to the NT administrators account is necessary. To configure ICA to launch an NT desktop for the NT Terminal Server with IP address <code>135.17.95.127</code>, execute the following command:</p> <p style="text-align: center;"><b>setup_ems.sh -t 135.17.95.127 -nt</b></p> <p><b>Result:</b> Each invocation of the <code>setup_ems.sh</code> file creates an alias definition in the <code>ems_aliases</code> file, located in the directory <code>/usr/add-on/ui/tools/ICA</code>. This alias file can be invoked from each users profile (e.g., <code>.vueprofile</code>, <code>.dtprofile</code>, or <code>.profile</code>) so that the alias definition will be defined in the current shell at user login.</p> <p><b>Stop! End of Task.</b></p>

**Updating user  
profile and testing  
the GUI**

The following procedure is used to update the user profile and test the GUI.

Step	Action
1	Log out as <code>root</code> and log in as the <code>ems</code> user. Add the following line to the user's profile:  <code>./usr/add-on/ui/tools/ICA/ems_aliases</code>
2	When complete, execute the profile in the current shell by executing the command:  <code>./{.vueprofile   .dtprofile   .profile}</code>  Then try each alias created in the user profile. In the above example, try the following:  <code>tobago</code> <code>dino</code> <code>nt</code>  <b>Stop! End of Task.</b>

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## NT Terminal Server Platform

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### Description

Windows NT Server 4.0 Terminal Server Edition (or NT Terminal Server 4.0) is a variant of the NT Server 4.0 operating system that supports terminal emulation to a variety of different user workstations. Terminal emulation is achieved through the use of a thin client application, called RDP, that treats the client as a dumb terminal, thereby allowing a user to access to all NT functionality through a Windows desktop.

Microsoft has partnered with several other companies to enhance the functionality of NT Terminal Server client/server computing. Most notable is the Citrix Corporation, which specializes in thin client computing across different platforms and networks.

### Citrix's Metaframe

Metaframe is a Citrix software product that extends the functionality of Microsoft's RDP software by providing server based computing to a larger variety of hardware/software platforms. Using Citrix's ICA, Metaframe can support connection to all WaveStar SNMS and ITM-NM target GUI platforms including HP-UX and Solaris workstations. ICA employs data compression in order to guarantee high performance and security between client and server. Metaframe server software is bundled with WaveStar SNMS and ITM-NM software deliveries.

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### Background

There are several steps required for installing/configuring the NT Terminal Server operating environment. These procedures are:

- Configuration of NT Server 4.0 Terminal Server Edition
  - Installation and Configuration of Metaframe 1.8
  - Server Disk Configuration
  - SNMS User Configuration
  - Terminal Server Connection Configuration
  - Installation and Configuration of Each Client Workstation
- 

### Before you begin

The NT Server software will arrive pre-configured on each computer server order by Lucent. Currently, the recommended platforms are:

- HP NetServer LH4 Server
- Dell 6300 PowerEdge Server

Both platforms are identically equipped with: 2 processors, 1 GB of RAM, three 9 GB drives configured for RAID 5, and dual Ethernet ports.

HP and Dell will factory install the NT Terminal Server Operating System with 10 user licenses. Site specific configuration, required for SNMS/NM, includes the following:

1. Network Configuration
2. Paging
3. Service Pack 4 Upgrade

## Network configuration

Network configuration is performed by “activating” the network icon on the control panel or the properties option on the Network Neighborhood desktop icon. The network configuration screen is titled Network and it displays a screen with 5 configuration tabs labeled: Identification, Services, Protocols, Adapters, and Bindings.

Step	Action
1	In the Identification tab, the Computer Name and Workgroup parameters should be configured. If no workgroup is applicable, leave the field blank.
2	In the Services tab, select the TCP/IP Protocol list item and press the Properties button. This should display a new screen titled Microsoft TCP/IP Properties, which should contain 5 configuration tabs labeled: IP Address, SNMS, WINS Address, DHCP Relay, and Routing.
3	<p>For the IP address tab, select the radio button labeled <b>Specify an IP address</b> and configure the associated parameters: IP Address, Subnet Mask, and Default Gateway. Use the Adapter pull-down menu for each network adapter. If only one network adapter is used, make sure that you connect the 10baseT LAN connection to the configured port. You can test LAN connectivity through use of the <b>ping</b> command (via MS-DOS window).</p> <p> <b>NOTE:</b> If more than one gateway needs to be configured, select the Advanced button and add all the applicable gateways.</p>

Step	Action
4	For the DNS tab, enter the IP address of each domain name server. If there is more than one domain name server is in the network, enter the IP address of each server in the search order, where the IP address at the top of the list is the first domain name server checked.
5	All other tabs are optional information. To save the entered information, press the <b>OK</b> button.
6	No configuration is necessary for the Protocols, Adapters, or Bindings tabs. Press <b>OK</b> to save the configuration.  <b>Stop! End of Task.</b>

### Paging size configuration

Although three disks are installed on the server, the RAID controller treats all the disks as one storage segment of size of 17+ GBs (the size differs a little depending on the RAID controller manufacturer). The NT Administrator can partition this storage segment into a set of logical disk drives of NTFS or FAT format. The NT utility for configuring the storage segment is called Disk Administrator and can be reached from the Start button:

Start button -> Programs -> Administrative Tools (Common) -> Disk Administrator

The default configuration for each server is a single drive labeled C, with a default size of 2GBs. The format should be NTFS but Dell has been known to deliver this drive as FAT format. The default C drive contains all NT operating system files and is also to be used for operating system paging.

Step	Action
1	Each server will be configured with 1 GB of paging space. The amount of paging space can be checked from the System properties screen. This screen can be launched from the control panel screen or from the Properties pull down menu item on the My Computer desktop icon.

Step	Action (Contd)
2	The System properties screen contains six tabbed folder of information. The paging space is displayed in the Performance tab. If the "Total paging file size for all disk volumes" is less than 1024 MB, press the <b>Change...</b> button.
3	The <b>Change...</b> button should display a new screen titled Virtual Memory. Select C drive from the drive list and enter 1024 for both the <i>Initial Size (MB)</i> and <i>Maximum Size (MB)</i> input parameters. Press the <b>Set</b> button to apply the parameters. Press the <b>OK</b> button to exit the screen and the <b>Close</b> button to exit the System Properties screen.
4	In order to re-initialize the paging file, the system will display a dialog box indicating that a system reboot is necessary. Press <b>OK</b> to commence the reboot procedure.  <b>Stop! End of Task.</b>

### Service Pack 4 upgrade

Service Pack 4 for NT Server 4.0 Terminal Server Edition contains a comprehensive set of problem fixes (including Y2K fixes) for the NT Server operating system. At the time of the writing of this document, Microsoft was shipping the NT operating system with Service Pack 3.0. However, both HP and Dell might eventually factory install NT with Service Pack 4.0 loaded. When this occurs, this Service Pack upgrade section can be skipped.

The installed Service Pack version is viewable from the System Properties screen. This screen is launched from the control panel screen or from the Properties pull-down menu item on the My Computer desktop icon. The Service Pack number and the NT version are displayed in the General tab folder.

Step	Action
1	<p>Load the CD-ROM containing the Terminal Server Service Pack into the CD-ROM disk drive of the computer. Open the My Computer desktop icon and click on the CD-ROM disk drive. This should open a screen listing all the files on the CD-ROM. The Terminal Server Service Pack 4.0 filename is called <b>Wtsi386.exe</b>. Double click on the <b>Wtsi386.exe</b> file to begin installation.</p> <p><b>Result:</b> The following prompts may be displayed during the installation:</p> <pre>In order to install this service pack, the system must first be in INSTALL mode. To place the system in INSTALL mode, you can start this program from the Add/Remove Programs applet from Control Panel. Would you like this program to place the system in INSTALL mode instead?</pre>
2	<p>Affirm this answer by pressing the <b>Yes</b> button.</p>
3	<p>The next screen display the end user license agreement. At the bottom there are two check boxes labeled</p> <ul style="list-style-type: none"> <li>■ Accept this license agreement (must accept before installing the Service Pack)</li> <li>■ Backup file necessary to uninstall this Service Pack at a later time</li> </ul> <p>Select both check boxes and press the <b>Install</b> button.</p>
4	<p>The next prompt may be displayed on some North American systems:</p> <pre>Your system is installed with 128 bit security. Do you wish to install this service pack?</pre> <p>Affirm this request by pressing the <b>Yes</b> button.</p>
5	<p>The final prompt should be a completion message:</p> <pre>Windows NT Terminal Server 4.0 Service Pack 4 installation is complete. You must restart your computer for the service pack update to take effect.</pre> <p>If you install any additional Windows NT Terminal Server components from the original NT Terminal Server CD, you should then reinstall service pack 4 to insure new components are updated.</p> <p>Press the <b>Restart</b> button to reboot your computer.</p> <p><b>Stop! End of Task.</b></p>

## Installation and configuration of Metaframe 1.8

### Licenses

Metaframe 1.8 is delivered on a CD-ROM along with user documentation. It is a licensed product that must be activated 30 days after the software is installed. Activation is accomplished by registering the software license with Citrix through their web site ([www.citrix.com](http://www.citrix.com)). Once registration is complete, the user will receive an activation code that must be entered into the Metaframe program. If web access is not available on the server, any computer with web access can be used to retrieve the activation code.

The standard installation of Metaframe will include 15 user licenses. However, for low use servers, Metaframe can be purchased with just 5 user licenses.

For servers with 15 Metaframe licenses, the maximum number of simultaneous users is restricted by the maximum number of NT user licenses (10). For servers with 5 Metaframe licenses, the maximum number of simultaneous users is restricted by the maximum number of Metaframe licenses (5).

### Disk Assignments

The target configuration for the terminal server will define 2 logical drives and one CD-ROM. The two disk drives will have the assigned letters C and M.

- The M drive will be the default boot partition. It is the original default partition labeled C, and changed to the letter M when Metaframe is installed. The recommended size for this drive is 2 GBs.
- The C drive is the WaveStar SNMS and ITM-NM application drive. It consists of the original, unformatted storage space available in the server. The recommended size is 15 GBs.

The CD-ROM drive will be assigned the letter D.

During the Metaframe software installation procedure, the installer will be asked whether to re-label available server storage devices, so as to not conflict with the storage devices on the client workstation. The installer will affirm this prompt, allowing the installation procedure to rename the boot partition (previously labeled C drive) to drive M, and rename the CD-ROM to drive N.

Once the Metaframe software installation is complete, the installer will be need to create a new C drive from unformatted storage space, and re-label the CD-ROM drive to D.

**Software  
installation**

The Metaframe software is delivered on a single CD-ROM. A label on the outside of the CD-ROM jewel case contains the base license number for the product. It has the format:

xxx-xxxx-xxxx-xxxx-xxxxxx.

You will need this license number during installation.

<b>Step</b>	<b>Action</b>
1	Log in to the server using the <i>Administrator</i> login and insert the installation CD in the CD-ROM disk drive. The installation procedure should automatically display a splash screen with three options: Metaframe Setup, Setup ICA Client, and Browse this CD. If the splash screen is not displayed after a few seconds, double click on the My Computer desktop icon.
2	When the My Computer screen is displayed, double click on the CD-ROM device to launch the Metaframe installation software.
3	To start the installation process, press the button labeled <b>Metaframe Setup</b> . This should display the Metaframe license agreement screen.

Step	Action (Contd)
4	<p>Press the <b>I Agree</b> button on the license agreement screen. This will commence the installation process.</p>
5	<p>There are several informational screens and data prompt screens presented during the installation procedure. Use the Next button to move from screen to screen. The following indicates the input data that will be required:</p> <p>Add License Pack - Press the button label Add License Pack. It should display the license screen with a dialog box in the center (prompting the installer for the license). The license can be found on the back of the CD-ROM jewel case. Enter the license number, including the hyphens, as it appears on the jewel case. Only 1 license pack will be installed.</p> <p>Network ICA Connections - Metaframe supports TCP/IP clients, IPX clients, and NetBIOS clients. For SNMS/NM, only TCP/IP clients will be supported. Therefore, make sure the TCP/IP check box is the only network connection selected.</p> <p>Add Modems - Modems are NOT supported so avoid this prompt</p> <p>Remap the Server Drives - Enable the check box labeled Remap the server drives. The pull-down menu will correspondingly become enabled. Make sure the pull-down menu choice is M.</p>
6	<p>When complete, the system will automatically reboot.</p> <p> <b>NOTE:</b> After the system reboots, logging in as any user will cause the system to display a warning message indicating that there are 30 days left before the Metaframe temporary license expires. This warning message is meant to prompt the administrator to activate the Citrix Metaframe license.</p> <p><b>Stop! End of Task.</b></p>

**License activation**

When the installer enters the license from the back of the CD-ROM jewel case, Metaframe appends 8 characters to the license string. You will need this complete license in order to get an activation code from the Citrix web site.

Step	Action
1	The Metaframe License can be retrieved from the Citrix Licensing Screen. Log in as Administrator and select the Metaframe task bar. The Metaframe task bar should contain a set of buttons, each with an associated tool tip. Passing the cursor over the each button should display the tool tip.
2	Press the button with the tool tip indicating Citrix Licensing (It should be the 2nd button from the top of the task bar). On the Citrix Licensing screen, each Service Pack license is listed (there should be only 1). Record the license number for the Service Pack entered during installation.
3	You can leave this screen open, since it will be needed to enter the activation code for this license.  <b>Stop! End of Task.</b>

**Activation code retrieval**

In order to retrieve the activation code for the license, you will need web access using any standard web browser.

Step	Action
1	Go to the URL <a href="http://www.citrix.com/activate">www.citrix.com/activate</a> and follow the instructions for Metaframe license activation. During the installation, you will be required to enter company information. You can use information for yourself or information for the author.
2	The last screen will display the activation code. It is recommended that the installer copy the activation code onto the back of the CD-ROM jewel case in order to have it for later re-installation.  <b>Stop! End of Task.</b>

**License activation**     The Metaframe license is activated from the Citrix Licensing screen.

Step	Action
1	Select the line containing the Metaframe license number (the text line should read "Metaframe 1.8 for Windows"). The line only becomes highlighted when the License Description field is selected.
2	A confirmation dialog should indicate that the license is now activated. Once the license is activated, you can close the Citrix Licensing Screen.  <b>Stop! End of Task.</b>

**Server disk configuration**

Step	Action
1	<p>To perform disk configuration, log in as <i>Administrator</i> and launch the Disk Administrator utility. This application can be reached from the start button, via the following cascading menus:</p> <p style="padding-left: 40px;">Start button -&gt; Programs -&gt; Administrative Tools (Common) -&gt; Disk Administrator</p> <p>Once launched, the disk administrator program will graphically depict the server disk formatting.</p> <p><b>Stop! End of Task.</b></p>

**Changing the CD-ROM drive letter To D**

Step	Action
1	Go to the box representing CD-ROM 0. It should be labeled as N. Use the left hand mouse button to select the box which represent the CD-ROM.
2	Next, display the popup menu for the CD-ROM by pressing the right hand mouse button in the selected box.

Step	Action (Contd)
3	From the popup menu, choose the option labeled <b>Assign Drive Letter</b> .  <b>Result:</b> A dialog box should be displayed indicating the available drive letter choices.
4	Assign the drive to letter D and press the <b>OK</b> button.  <b>Result:</b> A confirmation dialog indicates that the assignment will be performed immediately and ask whether you wish to continue.
5	Press <b>Yes</b> to affirm the change.  <b>Stop! End of Task.</b>

**Creating a new C drive**

Step	Action
1	In the graphical picture depicting Disk 0, go to the box labeled Free Space. The size of the space should approximately 15 GBs.
2	Use the left hand mouse button to select the free space box.
3	Next, display the associated popup menu by pressing the right hand mouse button in the selected box. Select the <b>Create</b> menu item from the popup menu.
4	Once Create is selected, a dialog box is displayed indicating that this new partition may not work with MS-DOS. Press the <b>Yes</b> button to continue the operation.
5	A new screen titled <i>Create Primary Partition</i> will be displayed. The screen will prompt the user for the size of the new partition. Fill in the associated text field with the total amount of free space available. Press the <b>OK</b> button to complete the operation.   <b>NOTE:</b> The label on the selected box should have changed to unformatted.

Step	Action (Contd)
6	<p>Display the popup menu again by pressing the right hand mouse button in the selected box. Select the <b>Assign Drive Letter</b> menu item from the popup menu. A dialog box should be displayed indicating the available drive letter choices. Assign the drive to letter C and press the <b>OK</b> button.</p> <p> <b>NOTE:</b> The drive letter on the selected box should have changed to C.</p>
7	<p>Display the popup menu again by pressing the right hand mouse button in the selected box. Select the <b>Commit Changes Now</b> menu item from the popup menu. A dialog box should be displayed asking whether the change should be written to disk. Press <b>Yes</b> to affirm the change. A dialog box should be displayed indicating successful completion. Press the <b>OK</b> button to continue.</p>
8	<p>Display the popup menu a fourth time by pressing the right hand mouse button in the selected box. Select the <b>Format</b> menu item from the popup menu. A dialog box should be displayed prompting the user for several items. Change the file system type from FAT to NTFS. Then press the <b>Start</b> button. Press <b>OK</b> for all subsequent dialog box warning and status messages.</p> <p> <b>NOTE:</b> The label on the selected box should have changed to NTFS.</p>
9	<p>At this point, the disk configuration is complete. To exit the disk administrator program, use the File menu bar pull-down menu and select the <b>Exit</b> menu item.</p> <p><b>Stop! End of Task.</b></p>

**Configuring the  
WaveStar SNMS  
user**

All WaveStar SNMS users will access the NT Terminal Server through the EMS user id. The default EMS password, EMS123, will be used with the `ems` login id.

This EMS login and password will be configured into the ICA software installed on each client workstation. When a workstation user launches the GUI on the NT Terminal Server, the user will be automatically launched using the EMS login id.

Step	Action
1	<p>To perform user configuration, log in as <i>Administrator</i> and launch the User Manager For Domains application. This application can be reached from the Start button, via the following cascading menus:</p> <p>Start button -&gt; Programs -&gt; Administrative Tools (Common) -&gt; User Manager For Domains</p> <p><b>Result:</b> A Screen titled User Manager should be displayed. This screen should contain a menu bar and a scrolled table showing all defined users.</p>
2	<p>To create a new user, access the <i>User</i> pull-down menu item and select the <b>New User</b> menu item.</p> <p><b>Result:</b> This should result in a new screen titled New User.</p>
3	<p>On the New User Screen, enter the following information:</p> <p>Username- <code>ems</code>  Full Name - <code>ems user</code>  Password - <code>ems123</code>  Confirm Password - <code>ems123</code></p>
4	<p>Put a check in the box labeled Password Never Expires. Then press the <b>Add</b> button. If no error occurs, the screen should clear in preparation of adding another user.</p>
5	<p>Press the <b>Close</b> button on the screen titled New User in order to stop adding new users.</p>
6	<p>Once the <code>ems</code> user id is created, the User Manager application can be exited. Access the User pull-down menu and select the <b>Exit</b> menu item.</p> <p><b>Stop! End of Task.</b></p>

**Terminal server client configuration**

The Terminal Server defines the concept of sessions. A session is a single user connection from a client to a server. A session will consist of either:

- A running WaveStar SNMS standalone application
- A running ITM-NM application and all associated SNMS cut-through GUIs

Exiting a running WaveStar SNMS standalone application or exiting a running ITM-NM application automatically terminates the user session.

In addition to shutting down the application, the user can close the window in which one of the above sessions is running. Closing the window will also close the associated session.

Session termination on window closure is a configurative attribute. By default, closing a session's window does not terminate the session. Instead, the session will remain active, waiting for the user to reconnect to the session. Once the user at a client workstation reconnects to the session, he/she can resume interaction with the previous session from where they left off.

In NT Terminal Server terminology, the default behavior for a "broken" session is disconnection. The NT Terminal Server should be configured to reset the session when it becomes "broken."

Step	Action						
1	<p>To perform session configuration, log in as <i>Administrator</i> and launch the Terminal Server Connection Configuration application. This application can be reached from the Start button, via the following cascading menus:</p> <p>Start button -&gt; Programs -&gt; Administrative Tools (Common) -&gt; Terminal Server Connection Configuration</p> <p><b>Result:</b> A Screen titled Terminal Server Connection Configuration should be displayed. This screen should contain a menu bar and a scrolled table showing the following two lines:</p> <table border="0" style="margin-left: 40px;"> <tr> <td style="padding-right: 20px;">ica-tcp</td> <td style="padding-right: 20px;">tcp</td> <td>Citrix ICA 3.0</td> </tr> <tr> <td>rdp-tcp</td> <td>tcp</td> <td>Microsoft RDP 4.0</td> </tr> </table>	ica-tcp	tcp	Citrix ICA 3.0	rdp-tcp	tcp	Microsoft RDP 4.0
ica-tcp	tcp	Citrix ICA 3.0					
rdp-tcp	tcp	Microsoft RDP 4.0					
2	<p>Double-click on the line specifying the ica-tcp connection. This should display a new screen titled <i>Edit Connection</i>. Press the <b>Advanced</b> button, which should result in the display on an additional screen titled <i>Advanced Connection Settings</i>.</p>						

Step	Action (Contd)
3	<p>At the bottom of this screen, there is a configuration parameter labeled:</p> <pre>On a broken or timed-out connection &lt;disconnect &gt; the session</pre> <p>A check box next to this configuration parameter is labeled (Inherit User Config). Disable the inheritance option (for the above configuration parameter only) by clicking on the adjoining check box. This should enable the configuration parameters choice list. Choose the reset value from the choice list. When complete, the configuration parameter should read:</p> <pre>On a broken or timed-out connection &lt;reset &gt; the session</pre>
4	<p>Press the <b>OK</b> button to save the configuration. This should close the screen labeled Advanced Connection Settings. A dialog box may display saying that the configuration change will apply to all future session only. Press <b>OK</b> to acknowledge the message.</p>
5	<p>On the Edit Connection Screen, press the <b>OK</b> button. This should close the Edit Connection Screen. On the Terminal Server Connection Configuration screen, access the User pull-down menu and select the <b>Exit</b> menu item.</p> <p><b>Stop! End of Task.</b></p>

### Installation and configuration of each client workstation

Citrix ICA client software must be loaded on each client UNIX workstation that will launch the WaveStar SNMS Java GUI from the NT Terminal Server. The currently supported versions of UNIX are Solaris, AIX and HP-UX. 3.6.1

ICA Client software is freely available from the Citrix web site. However, SNMS (and NM) repackage the ICA Client software in order to include a setup file with the Citrix software. This software is available on the CD-ROM with the WaveStar SNMS application software.



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# Redundancy Installation and Operations

# 4

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## Introduction

**Summary** This chapter describes the process for installing a redundant system and discusses redundancy operation procedures.

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## Installing HP Software for Redundant Operations

### Overview

WaveStar SNMS uses HP's High Availability (HA) Monitors and MC (Multi-Computer) Service Guard to provide for system redundancy and automatic switching between the active host and the standby host. When a server has problems in a redundant system, SNMS will automatically switch to the standby host. This is a warm standby in that both servers are logged into the network elements all the time. Only the active host writes to the SNMS database. The standby host's database is kept in sync with the active host through Informix Enterprise Replication (ER).

### Procedure

The following procedure is used to install the HP software bundles for **MC/ServiceGuard**, **MirrorDisk/UX** and **EMS** (Event Monitoring Services).

Step	Action
1	The installer should follow the procedures in Chapter 1 of this document to install HP-UX OS on the designated disk VG00.
2	To install <b>MC/ServiceGuard</b> , <b>MirrorDisk/UX</b> and <b>EMS</b> (Event Monitoring Services):  Obtain the correct codeword for this software bundle from HP by providing contract number/customer identification and the HP-UX Application Media CD serial numbers.
3	Run swinstall and unlock the bundle by entering the CustomerID and Codeword.
4	Select and install the bundle.   <b>NOTE:</b> Install the HP software bundles before running SNMS Coldstart.  If you have SNMS HP11 patches installed before MC/ServiceGuard or EMS, you have to reapply the SNMS HP11 patches again after all the above software gets installed.  <b>Stop! End of Task.</b>

## SNMS ColdStart

**Description** After installing HP-UX OS and the required HP software bundles, the installer should load the SNMS Coldstart from CD.

**Procedure** Perform the following steps to install the ColdStart fileset.

Step	Action
1	Insert the <b>ColdStart CD</b> into the CD-ROM drive.
2	At the Console Login prompt, login as <b>root</b> .
3	At the # prompt, enter the following commands: <ul style="list-style-type: none"> <li>■ <b>cd /tmp</b></li> <li>■ <b>./pfsMount</b></li> </ul> <p><b>Result:</b> The CD will be mounted as /cdrom.</p> <p> <b>NOTE:</b> You may see a message stating device /cdrom is busy.</p>
4	At the # prompt, enter the command: <p style="text-align: center;"><b>swinstall</b></p> <p><b>Result:</b> The main <i>swinstall</i> screen is displayed.</p>
5	Press the <b>Return</b> key to continue. <p><b>Result:</b> The <i>Specify Source</i> screen is displayed.</p>
6	Specify for the <i>Source Depot Path</i> : <b>/cdrom</b> .
7	Select <b>OK</b> and press the <b>Return</b> key. <p><b>Result:</b> A <i>Note</i> screen is displayed with CD ROM information.</p>
8	Select <b>OK</b> and press the <b>Return</b> key. <p><b>Result:</b> The <i>SD Install - Software Selection</i> screen is displayed.</p>
9	Select the fileset <b>ColdStart</b> by pressing the spacebar.

Step	Action (Contd)
10	<p>Tab to the Menu line and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Install (analysis)...</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A message is displayed regarding the software item selected.</p>
11	<p>Select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Install Analysis</i> screen is displayed.</p>
12	<p>Once the status field changes to <i>Ready</i>, select <b>OK</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> A <i>Confirmation</i> screen is displayed with a message.</p>
13	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The <i>Confirmation</i> screen displays another message and prompts with "Do you still wish to start Installation"?</p>
14	<p>Select <b>Yes</b> and press the <b>Return</b> key.</p> <p><b>Result:</b> The CD begins to be read. The <i>Install Window</i> screen is displayed. When the installation is finished, the <i>Status</i> changes to <i>Ready</i>.</p>
15	<p>Select <b>Done</b> and press the <b>Return</b> key.</p>
16	<p>Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the <i>swinstall</i> program.</p>
17	<p>At the command line, enter the following command:</p> <p style="text-align: center;"><b>sam</b></p> <p><b>Result:</b> The HP system administration tool is displayed.</p>
18	<p>Select <b>Kernal Configuration</b>.</p>
19	<p>Select <b>Configurable Paramenters</b>.</p>
20	<p>Select <b>maxvgs</b> by depressing the spacebar.</p>

Step	Action (Contd)
21	Tab to the menubar and use the right arrow key to select <b>Actions</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Modify Configurable Parameter</b> and press the <b>Return</b> key.
22	Tab to <b>Formula/Value</b> and set to <b>40</b> .
23	Select <b>OK</b> and press the <b>Return</b> key.
24	Tab to the menubar and use the right arrow key to select <b>File</b> and press the <b>Return</b> key. A drop down list is displayed. Press the down arrow to select <b>Exit</b> and press the <b>Return</b> key to exit the program
25	Select <b>Create a New Kernel Now</b> . Select <b>OK</b> and press the <b>Return</b> key.
26	Select <b>Move Kernel into Place and Shutdown/Reboot System Now</b> . Select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> A <i>Note</i> screen is displayed
27	Select <b>OK</b> and press the <b>Return</b> key.  <b>Result:</b> The system will reboot.

Step	Action (Contd)
28	<p>Login as <code>root</code>. At the <code>#</code> prompt, enter the following commands:</p> <pre><b>cd /tmp</b> <b>./init_disk</b></pre> <p>A message prompts you to enter the command again.</p> <pre><b>./init_disk</b></pre> <p><b>Result:</b> <code>init_disk</code> first checks the hardware configuration required by EMS on your system and then configures the hard disk according to EMS requirements. Screen output is displayed and the user will have to respond to several prompts when they appear including the following:</p> <pre>Do you want this host to support PM configuration? (y/n) Did you set maxvgs (Max Number of volume group) to 40? (y/n/q) Is this a redundancy configuration? (y/n) Do you want to use the default disk template /startup/default_cfg for this machine? (y/n) Do you want to review /tmp/default_cfg? (y/n) Do you want to modify /tmp/default_cfg? (y/n) Update the master configuration file /startup/dsk_cfg file? (y/n) Done with configuration file? (y/n/q)</pre> <p><b>⇒ NOTE:</b> If <code>init_disk</code> is running for the very first time on your system, it will automatically verify and collect hardware information on your system and then configure the hard disk with little intervention from the user. The <code>init_disk</code> process saves the collected configuration data in the <code>/startup</code> directory for future use.</p> <p>In the event that <code>init_disk</code> is interrupted before its completion, or there is a need to run <code>init_disk</code> again, several choices are available. See the section titled <code>Init_disk Information</code> in this document.</p> <p><b>Stop! End of Task.</b></p>

## Creating OS/SNMS Mirror

### Description

Although configuring disk mirroring is done automatically by the **init\_disk** command, this section briefly mentions the important steps in the procedure (root, data, database).

### Procedure

Use the following procedure for creating OS/SNMS mirror.

Step	Action
1	Create a bootable root LVM disk to be used for the mirror. <pre># pvcreate -B /dev/rdisk/cXtYdZ</pre> <p style="text-align: center;">or</p> Create an LVM disk to be used for a mirror on a non-root disk. <pre># pvcreate -B /dev/rdisk/cXtYdZ</pre>
2	Add this disk to the current root volume group. <pre># vgextend -g pvg1 /dev/vg00 /dev/dsk/cXtYdZ</pre>
3	Make the new disk a boot disk. <pre># mkboot /dev/rdisk/cXtYdZ</pre>
4	Copy the correct AUTO file into the new LIF area. <pre># mkboot -a "hpux (disk;0)/stand/vmunix" /dev/rdisk/cXtYdZ</pre>
5	Mirror the root and primary swap logical volumes, as well as all devices in vg00, such as /usr, /swap, etc., are mirrored. But the root logical volume must be mirrored first to ensure that it occupies the first contiguous set of extents on the new disk. The command we normally use to mirror a logical volume is: <pre># lvextend -m 1 /dev/vg00/lvol1 /dev/dsk/cXtYdZ</pre>
6	Check if the BDRA is correct <pre># /usr/sbin/lvlnboot -R /dev/vg00</pre>
7	Verify that the mirror was properly created <pre># lvlnboot -v</pre> <p><b>Stop! End of Task.</b></p>

## Synchronizing a Mirrored Logical Volume and Replacing a Disk

### Description

If the volume group is not currently active, LVM will automatically synchronize the mirrored copies of all logical volumes at boot time or later with the `vgchange` command; otherwise, manual synchronization is needed.

### Procedure for manual synchronization

The following steps describe how to do a manual synchronization.

Step	Action
1	Use <code>lvdisplay -v</code> to see if the logical volume contains any stale data.
2	Use <code>lvsync</code> or <code>vgsync</code> commands to manually synchronize the data.   <b>NOTE:</b> When replacing a disk, you need to perform the following steps to ensure that the data on the replacement disk is both synchronized and valid.
3	Run <code>vgcfgbackup</code> to save the volume group configuration information, if necessary.  <pre># vgcfgbackup -f &lt;vg_conf_file&gt; &lt;vg_name&gt;</pre> i.e., <code>vgcfgbackup -f /tmp/vg01 vg01</code>
4	Remove the disk from the volume group using <code>vgreduce &lt;vg_name&gt; &lt;pv_path&gt;</code> . i.e., <code>vgreduce vg01 /dev/dsk/c0t1d0</code>
5	Physically disconnect the bad disk and connect the replacement.

---

Step	Action (Contd)
6	Run <b>vgcfgrestore</b> to restore LVM configuration information to the added disk  # <b>vgcfgrestore -f &lt;vg_conf_file&gt; &lt;pv_path&gt;</b> i.e., <b>vgcfgrestore -f /tmp/vg01 /dev/dsk/c0t1d0</b>
7	Run <b>vgchange -a y &lt;vg_name&gt;</b> to reactivate the volume group to which the disk belongs. Since the volume group is already currently active, no automatic synchronization occurs.
8	Now run <b>vgsync</b> to manually synchronize all the extents in the volume group.  <b>Stop! End of Task.</b>

---

## Setup NTP with Real Time Source Server

### Description

It is strongly recommended that you enable NTP with Real Time Source Server on all redundancy nodes. The use of NTP ensures that the system time on all nodes is consistent, resulting in consistent and stable Informix ER, consistent timestamps in log files, and consistent behavior of message services.

### Procedure

To enable NTP on all redundancy nodes, perform the following steps for all servers in a redundant system.

Step	Action
1	As <b>root</b> , edit the file <b>/etc/ntp.conf</b> and insert information: <b>server &lt;TimeServer&gt; [version &lt;version#&gt;]</b> i.e., server 135.1.1.200
2	Edit the file <b>/etc/rc.config.d/netdaemons</b> , <ul style="list-style-type: none"> <li>• set environment variable XNTPD <b>XNTPD=1</b></li> <li>• set environment variable NTPDATE_SERVER <b>export NTPDATE_SERVER=&lt;TimeServer&gt;</b></li> </ul>
3	Xntp will start at boot time. Xntp can be started manually by run command <b># /sbin/init.d/xntpd start</b>
4	Xntp can be started manually by run command: <b># /sbin/init.d/xntpd stop</b>  <b>⇒ NOTE:</b> \$TimeServer is a real network time source server. It could be either hostname or IP address. In case of hostname, please make sure the \$TimeServer's hostname can be referenced by the host (if not, add \$TimeServer's hostname and IP in /etc/hosts). \$TimeServer will be different based on availability and customer preference.  Version# is version of NTP run on the \$TimeServer.  <b>Stop! End of Task.</b>

## Setup NTP between Redundancy Servers

### Description

Designating one of the redundancy hosts as local time server provides a temporary solution for NTP in the redundancy system. But it might result in error, if the designated source completely went down (loss of power). Using multiple real network time source is again strongly recommended.

Setting up NTP by using local\_primary host as time server will take approximately 15 minutes before it takes effect. An error message might appear complaining about lack of the proper time source.

### Procedure

The following steps describe how to setup NTP between redundancy servers.

Step	Action
1	On local_primary host: <ul style="list-style-type: none"><li>■ Start SAM.</li><li>■ Select Time.</li><li>■ Select NTP Network Time Sources.</li><li>■ Select Actions-&gt;Configure NTP local Clock.</li><li>■ Select Use System Clock for Local Clock.</li><li>■ Select Actions-&gt; Disable Authentication. (Disabled by Default, Do not change unless Authenticating is Enabled)</li><li>■ Select Actions-&gt;Start NTP</li></ul>

---

<b>Step</b>	<b>Action (Contd)</b>
2	<p>On all other hosts in redundancy system:</p> <ul style="list-style-type: none"><li>■ Start SAM.</li><li>■ Select Time.</li><li>■ Select NTP Network Time Sources.</li><li>■ Select Actions-&gt;Add Remote Server or Peer.</li><li>■ Enter the hostname of local_primary</li><li>■ Select Server (not Peer) on Relationship to Local Host.</li><li>■ Select right NTP Version for local time server.</li><li>■ Select Actions-&gt; Disable Authentication. (Disabled by Default, Do not change unless Authenticating is Enabled)</li><li>■ Select Actions-&gt;Start NTP</li></ul> <p><b>Stop! End of Task.</b></p>

---

## Connecting RS-232 MC/ServiceGuard Cluster

**Description** You need to configure a serial line (RS232) to carry heartbeat, then you first have to determine the serial device file that corresponds with the serial port on each node.

**Procedure** Perform the following steps to connect RS-232 MC/ServiceGuard cluster.

Step	Action
1	Use a RS232 cable with NULL Modem to connect the serial ports (port 6 recommended) on each node.
2	If host comes with a MUX MDP panel, use <code>ioscan -fnC</code> to display hardware addresses and device file names. For example: <b># ioscan -fnC tty</b>
3	Once the device file has been identified, verify the connection as follows, <ul style="list-style-type: none"><li>■ from a terminal on primary, run <b>#cat &lt; /dev/tty0p6</b></li><li>■ from a terminal on secondary, run <b>#cat /etc/passwd &gt; /dev/tty0p6</b></li></ul>
4	Then repeat the same test with the servers reversed. <b>Stop! End of Task.</b>

## Miscellaneous Items

**Description** The following procedure is based on the assumption that the SNMS application has been installed.

**Procedure** Perform the following steps on all the nodes in the redundancy configuration (both local and geographic redundancy).

Step	Action
1	The administrator may modify <code>/etc/lvmrc</code> file to set <code>AUTO_VG_ACTIVATE</code> to 1 and this will allow OS to activate all volume groups at boot up time.
2	Check <code>/etc/services</code> for MC/ServiceGuard related entries: <pre> hacl-hb      5300/tcp      # High Availabil- ity (HA) Cluster heartbeat hacl-gs      5301/tcp      # HA Cluster Gen- eral Services hacl-cfg     5302/tcp      # HA Cluster TCP configuration hacl-cfg     5302/udp      # HA Cluster UDP configuration hacl-probe   5303/tcp      # HA Cluster TCP probe hacl-probe   5303/udp      # HA Cluster UDP probe hacl-local   5304/tcp      # HA Cluster Com- mands hacl-test    5305/tcp      # HA Cluster Test hacl-dlm     5408/tcp      # HA Cluster dis- tributed lock manager </pre>
3	Check <code>/etc/inetd.conf</code> for MC/ServiceGuard related entries, <pre> hacl-cfg     dgram    udp      wait    root    /usr/ lbin/cmclconfd cmclconfd -p hacl-cfg     stream  tcp      nowait  root    /usr/ lbin/cmclconfd cmclconfd -c </pre>
4	Check <code>/etc/fstab</code> to make sure no cluster shared volume group requires mount.

---

<b>Step</b>	<b>Action (Contd)</b>
5	Check <code>/etc/rc.config.d/cmcluster</code> to make sure <code>AUTOSTART_CMCLD</code> is set to 0.
6	On all nodes in the cluster, arrange the <code>.rhosts</code> file under the <code>ems</code> home directory to contain a single line for each host in the clustered arrangement.
7	Comment out the automated startup of the SNMS application by editing the <code>/etc/snc.rc</code> file and commenting out the following line: <code>su - ems -c "up -b -n"</code>
8	Configure all required network interface cards via <code>sam</code> .  <b>Stop! End of Task.</b>

---

## Creating Cluster Lock Volume Group

### Description

MC/ServiceGuard requires a cluster lock volume group to be created in order to resolve conflicts within the clustered arrangement.

### Procedure

The following steps are required to create a clustered lock volume group.

Step	Action
1	Login as <code>root</code> and execute the following command: <b># sam</b>
2	Click on <b>Disks and File Systems</b> .
3	Click on <b>Volume Groups</b> . Then click on <b>Actions</b> .
4	Click on <b>Create</b> .
5	Click on <b>Select New Volume Group</b> . Enter volume group name and click on <b>OK</b> .
6	Click on <b>Select Disk(s)</b> . Select disk and click on <b>OK</b> .
7	Perform the following: <ul style="list-style-type: none"> <li>■ Click on <b>Define New Logical Volume(s)</b></li> <li>■ Enter LV Name</li> <li>■ Choose usage of <b>None(Raw)</b></li> <li>■ Enter LVSize(Mbytes) of <b>100</b></li> <li>■ Click on <b>Add</b></li> <li>■ Click on <b>OK</b></li> </ul>
8	Click on <b>OK</b> .
9	Click <b>Yes</b> on <i>Confirmation Page</i> .
10	Click on <b>File</b> and then on <b>Exit</b> .
11	Click <b>OK</b> on <i>Create a New Kernel Screen</i> .
12	Click <b>OK</b> on <i>Reboot the System Screen</i> .  <b>Result:</b> The system will reboot.  <b>Stop! End of Task.</b>

## Exporting Cluster Lock Volume Group

### Description

The Cluster Lock Volume group should first be created on the primary host and then export it to the secondary host.

### Procedure

Perform the following steps to export the cluster lock volume group. As an example, /dev/clvg00 has been created for Cluster Lock Volume Group on the primary host.

Step	Action
1	When setting up the cluster lock volume group for use on the secondary node, you must first deactivate it. Here you need to export /dev/clvg00 to the secondary host so that you can use it as cluster lock disk. <b># vgchange -a n /dev/clvg00</b>
2	Then, copy the mapping of the volume group to a specified file <b># vgexport -p -s -m /tmp/clvg00.map /dev/clvg00</b>
3	Copy the map file to secondary nodes <b># rcp /tmp/clvg00.map secondary:/tmp/clvg00.map</b>
4	Then, on the secondary host: <b>mkdir -p /dev/clvg00</b>
5	Create control file by running <b>mknod /dev/clvg00/group c 64 0xhh0000</b> , where hh must be unique (hh=value of shared lock volume).
6	Import the volume group data using the map file from primary node. <b># vgimport -v -s -m /tmp/clvg00.map /dev/clvg00</b> <b>Stop! End of Task.</b>

## installHA

---

### Description

The following briefly describes what the installHA script does.

- installHA is required to run on both local primary and remote primary with different options - for local primary, select Production option; for remote primary, select Disaster Recovery option
  - rlogin as **ems** first then **su root**, run installEMS and select option 6 for Configure Redundancy, or run **/ems/etc/installHA** directly.
  - It will prompt administrator for information which is covered in the planning session. No empty string is allowed in entering information during installation. Based on the correct information, it will be able to customize all cluster and package files.
  - It will generate and copy the binary cluster configuration file to the other node. There should be no errors during cluster configuration, otherwise cluster binary file will not be created correctly.
  - It will distribute package control scripts to both nodes.
  - It will also distribute all OA&M scripts to both nodes.
- 

### Procedure

Perform the following steps to launch the installHA script.

Step	Action
1	There are two ways of launching this script, through installEMS with option 6 (Configure Redundancy) or directly run <b>/ems/etc/installHA</b> .  <b>Stop! End of Task.</b>

---

## Starting the Event Monitoring Service

### Procedure

After the EMS is installed, the following procedure is used to start the Event Monitoring Service.

Step	Action
1	<p>Make sure the following links exist under /sbin/SnmpAgent.d after the HP bundle installed, otherwise create them.</p> <pre>lrwxrwxrwx 1 root sys 23 May 11 19:20 K435SnmpHpunix -&gt; /sbin/init.d/SnmpHpunix lrwxrwxrwx 1 root sys 21 May 11 19:20 K435SnmpMib2 - &gt; /sbin/init.d/SnmpMib2 lrwxrwxrwx 1 root sys 23 May 11 19:20 K435SnmpTrpDst -&gt; /sbin/init.d/SnmpTrpDst lrwxrwxrwx 1 root sys 23 May 11 19:21 K440SnmpMaster -&gt; /sbin/init.d/SnmpMaster lrwxrwxrwx 1 root sys 23 May 11 19:22 S560SnmpMaster -&gt; /sbin/init.d/SnmpMaster lrwxrwxrwx 1 root sys 23 May 11 19:22 S565SnmpHpunix -&gt; /sbin/init.d/SnmpHpunix lrwxrwxrwx 1 root sys 21 May 11 19:22 S565SnmpMib2 - &gt; /sbin/init.d/SnmpMib2 lrwxrwxrwx 1 root sys 23 May 11 19:21 S565SnmpTrpDst -&gt; /sbin/init.d/SnmpTrpDst</pre>
2	Start SNMP Master Network Management daemon, <b>#/usr/sbin/snmpdm.</b>
3	Type: <b>#sam.</b>
4	Go to <b>Resource Management.</b>
5	Go to <b>Event Monitoring Service.</b>
6	Select <b>Add Monitoring Request</b> in the <b>Actions</b> menu.
7	Proceed to <b>Monitoring Disk Status</b> or <b>Monitoring LAN Interface Status</b> or both.  <b>Stop! End of Task.</b>

## Monitoring Disk Status

### Procedure

The following procedure is used to monitor disk status.

Step	Action
1	In the <b>Resource Classes</b> window, select <b>/vg (All Instances)</b> .
2	In the <b>Add or Copy Monitoring Request</b> window <ul style="list-style-type: none"><li>— select <b>vg volume group</b></li><li>— select <b>pv-pvlink</b></li><li>— select <b>status</b></li><li>— select <b>disk</b></li><li>— select <b>OK</b></li></ul>
3	Click <b>OK</b> .
4	Proceed to Notify Events via TCP or Notify Events via email or both. <b>Stop! End of Task.</b>

---

## Notify Events via TCP

---

**Description** This is required for DeviceMon to pass any event as either alarm or alarmClear to FM\_Server.

---

**Procedure** Perform the following steps to select TCP as the event notification method.

Step	Action
1	Select Notification condition: <b>When value changes</b>
2	Enter Polling Interval: <b>30 seconds</b>
3	Select Notification method: <b>TCP</b>
4	Enter Host: <b>hostname</b> , <b>TCP Port=32000</b> , and Comment: <b>disk XXX</b>
5	Click <b>OK</b> .  <b>Stop! End of Task.</b>

---

## Notify Events via Email

### Procedure

This procedure is used to send a notification through email.

Step	Action
1	Select Notification condition: <b>When value is = "DOWN"</b> .
2	Enter Polling Interval: <b>30 seconds</b> .
3	Select Notification method: <b>EMAIL</b> .
4	Enter email address: <b>sa@XXX.com</b> .
5	Click <b>OK</b> and the monitoring requests are added.  <b>Stop! End of Task.</b>

---

## **Monitoring LAN Interface Status**

---

### **Procedure**

The following procedure is used to monitor disk status.

<b>Step</b>	<b>Action</b>
1	In the <b>Resource Classes</b> window, select <b>/net/interfaces/lan/status/(All Instances)</b>
2	Click <b>OK</b> .
3	Proceed to <b>Notify Events via TCP</b> or <b>Notify Events via Email</b> or both. <b>Stop! End of Task.</b>

---

---

## Viewing Cluster Status

---

**Description**

All SNMS-specific redundancy files are initially loaded in /snms/etc and later, by running /ems/etc/installHA. They are customized and then distributed into several directories. Native MC/ServiceGuard executables are stored in /usr/sbin and cluster and package related files are under /etc/cmcluster.

---

**Procedure**

Use the following procedure to check an MC/ServiceGuard cluster status.

<b>Step</b>	<b>Action</b>
1	Run the following (as ems or root): # <b>cmviewcl</b> (brief status of the cluster, node, and package) or # <b>cmviewcl -v</b> (detailed information for all aspects)  <b>Stop! End of Task.</b>

---

## Starting a Cluster

---

### Before you begin

Before you run any of the redundancy operation procedures, you need to make sure that the cluster is actually ready to run with the following checks:

- Is the primary host ready (OS, hardware, and software)?
- Is the SNMS loaded correctly (you may want to try to bring up SNMS manually as a simplex system outside the redundancy)?
- Is redundancy configuration done correctly?
- Is the Informix ER ready to run (has the ER configuration part of the installHA finished successfully)?

### Procedure

Perform the following steps to start a cluster. Normally if AUTOSTART\_CMCLD is set to 1 (which is not recommended) in `/etc/rc.config.d/cmcluster`, the cluster will start automatically during boot-up time.

Step	Action
1	<p>If the MC/ServiceGuard cluster is currently down, run the command as root on either primary or secondary.</p> <pre>#cmruncl -v</pre> <p><b>Result:</b> This will start the cluster and the package sncPkg on the primary host. This command is required to run once on both local and remote clusters. You should watchout on node/package switching states.</p> <p><b>Stop! End of Task.</b></p>

## Starting sncPkg

---

### Description

sncPkg is the primary package running in either local cluster or remote cluster. Its startup process does the following:

- directory clean up
- starts Informix ER
- brings up snms
- starts a monitor process
- resyncs topology among all redundancy nodes

When the cluster is first started, it will attempt to start sncPkg on primary. However, sncPkg may, due to many reasons, be down. You need to start it in either the local cluster or the remote cluster.

---

### Procedure

Perform the following steps to start sncPkg.

Step	Action
1	<p>To start sncPkg on a particular Node_Switching enabled node, as <i>root</i> run</p> <pre>#cmrunpkg -n &lt;active node name&gt; sncPkg</pre> <p><b>Result:</b> This will start the sncPkg on that node (nodeA).</p> <p> <b>NOTE:</b> As long as sncPkg is running, no "dn" command is allowed since it will cause unnecessary package switching.</p> <p><b>Stop! End of Task.</b></p>

---

## Starting standbyPkg

---

### Description

The standbyPkg only runs when there is a standby node in the MC/serviceGuard Cluster (not in a single node cluster). When the standby node first rejoins the redundancy, it will attempt to start standbyPkg on the node if there is a sncPkg running on some other node in the cluster. However, standbyPkg may be down (due to many reasons). You need to start it in either the local cluster or the remote cluster.

---

### Procedure

Use the following steps to start standbyPkg on a particular Node\_Switching enabled node.

Step	Action
1	Run the following command as <i>root</i> :  <b>#cmrunpkg -n &lt;standby node name&gt; standbyPkg</b>  <b>Result:</b> This will start the standbyPkg on that node (nodeS).  <b>Stop! End of Task</b>

---

## Rejoining a Node in Redundancy

### Description

As long as there is a sncPkg running in active mode, a node that is down rejoins the cluster using # **/ems/etc/rejoin** to join in redundancy configuration again. It will resync the database, flat files and start the application on the standby host. It will also notify MC/ServiceGuard that this host is ready to receive the package. Running this command in the same cluster, the active sncPkg will result in starting the standbyPkg; Running this command in a different cluster will result in starting either sncPkg, if not running yet in that cluster, or otherwise, standbyPkg.

Database resync process consists of the following parts (stop points):

- remove replication definition associated with this node
- drop and recreate database
- redefine replication
- activate replication
- suspend replication to keep all new data into a queue
- data resync by unloading from active node and loading at this node

Data will be resynced through two parts. The first part, critical data (i.e. that data needed when system is coming up) will be resynced out front. The second part is historical related information like historical alarms, command/response information, pm data, etc and will be resynced through background processing while the rest of the rejoin process is still on going. Tables that will be resynced in the background are defined in /ems/etc/dbconfig/sncdb\_tabs.skip. The whole resync process might take from 30 minutes to over several hours depending upon the size of the database. At the end of the second part of data resync, a "skipped table copy completed.." message will be put into /tmp/er\_resync.log file.

Before running the rejoin command, please make sure that the active node is up and running normally.

### Procedure

Perform the following to rejoin a node that is down in a redundant configuration.

Step	Action
1	Login as <b>ems</b> and su (no "-") to root
2	Run the following command: <div style="text-align: center;"><b># /ems/etc/rejoin</b> (answer <b>Y</b> to all the prompts)</div> <p><b>Stop! End of Task</b></p>

## Halting sncPkg

---

### Description

Halting sncPkg will

- first kill HA\_Mgr process and some other process
- stop ER replication
- cleanup Event Forwarding directories.
- shutdown SNMS and send Alarm to console



#### NOTE:

Please pay attention to the following:

- Halting a sncPkg with application running in active mode will result in no active SNMS anywhere. No sncPkg package switching will occur. Therefore use this procedure with caution.
- Halting a sncPkg with application running in standby mode will remove this node from redundancy. No package switching will occur. To bring this node back in again requires the procedure described under *Rejoin a Node in Redundancy*.

---

### Procedure

Perform the following procedure to halt sncPkg.

Step	Action
1	<p>To shutdown a running sncPkg on nodeA, as <code>root</code> run</p> <pre>#cmhaltpkg -n &lt;active node name&gt; sncPkg</pre> <p><b>Result:</b> At the end, you should see console message like "!! SNMS application is Shutting down!!".</p> <p><b>Stop! End of Task</b></p>

---

## Halting standbyPkg

---

**Description**

Halting a standbyPkg will remove this node from redundancy and no switching will occur. To bring this node back in again requires the procedure described under *Rejoin a Node in Redundancy*

---

**Procedure**

Perform the following procedure to halt standbyPkg.

Step	Action
1	To shutdown a running standbyPkg on nodeS, as <code>root</code> run  <code>#cmhaltpkg -n &lt;standby node name&gt; standbyPkg</code>  <b>Stop! End of Task</b>

---

## Halting Node in Cluster

---

### Description

Halting a node in the MC/ServiceGuard cluster causes a node to halt its cluster daemon and remove itself from the existing cluster. This will also move all running packages on it to the standby node if the standby node is ready to receive it (*Enabling/Disabling Package Switching*).

---

### Procedure

Perform the following steps to halt a node in the MC/ServiceGuard cluster.

Step	Action
1	<p>To force a node to halt even if there are packages running, as <code>root</code> run</p> <pre># cmhaltnode -f</pre> <p> <b>NOTE:</b> To bring the node back in the cluster again, requires the procedure described under <i>Rejoin a Node in Redundancy</i>.</p> <p><b>Stop! End of Task</b></p>

---

## Enabling/Disabling Package Switching

### Procedure

Perform the following steps to enable/disable package switching.

Step	Action
1	<p>When cluster status shows that package switching is disabled (usually this is true after failover), to enable/disable as <code>root</code> run</p> <pre># <b>cmmodpkg [-e -d] sncPkg</b></pre> <p>When cluster status shows that one node is disabled from running the package on it (switching the package to it from other node), to enable/disable it use</p> <pre># <b>cmmodpkg -n node1 [-e -d] sncPkg</b></pre> <p><b>Stop! End of Task</b></p>

## Shutting Down Cluster

### Procedure

Perform the following steps to shut down a running cluster.

Step	Action
1	To shut down a running cluster, run  # <b>cmhaltcl -f</b>   <b>NOTE:</b> It will shut down all packages first then the cluster, so proceed with caution.  <b>Stop! End of Task</b>

---

## Shutting Down ER

---

**Description** er\_remove will completely remove replication definitions from all nodes defined in 'redstat'.

After er\_remove is done, er\_status report on all nodes is down.

---

**Procedure** Perform the following steps to shut down er.

Step	Action
1	Run the following command: <b>er_remove</b> <b>Stop! End of Task</b>

---

---

## Checking Application Status

---

**Description** The **showtop** command will show the current redundancy topology adopted by this node and the mode in which the SNMS application is running.

---

**Procedure** Perform the following steps to check application status.

Step	Action
1	Run the following command: <b>#showtop</b>  <b>Stop! End of Task</b>

---

---

## Checking ER Status

---

**Description**

The command `er_status` shows the Informix replication status from this node. All redundancy nodes should have same redundancy info, but the status report won't be exactly the same. If any one of hosts return different redundancy info, some corrective action needs to be performed immediately.

---

**Procedure**

Perform the following steps to check er status

<b>Step</b>	<b>Action</b>
1	Run the following command: <b>er_status</b>  <b>Stop! End of Task</b>

---

## Switching Packages Manually

### Description

If there is a need to manually switch packages from the current node to the standby node, it is suggested that it be done carefully. Check whether the receiving standby is in good health by Checking Cluster Status, Checking Application Status and Checking ER Status.

### Procedure

Perform the following steps to switch packages manually from the current node to the standby node.

Step	Action
1	<p>If the switchover should happen within MC/ServiceGuard cluster, the following commands are recommended:</p> <pre># cmhaltpkg -n &lt;current node&gt; sncPkg</pre> <p>then</p> <pre># cmmodpkg -e -n &lt;standby node&gt; sncPkg</pre> <pre># cmrunpkg -n &lt;standby node&gt; sncPkg</pre> <p><b>⇒ NOTE:</b> If the switchover should happen between local and remote clusters, the following steps should be followed.</p>
2	<p>Halt the sncPkg running ACTIVE application</p> <pre># cmhaltpkg -n &lt;current node&gt; sncPkg</pre>
3	<p>Wait until the halt package command finishes. Log in to the other cluster with that cluster's virtual IP as ems and run</p> <pre>HA_MgrClient -m setOperMode -o ACTIVE</pre> <p><b>⇒ NOTE:</b> It is not recommended to do a manual switch for the standbyPkg since it is simply not necessary.</p> <p><b>Stop! End of Task</b></p>

## Quick Redundancy Testing

### Procedure

To perform quick redundancy testing for hardware failover use the following steps.

Step	Action
1	Disconnect primary office LAN connection on active/standby hosts.
2	Disconnect primary OSI LAN connection on active/standby hosts.
3	Disconnect SCSI connection on primary disk array on active/standby hosts.
4	Disconnect both of primary and backup office LAN connections on active hosts.
	<b>Stop! End of Task</b>

To perform quick redundancy testing for software failover use the following steps.

Step	Action
1	Kill Orbix daemon.
2	Kill OSI stack/HP Openview daemon.
3	Kill High Availability Manager daemon.
4	Fill up EMS database space/replication spool disk filling
5	Fill snms disk space up to 95%.
	<b>Stop! End of Task</b>

## Upgrading SNMS in Redundancy

### Description

During application upgrade, the application will lose the connection to the network element for a period of time. To keep the data loss to a minimum, perform the upgrade procedure at a quiet period where no NEs are added or deleted and there are no equipment changes on the NEs.

### Procedure

The following upgrade procedure should be used when down time is acceptable:

Step	Action
1	Stop Enterprise Replication (see section titled <i>Shutting Down ER</i> ).
2	Take all servers off-line (see section titled <i>Shutting Down Cluster</i> ).
3	Upgrade each SNMS host.
4	Configure HA (see section titled <i>installHA</i> ).
5	Perform database conversion on primary server.
6	Bring the application up on primary server and verify status.
7	Rejoin each standby servers and verify status (see section titled <i>Redundancy Operation</i> ).
	<b>Stop! End of Task</b>

The following upgrade procedure should be used when down time must be kept to a minimum:

Step	Action
1	Stop Enterprise Replication (see section titled <i>Shutting Down ER</i> ).
2	Bring primary host down and switch over to standby host (see section titled <i>Redundancy Operation</i> ).
3	Upgrade the primary SNMS host according to Chapter 3 of this document.
4	Configure HA (see section titled <i>installHA</i> ).
5	Perform database conversion on primary server.
6	Bring standby host down (see section titled <i>Redundancy Operation</i> ).

---

<b>Step</b>	<b>Action (Contd)</b>
7	Activate primary hosts to be active again.
8	Upgrade the standby SNMS hosts.
9	Rejoin standby server and verify status (see section titled <i>Redundancy Operation</i> ).  <b>Stop! End of Task</b>

---



## Introduction

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### Summary

This chapter provides a general system overview of WaveStar SNMS.

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### Contents

The following topics are discussed in this chapter.

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## System Overview

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### 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-2000\* 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.

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\* 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

**Software Management**

- Software download to NEs
  - Software copy from one NE to another
  - Software install (activate) on NE
- 

**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.

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## 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 (32-bit) (Nov. 1999) with associated peripherals (console, terminals, and printers)
  - PC running Windows NT<sup>®</sup> 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

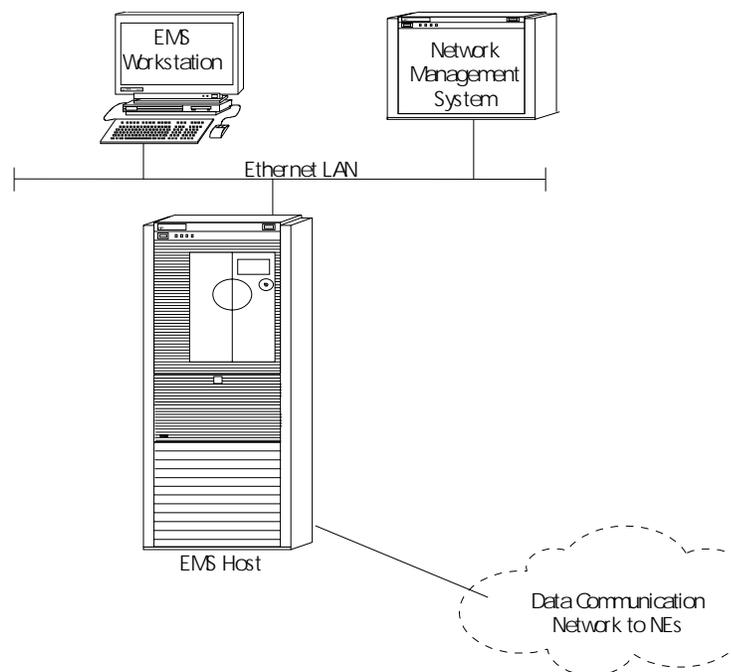
domain. The backup host is in a hot-standby state, maintaining data connections to the network, and using data replication from the active host to keep its database current. In the event of a primary host failure, there is automatic switch-over with the local redundancy configuration, while a manual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

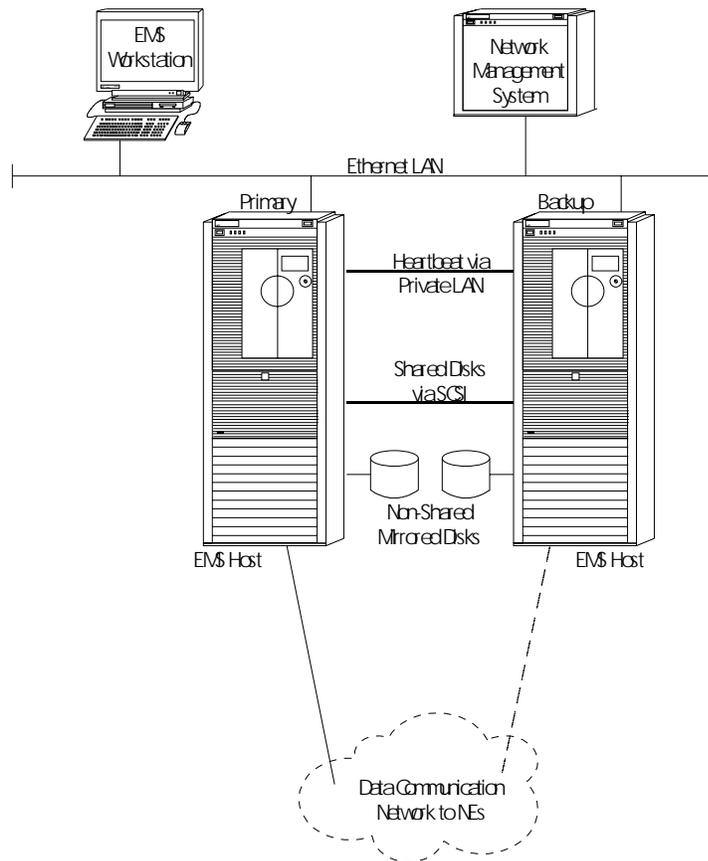
Host redundancy provides component redundancy within a single host where there is no backup host available (Figure 1-1). Recovery relies on switching control to another resource on the same host such as a backup LAN card or mirrored disk.



**Figure 5-1. EMS Basic Host Redundancy Configuration**

## Local redundancy

Local redundancy employs two similarly equipped hosts located in the same building (Figure 1-2). Each host is configured with redundant hardware components. Should the primary host fail, the backup host is activated automatically without user intervention.



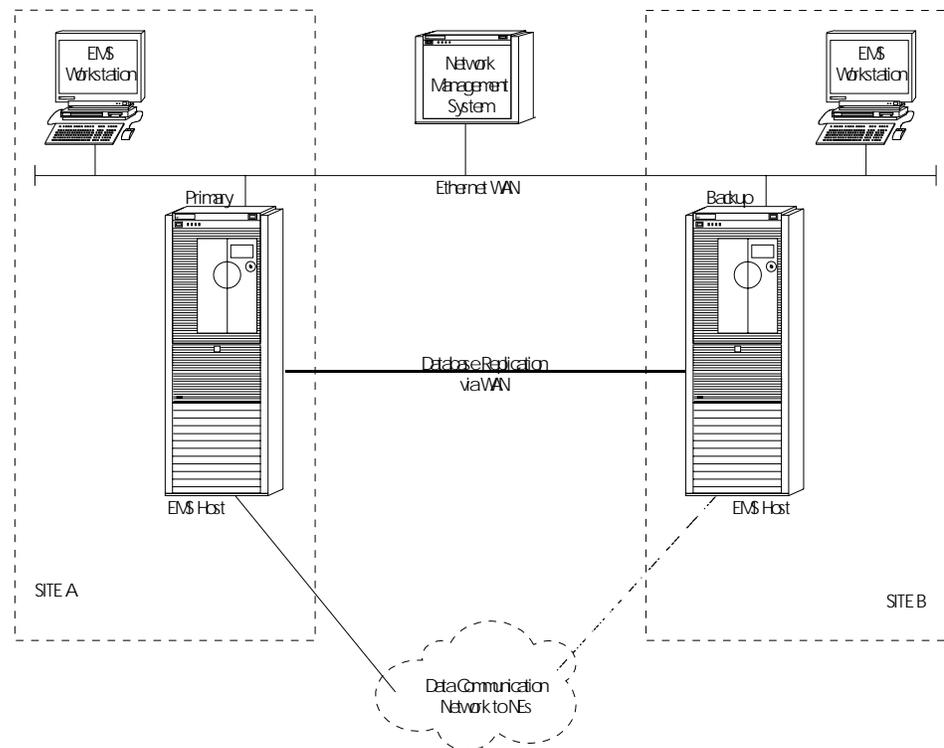
**Figure 5-2. EMS Local Redundancy Configuration**

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 1-3)). 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 5-3. 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



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:

4. 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.
5. 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.

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## Software Architecture

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### 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 5-1. 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

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## System Interfaces

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### 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.

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### 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

### **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 Management Information Tree (MIT). 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.

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## Hardware Requirements

### Overview

WaveStar SNMS runs on a scalable hardware platform to support small to large networks. The WaveStar SNMS software release is independent of platform. The choice of platform is driven by the characteristics and needs of the customer's network.

WaveStar SNMS hardware architecture consists of two main components:

- HP K-class or N-class server platform and associated peripherals (console, terminals, and printer)
- PC running Windows NT 4.0 (Service Pack 4)



#### NOTE:

The system console is connected to the host and is used by the system administrator to enter HP-UX commands. HP-UX and application output is sent to the system console as well.

### Host platform

The host is an HP K-class or N-class server running HP-UX Version 11.0. The configuration of the host is based on the number of equivalent NEs supported by the system. The following aspects of the system will vary based on the number of NEs supported:

- HP Model
- Memory
- Disk space
- SCSI

The following table shows typical host server hardware configurations.

**Table 5-2. K-class Server Configurations (Non-redundancy)**

K-class Server Configuration	Model K380	Model K380/K580 with 2 CPUs	Model K580 with 4 CPUs	Model K580 with 6 CPUs
Memory	768 MB	1024MB	1280 MB	2048MB
Swap Space	1536MB	2048MB	2560MB	2560MB
Disk Space w/o PM Data	27 GB (3X9GB)	45 GB (5X9GB)	54 GB (6X9GB)	54 GB (6X9GB)

<b>K-class Server Configuration</b>	<b>Model K380</b>	<b>Model K380/K580 with 2 CPUs</b>	<b>Model K580 with 4 CPUs</b>	<b>Model K580 with 6 CPUs</b>
Disk Space w/ PM Data	54GB (6x9/3x18)	108GB (11x9/6x18)	180GB (20x9/10x18)	180GB (10x18)
RS232 Ports	16	32	32	32
LAN (100BaseT)	2	3	3	3
SCSI Controller	2	3	4	4
System GUI PCs	20	30	30	30
X.25 GNE (SNC only)	32	125	188	188
X.25 (optional)	1ACC MUX	2 ACC MUX	2 ACC MUX	2 ACC MUX
DAT Tape Drive	DDS3 (for all HW models)			
CD-ROM Drive	DVD (for all HW models)			

**Table 5-3. N-class Server Configurations (Non-redundancy)**

<b>N-class Server Configuration</b>	<b>Model N-4000 with 8 CPUs</b>
Memory	8GB
Swap Space	8GB
Internal disk	18GB (2x9GB/1x18GB))
Total Disk Space with PM	288GB (8x36GB)
LAN(100BaseT)	2
SCSI Controller	2
DAT Tape Drive	1 X 4GB DDS
CD-ROM Drive	DVD
X.25	N/A

**Table 5-4. Bus/Jumper Settings**

<b>K-class/N-class Settings</b>	<b>Model K380</b>	<b>Model K380/K580</b> with 2 CPUs	<b>Model K580</b> with 4 CPUs	<b>Model K580</b> with 6 CPUs	<b>Model N-4000</b> with 8 CPUs
Bus Mode	Full bus/Dual Connection	Full bus/Dual Connection	Split bus/Dual Connection	Split bus/Dual Connection	Split bus/Dual Connection
Jumper Setting	11111	11111	01111	01111	01111

**GUI workstation**

The SNMS GUI Client can be run by a PC, HP B2000 workstation, or a SUN Ultra5 workstation. The following table shows the GUI Client platform configurations.

**Table 5-5. GUI Client Platform Configurations**

	<b>Primary Configuration</b>	<b>Secondary Configuration II</b>	<b>Secondary Configuration III</b>
Model	PC	HP B2000	SUN Ultra 5 Workstation
CPU	Pentium II, 450MHz or better preferred, 200MHz Minimum(100MHz bus, 512KB cache)	300 MHz	360MHz UltraSPARC
Memory	256 MB or more	256MB	256MB
Disk	6GB or more	8GB	8GB
Video	video card with at least 8MB VRAM	built-in	built-in
Network Card	10/100BaseT	10/100 Ethernet NIC	10/100 Ethernet NIC
Monitor	19" or better	21"	21"
Sound Card	sound card with speakers	built-in	built-in
CD_ROM	24X	Fast	Fast

	<b>Primary Configuration</b>	<b>Secondary Configuration II</b>	<b>Secondary Configuration III</b>
OS	NT 4.0 ServicePack 4	HP-UX 10.20/11.0	Solaris 2.6/2.7

## Sizing the system

System sizing is a function of the capacity of the WaveStar SNMS platforms and the load placed upon the platforms by the managed network. The load generated while managing the network depends on the numbers, types, and equipages of managed NEs, the manner in which the NEs are connected to WaveStar SNMS, and your management operational profile.

Detailed sizing guidelines and a capacity estimation tool are available to configure WaveStar SNMS systems to efficiently meet your needs. These detailed sizing guidelines use as input, information describing the network to be managed and your NE management operational profile. Load factors are applied based on the input to allow for differences in the size and complexity of the different NEs and your operational profile.

### Capacity Affecting Network Element Parameters

The following parameters have been identified as having the most impact to the overall EMS capacity:

- MFA Database size (number of records).
- Relative Activity (a factor that represents the relative degree of EMS activity required to manage a particular network element type under "normal" operating and load conditions, as compared to that needed for an FT and its successor, the WaveStar 2.5G).
- Number supported LAN associations.
- Configuration Factor.



#### NOTE:

See your Lucent Technologies' representative for details on sizing your system.

## Software Requirements

### Application components

The following tables show the software components required for WaveStar SNMS R4.2:

**Table 5-6. Software Components for Standalone Systems**

Software Description	Software Version
HP-UX General Release Patches, March 2000	B.11.00.48
HP-UX Hardware Enablement and Critical Patches, June 2000	B.11.00.49.3
SNMS CD Utilities	121500
SNMS HP11 PATCH	010401
ACC and X.25/9000 Software Bundle	B.03.10.00
ACC Base Software	B.03.10.00
ACC Protocols for Application Developers	B.03.10.00
SNMS Cold Start	F4.2
Informix Dynamic Server	7.31.UC2.1
OrbixNames	2.3c
CORBA-compliant Object Request Broker	2.3c
WaveStar Subnetwork Management System	4.2
WaveStar SNMS Release 4.2.0 GUI Client (NT)	SEQ 1212i00204
WaveStar SNMS Release 4.2.0 GUI Client (HP)	SEQ 1212i00204
Persistence	3.4.2
HP JRE (Java GUI Client)	1.1.6
HP OpenView (for CMISE NE only)	DMR5.03
ATOS OSIAM (for OSI NE only)	2.6F
HP OmniBack II (special order for DLT customers)	A.03.00

**Table 5-7. Software Components for Redundant Systems**

<b>Software Description</b>	<b>Software Version</b>
HP-UX General Release Patches, March 2000	B.11.00.48
HP-UX Hardware Enablement and Critical Patches, June 2000	B.11.00.49.3
Event Monitoring Service	A.03.10
HA Monitors	A.03.10
MC / Service Guard	A.11.09
MirrorDisk/UX	B.11.00
SNMS CD Utilities	121500
SNMS HP11 PATCH	010401
ACC and X.25/9000 Software Bundle	B.03.10.00
ACC Base Software	B.03.10.00
ACC Protocols for Application Developers	B.03.10.00
SNMS Cold Start	F4.2
Informix Dynamic Server	7.31.UC2.1
OrbixNames	2.3c
CORBA-compliant Object Request Broker	2.3c
WaveStar Subnetwork Management System	4.2
WaveStar SNMS Release 4.2.0 GUI Client (NT)	SEQ 1212i00204
WaveStar SNMS Release 4.2.0 GUI Client (HP)	SEQ 1212i00204
Persistence	3.4.2
HP JRE (Java GUI Client)	1.1.6
HP OpenView (for CMISE NE only)	DMR5.03
ATOS OSIAM (for OSI NE only)	2.6F
HP OmniBack II (special order for DLT customers)	A.03.00



## Introduction

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### Purpose

This chapter provides general information about the installation procedures used to deploy a new installation of WaveStar SNMS.

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### Contents

The following topics are discussed in this chapter.

- Before You Begin 2
- Disk Space Partitions 3
- HP-UX Patch List 9
- Init\_disk Process 12
- ColdStart Screen Output 23
- SNMS Installation Screen Output 31

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## Before You Begin

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### Summary

The following items are needed for the Cold Start installation:

- HP-UX 11.0 CD (Nov. 1999)
- Optional HP-UX 11.0 Multi-User License CD
- WaveStar SNMS Cold Start CD
- WaveStar SNMS Application (2 CDs)
- WaveStar SNMS HP-UX Patch CD
- HP Openview CD (used for 400G)
- GUI Client CD
- License numbers for:
  - UNIX multi-user license (optional)
  - Informix Dynamic Server and serial numbers
  - HP Openview license
  - Orbix license (Orbix MT and OrbixNames)
  - ATOS license

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### Order of installation

During installation, the order for installing the items must proceed as follows:

OS  
LAN Driver - optional  
General Release Bundle  
Hardware Enablement and Critical Bundle  
Redundancy related software - optional (MS/ServiceGuard, MirrorDisk, EMS,  
and HA monitors)  
SNMS HP11 patch  
Coldstart  
Init disk  
Informix  
Orbix and OrbixNames  
Coldstart script  
HP Openview - optional  
SNMS application

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## Disk Space Partitions

### Summary

The following tables show required disk space partitions.

**Table 6-1. Disk Partitions for K-Class 9GB-based Systems with PM Support**

Disk No.(Size)		Mount Point	K380(K360)	K380(K580/K460) (2 CPUs)	K580(K460) (4 CPUs/6CPUs)
			Allocated Space	Allocated Space	Allocated Space
VG#0 (9GB)	VG#0 (18GB)	Swap1	768MB*2	1024MB*2	(1536+1024)MB
		/	100MB	100MB	100MB
		/stand	100MB	100MB	100MB
		/opt	1024MB	1024MB	1024MB
		/var	1024MB	1024MB	1024MB
		/usr	512MB	512MB	512MB
		/home	100MB	100MB	100MB
		/tmp	512MB	512MB	512MB
	dbspace	dbspe1_1G	dbspe1_1G	dbspe1_1G	
VG#1 (9GB)		/ems	6GB	6GB	6GB
		/tools	600MB	600MB	600MB
		/reports	1.8GB	1.8G	1.8G
VG#2 (9GB)	VG#1 (18GB)	dbspace	dbsp1_1G	dbsp1_1G	dbsp1_2G
		pmspace	pmsp{1-3}_2G	pmsp{1-3}_2G	pmsp{1-3}_2G
VG#3 (9GB)		dbspace	dbsp2_1G	dbsp2_1G	dbsp2_2G
		dbspace	dbsp3_1G		
		pmspace	pmsp{4-6}_2G	pmsp{4-6}_2G	pmsp{4-6}_2G

Disk No.(Size)		Mount Point	K380(K360)	K380(K580/K460) (2 CPUs)	K580(K460) (4 CPUs/6CPUs)
			Allocated Space	Allocated Space	Allocated Space
VG#4 (9GB)	VG#2 (18GB)	dbspace		dbsp3_1G	dbsp3_2G
		dbspace		dbspe2_2G	dbspe2_2G
		pmspace	pmsp{7-8}_2G	pmsp{7-8}_2G	pmsp{7-8}_2G
		pmspace	pmsp{9-10}_2G		
VG#5 (9GB)		/data	4GB		
		dbspace		dbsp4_1G	dbsp4_2G
		dbspace		dbsp5_2G	
		pmspace	pmsp{11-12}_2G	pmsp{9-10}_2G	pmsp{9-11}_2G
VG#6 (9GB)	VG#3 (18GB)	dbspace			dbsp5_2G
		pmspace		pmsp{11-14}_2G	pmsp{12-14}_2G
VG#7 (9GB)		dbspace			dbsp6_2G
		dbspace			dbspe3_2G
		pmspace		pmsp{15-18}_2G	pmsp{15-16}_2G
VG#8 (9GB)	VG#4 (18GB)	pmspace		pmsp{19-22}_2G	pmsp{17-20}_2G
		VG#9 (9GB)	pmspace		pmsp{23-26}_2G
VG#10 (9GB)	VG#5 (18GB)		pmspace		pmsp{27-28}_2G
		/data		4 GB	
VG#11 (9GB)		pmspace			pmsp{29-32}_2G
VG#12 (9GB)	VG#6 (18GB)	pmspace			pmsp{33-36}_2G
		VG#13 (9GB)	pmspace		

Disk No.(Size)		Mount Point	K380(K360)	K380(K580/K460) (2 CPUs)	K580(K460) (4 CPUs/6CPUs)
			Allocated Space	Allocated Space	Allocated Space
VG#14 (9GB)	VG#7 (18GB)	pmspace			pmsp{41-44}_2G
VG#15 (9GB)		pmspace			pmsp{45-48}_2G
VG#16 (9GB)	VG#8 (18GB)	pmspace			pmsp{49-52}_2G
VG#17 (9GB)		pmspace			pmsp{53-56}_2G
VG#18 (9GB)	VG#9 (18GB)	pmspace			pmsp{57-60}_2G
VG#19 (9GB)		/data			4GB
		/var/opt/omni			4GB

**Table 6-2. Disk Partitions for N-class Servers**

<b>Disk No. (Size)</b>	<b>Mount Point</b>	<b>N4000 (8 CPUs)</b>
VG#0 (9GB)	Swap1	2048MB
	/	140MB
	/stand	100MB
	/opt	1024MB
	/var	1024MB
	/usr	512MB
	/home	100MB
	/tmp	1024MB
VG#1 (35GB)	/ems	6GB
	/data	10GB
	/reports	2GB
	/tools	640MB
	/work (for all purposes)	4GB
	/var/opt/omni(optioanal)	4GB
VG#2 (35GB)	dbspace	dbsp1_2G
	Swap2	1024MB
	pmspace	pmsp{1-15}_2G
VG#3 (35GB)	dbspace	dbsp2_2G
	Swap3	1024MB
	pmspace	pmsp{16-30}_2G
VG#4 (35GB)	dbspace	dbsp3_2G
	Swap4	1024MB
	pmspace	pmsp{31-45}_2G

<b>Disk No. (Size)</b>	<b>Mount Point</b>	<b>N4000 (8 CPUs)</b>
VG#5 (35GB)	dbspace	dbsp4_2G
	Swap5	1024MB
	pmspace	pmsp{46-50}_2G
	nqspace	nqsp{1-10}_2G
VG#6 (35GB)	dbspace	dbsp5_2G
	Swap6	1024MB
	nqspace	nqsp{11-25}_2G
VG#7(35GB)	dbspace	dbsp6_2G
	Swap7	1024MB
	nqspace	nqsp{26-40}_2G
VG#8(35GB)	dbspace	dbsp7_2G
	dbspace	dbsp8_2G
	dbspace	dbsp9_2G
	dbspace	dbsp10_2G

**Table 6-3. Disk Partitions for K-class 9GB-based Systems without PM Support**

Disk No.(Size)	Mount Point	K380(K360)	K380(K580) (2 CPUs)	K580 (4 CPUs/6CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#0 (9GB)	Swap1	768MB*2	1024MB*2	2560MB
	/	100MB	100MB	100MB
	/stand	100MB	100MB	100MB
	/opt	1024MB	1024MB	1024MB
	/var	1024MB	1024MB	1024MB
	/usr	512MB	512MB	512MB
	/home	100MB	100MB	100MB
	/tmp	512MB	512MB	512MB
	/reports	2G	2GB	2GB
dbspace	dbsp3_1G			
VG#1(9GB)	/ems	6GB	6GB	6GB
	/tools	600MB	600MB	600MB
	dbspace	dbsp2_1G	dbsp3_1G	dbsp3_2G
VG#2(9GB)	dbspace	dbsp1_1G	dbsp1_1G	dbsp1_2G
	pmspace	pmsp{1-2}_2G	pmsp1_2G	pmsp1_2G
	dbspace	dbspe1_1G	dbspe1_1G	
	/data	2GB	4GB	4GB
VG#3(9GB)	dbspace		dbsp2_1G	dbsp2_2G
	dbspace			dbspe1_1G
	pmspace		pmsp2_2G	pmsp2_2G
VG#4 (9GB)	dbspace		dbsp4_1G	dbsp4_2G
	dbspace		dbsp5_2G	dbspe2_2G
	pmspace			
VG#5 (9GB)	dbspace			dbsp5_2G
	dbspace			dbsp6_2G
	dbspace			dbspe3_2G

## HP-UX Patch List

### Summary

The following table lists all essential patches for the core operating system.

**Table 6-4. Required Patches for HP-UX 11.0**

Patch Code	Description
PHCO_19292	11.00 login(1) cumulative patch
PHCO_19308	11.00 savecrash(1M) cumulative patch
PHCO_19491	11.00 libc cumulative patch
PHCO_19550	11.00 HP-UX Patch Tools and White Paper
PHCO_19623	11.00 mount_hfs(1M) cumulative patch
PHCO_19666	11.00 libpthreads cumulative patch
PHCO_19673	11.00 fsck_hfs(1M) cumulative patch
PHCO_19732	11.00 cumulative fbackup(1M)/frecover(1M) patch
PHCO_19772	11.00 st(1M),shared tape, cumulative patch
PHCO_19945	11.00 bdf(1M) patch to skip autofs file systems
PHCO_19986	11.00 Year 2000 cumulative cron/at/crontab patch
PHCO_20027	11.00 pax(1) cumulative patch
PHCO_20054	11.00 LVM commands cumulative patch
PHCO_20104	11.00 cumulative libpam patch
PHCO_20221	11.00 Year 2000 HP-UX Application Patch Tool
PHCO_20443	11.00 memroy windows cumulative patch
PHCO_20493	11.00 cumulative 10.20 libc compatibility support
PHCO_20765	11.00 libc cumulative patch
PHCO_20882	fsck_vxfs(1M) cumulative patch
PHCO_21187	cumulative SAM/ObAM patch
PHKL_13203	11.00 OnLineJFS inode left in inconsistent state
PHKL_13431	11.00 bad block msg, panic; data possibly corrupted
PHKL_14026	11.00 mtstart() page fault, tape0 hang, panic patch

Patch Code	Description
PHKL_14119	11.00 32 bit binary compatibility on 64 bit systems
PHKL_14762	11.00 POSIX semaphore deadlock/hang
PHKL_14763	11.00 JFS extended map inodes cause fsck failure
PHKL_14765	11.00 fixes HFS panic in allocgblk
PHKL_15689	11.00 AutoFS support patch
PHKL_15956	11.00 LVM cumulative PVLinks patch
PHKL_16074	11.00 KI nfs performance fix and KI panic fix
PHKL_16209	11.00 fix race conditions in UP emulation
PHKL_16433	11.00 LVM commands hang due to bad timestamp
PHKL_16807	11.00 DLKM unloading and open bug with autoloading
PHKL_16981	11.00 fix for panic in scr_bltb() and scr_bltf()
PHKL_17038	11.00 data page fault when field vmtrace'ng fix
PHKL_17368	11.00 SCSI pass thru driver cumulative patch
PHKL_17801	11.00 fix device swap problems
PHKL_18111	11.00 adds check on BSS size for ELF64 executables
PHKL_18325	11.00 prevent load 32-bit kernel on 64-bit system
PHKL_18452	11.00 invalid I/O sizes from JFS causes hangs
PHKL_18503	11.00 audio driver potential data corruption fix
PHKL_18543	11.00 PM/VMM/UFS/async/scsi/io/DMAPI/JFS/perf patch
PHKL_18798	11.00 fix for HFS filesystems with short filenames
PHKL_18799	11.00 PANIC in diskquota while running sendmail
PHKL_18800	11.00 cumulative JFS patch - panic: dirty inval
PHNE_20094	11.00 streams pty cumulative patch
PHNE_20150	11.00 cumulative mux and pty patch
PHNE_20316	Cumulative STREAMS patch
PHNE_20436	11.00 cumulative ARPA transport patch
PHNE_20969	HP-PB 100 Base-T cumulative

---

<b>Patch Code</b>	<b>Description</b>
PHNE_21217	LAN product cumulative patch
PHNE_21767	cumulative ARPA Transport patch
PHSS_21046	OV EMANATE14.Z Agent Consolidated Patch
PHSS_22540	MC/ServiceGuard and SG-OPS

---

## Init\_disk Process

---

### Description

The `init_disk` process is run after installing the ColdStart file set. `Init_disk` first checks the hardware configuration required by EMS on your system and then configures the hard disk according to EMS requirements.



#### NOTE:

If `init_disk` is running for the very first time on your system, it will automatically verify and collect hardware information on your system and then configure the hard disk with little intervention from the user. The `init_disk` process saves the collected configuration data in the `/startup` directory for future use.

In the event that `init_disk` is interrupted before its completion, or there is a need to run `init_disk` again, the following choices are available:

- You can choose to re-use previously collected configuration data, skip previously performed configuration steps, or you can choose to start the whole `init_disk` process from scratch (data saved in `/startup` will be removed).
- If you choose to use previously collected configuration data, `init_disk` will display the hardware data, one step at a time, including CPU, memory, LAN, etc. You have the choice to verify and collect any portion of the previously saved configuration, or you can choose to use all of the saved data from the previous configuration.
- If `init_disk` was interrupted before its completion in the previous run, `init_disk` will remember where it was interrupted. For the configuration steps, you then have the choice to skip one particular step, run the step again, or run all subsequent steps.
- To make sure that the `init_disk` process has completed properly, check the result in `/tmp/init_disk.log`.

A utility named “`undo_disk`” is available to undo the actions of the `init_disk` process during the installation procedure. `Undo_disk` restores the system (file systems, logical volumes, physical volumes, etc.) back to the state just prior to running `init_disk`. `Undo_disk` does not undo the coldStart process that runs after `init_disk`.

**Undo Disk  
procedure**

The following steps describe the procedure to run Undo Disk.

Step	Action
1	<b>cd /tmp</b>
2	Enter command <b>./undo_disk</b>
3	Undo_disk will prompt you for each undo task. You can choose: <b>y</b> - to undo one specific configuration <b>n</b> - not undo one specific configuration <b>all</b> - to undo every configuration
4	Use <b>ls -l /dev/vg*</b> and <b>bdf</b> command to verify that the system is restored to its original configuration.
5	Reboot the system.  <b>Stop! End of Task.</b>

**Init\_disk help and  
examples**

The `init_disk` script is designed to give the installer the flexibility to work with both the client's standard and non-standard configurations. "Non-Standard" configurations are disk configurations that meet the total capacity requirement and have at least as many physical disks as there are volume groups. For example, having many 4Gb disks and the proper total capacity is a possibility. Conversely, meeting the capacity requirement with two 35Gb disks will not suffice, for reasons to be explained later.

Starting the `init_disk`:

`init_disk` uses the "script" command to save its output into the log file. The "script" command cannot run in the background (this is, it cannot be coded like "script &" in the `init_disk` script. This means that you need to start `init_disk` twice, if "script" is not running. At the first run, `init_disk` starts the "script" and exits. At the second run, `init_disk` detects the "script" command is running, it will not restart it again and begins the configuration task which is described in the following sections.

`init_disk` has an option "-t". You can use "`init_disk -t`" for testing. When "-t" is used, `init_disk`, will not really configure the disk for you. It just display messages and also create real `undo_disk` scripts, based on your configuration. In case you removed the `undo_disk` files, but you need them,

use "-t" to re-create it (assuming you did not change the hardware and the configuration file).

#### Checking The Hardware Configuration:

When `init_disk` is started, it collects all of the hardware data on the system. This includes parameters such as CPU, memory, disks, LAN Card, etc. These parameters are displayed on the screen. If `init_disk` has been ran before, you has the choice to review and use the saved parameters or let the `init_disk` collect the data again.

After the script checks for hardware and memory, it checks the disks and lists their path, size, and whether they are being used. Below is a sample output from a ST system.

```
/dev/rdisk/c0t3d0    8891556    n
/dev/rdisk/c0t4d0    8891556    n
/dev/rdisk/c0t5d0    8891556    n
/dev/rdisk/c0t6d0    8891556    n
/dev/rdisk/c1t3d0    8891556    n
/dev/rdisk/c1t4d0    8891556    n
/dev/rdisk/c1t6d0    8891556    y
```

#### Disk Configuration Templates:

For each supported machine model, a disk template configuration file is delivered with the `init_disk` script. These template files are created based on the hardware configuration requirement. At the run time, `init_disk` selects the default template configuration based on the machine model and the number of CPUs as described in the requirement.

#### Saved Master Configuration File or User Supplied Configuration File:

If `init_disk` has run before and a master configuration file has been saved, `init_disk` will prompt you whether the saved configuration file or the default template configuration file should be used. If both are not desirable, you can specify a different configuration file by its path. Once a configuration file is specified, a temporary file is created for review and modification. The templates are stored under `/tmp` with names `disk_temp*` (for the many configurations). The default templates for K-servers are for 9G disks. However, if the machine has 18G disks, then the templates for 18G disks are to be used. For example: the default template for a K380 with 1 cpu is `/tmp/disk_temp.K380X1`. If that system has 18G disks, the template to use is `/tmp/disk_temp.K380X1_18G`. The script will ask if the default template is

to be used. In this case, that question would be answered with 'n'.  
The full path of the 18G template must be given.

#### Review and Modify the Configuration File

During an `init_disk` session, you have the choice to review and modify the temporary configuration file selected.

#### Configuration File Validation:

After the temporary configuration is modified and saved, `init_disk` validates its contents. This includes the syntax and the availability of disks and sufficiency of the disk spaces for each volume group. `init_disk` will display the validation results and you have the chance to modify the configuration file again. If there is no error in the configuration file, you have the choice to save it as the master configuration file. The modification, validation, and updating of the master configuration file continues until the user decides that the process is complete.

#### Configure the Disk:

After the modification, validation, and updating of the master configuration file is complete, `init_disk` starts to configure the disk based on the contents of the master configuration file. The results of each step are displayed.

#### Undo\_disk:

The `undo-disk` script is generated while creating the disk configuration. In the event that the disks need to be restored back to the configuration that existed before the `init_disk` was performed, run the `undo_disk` to undo the `init_disk`.

#### Tailor the Disk Configuration:

You can tailor your disk configuration by modifying the disk configuration file. The following section provides you the definition and syntax of the disk configuration file.

#### Disk Configuration File Syntax:

A line starts with "#" is a comment line. It is ignored.  
Each row has 4 parameters.  
The first parameter defines the volume group number, such as

VG00, VG01, etc.

The second parameter defines the mount point or directory, such as `ems`, `reports`, `dbsp2_1G`, `dbsp2_1G`, etc. Note that the first character cannot be `/`. For example, you specifies `ems`, not `/ems` and `tools`, not `/tools`.

The third parameter defines the size (in M-bytes) of the disk space required by the parameter specified in the second parameter.

The fourth parameter defines a keyword. The follow are the valid keywords:

`data`, `dbspace`, `home`, `omni`, `pmspace`, `reports`, `tools`, `vgroup`, `vgdisk`.

Each keyword indicates the usage of the space.

"`data`" is for `/data`.

"`home`" is for `/ems`.

"`reports`" is for `/reports`.

"`tools`" is for `/tools`.

"`omni`" is for `/var/opt/omni`.

"`dbspace`" is for database space.

"`pmspace`" is for performance monitoring space.

"`vgroup`" is for volume group. If Type is "`vgroup`", the size (the third parameter) specifies the total disk size required for the `vgroup` and the second parameter should be a "-" (dash). For each `vgroup` (e.g., `VG01`), one and only one entry with type "`vgroup`" must be specified. This is the very first entry of that volume group.

"`vgdisk`" is for disk assignment. This is an optional entry. If no "`vgdisk`" is specified for a "`vgroup`", `init_disk` will automatically select and assign the disk for that volume group. If "`vgdisk`" is specified, the second parameter must be a "`pv_path`" (e.g., `c0t1d0`) that is the block device path name of a physical volume and the size should be a "-". Once a disk (e.g., `c0t2d0`) is used in a "`vgdisk`" assignment, it will not be selected by `init_disk` in the automatic select mode. This means that the disk (e.g., `c0t2d0`) will not be assigned by `init_disk` to other volume groups; unless it is explicitly used in a "`vgdisk`" of another "`vgroup`".

Allocate More than One Disks for One Volume Group:

You can allocate more than one disks for one volume group. For example, you can use the "`vgdisk`" to assign two disks (`c0t3d0` and `c0t4d0`) for one "`vgroup`" (`VG02`).

```
VG02 -          9000  vgroup
VG02 c0t3d0      -    vdisk
```

```

VG02  dbsp1_1G    1000  dbSPACE
VG02  pmsp1_2G    2000  pmSPACE
VG02  c0t4d0      -      vgdisk
VG02  pmsp2_2G    1000  pmSPACE
VG02  pmsp3_2G    1000  pmSPACE

```

In this example, disk c0t3d0 is used by volume group VG02 and dbsp1\_1G and pmsp1\_2G are allocated on c0t3d0. Also disk c0t4d0 is used by volume group VG02 and pmsp2\_2G and pmsp3\_2G are allocated on c0t4d0.

Note that, the order of the "vgdisk" row and the "dbSPACE" and "pmSPACE" rows are important. A "dbSPACE" or a "pmSPACE" gets space allocated into the disk assigned by a "vgdisk" (or assigned by init\_disk automatically) that appears right before the "dbSPACE" or a "pmSPACE" line.

HINT: In this example, c0t3d0 and c0t4d0 will not be assigned by init\_disk for other "vgroup"s. Make sure that the total disk space of c0t3d0 and c0t4d0 are fully used. You can assign c0t3d0 and c0t4d0 to other "vgroup"s via the "vgdisk" statement.

HINT: Once a "vgdisk" is used in a "vgroup", you must explicitly assign the disk for all of the mount points or directories (all of the second parameters). That means the following is an error, because automatic disk assignment and explicit disk assignment cannot be mixed.

```

VG02  -          9000  vgroup
#VG02 c0t3d0      -      vgdisk --- commented out or does not exist
VG02  dbsp1_1G    1000  dbSPACE
VG02  pmsp1_2G    2000  pmSPACE
VG02  c0t4d0      -      vgdisk
VG02  pmsp2_2G    1000  pmSPACE
VG02  pmsp3_2G    1000  pmSPACE

```

#### Allocate Space of One Disk for More than One Volume Group:

You can NOT use the "vgdisk" to assign one disk for more than one "vgroup"s.

For example, the following is an error.

```

VG02  -          9000  vgroup
VG02  c0t3d0      -      vgdisk
VG02  dbsp1_1G    1000  dbSPACE
VG02  pmsp1_2G    2000  pmSPACE

```

```

VG02  pmsp2_2G    1000  pmspace
VG02  pmsp3_2G    1000  pmspace
#
VG03  -           9000  vgroup
VG03  c0t3d0      -      vdisk
VG03  dbsp2_1G    1000  dbspace
VG03  dbsp3_2G    1000  dbspace
VG03  pmsp4_2G    1000  pmspace
VG03  pmsp5_2G    2000  pmspace

```

## REDUNDANCY CONFIGURATION

vgdiskpri, vdisksec, and swap:

For redundancy configuration, you must specify the pv\_path of the primary and secondary disks for all volume groups. The keywords are "vgdiskpri" and "vgdisksec". You also can specify swap space in the configuration. The keyword is "swap". The init\_disk will do only limited validation for redundancy configurations. There are several redundancy configuration templates provided with the init\_disk.

It is better to modify a proper template for your system before starting the init\_disk and copy the configuration to /startup/disk\_cfg, and then start the init\_disk.

Running init\_disk:

When the coldstart package is loaded from the tape using swinstall, the files are copied to the /tmp directory. The instructions will have the user change directory to /tmp and run ./init\_disk. Due to environment and shell restrictions, the user will again have to enter ./init\_disk a second time.

After the script checks for hardware and memory, it checks the disks and lists their path, size, and whether they are being used. Below is a sample output from a system called "rafiki."

```

/dev/rdisk/c0t3d0    8891556    n
/dev/rdisk/c0t4d0    8891556    n
/dev/rdisk/c0t5d0    8891556    n
/dev/rdisk/c0t6d0    8891556    n
/dev/rdisk/c1t3d0    8891556    n
/dev/rdisk/c1t4d0    8891556    n
/dev/rdisk/c1t6d0    8891556    y

```

We have seven 9Gb disks, which is more than enough capacity for a non PM

system with a standard sized disks. Running `init_disk` and not modifying the template will result in the disks being used in the order listed and assigned the proper volume groups. Below is a sample of the template that would not need to be modified in this example:

```
VG00 -          9000 vgroup
VG00 reports    2000 reports
VG00 dbsp3_1G   1000 dbspace
#
VG01 -          9000 vgroup
VG01 ems        6000 home
VG01 tools      600  tools
VG01 dbsp2_1G   1000 dbspace
#
VG02 -          9000 vgroup
VG02 dbsp1_1G   1000 dbspace
VG02 pmsp1_2G   2000 pmspace
VG02 pmsp2_2G   2000 pmspace
VG02 dbspe1_1G  1000 dbspace
VG02 data       2000 data
```

Suppose that the system has enough capacity, but non-standard disks, as seen below:

```
/dev/rdisk/c0t3d0  4194157  n
/dev/rdisk/c0t4d0  8891556  n
/dev/rdisk/c0t5d0  4194157  n
/dev/rdisk/c0t6d0  4194157  n
/dev/rdisk/c1t3d0  4194157  n
/dev/rdisk/c1t4d0  4194157  n
/dev/rdisk/c1t6d0  8891556  y
```

The installer would have to modify the template when the script invoked it, assigning disks to the proper volume groups. Below is an example of how to do this:

```
VG00 -          9000 vgroup
VG00 reports    2000 reports
VG00 dbsp3_1G   1000 dbspace
#
VG01 -          9000 vgroup
VG01 c0t4d0     -      vdisk
VG01 ems        6000 home
VG01 tools      600  tools
VG01 dbsp2_1G   1000 dbspace
#
VG02 -          9000 vgroup
```

VG02	c0t3d0	-	vgdisk
VG02	pmsp1_2G	2000	pmspace
VG02	pmsp2_2G	2000	pmspace
VG02	c0t5d0	-	vgdisk
VG02	dbsp1_1G	1000	dbspace
VG02	dbspe1_1G	1000	dbspace
VG02	data	2000	data

Notice that VG00 did not have any assignments. By default, that will use the root disk(s). Notice that VG01 had one large filesystem (/ems) that was 6Gb. If there were no 9Gb disks, the installer would have to make that filesystem smaller to fit the assigned disk. For VG02, dbsp1\_1G was moved lower in the list so that two 2Gb PM spaces would be assigned to one 4Gb disk and the rest assigned to another 4Gb disk.

When customizing the template, the installer does not have to select from the top of the list of disks and work down. He or she can use any disk, as long as the capacity exists. Whether the capacity exists or does not, the script will verify that the disks can hold the required volume groups and their file systems. Below is a sample output (not from the above example)

Validating disk configuration file "/tmp/tmp\_cfg.tmp"...

VG00 has Disk[6] c1t6d0 assigned.  
 VG01 has Disk[0] c0t3d0 assigned.  
 VG02 has Disk[1] c0t4d0 assigned.  
 VG03 has Disk[2] c0t5d0 assigned.  
 VG04 has Disk[3] c0t6d0 assigned.  
 VG05 has Disk[4] c1t3d0 assigned.

Disk[0] c0t3d0 is assigned to VG01.  
 Disk[1] c0t4d0 is assigned to VG02.  
 Disk[2] c0t5d0 is assigned to VG03.  
 Disk[3] c0t6d0 is assigned to VG04.  
 Disk[4] c1t3d0 is assigned to VG05.  
 Disk[5] c1t4d0 has no vol group assigned.  
 Disk[6] c1t6d0 is assigned to VG00.

-----  
 Validate hardware configuration and disk configuration file "/tmp/tmp\_cfg.tmp"

.  
 OK - Disk[1] c0t4d0 has enough space 8891556 for all vol group(s) space 7000000.  
 OK - Disk[2] c0t5d0 has enough space 8891556 for all vol group(s) space 8000000.  
 OK - Disk[3] c0t6d0 has enough space 8891556 for all vol group(s) space 8000000.  
 OK - Disk[4] c1t3d0 has enough space 8891556 for all vol group(s) space 8000000.

OK - Disk[5] c1t4d0 has enough space 8891556 for all vol group(s) space 0.  
 OK - Disk[6] c1t6d0 has enough space 8891556 for all vol group(s) space 1000000.  
 OK - VG00 has enough space 1000000 from total disk capacity 8891556  
 OK - VG01 has enough space 8400000 from total disk capacity 8891556  
 OK - VG02 has enough space 7000000 from total disk capacity 8891556  
 OK - VG03 has enough space 8000000 from total disk capacity 8891556  
 OK - VG04 has enough space 8000000 from total disk capacity 8891556  
 OK - VG05 has enough space 8000000 from total disk capacity 8891556

If an error occurred, the installer would have the option to go back and make necessary changes. After the validation, the script creates the VG's and their appropriate contents. All output is logged to /tmp/init\_disk.out and /tmp/init\_disk.log

#### Warnings:

Do not use one disk in more than one volume group. The number of physical disks must be greater than or equal to the number of volume groups and the total capacity must be greater than or equal to the required capacity.

#### Templates:

Init\_disk will choose the appropriate template from which to start. Below are the templates found in /tmp that are used.

```
-rwxr-xr-x 1 root sys 1228 Sep 16 19:19 disk_temp.K380X1
-rwxr-xr-x 1 root sys 1566 Sep 16 19:19 disk_temp.K380X1PM
-rwxr-xr-x 1 root sys 1503 Oct 18 20:01
disk_temp.K380X1PM_18G
-rwxr-xr-x 1 root sys 1206 Oct 18 20:01 disk_temp.K380X1_18G
-rwxr-xr-x 1 root sys 1364 Sep 16 19:19 disk_temp.K380X2
-rwxr-xr-x 1 root sys 2215 Sep 16 19:19 disk_temp.K380X2PM
-rwxr-xr-x 1 root sys 2111 Oct 18 20:01
disk_temp.K380X2PM_18G
-rwxr-xr-x 1 root sys 1836 Sep 16 19:19 disk_temp.K380X2R
-rwxr-xr-x 1 root sys 1653 Oct 18 20:01 disk_temp.K380X2R_18G
-rwxr-xr-x 1 root sys 1323 Oct 18 20:01 disk_temp.K380X2_18G
-rwxr-xr-x 1 root sys 1441 Sep 16 19:19 disk_temp.K580X4
-rwxr-xr-x 1 root sys 3310 Sep 16 19:19 disk_temp.K580X4PM
-rwxr-xr-x 1 root sys 3100 Oct 18 20:01
disk_temp.K580X4PM_18G
-rwxr-xr-x 1 root sys 4406 Sep 16 19:19 disk_temp.K580X4R
-rwxr-xr-x 1 root sys 3796 Oct 18 20:01 disk_temp.K580X4R_18G
-rwxr-xr-x 1 root sys 1378 Oct 18 20:01 disk_temp.K580X4_18G
-rwxr-xr-x 1 root sys 4844 Sep 16 19:19 disk_temp.K580X6R
-rwxr-xr-x 1 root sys 4090 Sep 16 19:19 disk_temp.N4000X8
-rwxr-xr-x 1 root sys 3592 Sep 16 19:19 disk_temp.N4000X8R
```

The `init_disk` script will identify the hardware and number of CPUs and ask the installer if this is a PM configuration. It will then determine which template is a match. Once the file is called and edited, if necessary, the saved version of it will be `/startup/disk_cfg`.

---

## ColdStart Screen Output

### Summary

The following messages are displayed when `./coldStart` is run:

```
=====
START: INSTALLATION Tue Nov 21 09:55:31 EST 2000
```

#### EMS SYSTEM INITIALIZATION PROGRAM

This is a fresh start of coldStart  
CHECK\_POINT=0

The EMS new host initialization is about to begin. You will be prompted for user information next. After all user input has been entered, the installation will continue automatically. This process may take up to 2 hours to complete and should not require user interaction until completed.

Do you wish to continue with this initialization (y/n/q)? y

```
EMS_HOST_MODEL_NUM=K360
EMSROOT=/ems
EMS_GID=200
INFORMIX_GID=201
EMS_UID=200
INFORMIX_UID=201
TL1_UID=203
```

```
-----
coldStart performs getInformix() function .....
```

#### INFORMIX LICENSE INFORMATION:

License information is required to validate the INFORMIX fileset.

Do you wish to specify INFORMIX license information at this time (y/n/q)? y

Please enter the Serial Number for the INFORMIX DynamicServer package:  
AAC#J673963

You have entered AAC#J673963 as INFORMIX DynamicServer Serial Number.

Is this correct?

Press [y] for yes or [n] for no, then press [Return]: y

Please enter the Key for the INFORMIX DynamicServer package: OHSCJT

You have entered OHSCJT as INFORMIX DynamicServer Key.

Is this correct?

Press [y] for yes or [n] for no, then press [Return]: y

-----  
coldStart performs getOrbix() function .....

ORBIX MT LICENSE INFORMATION:

License information is required to validate the ORBIX fileset.

Do you wish to specify ORBIX license information at this time (y/n/q)? y

Please enter the License String for the ORBIX package: 19897393-38b22499-39355537-3130ba30-8a02dc31

You have entered 19897393-38b22499-39355537-3130ba30-8a02dc31 as

ORBIX License Key.

Is this correct?

Press [y] for yes or [n] for no, then press [Return]: y

-----  
coldStart performs getOrbixNames() function .....

Do you wish to specify OrbixNames license information at this time (y/n/q)? y

Please enter the License String for the OrbixNames package: 19907393-31993599-32367135-3131b935-b0120132

You have entered 19907393-31993599-32367135-3131b935-b0120132 as

OrbixNames License Key.

Is this correct?

Press [y] for yes or [n] for no, then press [Return]: y

-----  
Please enter your local DNS domain name (blank for none): [Return]

You have entered as local DNS domain name.

Is this correct?

Press [y] for yes or [n] for no, then press [Return]: y

#### INPUT REVIEW

The following is a review of the required information:

1. EMS Home Directory = /ems
2. EMS Group ID (GID) = 200
3. INFORMIX Group ID (GID) = 201
4. EMS User ID (UID) = 200
5. INFORMIX User ID (UID) = 201

6. TL1 User ID (UID) = 203
7. INFORMIX DynamicServer Serial Number = AAC#J673963
8. INFORMIX DynamicServer Key= OHSCJT
9. ORBIX MT License Code = 19897393-38b22499-39355537-3130ba30-8a02dc31
- 10.OrbixNames License Code = 19907393-31993599-32367135-3131b935-b0120132
- 11.Local DNS Domain Name =

**WARNING:**

*If communicating with ITM-NM (SONET), the Local DNS Domain Name MUST NOT be set.*

Enter the item number [1-11] to change the current value.  
Enter "s" to save the above input and continue.

What would you like to do [1-11 or s][q to quit]: s

EMS System Initialization will continue automatically.  
Check /tmp/coldStart.log file for logged messages.

-----  
coldStart performs setUpGroup() function .....

Setting up groups.....

-----  
coldStart performs setUpUser() function .....

Setting up user logins.....

-----  
coldStart performs setUpInformix() function .....

Installing DynamicServer license will take about 10 minutes!

Informix Dynamic Server Version 7.31.UC2XC  
Copyright (C) 1986-1999 Informix Software, Inc.

#### Installation and Configuration Script

This installation procedure must be run by a privileged user (Super User)  
It will change the owner, group, mode, (and other file attributes on  
Secure systems) of all files of this package in this directory.

There must be a user "informix" and a group "informix" known to the system.

Press RETURN to continue,  
or the interrupt key (usually CTRL-C or DEL) to abort.

Enter your serial number (for example, INF#X999999) >  
Enter your serial number KEY (uppercase letters only) >

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Press RETURN to continue,  
or the interrupt key (usually CTRL-C or DEL) to abort.

Installing directory .  
Installing directory aaodir  
Installing directory bin  
Installing directory snmp  
Installing directory snmp/snmpd  
Installing directory snmp/peer  
Installing directory dbssodir  
Installing directory lib  
Installing directory lib/csm  
Installing directory msg  
Installing directory msg/en\_us  
Installing directory msg/en\_us/0333  
Installing directory etc  
Installing directory incl  
Installing directory incl/hpl  
Installing directory incl/esql  
Installing directory release  
Installing directory release/en\_us  
Installing directory release/en\_us/0333  
Installing directory forms  
Installing directory demo  
Installing directory demo/dbaccess  
Installing directory hhelp  
Installing directory hhelp/xprinter  
Installing directory hhelp/xprinter/FontMetrics  
Installing directory hhelp/xprinter/FontMetrics/AFM  
Installing directory hhelp/xprinter/FontMetrics/TFM  
Installing directory hhelp/xprinter/PCLPPDS  
Installing directory hhelp/xprinter/PPDS  
Installing directory hhelp/xprinter/PSPPDS

Installing directory ism  
Installing directory gls  
Installing directory gls/cm3  
Installing directory gls/cv9  
Installing directory gls/lc11  
Installing directory gls/lc11/cs\_cz  
Installing directory gls/lc11/da\_dk  
Installing directory gls/lc11/de\_at  
Installing directory gls/lc11/de\_ch  
Installing directory gls/lc11/de\_de  
Installing directory gls/lc11/en\_au  
Installing directory gls/lc11/en\_gb  
Installing directory gls/lc11/en\_us  
Installing directory gls/lc11/es\_es  
Installing directory gls/lc11/fi\_fi  
Installing directory gls/lc11/fr\_be  
Installing directory gls/lc11/fr\_ca  
Installing directory gls/lc11/fr\_ch  
Installing directory gls/lc11/fr\_fr  
Installing directory gls/lc11/is\_is  
Installing directory gls/lc11/it\_it  
Installing directory gls/lc11/ja\_jp  
Installing directory gls/lc11/ko\_kr  
Installing directory gls/lc11/nl\_be  
Installing directory gls/lc11/nl\_nl  
Installing directory gls/lc11/no\_no  
Installing directory gls/lc11/os  
Installing directory gls/lc11/pl\_pl  
Installing directory gls/lc11/pt\_br  
Installing directory gls/lc11/pt\_pt  
Installing directory gls/lc11/ru\_ru  
Installing directory gls/lc11/sk\_sk  
Installing directory gls/lc11/sv\_se  
Installing directory gls/lc11/th\_th  
Installing directory gls/lc11/zh\_cn  
Installing directory gls/lc11/zh\_tw

Installing Shared Libraries in System Directories ...

Linking /usr/lib/iosm07a.sl from lib/iosm07a.sl

Linking /usr/lib/ipldd07a.sl from lib/ipldd07a.sl

Installation of Informix Dynamic Server complete.

Done for installing DynamicServer!!!

Installing IECC license will take about 5 minutes!

#### Installation Script

This installation procedure must be run by root (super-user). It will change the owner, group, and mode of all files of this package in this directory. There must be a user "informix" and a group "informix" known to the system.

Press RETURN to continue,  
or the interrupt key (usually CTRL-C or DEL) to abort.

Enter your serial number (for example, INF#X999999) >  
Enter your serial number KEY (uppercase letters only) >

#### WARNING!

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Press RETURN to continue,  
or the interrupt key (usually CTRL-C or DEL) to abort.

Installing directory .  
Installing directory bin  
Installing directory lib  
Installing directory msg  
Installing directory msg/en\_us  
Installing directory msg/en\_us/0333  
Installing directory release  
Installing directory release/en\_us  
Installing directory release/en\_us/0333  
Installing directory etc

Installing Shared Libraries in System Directories ...

Linking /usr/lib/liborb\_r.sl from lib/liborb\_r.sl

Installation of INFORMIX-Enterprise Command Center complete.

Done for installing IECC!!!

-----  
coldStart performs setUpOrbix() function .....

Install Orbix License.....

OrbixSSL Java enabled daemon v2.3c03-01  
s1190-2.3c03-01: Orbix Version v2.3c03-01 for Native C++ compiler on HP/  
UX 10

Implementation Repository Path :/ems/Orbix/ImpRep  
Daemon Port :1570  
Daemon Port Base :1590  
Daemon Port Range :1000  
Orbix Errors File :/ems/Orbix/cfg/ErrorMsgs  
Orbix Locator Path :/ems/Orbix/cfg  
Interface Repository Path :/ems/Orbix/Interfaces  
Local Host :rafiki  
Local domain :

Java Interpreter :java  
Default Classpath :.

Done for installing Orbix!!!

-----  
coldStart performs setUpOrbixNames() function .....

Install OrbixNames License.....

[ s1225: OrbixNames (Release 1.1c01-08) ]  
[ s1371: OrbixOTM package (Release 1.0c02) ]  
[ Name server exiting with status: 0 ...]

Done for installing OrbixNames!!!

-----  
coldStart performs setCronAt() function .....

-----  
coldStart performs chgFSPerm() function .....

Set file system ownership, group and permission

-----  
coldStart performs rebuild\_kernel() function .....

Modifying kernel parameters  
Trying to rebuild kernel  
Compiling /stand/build/conf.c...  
Loading the kernel...  
Generating kernel symbol table...  
Kernel rebuild successfully  
Installing new kernel  
Shutdown at 10:00 (in 1 minute) [pid 7763]

-----  
coldStart performs setUpFTP() function .....

Adding FTP related entries into /etc/passwd and /etc/group  
Creating new home directory for FTP user  
Setting up FTP home directory

Check /tmp/coldStart.log file for logged messages.

END: INSTALLATION Tue Nov 21 09:59:55 EST 2000

=====

---

## SNMS Installation Screen Output

### Summary

The following pages show screen displays that appear during the WaveStar SNMS application installation:

#### # installEms

Did you add or modify hardware configuration since init\_disk was done?  
For example, add a LAN Card? (y/n/q): **n**

The root node for the SNMS application is /ems.  
<CR> if OK, (q) to exit, or change to:

InstallEms is checking Hardware, please be patient!

The current EMS run level is "Shutdown".

=====

EMS INSTALLATION AND CONFIGURATION PROGRAM 11-20-00

Current EMS Version: 4.2.0-176

Main Menu:

- 1) Backup the current EMS database & configuration settings
- 2) Restore a previously saved EMS database & configuration settings
- 3) Install/Upgrade EMS software
- 4) Configure EMS - making the provisioned parameters effective
- 5) Configure EMS using profile saved from last session
- 6) Configure Redundancy
- 7) Display EMS system information
- 0) Exit

NOTE: Root permission ("su" without -) is required for all tasks

Specify your choice by number: **3**

The EMS Application installation is about to begin. This process may take up to 2 hours to complete and should not require any further user interaction.

Do you wish to continue with this installation (y/n)? **y**

WARNING:

The EMS Application database should be backed up prior to upgrading the software.

Do you wish to backup the EMS application database(y/n/q)? **n**

User bypassed backup prior to performing the upgrade  
OLDVER=(4.2.0) NEWVER=()

The EMS Application installation will automatically upgrade the current database for use with the new software. This step may be skipped and performed manually at the end of the installation.

Do you wish to upgrade the database automatically (y/n/q)? **n**

User bypassed. Can be performed manually at the end of the installation

Starting the APPLICATION LOADING process ...

What software media will be used to load the EMS Application:

1. CD-ROM
2. Digital Audio Tape (DAT)

Please enter the software media type [1/2/q]? **2**

Saving existing SNMS setup files ...

Saving the existing setup files ...

If this is an upgrade operation, it will destroy existing files in the following directories:

bin,  
tbin,  
lib,  
etc  
bwx6.2

Orbix/Interfaces

However, existing setup files have been saved for you to restore later.

Are you ready to proceed? (y) to proceed, <CR> to skip, or (q) to quit: **y**

Removing files from /ems/dt\_bin ...

Removing files from /ems/bin ...

Removing files from /ems/Orbix/Interfaces ...

Removing files from /ems/tbin ...

Removing files from /ems/lib ...

Removing files from /ems/etc ...

Write-protect the delivery tape and put it in the tape drive.

Hit <CR> to continue .....

Reading table of content on Tape ....

This MEDIA contains the following filesets:

FILESET	SIZE(KB)	DESCRIPTION
SNMS.snms-install.snmsInstall software"	122.5	"SNMS installation
SNMS.snms-install.snmslibc	1997.4	"Shared Library"
SNMS.snmsFixDir.snmsInterfaces	932.0	"interface files for Orbix"
SNMS.snmsFixDir.snmsRogue SNMS"	5461.6	"RogueWave library for
SNMS.snmsRelease.snms software"	1708779.4	"snms application
EMSROOT	1708779.4	
/tools	6393.6	
Total	1715173.0	

Available space at /ems is: 4879425 Kbytes

Going ahead with the assumption that space is OK.

The new EMS files will be installed ...

Are you ready to proceed? (y) to proceed, <CR> to skip, or (q) to quit: **y**

```
===== 11/20/00 12:28:43 EST BEGIN swinstall SESSION
(non-interactive)
```

```
* Session started for user "root@labtst".
```

```
* Beginning Selection
```

```
* Target connection succeeded for "labtst:/".
```

```
* "labtst:/dev/rmt/0m": This source is a tape device.
```

```
* "labtst:/dev/rmt/0m": Cannot open the logfile on this target
or source. Possibly the media is read-only or there is a
permission problem. Check the daemon logfile and
"/var/tmp/swagent.log" on this host for more information.
```

```
* Source: /dev/rmt/0m
```

```
* Targets: labtst:/
```

```
* Software selections:
```

```
SNMS.snmsInterfaces,r=10.0,v=SNMS
```

```
SNMS.snmsRogue,r=10.0,v=SNMS
```

```
* Selection succeeded.
```

```
* Beginning Analysis
* Session selections have been saved in the file
"/var/adm/sw/sessions/swinstall.last".
WARNING: "labtst/": There will be no attempt to mount filesystems that
appear in the filesystem table.
* Analysis succeeded.
```

```
* Beginning Execution
* The execution phase succeeded for "labtst/".
* Execution succeeded.
```

NOTE: More information may be found in the agent logfile (location is labtst:/var/adm/sw/swagent.log).

```
===== 11/20/00 12:56:23 EST END swinstall SESSION (non-interactive)
```

OS and Package files loaded.

```
===== 11/20/00 12:56:23 EST BEGIN swinstall SESSION (non-
interactive)
```

```
* Session started for user "root@labtst".
```

```
* Beginning Selection
* Target connection succeeded for "labtst:/ems".
* "labtst:/dev/rmt/0m": This source is a tape device.
* "labtst:/dev/rmt/0m": Cannot open the logfile on this target
or source. Possibly the media is read-only or there is a
permission problem. Check the daemon logfile and
"/var/tmp/swagent.log" on this host for more information.
* Source:          /dev/rmt/0m
* Targets:         labtst:/ems
* Software selections:
      SNMS.snms,r=4.2,v=SNMS
* Selection succeeded.
```

```
* Beginning Analysis
* Session selections have been saved in the file
"/var/adm/sw/sessions/swinstall.last".
WARNING: "labtst:/ems": There will be no attempt to mount filesystems
that appear in the filesystem table.
* Analysis succeeded.
```

```
* Beginning Execution
WARNING: "labtst:/ems": 1 postinstall or postremove scripts had
warnings.
* Execution succeeded.
```

NOTE: More information may be found in the agent logfile (location is labtst:/ems/var/adm/sw/swagent.log).

===== 11/20/00 13:24:45 EST END swinstall SESSION (non-interactive)

WaveStar SNMS release files are loaded.  
obr\_root/Data/ALLMETRO: No such file or directory  
obr\_root/Data/OXC\_LR: No such file or directory  
sw/data/ALLMETRO: No such file or directory  
sw/data/OXC\_LR: No such file or directory  
obr\_root/Data/ALLMETRO: No such file or directory  
obr\_root/Data/OXC\_LR: No such file or directory  
sw/data/ALLMETRO: No such file or directory  
sw/data/OXC\_LR: No such file or directory  
ems  
labtst

Setting up .profile for user tl1 ...

Starting the EMS PROVISIONING process ...

At this time, you may choose a new set of environment parameters for the new SNMS configuration.

**WARNING:**

The EMS new host Informix Database configuration is about to begin. The Informix Database configuration will use socket instead of share memory. Please adjust your Name Service Switch accordingly.

Do you want to continue this process (y/n/q): **n**

Skip Informix Database configuration!

Press [ENTER] to continue.

ifconfig: no such interface

The following LAN interface(s) have been detected:

lanmux 0	10/4/8	lanmux0	CLAIMED	INTERFACE HP J2146A - 802.3 LAN
lanmux 1	10/4/16	lanmux0	CLAIMED	INTERFACE HP J2146A - 802.3 LAN
lan	2 10/12/6	lan2	CLAIMED	INTERFACE Built-in LAN

Press [Enter] to continue

1. Network Service Attachment Point (NSAP) forms (Fixed/Flexible)?: **Fixed**

2. Activate SONET Directory Services (y/n)?: **Y**

### 3. NE PROTOCOL INFORMATION

The current configuration is displayed:

CMISE: (y/n) **Y**  
OSI TL1: (y/n) **Y**  
X.25 TL1: (y/n) **Y**

Please enter the item number [1-3] to make change.  
Enter "s" to save the above input and continue.  
Enter "q" to quit. **s**

The current OSI Configuration is summarized as following:

1. lanmux 0 10/4/8 - N/C
2. lanmux 1 10/4/16 - N/C
3. lan 2 10/12/6 - Primary 000000 0000 0000

Please use the following menu to customize your local configuration

1. Primary OSI LAN interface number= 3
2. Organization Identifier= 000000
3. Routing Domain= 0000
4. OSI Area= 0000
5. OSI Lan Redundancy is configured. Redunant OSI Lan interface = 3
6. IP address for OSI over TCP/IP= 172010010150

Enter the item number [1-6] to change the current value.  
Enter "s" to save the above input and continue.  
What would you like to do [1-6, or s] [q to quit]: **s**

### CMISE INFORMATION REVIEW

The following is a review of Network Element protocol information:

1. EMS Name = ems123
2. Presentation Selector = 70737431
3. Session Selector = 73657331
4. Transport Selector = 747030
5. OLS-400G Support = YES

Enter the item number [1-5] to change the current value.  
Enter "s" to save the above input and continue.  
What would you like to do [1-5, or s] [q to quit]: **s**

## DIB PREFIX REVIEW:

The following is a review of DIB prefix:

1. DIB Country Name prefix = US
2. DIB Organization Name prefix = LUCENT
3. DIB Organization Unit Name prefix = SNMS1;SNMS2

Enter the item number [1-3] to change the current value.

Enter "s" to save the above input and continue.

What would you like to do [1-3, or s] [q to quit]: **s**

Accept the current configuration (y/n/q)? **y**

Saving the configuration.....Configuration saved.

Your SNMS environment:

APPTAG = EMS

EMSROOT = /ems

APPCONFIG = /ems/etc/appconfig

APPMON\_PORT= 7578

ROAMLOG = /ems/log/data

Running Setup from scratch.

EMS is being reconfigured.

Successful Validation. Created appconfig from appconfig.t

/ems/obr\_root/Data/ALLMETRO: No such file or directory

/ems/obr\_root/Data/OXC\_LR: No such file or directory

/ems/sw/data/ALLMETRO: No such file or directory

/ems/sw/data/OXC\_LR: No such file or directory

/ems/obr\_root/Data/ALLMETRO: No such file or directory

/ems/obr\_root/Data/OXC\_LR: No such file or directory

/ems/sw/data/ALLMETRO: No such file or directory

/ems/sw/data/OXC\_LR: No such file or directory

Change permission of files.....

The following directories are currently defined for PM data collection -

/reports/pm

Do you wish to change the list of PM directories(y/n)? **n**

Creating link for ALLMETRO...

```
In: /ems/sw/data/ALLMETRO exists
In: /ems/obr_root/Data/ALLMETRO exists
Creating link for OXC_LR...
```

```
In: /ems/sw/data/OXC_LR exists
In: /ems/obr_root/Data/OXC_LR exists
Done creating links
```

After installEms exited, you may be logged out automatically. If not, logout yourself. Login again as a EMS user, then start SNMS with the "up" command.

Thank you for using "installEms"!

Enter the following commands:

```
# pfs_umount /cdrom
# exit
# exit
```

Login as **ems** and enter the following command:

```
up
```

---

## Introduction

---

### Summary

This chapter provides general information about redundancy procedures. It also contains Planning Information Worksheets to help the installer in preparing cluster information and configuration for redundant systems.

---

### Contents

The following topics are discussed in this chapter.

- Redundancy Configurations 2
  - Hardware Worksheet 11
  - Volume Group and Physical Volume Worksheet 12
  - Cluster Configuration Worksheet 16
  - Screen Output for Rejoin Command 17
-

---

## Redundancy Configurations

---

### System planning

Planning Information Sheets are available to help the installer in preparing cluster installation and configuration for redundant systems. These forms should be completed in as much detail as possible as they will provide inputs to the `init_disk` template modification as well as prompts by the `installHA` script. It is also important to document the configured system for future maintenance. When filling in the Planning Sheets, the following commands are useful in determining the correct information:

```
# uname -a
# dmesg
# ioscan -fn
# lanscan
# vgdisplay -v [/dev/vgXX]
```

**NOTE:**

Planning Information Worksheets for hardware planning per node, volume group and physical volume planning per node, and local cluster configuration planning are available at the end of this chapter.

---

### Host configurations for redundancy

The following tables outline redundancy configurations for K-class and N-class servers.

**Table 7-1. Redundancy Configurations for K-class Servers (single host)**

HP System Model:	<b>K380(K360)</b> 2 CPUs	<b>K580</b> 4 CPUs	<b>K580</b> 6 CPUs
HP-UX Version	Release 11.0(32bit)	Release 11.0(32bit)	Release 11.0(32bit)
NELU	Refer to Performance and Capacity Document		
Memory	1024 MB	1280 MB	4096MB
Swap Space	1GBx2	2.5GB	4GBx2
Total Disk Space	108GB	288GB	360GB
Base Disk Space (minimum)*	18GBx2	18GBx2	20GBx2
PM+NB Log Disk Space (minimum)*	26GBx2	94GBx2	156GBx2
DAT Tape Drive	DDS3		
CD-ROM Drive	DVD		
SCSI Controller	4	6	8
LAN Interface Card	5	5	7
Cabinet	2.0m, 1/host	2.0m, 2/host	2.0m, 2/host

**Table 7-2. Redundancy Configurations for N-class Servers (single host)**

HP System Model:	N4000-440 /8 CPUs
HP-UX Version	Release 11.0 (64bit)
NELU	Refer to Performance and Capacity Document
Memory	8GB
Swap Space	8GB
Total Disk Space	288GBx2(16x36GB drives)
DAT Tape Drive	12GB DDS
CD-ROM Drive	DVD
SCSI Controller	4
LAN Interface Card	4
Cabinet	1.6m, 1/host

**Table 7-3. HVD10/SC10 Configuration for Redundancy Server**

HP System Model:	Bus Mode	Jumper Setting
K380 2 CPUs	Split Bus/Dual Connection	01111
K580 4 CPUs	Split Bus/Dual Connection	01111
K580 6 CPUs	Split Bus/Dual Connection	01111
N-4000 8 CPUs	Split Bus/Dual Connection	01111

**Table 7-4. Disk Partitions for K380 Redundancy**

Disk No.(Size)		Mount Point	K380(K360) (2 CPUs)
			Allocated Space
VG#0 (SCSI bus#1) (9GBx2, Mirrored)	VG#0 (18GBX2, Mirrored)	Swap1	1536MB
		/	100MB
		/stand	100MB
		/opt	1024MB
		/var	1024MB
		/usr	512MB
		/home	100MB
		/tmp	512MB
		dbspace	dbspe_1G
VG#1(SCSI Bus #1) (9GBx2, Mirrored)		/ems	6GB
		/tools	600MB
		/reports	1.8GB
VG#2(SCSI Bus #2) (9GBx2, Mirrored)	VG#1 (18GBX2, Mirrored)	dbspace	dbsp1_1G
		pmspace	pmsp{1-3}_2G
VG#3 (9GBx2, Mirrored)		dbspace	dbsp2_1G
		dbspace	dbsp3_1G
		pmspace	pmsp{4-6}_2G
VG#4 (9GBx2, Mirrored)	VG#2 (18GBX2, Mirrored)	pmspace	pmsp{7-10}_2G
		pmspace	pmsp{11,12}_2G
VG#5 (9GBx2, Mirrored)		/data	4GB

**Table 7-5. Disk Partitions for K580/4CPU Redundancy**

Disk No.(Size)		Mount Point	K580 (4 CPUs)
			Allocated Space
VG#0 (9GBx2,Mirrored)	VG#0 (18GBX2, Mirrored)	Swap	1536MB+1024MB
		/	100MB
		/stand	100MB
		/opt	1024MB
		/var	1024MB
		/usr	512MB
		/home	100MB
		/tmp	512MB
		dbspace	dbspe1_1G
VG#1 (9GBx2, Mirrored)		/ems	6GB
		/tools	600MB
		/reports	1.8GB
VG#2 (9GBx2, Mirrored )	VG#1 (18GBX2, Mirrored)	dbspace	dbsp1_2G
		pmspace	pmsp{1-3}_2G
VG#3 (9GBx2, Mirrored)		dbspace	dbsp2_2G
		pmspace	pmsp{4-6}_2G
VG#4 (9GBx2,Mirrored)	VG#2 (18GBX2, Mirrored)	dbspace	dbsp3_2G
		dbspace	dbspe2_2G
		pmspace	pmsp{7-8}_2G
VG#5 (9GBx2, Mirrored)		dbspace	dbsp4_2G
		dbspace	dbspe3_2G
		pmspace	pmsp{9-10}_2G
VG#6 (9GBx2, Mirrored)	VG#3 (18GBX2, Mirrored)	dbspace	dbsp5_2G
		pmspace	pmsp{11-13}_2G
VG#7 (9GBx2, Mirrored)		dbspace	dbsp6_2G
		pmspace	pmsp{14-16}_2G
VG#8 (9GBx2, Mirrored)	VG#4 (18GBX2, Mirrored)	pmspace	pmsp{17-20}_2G
VG#9 (9GBx2, Mirrored)		pmspace	pmsp{21-24}_2G

Disk No.(Size)		Mount Point	K580 (4 CPUs)
			Allocated Space
VG#10 (9GBx2, Mirrored)	VG#5 (18GBX2, Mirrored)	pmspace	pmsp{25-28}_2G
VG#11 (9GBx2, Mirrored)		pmspace	pmsp{29-32}_2G
VG#12 (9GBx2, Mirrored)	VG#6 (18GBX2, Mirrored)	pmspace	pmsp{33-36}_2G
VG#13 (9GBx2, Mirrored)		pmspace	pmsp{37-40}_2G
VG#14 (9GBx2, Mirrored)	VG#7 (18GBX2, Mirrored)	pmspace	pmsp{41-44}_2G
VG#15 (9GBx2, Mirrored)		pmspace	pmsp{45-46}_2G
		/data	4GB

**Table 7-6. Disk Partitions for K580/6CPU Redundancy**

Disk No.(Size)	Mount Point	K580 (6 CPUs)
		Allocated Space
VG#0 (18GBx2,Mirrored)	Swap1	1024MB
	/	100MB
	/stand	100MB
	/opt	1024MB
	/var	1024MB
	/usr	512MB
	/home	100MB
	/tmp	512MB
	/var/opt/omni(optional)	4096MB
	/tools	640MB
	/work (for all purposes) (Total Used)	4GB 13GB
VG#1 (18GBx2,Mirrored)	/ems	6GB
	/data	10GB
	/reports	1.5GB

Disk No.(Size)	Mount Point	K580 (6 CPUs)
		Allocated Space
VG#2 (18GBx2, Mirrored )	dbspace	dbsp1_2G
	pmspace	pmsp{1-7}_2G
VG#3 (18GBx2, Mirrored)	Swap2	1024MB
	dbspace	dbsp2_2G
	pmspace	pmsp{8-14}_2G
VG#4 (18GBx2, Mirrored)	Swap3	1024MB
	dbspace	dbsp3_2G
	pmspace	pmsp{15-21}_2G
VG#5 (18GBx2, Mirrored)	Swap4	1024MB
	dbspace	dbsp4_2G
	pmspace	pmsp{22-28}_2G
VG#6 (18GBx2, Mirrored)	dbspace	dbsp5_2G
	pmspace	pmsp{29-35}_2G
VG#7 (18GBx2, Mirrored)	pmspace	pm{36-42}_2G
	dbspace	dbsp6_2G
VG#8 (18GBx2, Mirrored)	nqspace	nqsp{1-8}_2G
	dbspace	dbspe1_1G
VG#9 (9GBx2, Mirrored)	pmspace	pmsp{43-46}_2G
VG#10 (9GBx2, Mirrored)	pmspace	pmsp{47-50}_2G
VG#11 (9GBx2, Mirrored)	nqspace	nqsp{9-12}_2G
VG#12 (9GBx2, Mirrored)	nqspace	nqsp{13-15}_2G
	dbspace	dbspe2_2G

**Table 7-7. Disk Partitions for N4000/8CPU Redundancy**

Disk No.(Size)	Mount Point	N4000 (8 CPUs)
		Allocated Space
VG#0 (9GBx2,Mirrored)	Swap1	2048MB
	/	140MB
	/stand	100MB
	/opt	1024MB
	/var	1024MB
	/usr	512MB
	/home	100MB
	/tmp	1024MB
VG#1 (35GBx2,Mirrored)	/ems	6GB
	/data	10GB
	/reports	2GB
	/tools	640MB
	/work (for all purposes)	4GB
	/var/opt/omni(optioanl)	4GB
VG#2 (35GBx2, Mirrored )	dbspace	dbsp1_2G
	Swap2	1024MB
	pmspace	pmsp{1-15}_2G
VG#3 (35GBx2,Mirrored)	dbspace	dbsp2_2G
	Swap3	1024MB
	pmspace	pmsp{16-30}_2G

Disk No.(Size)	Mount Point	N4000 (8 CPUs)
		Allocated Space
VG#4 (35GBx2, Mirrored)	dbspace	dbbsp3_2G
	Swap4	1024MB
	pmspace	pmsp{31-45}_2G
VG#5 (35GBx2, Mirrored)	dbspace	dbbsp4_2G
	Swap5	1024MB
	pmspace	pmsp{46-50}_2G
	nqspace	nqsp{1-10}_2G
VG#6 (35GBx2, Mirrored)	dbspace	dbbsp5_2G
	Swap6	1024MB
	nqspace	nqsp{11-25}_2G
VG#7(35GBx2, Mirrored)	dbspace	dbbsp6_2G
	Swap7	1024MB
	nqspace	nqsp{26-40}_2G
VG#8(35GBx2, Mirrored)	dbspace	dbbsp7_2G
	dbspace	dbbsp8_2G
	dbspace	dbbsp9_2G
	dbspace	dbbsp10_2G

## Hardware Worksheet

**Table 7-8. Hardware Planning Sheet per Node**

HARDWARE WORKSHEET				
SPU Information				
S800 Host Name:		S800 Series No. :		
Memory Capacity:		Number of I/O Slots:		
LAN Information				
Name of Subnet:	Name of Interface:	IP Address	Traffic Type: Heartbeat/Client/NE/Standby/Other( )	
Name of Subnet:	Name of Interface:	IP Address	Traffic Type: Heartbeat/Client/NE/Standby/Other( )	
Name of Subnet	Name of Interface:	IP Address	Traffic Type: Heartbeat/Client/NE/Standby/Other( )	
Name of Subnet:	Name of Interface:	IP Address	Traffic Type: Heartbeat/Client/NE/Standby/Other( )	
Serial (RS232) Heartbeat Interface Information				
Node Name:		RS232 Device File:		
Node Name:		RS232 Device File:		
Disk I/O Information for Shared Disks				
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:
Bus Type:	SCSI	Slot Number:	Bus Address:	Device File Name:

## Volume Group and Physical Volume Worksheet

**Table 7-9. Volume Group and Physical Volume Planning per Node**

Node Name:	
Volume Group Name: <b>/dev/vg00</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg01</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg02</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg03</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg04</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:

Node Name:	
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg05</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg06</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg07</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:

Node Name:	
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	

Node Name:	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Volume Group Name: <b>/dev/vg</b>	
Name of First Physical Volume Group:	Name of Second Physical Volume group:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:
Physical Volume Name:	Physical Volume Name:

## Cluster Configuration Worksheet

**Table 7-10. Local Cluster Configuration Planning**

Cluster Configuration Worksheet	
Cluster Name:	Virtual IP Address for sncPkg:
Primary Node Name:	subnet for sncPkg:
Secondary Node Name:	Cluster Volume Groups:
Information for Primary Node ( )	Information for Secondary Node ( )
Active Office LAN Name:	Active Office LAN Name:
Active Office LAN IP:	Active Office LAN IP:
Standby Office LAN Name:	Standby Office LAN Name:
Dedicated Heartbeat LAN name:	Dedicated Heartbeat LAN name:
Dedicated Heartbeat LAN IP:	Dedicated Heartbeat LAN IP:
Active OSI/TCPIP LAN name:	Active OSI/TCPIP LAN name:
Active OSI/TCPIP LAN IP:	Active OSI/TCPIP LAN IP:
Standby OSI/TCPIP LAN name:	Standby OSI/TCPIP LAN name:
Subnet Address for OSI LAN:	Subnet Address for OSI LAN:
Heartbeat Serial Device File:	Heartbeat Serial Device File:
Physical Volume name for the Cluster Lock Disk:	Physical Volume name for the Cluster Lock Disk:
First Lock Volume group:	
Number of Shared Volume Groups:	
Remote Cluster Name:	
Primary Node Name:	
Secondary Node Name:	
Information for Remote Primary Node ( )	Information for Remote Secondary Node ( )
Active Office LAN Name:	Active Office LAN Name:
Active Office LAN IP:	Active Office LAN IP:
Heartbeat Interval	2 sec
Node Timeout	4 sec
Network Polling Interval	2 sec
Autostart Delay	0 sec

## Screen Output for Rejoin Command

### Summary

The following pages show screen output that appears during the **rejoin** command execution:

```
# /ems/etc/rejoin
Checking application status...
Get topology file and resync on all hosts...
Establishing connection to HA_Mgr.
Resync Database...
(c)Copyright 1983-1997 Hewlett-Packard Co., All Rights Reserved.
(c)Copyright 1979, 1980, 1983, 1985-1993 The Regents of the Univ. of California
(c)Copyright 1980, 1984, 1986 Novell, Inc.
(c)Copyright 1986-1992 Sun Microsystems, Inc.
(c)Copyright 1985, 1986, 1988 Massachusetts Institute of Technology
(c)Copyright 1989-1993The Open Software Foundation, Inc.
(c)Copyright 1986 Digital Equipment Corp.
(c)Copyright 1990 Motorola, Inc.
(c)Copyright 1990, 1991, 1992 Cornell University
(c)Copyright 1989-1991 The University of Maryland
(c)Copyright 1988 Carnegie Mellon University
(c)Copyright 1991-1997 Mentat, Inc.
(c)Copyright 1996 Morning Star Technologies, Inc.
(c)Copyright 1996 Progressive Systems, Inc.
(c)Copyright 1997 Isogon Corporation
```

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Palo Alto, CA 94304 U.S.A.

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You have mail.

Your SNMS environment:

```
APPTAG = EMS
EMSROOT = /ems
APPCONFIG = /ems/etc/appconfig
```



```
Running buildsmi ....
Bring informix down ....
Bring informix up ....
Dropping/Create database on STANDBY HOST (timon)? (y/n) y6
Dropping/Create database on STANDBY HOST (timon)...
ReConfig ER ...
ER Configuration between pumbaa and timon (as), (y/n)?y
ER Configuration between pumbaa and timon ...
Config module: EAPP
Config module: FM
Config module: LM
Config module: NM
Config module: OAM
Config module: CF
Config module: SDS
Config module: SM
Config module: UI
Config module: CFS1 CFS2
Config module: PM1
Config module: PM2
Config module: PM3
Config module: PM4
Config module: PM5
Config module: NCI
Do you need to activate replication between a and s ? (y/n) y
Start replication...
Suspending replication to timon...
Do you need to do data resync ? (y/n) y
The data resync process might take hours to complete...
Unloading/Loading data...
Do all snms copy w/o skip tables...
Clean ...
copybytable ems_db cf_ne2db 2
4 unloaded/4 loaded
copybytable ems_db cf_global_prov 2
3 unloaded/3 loaded
copybytable ems_db nt_trail 9
2 unloaded/2 loaded
copybytable ems_db nt_xcgroup 5
0 unloaded/skip loading
copybytable ems_db nt_userxc 12
0 unloaded/skip loading
copybytable ems_db ne_ne 34
4 unloaded/4 loaded
copybytable ems_db ne_subnet 6
4 unloaded/4 loaded
copybytable ems_db ne_dccsn 4
```

4 unloaded/4 loaded  
copybytable ems\_db ne\_sonetnetwrk 2  
1 unloaded/1 loaded  
copybytable ems\_db fm\_dbactivelog 16  
14 unloaded/14 loaded  
copybytable ems\_db fm\_dbiafparams 5  
1 unloaded/1 loaded  
copybytable ems\_db fm\_dbusam 9  
3 unloaded/3 loaded  
copybytable ems\_db fm\_lastmessage 14  
3 unloaded/3 loaded  
copybytable ems\_db sm\_user 20  
3 unloaded/3 loaded  
copybytable ems\_db sm\_cmddict 10  
1367 unloaded/1367 loaded  
copybytable ems\_db sm\_cmdgrp 2  
7 unloaded/7 loaded  
copybytable ems\_db sm\_cmdgrpdict 2  
0 unloaded/skip loading  
copybytable ems\_db sm\_tgtgrp 2  
2 unloaded/2 loaded  
copybytable ems\_db sm\_tgtgrpdict 2  
0 unloaded/skip loading  
copybytable ems\_db sm\_neuser 4  
0 unloaded/skip loading  
copybytable ems\_db sm\_secparams 8  
1 unloaded/1 loaded  
copybytable ems\_db oam\_schedinfo 18  
0 unloaded/skip loading  
copybytable ems\_db oam\_schedstat 5  
0 unloaded/skip loading  
copybytable ems\_db oam\_prntgrp 4  
0 unloaded/skip loading  
copybytable ems\_db oam\_pmfiles 6  
0 unloaded/skip loading  
copybytable ems\_db lm\_ps\_neeevent 12  
0 unloaded/skip loading  
copybytable ems\_db sds\_prefix 4  
3 unloaded/3 loaded  
copybytable ems\_db sds\_ne 10  
4 unloaded/4 loaded  
copybytable ems\_db sds\_ae 6  
6 unloaded/6 loaded  
copybytable ems\_db ui\_cpack 3  
0 unloaded/skip loading  
copybytable ems\_db ui\_node 4  
0 unloaded/skip loading

```
copybytable ems_db ui_view 3
46 unloaded/46 loaded
copybytable ems_db ui_aggr 4
0 unloaded/skip loading
copybytable ems_db ui_aggrchild 4
0 unloaded/skip loading
copybytable ems_db ui_user 4
2 unloaded/2 loaded
copybytable ems_db ui_usrprt 5
0 unloaded/skip loading
copybytable ems_db eapp_fmprofile 6
97 unloaded/97 loaded
copybytable ems_db eapp_fmneamap 6
14 unloaded/14 loaded
copybytable ems_db eapp_pmprofile 7
30 unloaded/30 loaded
copybytable ems_db eapp_pmnemap 6
12 unloaded/12 loaded
copybytable cf_db1 snc_assoc 12
0 unloaded/skip loading
copybytable cf_db1 snc_bay 15
1 unloaded/1 loaded
copybytable cf_db1 snc_cktpack 14
22 unloaded/22 loaded
copybytable cf_db1 snc_ctp 12
722 unloaded/722 loaded
copybytable cf_db1 snc_ctpattribute 4
5620 unloaded/5620 loaded
copybytable cf_db1 snc_discrete 4
0 unloaded/skip loading
copybytable cf_db1 snc_discattribute 4
0 unloaded/skip loading
copybytable cf_db1 snc_element 20
2 unloaded/2 loaded
copybytable cf_db1 snc_eqptattribute 4
2153 unloaded/2153 loaded
copybytable cf_db1 snc_neattribute 4
17 unloaded/17 loaded
copybytable cf_db1 snc_port 9
0 unloaded/skip loading
copybytable cf_db1 snc_portattribute 4
0 unloaded/skip loading
copybytable cf_db1 snc_pgattribute 4
40 unloaded/40 loaded
copybytable cf_db1 snc_protgroup 6
5 unloaded/5 loaded
copybytable cf_db1 snc_shelf 16
```

2 unloaded/2 loaded  
copybytable cf\_db1 snc\_slot 19  
42 unloaded/42 loaded  
copybytable cf\_db1 snc\_ttp 12  
12 unloaded/12 loaded  
copybytable cf\_db1 snc\_ttpattribute 4  
210 unloaded/210 loaded  
copybytable cf\_db1 snc\_xc2tprel 3  
4 unloaded/4 loaded  
copybytable cf\_db1 snc\_xcattribute 4  
33 unloaded/33 loaded  
copybytable cf\_db1 snc\_xconn 7  
4 unloaded/4 loaded  
copybytable cf\_db2 snc\_assoc 12  
0 unloaded/skip loading  
copybytable cf\_db2 snc\_bay 15  
1 unloaded/1 loaded  
copybytable cf\_db2 snc\_cktpack 14  
26 unloaded/26 loaded  
copybytable cf\_db2 snc\_ctp 12  
756 unloaded/756 loaded  
copybytable cf\_db2 snc\_ctpattribute 4  
5951 unloaded/5951 loaded  
copybytable cf\_db2 snc\_discrete 4  
0 unloaded/skip loading  
copybytable cf\_db2 snc\_discattribute 4  
0 unloaded/skip loading  
copybytable cf\_db2 snc\_element 20  
2 unloaded/2 loaded  
copybytable cf\_db2 snc\_eqptattribute 4  
1800 unloaded/1800 loaded  
copybytable cf\_db2 snc\_neattribute 4  
31 unloaded/31 loaded  
copybytable cf\_db2 snc\_port 9  
0 unloaded/skip loading  
copybytable cf\_db2 snc\_portattribute 4  
0 unloaded/skip loading  
copybytable cf\_db2 snc\_pgattribute 4  
88 unloaded/88 loaded  
copybytable cf\_db2 snc\_protgroup 6  
8 unloaded/8 loaded  
copybytable cf\_db2 snc\_shelf 16  
2 unloaded/2 loaded  
copybytable cf\_db2 snc\_slot 19  
42 unloaded/42 loaded  
copybytable cf\_db2 snc\_ttp 12  
14 unloaded/14 loaded

copybytable cf\_db2 snc\_tpattribute 4  
226 unloaded/226 loaded  
copybytable cf\_db2 snc\_xc2tprel 3  
16 unloaded/16 loaded  
copybytable cf\_db2 snc\_xcattribute 4  
134 unloaded/134 loaded  
copybytable cf\_db2 snc\_xconn 7  
16 unloaded/16 loaded  
copybytable pm\_db pm\_monitorheader 6  
0 unloaded/skip loading  
copybytable pm\_db pm\_monitorlookup 5  
0 unloaded/skip loading  
copybytable pm\_db pm\_datamap 2  
32 unloaded/32 loaded  
copybytable tmf\_db nci\_snc 9  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_xc 5  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_tp 5  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_tp\_tr\_pars 5  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_tp\_assoc 4  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_xc\_tp\_asso 4  
0 unloaded/skip loading  
copybytable tmf\_db nci\_snc\_add\_info 3  
0 unloaded/skip loading  
copybytable tmf\_db nci\_userlabel 5  
0 unloaded/skip loading  
copybytable tmf\_db nci\_pm\_tp 4  
0 unloaded/skip loading  
copybytable tmf\_db nci\_tp 7  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_alarm 5  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_alarm\_atp 2  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_tca 11  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_co 7  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_co\_me 11  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_co\_tp 20  
0 unloaded/skip loading  
copybytable tmf\_db nci\_nf\_co\_tp\_lp 5

```
0 unloaded/skip loading
copybytable tmf_db nci_nf_co_snc 24
0 unloaded/skip loading
copybytable tmf_db nci_nf_co_snc_tp 6
0 unloaded/skip loading
copybytable tmf_db nci_nf_co_pgp 16
0 unloaded/skip loading
copybytable tmf_db nci_nf_co_pgp_tp 7
0 unloaded/skip loading
copybytable tmf_db nci_nf_do 6
0 unloaded/skip loading
copybytable tmf_db nci_nf_ps 12
0 unloaded/skip loading
copybytable tmf_db nci_nf_sps 16
0 unloaded/skip loading
copybytable tmf_db nci_nf_avcsc 11
0 unloaded/skip loading
copybytable tmf_db nci_nf_client_id 4
0 unloaded/skip loading
copybytable tmf_db nci_nf_filters 4
0 unloaded/skip loading
snms copy completed...
Sending 2nd large data files in background...
Resume replication to timon...
Resync completed at Fri Dec 15 16:51:09 EST 2000...
logout
Resync flat files...
pumbaais active machine.
process not attached to terminal
/ems/etc/BR_rc
/ems/etc/CF_rc
/ems/etc/CM_rc
/ems/etc/EAPP_rc
/ems/etc/FM_rc
/ems/etc/LD_rc
/ems/etc/LM_Client_rc
/ems/etc/LM_rc
/ems/etc/NM_rc
/ems/etc/OA_LogPurger_rc
/ems/etc/OBR_rc
/ems/etc/OSB_rc
/ems/etc/OSWDL_rc
/ems/etc/PM_FTAM.rc
/ems/etc/PM_rc
/ems/etc/RP_rc
/ems/etc/SDSenv_rc
/ems/etc/SF_rc
```

```
/ems/etc/SM_Sec_rc
/ems/etc/SNC_MON_rc
/ems/etc/TLA_CMD_rc
/ems/etc/X25_rc
/ems/etc/foldtrc
/ems/etc/globalenv.rc
/ems/etc/trc
/ems/etc/vuewmrc
990 blocks
/ems/etc/CF_CktPackInfo
20 blocks
/ems/etc/OL_.config
10 blocks
/ems/etc/duainit
10 blocks
/ems/config/OA/scheduler/MultiNeJob.config
10 blocks
/ems/neData
10 blocks
/ems/.pm
/ems/.pm/.pm_global
/ems/.pm/DbManager
/ems/.pm/DbManager/.PM_PurgeFile.sql
/ems/.pm/DbManager/.Pm_DbDataMap_PurgeFile
/ems/.pm/FTAM
/ems/.pm/.pm_divisors
/ems/.pm/.sondre
/ems/.pm/.sondre/lost.20001204
/ems/.pm/.sondre/lost.20001205
/ems/.pm/.sondre/lost.20001206
/ems/.pm/.sondre/lost.20001207
/ems/.pm/.sondre/lost.20001208
/ems/.pm/.sondre/lost.20001209
/ems/.pm/.sondre/lost.20001210
/ems/.pm/.sondre/lost.20001211
/ems/.pm/.sondre/lost.20001212
/ems/.pm/.sondre/lost.20001120
/ems/.pm/.sondre/lost.20001121
/ems/.pm/.sondre/lost.20001122
/ems/.pm/.sondre/lost.20001123
/ems/.pm/.sondre/lost.20001124
/ems/.pm/.sondre/lost.20001125
/ems/.pm/.sondre/lost.20001126
/ems/.pm/.sondre/lost.20001127
/ems/.pm/.sondre/lost.20001128
/ems/.pm/.sondre/lost.20001129
/ems/.pm/.sondre/lost.20001213
```

/ems/.pm/.sondre/lost.20001214  
/ems/.pm/.sondre/lost.20001215  
/ems/.pm/.sondre/lost.20001216  
/ems/.pm/mapping  
/ems/.pm/mapping/attributename  
/ems/.pm/mapping/dirn  
/ems/.pm/mapping/locn  
/ems/.pm/mapping/mfamodifier  
/ems/.pm/mapping/tca  
/ems/.pm/mapping/validity  
/ems/.pm/JRG  
20 blocks  
/ems/config/FM  
/ems/config/FM/FM.cfg  
/ems/config/FM/FM\_Conditions  
10 blocks  
/reports/pm  
10 blocks  
/ems/userdb  
/ems/userdb/tfwdata  
10 blocks  
/ems/dsa/DB-bk  
/ems/dsa/DB-bk/DB  
/ems/dsa/DB-bk/DB.pfx  
/ems/dsa/DB-bk/DB.att  
/ems/dsa/DB-bk/DB.obc  
/ems/dsa/DB-bk/DB.ncx  
/ems/dsa/DB-bk/DB.dsa  
/ems/dsa/DB-bk/DB.crf  
/ems/dsa/DB-bk/aaaaaaaa.iDB  
/ems/dsa/DB-bk/aaaaaaaa.vDB  
/ems/dsa/DB-bk/baaaaaaaa.iDB  
/ems/dsa/DB-bk/BACKUP\_ID  
1180 blocks  
1180 blocks

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You have mail.

Your SNMS environment:

APPTAG = EMS  
EMSROOT = /ems  
APPCONFIG = /ems/etc/appconfig  
APPMON\_PORT= 7578  
ROAMLOG = /ems/log/data

timon is standby machine.

990 blocks  
20 blocks  
10 blocks  
10 blocks  
10 blocks  
10 blocks  
20 blocks  
10 blocks  
10 blocks  
10 blocks

logout

Resync NE SW files...

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Current EMS Version: 4.2.0-200

```
...Creating SNMS R4.2 ems_db Database ...
...Database "ems_db" previously created...
CF Global Tables were created successfully ...
NT Tables were created successfully ...
NM Tables were created successfully ...
FM Tables were created successfully ...
SM Tables were created successfully ...
OAM Tables were created successfully ...
LM Tables and stored procedures were created successfully ...
SDS Tables were created successfully ...
UI Tables were created successfully ...
EAPP Tables were created successfully ...
...Creating SNMS R4.2 cf_db1 Database ...
...Database "cf_db1" previously created...
CF Local Tables were created successfully ...
CF stored procedures were created successfully ...
CF Views were created successfully ...
...Creating SNMS R4.2 cf_db2 Database ...
...Database "cf_db2" previously created...
CF Local Tables were created successfully ...
CF stored procedures were created successfully ...
CF Views were created successfully ...
...Creating SNMS R4.2 pm_db Database ...
...Database "pm_db" previously created...
PM Tables and stored procedures were created successfully ...
...Creating SNMS R4.2 q3nb_db Database ...
...Database "q3nb_db" previously created...
NQ Tables were created successfully ...
...Creating SNMS R4.2 tmf_db Database ...
...Database "tmf_db" previously created...
NCI Tables were created successfully ...
Appmon is already running
```

```
===== Start EMS Application Processes =====
```

CURRENT RUN LEVEL IS: Shutdown

```
</tmp/SNC_LogDaemon.lock locked>.
Process <logdaemon> Started. "SNC_LogDaemon"
</tmp/SNC_LogDaemon.lock released>.
Process <orbixd> Started. "orbixd -u -c $ROAMLOG/OrbixCheckpoint.dat >
$ROAMLOG/OR.out 2>&1"
</tmp/stackHpov.lock locked>.
Process <stackHpov> Started. "startksh OsiStack /tmp/stackHpov.lock"

APPMON WARNING: waiting for /tmp/stackHpov.lock to be unlocked for 1 minute
</tmp/stackHpov.lock released>.
Process <GUIunlock> Started. "rm -f /tmp/GUI_Wait_Locks/* /tmp/CN_ttylocks/*"
Process <GUIunlock> Completed.
Process <sncCron> Started. "Crontab /ems/etc/cronProc"
Process <sncCron> Completed.
Process <ifr> Started. "ifr -L > $ROAMLOG/IFR.out 2>&1"
<delay 1 second>
Process <ns> Started. "ns > $ROAMLOG/NS.out 2>&1"
<delay 1 second>
</tmp/dsa.lock locked>.
Process <DsaStack> Started. "DsaStack /tmp/dsa.lock > /dev/null 2>&1"
</tmp/dsa.lock released>.
</tmp/HA_Mgr.lock locked>.
Process <HA_Mgr> Started. "HA_Mgr -server HA_Mgr -lockfile /tmp/HA_Mgr.lock
> /dev/null 2>&1"
</tmp/HA_Mgr.lock released>.
Process <putit2000> Started. "putit -port 2000 GUI_Server -persistent"
Process <putit2000> Completed.
<delay 2 seconds>
Process <putit3000> Started. "putit -port 3000 GDB_ServerFile -persistent"
Process <putit3000> Completed.
<delay 2 seconds>
Process <putit4000> Started. "putit -port 4000 GDB_Server -persistent"
Process <putit4000> Completed.
<delay 2 seconds>
Process <GUIchmod> Started. "chmodit GUI_Server i+all"
Process <GUIchmod> Completed.
Process <GDBchmodFile> Started. "chmodit GDB_ServerFile i+all"
Process <GDBchmodFile> Completed.
Process <GDBchmod> Started. "chmodit GDB_Server i+all"
Process <GDBchmod> Completed.
</tmp/GUI_TrceServer.lock locked>.
Process <GUI_TrceServer> Started. "GUI_TrceServer TRACE_SERVER >
$ROAMLOG/TRACE_SERVER.out"
</tmp/GUI_TrceServer.lock released>.
Process <DSA_Prov> Started. "DSA_Prov"
</tmp/LD_Manager.lock locked>.
Process <LD_Manager> Started. "LD_Manager -d $LD_DEBUG -k /tmp
```

```
LD_Manager.lock > /dev/null 2>&1"
</tmp/LD_Manager.lock released>.
</tmp/LM_Logger.lock locked>.
Process <LM_Logger> Started. "LM_Logger -s $LML_SIZE -t $LML_TIMER -d
$LML_DEBUG -u $LML_MTB -m $LML_LOGMODE -k /tmp/LM_Logger.lock >
dev/null 2>&1"
</tmp/LM_Logger.lock released>.
</tmp/LM_Browser.lock locked>.
Process <LM_Browser> Started. "LM_Browser -k /tmp/LM_Browser.lock"
</tmp/LM_Browser.lock released>.
Process <PM_DbManager> Started. "PM_DbManager -server PM_DbManager"
Process <PM_DbServer> Started. "PM_DbServer -server PM_DbServer"
</tmp/SB_Q3_400g.01.lock locked>.
Process <SB_Q3_400g01> Started. "startksh run400gq3 -i 01 /tmp
SB_Q3_400g.01.lock"
</tmp/SB_Q3_400g.01.lock released>.
</tmp/SB_Q3_400g.02.lock locked>.
Process <SB_Q3_400g02> Started. "startksh run400gq3 -i 02 /tmp
SB_Q3_400g.02.lock"
</tmp/SB_Q3_400g.02.lock released>.
</tmp/CM.lock locked>.
Process <CM_Server> Started. "CM_Server -l /tmp/CM.lock > $ROAMLOG
CM.out 2>&1"
</tmp/CM.lock released>.
</tmp/NEH_Server.lock locked>.
Process <NEH_Server> Started. "NEH_Server -server NEH_Server -lockfile /tmp
NEH_Server.lock"
</tmp/NEH_Server.lock released>.
</tmp/SDS_Server.lock locked>.
Process <SDS_Server> Started. "SDS_Server -l /tmp/SDS_Server.lock"
</tmp/SDS_Server.lock released>.
</tmp/CS_SbOsi.lock locked>.
Process <CS_SbOsi> Started. "CS_SbOsi -s CS_SbOsi -i 01 -m dlp -t 3 -l /tmp
CS_SbOsi.lock"
</tmp/CS_SbOsi.lock released>.
</tmp/CS_Southbound.lock locked>.
Process <CS_Southbound> Started. "CS_Southbound -s CS_Southbound01 -i 01
-t 3 -l /tmp/CS_Southbound.lock"
</tmp/CS_Southbound.lock released>.
</tmp/SB_TL1Mgr.lock locked>.
Process <SB_TL1Mgr> Started. "SB_TL1Mgr -server SB_TL1Mgr -lockfile /tmp
SB_TL1Mgr.lock"
</tmp/SB_TL1Mgr.lock released>.
</tmp/CF_NeProxy.lock locked>.
Process <CF_NeProxy> Started. "CF_NeProxy -server CF_NeAgent -lockfile
tmp/CF_NeProxy.lock"
</tmp/CF_NeProxy.lock released>.
```

```
</tmp/CF_NeAgent_1.lock locked>.
Process <CF_NeAgent_1> Started. "CF_NeAgent -server CF_NeAgent_1
lockfile /tmp/CF_NeAgent_1.lock -S Agent0001 > $ROAMLOG/CF_NeAgent.out
2>&1"
</tmp/CF_NeAgent_1.lock released>.
Process <CF_NeAgent_2> Started. "CF_NeAgent -server CF_NeAgent_2
lockfile /tmp/CF_NeAgent_2.lock -S Agent0001 > $ROAMLOG/CF_NeAgent.out
2>&1"
</tmp/CF_DbServer.lock locked>.
Process <CF_DbServer> Started. "CF_DbServer -server CF_DbServer -lockfile
tmp/CF_DbServer.lock"
</tmp/CF_DbServer.lock released>.
</tmp/NT_Manager.lock locked>.
tmp/NT_Manager.lock"
</tmp/NT_Manager.lock released>.
Process <NT_Application> Started. "NT_Application -server NT_Application"
</tmp/SNC_Mon.lock locked>.
Process <SNC_Mon> Started. "SNC_Mon SNC_Mon FM_Server /tmp
SNC_Mon.lock > $ROAMLOG/SNC_Mon.out 2>&1"
</tmp/FM_Db.lock locked>.
Process <FM_DbServer> Started. "FM_DbServer FM_Db /tmp/FM_Db.lock"
</tmp/FM_Db.lock released>.
Process <DeviceMon> Started. "DeviceMon FM_server 32000 > $ROAMLOG
DeviceMon.out"
</tmp/FM.lock locked>.
Process <FM_Server> Started. "FM_Server FM_Server /tmp/FM.lock"
</tmp/FM.lock released>.
</tmp/FM_Prov.lock locked>.
Process <FM_Prov> Started. "FM_Prov FM_Prov /tmp/FM_Prov.lock"
</tmp/FM_Prov.lock released>.
</tmp/PROF.lock locked>.
Process <PROF_Prov> Started. "PROF_Prov PROF_Prov /tmp/PROF.lock"
</tmp/PROF.lock released>.
</tmp/SB_Q3Gateway.lock locked>.
Process <SB_Q3Gateway> Started. "SB_Q3Gateway -f $$SNCROOT/etc
gwConfig.txt"
</tmp/SB_Q3Gateway.lock released>.
</tmp/BR_bacres.lock locked>.
Process <BR_bacres> Started. "BR_bacres -server BR_bacres -trace BR=3
lockfile /tmp/BR_bacres.lock > $ROAMLOG/BR.out 2>&1"
</tmp/BR_bacres.lock released>.
</tmp/SM_Security.lock locked>.
Process <SM_Security> Started. "SM_Security -lockfile /tmp/SM_Security.lock
server SM_Security -trace SecServ=5 > $ROAMLOG/SM.out 2>&1"
</tmp/SM_Security.lock released>.
Process <GDB_Server> Started. "GDB_Server GDB_Server"
Process <GDB_ServerFile> Started. "GDB_ServerFile GDB_ServerFile >
```

```
$ROAMLOG/GDB_File.out 2>&1"
Process <GDB_ServerNtwk> Started. "GDB_ServerNtwk GDB_ServerNtwk >
$ROAMLOG/GDB_Ntwk.out 2>&1"
</tmp/OBR_Main.lock locked>.
Process <OBR_Main> Started. "OBR_Main -server OBR_Main -lockfile /tmp
OBR_Main.lock > $ROAMLOG/OBR.out 2>&1"
</tmp/OBR_Main.lock released>.
Process <OBR_Main3K> Started. "OBR_Main3K -server OBR_Main3K"
</tmp/SWM_Gateway.lock locked>.
Process <SWM_Gateway> Started. "SWM_Gateway -server SWM_Gateway
lockfile /tmp/SWM_Gateway.lock -m dlp > $ROAMLOG/SWM.out 2>&1"
</tmp/SWM_Gateway.lock released>.
</tmp/OAM_Scheduler.lock locked>.
Process <OAM_Scheduler> Started. "OAM_Scheduler -server OAM_Scheduler
lockfile /tmp/OAM_Scheduler.lock > $ROAMLOG/SCHED.out 2>&1"
</tmp/OAM_Scheduler.lock released>.
Process <GUI_Server> Started. "GUI_Server GUI_Server >$ROAMLOG/GS.out
2>&1"
Process <GUI_AdminServer> Started. "UI_AdminServer GUI_AdminServer"
Process <GUI_JvmLauncher> Started. "GUI_JvmLauncher"
Process <PM_FTAM_1> Started. "PM_FTAM -server PM_FTAM_1"
Process <PM_FTAM_2> Started. "PM_FTAM -server PM_FTAM_2"
</tmp/PM_Dc.lock locked>.
Process <PM_Dc> Started. "PM_Dc -server PM_Dc -lockfile /tmp/PM_Dc.lock"
</tmp/PM_Dc.lock released>.
</tmp/OAM_BcServer.lock locked>.
Process <OAM_BcServer> Started. "OAM_BcServer -server OAM_BcServer
lockfile /tmp/OAM_BcServer.lock > $ROAMLOG/BS.out 2>&1"
</tmp/OAM_BcServer.lock released>.
Process <putit5000> Started. "putit -port 5000 tmf_notifsvr -persistent"
Process <putit5000> Completed.
<delay 2 seconds>
</tmp/tmf_notifsvr.lock locked>.
Process <tmf_notifsvr> Started. "tmf_notifsvr -server TMFNotifService -lockfile
tmp/tmf_notifsvr.lock -t $LML_TIMER"
</tmp/tmf_notifsvr.lock released>.
</tmp/tmf_gateway.lock locked>.
Process <tmf_gateway> Started. "tmf_gateway -server NetworkR1 -lockfile /tmp
tmf_gateway.lock"
</tmp/tmf_gateway.lock released>.
Process <MTA> Started. "MTA MTA /tmp/MTA"
```

NEW RUN LEVEL IS: Running

===== EMS Application Processes are running =====

```
logout
Join to the cluster...
cmruncl : Cluster is already running on "pumbaa".
cmruncl : Cluster is already running on "timon".
cmrunnode : Cluster is already running on "timon".
cmmodpkg : Warning: Package sncPkg is already able to be switched.
cmmodpkg : Completed successfully on all packages specified.
cmmodpkg : Warning: Node timon is already able to run package sncPkg.
cmmodpkg : Completed successfully on all packages specified.
cmmodpkg : Warning: Package standbyPkg is already unable to be switched.
cmmodpkg : Completed successfully on all packages specified.
cmmodpkg : Warning: Node pumbaa is already unable to run package
standbyPkg .
cmmodpkg : Completed successfully on all packages specified.
cmmodpkg : Completed successfully on all packages specified.
cmrunpkg : Completed successfully on all packages specified.
Establishing connection to HA_Mgr.
```

Your SNMS environment:

```
APPTAG = EMS
EMSROOT = /ems
APPCONFIG = /ems/etc/appconfig
APPMON_PORT= 7578
ROAMLOG = /ems/log/data
```

```
#
```

---



---

# Glossary

---

## 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 WaveStar SNMS 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.

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**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.

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**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.

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**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.

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**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 K-class or N-class server 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.

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**J****Jitter**

Short term variations of amplitude and frequency components of a digital signal from their ideal position in time.

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**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.

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**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).

**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.

**Management Functional Areas (MFAs)**

These refer to the various category of service modules in the system; i.e., Configuration Management, Performance Management, Security Management, etc.

**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.

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**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.

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## 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 $\mu$  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  $\mu$  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  $\mu$  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.

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**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.

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**Q****Quad Optical Translator Unit (QOTU)**

A unit that provides functions similar to an Optical Translator Unit (OTU), except that an QOTU provides the equivalent functionality of four OTUs in a package that is only twice the size of an OTU.

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**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 trouble-shooting.

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**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- $\mu$  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.

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**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.

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**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.

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**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.

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**Z****Zero Code Suppression**

A technique used to reduce the number of consecutive zeros in a line-coded signal (B3ZS, B8ZS).

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