Lucent Technologies
Bell Labs Innovations

WaveStar™ SubNetwork Management System (SNMS)

Operations, Administration, and Maintenance Guide

190-224-101
Release 3.1
Issue 1.0
June 2000

Notice

Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. This information is subject to change, however. Lucent Technologies assumes no responsibility for any errors that may appear in this document.

FCC Warning Statement

This equipment generates, uses, and can radiate radio frequency energy. If not installed, used, and maintained in accordance with the instruction manual, it may cause interference to radio communications. Operation of this equipment in a residential area may cause interference, in which case users will be required to take whatever measures may be required to correct the interference at their own expense.

Trademarks

BaseworX and SLC are registered trademarks of Lucent Technologies.
WaveStar is a trademark of Lucent Technologies.
INFORMIX is a registered trademark of Informix Software, Inc.
Lantronix is a registered trademark of Lantronix.
Microsoft is a registered trademark and Windows and Windows NT are trademarks of Microsoft Corporation.
Hewlett-Packard, HP, and HP-UX are registered trademarks of Hewlett-Packard.
Pentium is a registered trademark of Intel Corporation.
FLEXR is a trademark and Fujitsu is a registered trademark of Fujitsu Ltd.
TITAN is a registered trademark of Tellabs, Inc.
UNIX is a registered trademark in the United States and other countries licensed exclusively through X/Open Company Limited.

Ordering Information

The ordering number for this document is 190-224-101. To order this or any other Lucent Technologies document and software, call your Lucent Technologies account representative or contact the Customer Information Center (CIC) at 1 888 LUCENT8.

Customer Assistance or Technical Support

You may call the toll-free hotline at 1 800 225-4672 for customer assistance and troubleshooting 24 hours a day. See your Lucent Technologies account representative for further details.

This document was produced by Customer Training and Information Products (CTIP).

Contents

Contents

Contents

3 Installation

Contents

Contents

Contents

Contents

6 Troubleshooting

Contents

About This Document

Overview

Purpose

This document provides the system administrator with application information for the installation, turn-up and configuration of the WaveStar™ Subnetwork Management System (SNMS). The system administrator should also understand the user features described in the *WaveStar Subnetwork Management System (SNMS) User Guide*. The information in this manual only describes system operation, administration, and maintenance tasks.

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.

Chapter summary

This document is organized by chapter and covers the following:

- **Chapter 1. Introduction** provides an overview of the system.
- **Chapter 2. System Requirements** describes the hardware and software requirements necessary to install and run the system.

- **Chapter 3. Installation** covers the procedures for implementing a new system installation.
- **Chapter 4. Interface Setup** gives details for setting up the communication interfaces supported by the system.
- **Chapter 5. System Administration** contains the procedures for performing administrative functions such as system startup and shutdown and database backup and restore.
- **Chapter 6. Troubleshooting** offers techniques and tools used to pinpoint and resolve problems and test the system.

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 the following typeface: **rlogin**
- The names of directories, files, screens, and menu items are shown in the following typeface:
  /path/filename
- Messages that appear on a screen are shown in the following typeface:
  `Error message`
- Keyboard keys that you press to enter text or issue commands are shown as follows: Return

Related information

The WaveStar SNMS family includes the following documents and training courses:

Documents

- *SNMS User Guide (190-224-100)*
- *SNMS Operations, Administration & Maintenance Guide (190-224-101)*

The following document covers INFORMIX® database administration:

- *INFORMIX-OnLine Administrator's Guide (000-7106)*

The following documents provide information for the installation, configuration, and maintenance of SNMS hardware components:

- SNMS Host
  - — *Hewlett-Packard® (HP®) 9000/800 Series Computer System Administration Tasks* (B3108-90005)
  - — *HP 9000/800 Series Computers HP-UX Reference* (B2355-90033)
  - — *HP 9000/800 Series Computers Installing and Updating HP-UX* (B3108-90006)
  - — *HP 9000/800 Series Computers Installing Peripherals* (B3108-90004)

Training Courses

- *WaveStar SubNetwork Management System (SNMS) User Training (Course No. TR4510)*
- *WaveStar SubNetwork Management System (SNMS) System Administration Training (Course No. TR4511)*

Customer comments

This manual was developed by Customer Training and Information Products (CTIP). The CTIP organization welcomes your comments and a form is provided for this purpose. Please complete the form and fax it to Ken Zane at (732) 949-8415.

We'd Like Your Opinion

We'd like your feedback on this document. Your comments can be of great value in helping us improve our documentation. When you have completed this form, please fax it to: ***(732) 949-8415 - Attention: Ken Zane***.

Document Title: ***WaveStar SubNetwork Management System (SNMS) Operations, Administration and Maintenance Guide, Release 3.1 Issue 1.0***

Document Number: ***190-224-101***
Publication Date: ***June 2000***

Please check the ways you feel we could improve this document:

- o Improve the preface
- o Improve the table of contents
- o Improve the organization
- o Improve the index
- o Include more figures
- o Add more examples
- o Make it more concise / brief
- o Simplify the ordering information
- o Add more detail
- o Make it less technical
- o Add more / better quick reference aids
- o Fonts
- o Other

Please provide details for the suggested improvement.

_____

_____

_____

_____

_____

Please tell us what aspects of this document are most helpful or appealing to you or write any other comments below:

_____

_____

If we may contact you concerning your comments, please fill out the following:

Name: _____ Telephone _____

Company / Organization: _____
Date: _____

Address: _____

_____

_____

Introduction

1

Contents

System Overview

Description

The Lucent Technologies' WaveStar™ SubNetwork Management System (SNMS) is an Element Management System (EMS) that supports the new generation of Lucent Technologies' transmission products: the Lucent Technologies' WaveStar product family. The WaveStar products are intelligent Network Elements (NEs) which, in addition to being software configurative, can also discover and report their configuration (including their physical equipage) and their 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 optimize the role of the NEs in management functions to create an intelligent operations environment.

Just as the WaveStar network elements are the answer to your transport network needs, WaveStar SNMS is the answer to the corresponding operations needs to efficiently manage the network. The following shows 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[1] initiative to ensure correct date representation and date/time calculation for the year 2000 and beyond. This includes data that is received by WaveStar SNMS from the supported NEs.

1 WaveStar SNMS Release 3.1 and UNIX Release 10.20 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 catagories:

- 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). Command Groups and Target Groups can be set up according to the type of tasks users are performing, such as maintenance, provisioning, or monitoring.

WaveStar SNMS provides two levels of security management:

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

Log management

Log Management provides services to various system modules including:

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

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

NE event handler

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

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

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

Cut-through capability

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

Hardware Architecture

Overview

WaveStar SNMS consists of a Hewlett-Packard (HP) host processor, and Windows NT PCs connected via an 802.3 Ethernet LAN, with the option to interface via a Wide Area Network (WAN). Printer support is provided for HP printers and compatibles.

Host platform

The system hardware architecture consists of two main components:

- HP 9000/800 series server running HP-UX version 10.20 with associated peripherals (console, terminals, and printers)
- PC running Windows NT® 4.0 (Service Pack 4)

  or

- Sun Solaris workstation Version 2.6 or 2.7.

NOTE:
The configuration of the host is based on the number of equivalent NEs supported by the system.

System GUI PC (Windows NT 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

The EMS system redundancy feature provides multiple levels of application and host redundancy for backup support and disaster recovery in the event of failure. The feature includes four redundancy configurations:

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

NOTE:
As of WaveStar SNMS Release 3.1, only the K460 and K580 hosts have the I/O capacity to support the redundancy hardware configurations.

Host redundancy

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

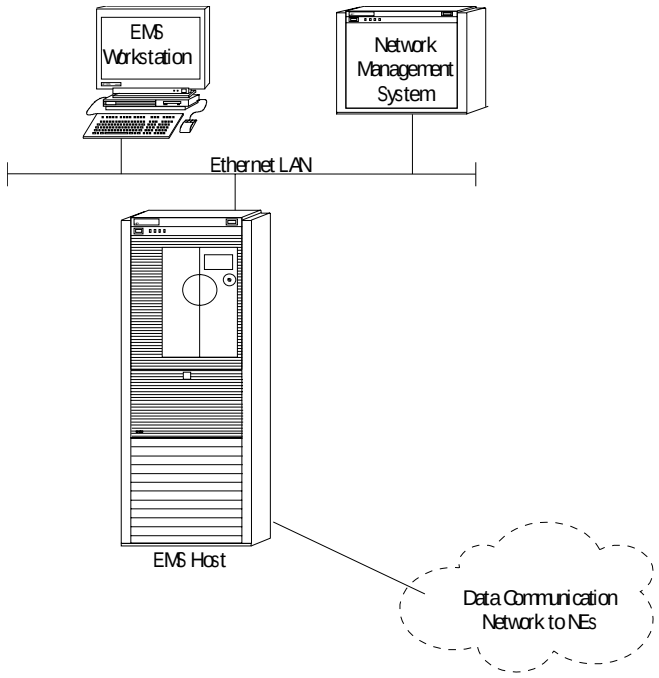


Figure 1-1. EMS Basic Host Redundancy Configuration

In the event of a hardware failure, the network interface card on the system application continues to function without user intervention. Customers not wishing to deploy a dedicated backup processor may still use this configuration to increase the reliability of the Host without incurring significant hardware costs.

Local redundancy

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

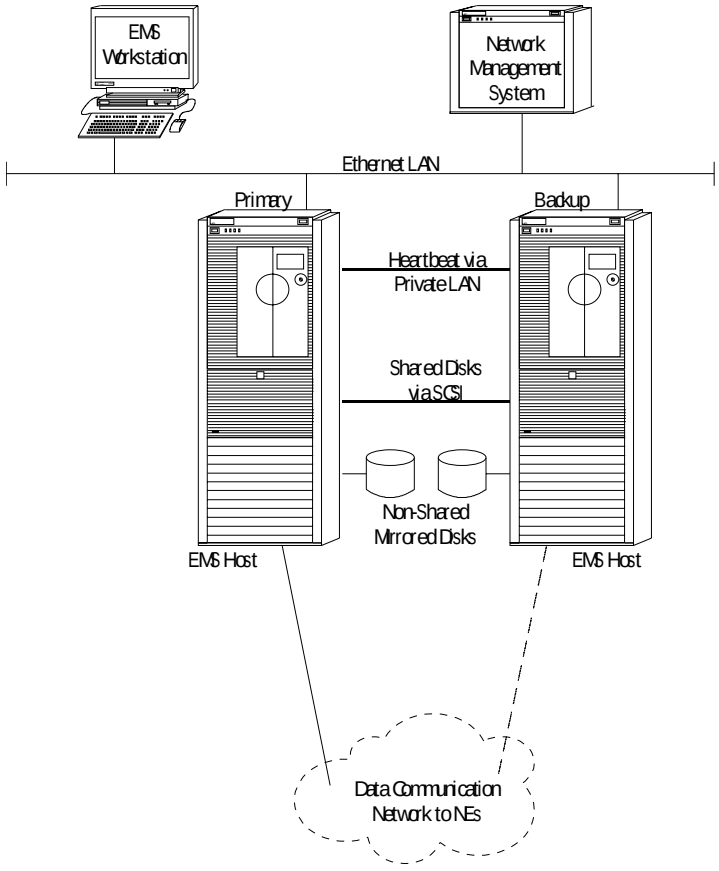


Figure 1-2. EMS Local Redundancy Configuration

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). 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 ITM SNC database and UNIX file system synchronization.

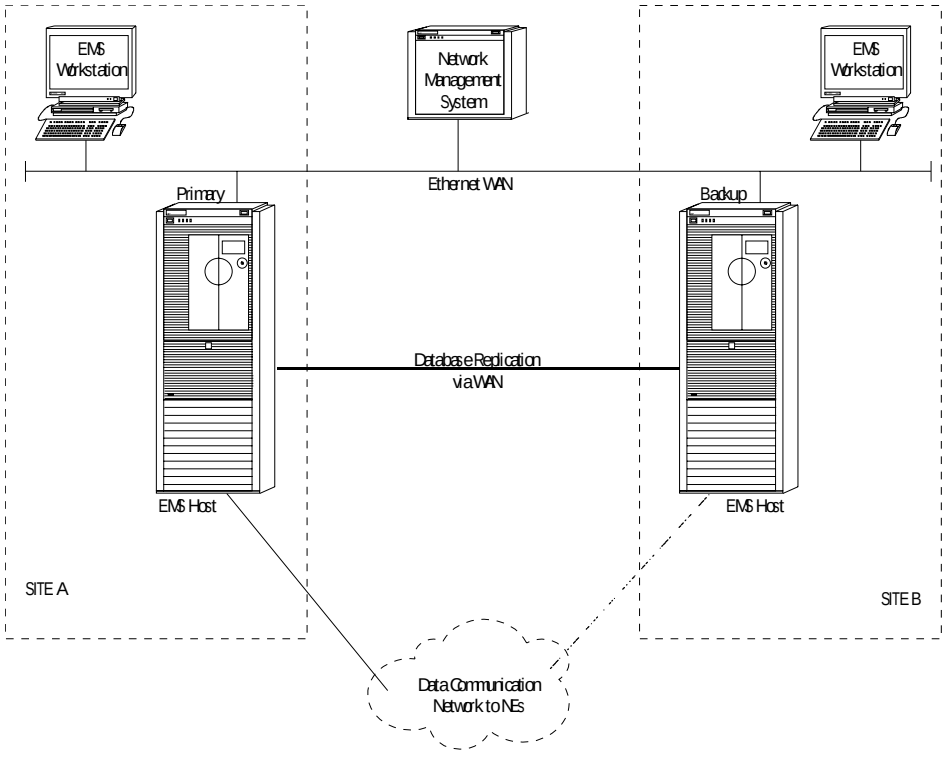


Figure 1-3. EMS Geographic Redundancy Configuration

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

switched from the primary to the backup host changing the WaveStar SNMS application from “standby” to “active” service.

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

Dual redundancy

In dual redundancy, both local and geographic strategies are combined to provide an additional level of reliability. As shown in Figure 1-4, both Site A and B have two hosts that can be employed to monitor the network.

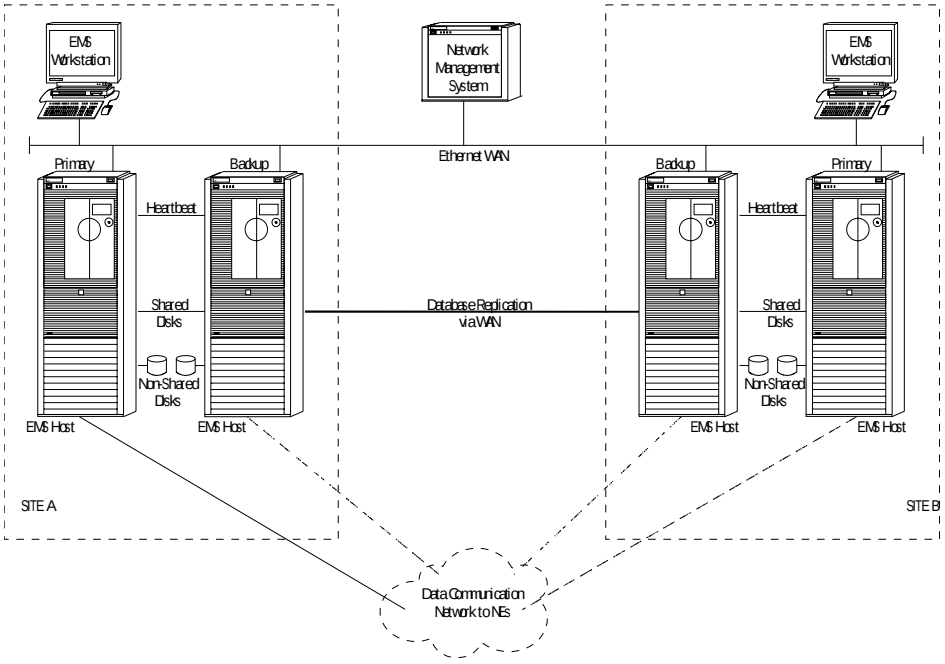


Figure 1-4. EMS Dual Redundancy Configuration

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

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

1. 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.
2. If the expected time to repair the failed host at Site A is lengthy, the backup host at Site B can be brought on-line in “standby” mode and synchronized with the active host at Site A.

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

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

Software Architecture

Overview

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

- Configuration Management
- Fault Management
- NE Event Handler (NEH)
- 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 R3.1 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 1-1. Network Elements Supported by WaveStar SNMS R3.1

Managed NEs	Supported Releases
WaveStar BWM	R1.2, R1.3, R2.0
WaveStar OLS 400G	R2.0, R3.0
WaveStar NCC	R3.0, R3.1, R3.2
WaveStar 2.5G/10G	R2.0, R3.0
WaveStar OC-192 4-Fiber	R1.0
WaveStar AllMetro OLS	R1.0
STM-64	R1.0
FT-2000 LCT	R4.0

System Interfaces

Overview

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

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

Southbound interface

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

Connection Manager Process

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

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

CMISE Southbound

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

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

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.

OSI-based communications

The WaveStar SNMS IAO-LAN interface provides an OSI standard, high-speed communications path to NEs. It enables the reduction of performance bottlenecks by providing faster communications between the EMS and NEs. The OSI/LAN interface provides up to three high bandwidth communication paths or OSI

associations to NEs. This communication model is based on the standard 7-layer OSI stack reference model.

For increased system availability, WaveStar SNMS supports IAO-LAN redundancy. WaveStar SNMS is connected to a subnetwork of NEs via two separate IAO-LAN connections/hubs. Both connections are active. In the event that one IAO-LAN connection fails, WaveStar SNMS detects the failure and automatically switches to the other connection.

OSI-Connected NEs and Subnetwork Discovery

When any NE with a direct OSI/LAN connection to WaveStar SNMS is manually added to the WaveStar SNMS database, it can be used as the “seed NE” through which WaveStar SNMS can automatically discover NEs in the subnetwork to complete the network model. When the NE is added and DNO is executed, the EMS issues a RTRV-MAP-NEIGHBOR command (or its NE equivalent) to the NE and discovers all Lucent Technologies NEs and other devices connected to the network. WaveStar SNMS obtains the NE type from the device; in some cases, the device may be a router or similar equipment not managed by WaveStar SNMS.

The EMS can send messages to NEs that are not part of the same network as the “seed NE” by virtue of the TARP method of broadcasting messages and routing tables that are contained in each NE.

NOTE:
Any NEs that are not discovered through the DNO process or non-Lucent Technologies NEs must be manually added to the WaveStar SNMS database to complete the network model.

Non-managed Devices

NEs that are not managed by WaveStar SNMS are treated as “non-managed devices” and are added during the auto discovery process to complete the network model and to avoid repeated attempts by the EMS to log into these NEs.

TCP/IP-based communications

WaveStar SNMS supports OSI connections with NEs over a TCP/IP backbone network. In OSI over TCP/IP communications, a Network Communication Controller (NCC) or OLS 400G is required to perform OSI protocol conversion, as a transport bridge, for messages/responses handled to/from the EMS and NEs.

If the WaveStar NE has a direct OSI/LAN connection with the EMS and is not communicating over a TCP/IP network, a transport bridge is not needed.

Network Communication Controller

A Network Communication Controller (NCC) is an Intel Pentium-based single-board computer running Microsoft Windows NT. It has no video display, keyboard, or mouse. The system is equipped with an on-board hard disk drive as the primary Non-Volatile Memory (NVM), and a removable PCMCIA disk for use in loading software, and backing up and restoring data. An NCC uses a single 10BaseT LAN connection for both OSI and TCP/IP.

An NCC can be provisioned to serve two main functions:

- Directory Services Agent (DSA) for SONET Directory Services (SDS)
- Transport bridge for TCP/IP to OSI protocol conversion for OSI-connected WaveStar BWM NEs communicating with WaveStar SNMS over a TCP/IP backbone network

An NCC can be designated as a DSA and/or transport bridge.

Security Management

The NCC has basic local security features similar to an NE. It has user logins, passwords, privileges, a user activity log, and the ability to detect security violations.

Function Activation

Each NCC can handle a variety of functions that can be provisioned through the GUI or via the Craft Interface Terminal (CIT) by a system administrator. These functions include:

- T1.245 DSA
- T1.245 Registration Manager (RM)
- TCP/IP transport bridge
- MFS Alarm Monitor
- Notification of directory additions/deletions

Directory Services Agent

SDS provides for name/address resolution for WaveStar NEs communicating with WaveStar SNMS through an OSI or OSI over TCP/IP network. An NCC provisioned as the DSA, or the SNMS-based DSA, provides the directory of NEs to WaveStar SNMS.

Before WaveStar SNMS can communicate with the NE, the NSAP address of the NE and, optionally, the TCP/IP address of the NE is provisioned through the CIT, and the NE is registered in the T1.245 directory. The NCC serving as the DSA or SNMS-based DSA, stores the T1.245 directory. The NCC can also function as a Registration Manager (RM). WaveStar SNMS, acting as the DUA, obtains the

address information from the NCC/DSA or SNMS-based DSA for sending and receiving commands/responses, instead of requiring manual provisioning of this information.

Transport Bridge

An NCC or OLS 400G defined as a transport bridge allows associated NEs and NCCs to communicate over a TCP/IP backbone network by performing TCP/IP to OSI protocol conversion in both directions. As a transport bridge, the selected NE or NCC bridges connection layers of OSI running over TCP/IP between the upper and lower layers of the OSI protocol stack. The OLS 400G NEs have an integrated transport bridge, and thus can also communicate with WaveStar SNMS via OSI over TCP/IP.

If WaveStar SNMS has a direct OSI/LAN connection or an OSI/LAN to a Wide Area Network (WAN) connection with a WaveStar NE, transport bridges are not needed.

When a transport bridge is added to the network, it is set up to communicate via OSI over TCP/IP.

At least one transport bridge should be manually added, or, if the transport bridge is autodiscovered when the DNO process is run, it should be defined as a transport bridge via the Modify NE window in the GUI before the NEs it supports are added to the WaveStar SNMS database.

Primary and Secondary Transport Bridges

During the subnetwork discovery process, WaveStar SNMS automatically assigns NEs to a single primary transport bridge based on the routing domain of each device's Network Service Access Point (NSAP) address. A secondary transport bridge can be manually assigned through the WaveStar SNMS GUI to provide LAN redundancy. If communications are lost with the primary transport bridge, a secondary transport bridge can be designated to take over automatically.

A primary and secondary transport bridge can be initially assigned to the NE through the *Add an NE* window in the WaveStar SNMS GUI. Reassignment of transport bridges to NEs can be done through the Management Transport Bridges window in the WaveStar SNMS GUI.

Assigning Transport Bridges

When an NCC or OLS 400G is added to WaveStar SNMS, it can be designated as a transport bridge. If the NCC or OLS 400G is added as a transport bridge, its IP address is required.

When a WaveStar NE is added, and it communicates with WaveStar SNMS over a TCP/IP backbone network, a primary (and, if desired, secondary) transport bridge needs to be assigned.

If WaveStar SNMS is communicating with a BWM NE that is equipped with dual system controller packs, there are two possible scenarios:

1. WaveStar SNMS uses two separate transport bridge NCCs, one for each BWM NE system controller pack. In the event of communication failure with the first transport bridge, the system communicates with the BWM NE through the secondary (backup) transport bridge NCC.
2. If there is only one transport bridge NCC and two system controller packs, WaveStar SNMS interfaces with the BWM using one of the two system controller NSAP addresses. The system controller pack with the lower NSAP address is used as the primary communications interface.

If the BWM's primary system controller pack fails, WaveStar SNMS detects the failure in the form of a time-out. WaveStar SNMS attempts to re-establish communications with the NE using the same system controller NSAP address one more time. If this is not successful, WaveStar SNMS establishes communication with the NE using the second system controller's NSAP address in the BWM NE. All communication failures are logged.

Managing Transport Bridges

Once all of the NEs and transport bridges have been added and/or defined and the network is brought up, the WaveStar SNMS system administrator can reassign NEs to transport bridges as needed to load balance the OSI over TCP/IP data traffic. WaveStar SNMS switches traffic for the target NE(s) to the newly assigned transport bridge(s) once the reassignment(s) is made.

The Manage Transport Bridges function is available as an Administration menu option in the WaveStar SNMS GUI.

System Requirements

2

Contents

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 9000/800 series 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 9000/800 series server running HP-UX Version 10.20. 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 2-1. Host Server Hardware Configuration

HP9000 Hardware	Model K360/K380	Model K380/K460 with 2 CPUs	Model K460/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)

HP9000 Hardware	Model K360/K380	Model K380/K460 with 2 CPUs	Model K460/K580 with 4 CPUs	Model K580 with 6 CPUs
Disk Space w/ PM Data	54GB (6X9GB)	99GB (11X9GB)	180GB (20X9GB)	180GB (20X9GB)
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

System GUI PC

The GUI PC is a Pentium-based IBM-compatible PC running Microsoft Windows™ NT 4.0 with Service Pack 4. The GUI Client runs on the GUI PC, and transaction requests are issued by the GUI Client to the GUI Server running on the host. The minimal requirements for the GUI PC are shown in the following table.

Table 2-2. GUI PC Minimal Hardware Requirements

Processor	Pentium II/Pentium III
Processor Speed	400 MHz
L2 cache	512 KB
RAM	256 MB
Hard Disk	4 GB
CD-ROM Speed	24X
Floppy Drive	3.5”
Mouse	2-button Mouse
LAN	10/100 BaseT
Video RAM	8 MB
Operating System	Windows NT 4.0 with Service Pack 4
Monitor Viewable Image	19”
Monitor Resolution	1,024 x 768

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 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 table shows the software components required for WaveStar SNMS R3.1:

Table 2-3. WaveStar SNMS R3.1 Application Components

SNMS Application	Release 3.1
Informix Dynamic Server	Release 7.31 uc2xc
BaseWorX®	Release 6.2
HP Openview	Release 5.03
OrbixMT	Release 2.3
OrbixNames	Release 1.1
X.25/ACC	Release 2.40
ATOS	Release 2.6

Installation

3

Contents

Getting Started

Overview

This chapter details the procedure used to deploy a new installation of WaveStar SNMS. This is most commonly referred to as “Cold Starting.” This procedure is done only once, when the host is set up for the first time. The WaveStar SNMS Cold Start file set contains software tools to set up a foundation and to configure and verify a new host to support the WaveStar SNMS application. The Cold Start software includes various support files that do not reside in the actual WaveStar SNMS application.

WaveStar SNMS has an interactive script-assisted procedure to minimize the effort of first-time software installation and subsequent upgrades. The interactive menu-driven scripts provide prompts and conditional alerts to assist the user.

It is assumed that the WaveStar SNMS host and workstation hardware were obtained by the customer in one of the following ways:

- The WaveStar SNMS host and workstation hardware was purchased from Lucent Technologies where Lucent was responsible for engineering, ordering, and delivering the hardware to the customer premise.
- The WaveStar SNMS host and workstation configuration specifications were provided to the customer and the customer obtained the necessary hardware directly from the vendor.

Before you begin

The following items are needed for the Cold Start installation:

- HP-UX 10.20 CD (optional HP-UX 10.20 Multi-User License CD)
- WaveStar SNMS Cold Start CD
- WaveStar SNMS Application (2 CDs)
- 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

Installing the Host Computer Operating System

Installing HP-UX 10.20

The following procedure is used for installing the HP-UX 10.20 operating system. The procedure takes approximately ninety minutes.

NOTE:
The screens shown in the following procedure may vary, depending upon the host machine.

Procedure: Installing HP-UX 10.20

1. Power on the computer.
2. Insert the **HP-UX Install and Hardware Extensions 3.0 CD** into the CD-ROM drive. The processor boots from the first available device. To discontinue, press any key within ten seconds.

   UNIX begins its boot-up process and you are prompted to interrupt the autoboot sequence.
3. When prompted, hit any key to abort the autoboot procedure.

   Messages similar to the following are displayed:

```
Boot terminated.

------- Main Menu -----------------------------------------------

        Command                          Description
        -------                          -----------

        BOot [PRI|ALT|<path>]            Boot from specified path
        PAth [PRI|ALT] [<path>]          Display or modify a path
        SEArch [DIsplay|IPL] [<path>]    Search for boot devices

        COnfiguration menu               Displays or sets boot values
        INformation menu                 Displays hardware information
        SERvice menu                     Displays service commands

        DIsplay                          Redisplay the current menu
        HElp [<menu>|<command>]          Display help for menu or command
        RESET                            Restart the system
-------
Main Menu: Enter command or menu > in memory
```

4. At the prompt, enter: **in memory**

   This will instruct the computer to display internal memory information.

Messages similar to the following are displayed:

```
MEMORY STATUS TABLE

   Carrier     Slot     Size(a+b)     Status
   -------     ----     ---------     ------
      0        0a/b       512MB       Configured
      0        1a/b       256MB       Configured

                          ---------
   TOTAL                   768MB

<Press any key to continue>
```

5. Verify that the correct amount of memory is configured (in this example, 768MB has been configured).

NOTE:
The following table shows the amount of memory that needs to be configured for each server type:

Model	RAM (Megabytes)
K360/K380	768
K460/K580 with 2 CPUs	1024
K460/K580 with 4 CPUs	1280
K580 with 6 CPUs	2048

You may press the Return key and skip through the next two responses.

6. At the prompt, enter: **in bootinfo**

   Messages similar to the following are displayed:

```
BOOT INFORMATION

   Processor         Boot ID
   ---------         -------
       0                 2
       1                 2

   Autoboot:             ON
  Autosearch:           OFF
   Autostart:           OFF
   Fastboot:             OFF
```

```
   Primary boot path:    10/0.6   (dec)
                         0a/0.6   (hex)
   Alternate boot path:  10/12/5.0   (dec)
                         0a/0c/05.0   (hex)
   Console path:         10/4/0.0   (dec)
                         0a/04/0.0   (hex)
   Keyboard path:        10/12/7.0   (dec)
                         0a/0c/07.0   (hex)

   LAN Station Address:  080009-d4a656

   Wed Mar  5 17:36:02 GMT 1997    (19:97:03:05:17:36:02)
```

7. Verify that `Autoboot` is set to **ON.**
8. Verify that the Primary boot path is set to the first hard drive on the chain (in this example, **10/0.6.**)
9. At the prompt, enter: **display**

   Messages similar to the following are displayed:

```
------- Main Menu ----------------------------------------

        Command                         Description
        -------                         -----------

        Boot [PRI|ALT|<path>]           Boot from specified path
        Path [PRI|ALT|CON|KEY] [<path>] Display or modify a path
        SEArch [Display|IPL] [<path>]   Search for boot devices

        Configuration menu              Displays or sets boot values
        INformation menu                Displays hardware information
        SERvice menu                    Displays service commands

        DIsplay                         Redisplay the current menu
        HElp [<menu>|<command>]         Display help for menu or command
        RESET                           Restart the system
-------
Main Menu: Enter command or menu >
```

10. At the prompt, enter: **search ipl**

    This instructs the computer to search for all bootable devices.

    Messages and a menu similar to the following example are displayed:

```
Searching for potential boot device(s)
This may take several minutes.

To discontinue search, press any key (termination may not be immediate).

   Path Number      Device Path                  Device Type
-------------------------------------------------------------------
   P0                    10/0.6                  Random access media
                                                  IPL
   P1                    10/4/8.0                LAN Module
   P2                    10/12/5.0               Random access media
                                                 IPL
   P3                    10/12/6.0               LAN Module

Main Menu: Enter command or menu >
```

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:

- Look on the label that is on the inside of the front door on the host
- After the search IPL command completes, look for the line that has the Device Path reading SESCSI.2

11. At the prompt, enter the appropriate device type (in this example, **path alt 10/12/5.0**)

    The following message and menu prompt are displayed:

```
  Alternate boot path:   10/12/5.0    (dec)
                          0a/0c/05.0    (hex)

Main Menu: Enter command or menu >
```

12. At the prompt, enter: **boot alt**

    This instructs the computer to boot from the CD-ROM drive. The following message prompt is displayed:

```
 Interact with IPL (Y or N)?>
```

13. At the prompt, enter: **N**

    After a few seconds, a message similar to the following is displayed:

```
Booting…
Boot IO Dependent Code (IODC) revision 0

HARD Booted

ISL Revision A.00.38 Oct 26, 1994

ISL Booting hpux boot (;0):INSTALL
```

    After approximately one minute, the following message is displayed:

```
 Welcome to the HP-UX installation process!

Use the <tab> and/or arrow keys to navigate through the following menus
 and use the <return> key to select an item.  If the menu items are not
 clear, select the "Help" item for more information.



                  [      Install HP-UX       ]

                  [   Run a Recovery Shell   ]

                  [    Cancel and Reboot     ]

                  [    Advanced Options      ]



                           [   Help    ]
```

14. At the prompt, select **Install HP-UX.**

    After a few seconds, a message similar to the following is displayed:

```
If you plan to use a network software depot to load the operating
system, you will need to enable networking at this time.

Would you like to enable networking now?[y]
```

15. At the prompt, enter: **Y**

NOTE:
If using 100MB LAN cards for the local LAN, enter **N** at the above prompt. After installation, load 100MB drivers and use the set_parms command to finish configuring the SNMS host.

After a few seconds, messages similar to the following are displayed.

If there is more than one LAN card equipped in the host, messages similar to the following are displayed. Otherwise, you will see the second screen that follows.

```
                    LAN Interface Selection

More than one network interface was detected on the system. You
will need to select the interface to enable. Only one interface
can be enabled, and it must be the one connected to the network
that can be used in contacting the install and/or SD servers.

Use the <tab> and/or arrow keys to move to the desired LAN device
to enable, then press <Return>.

            H/W Path          Interface   Station Address
            ---------------------------------------------
          [ 10/4/8.1             lan0     0x080009d24ec9 ]

          [ 10/12/6              lan1     0x080009adbc8e ]
```

In the above example, `10/4/8.1` is the address for the External LAN card, and `10/12/6` is the address for the Internal LAN card.

```
  * Searching the network for a DHCP server to supply default networking
information....

    This could take up to 30 seconds if a DCHP server cannot be found. If
you wish to cancel the DHCP server search, you may press CTRL-C now.
```

After a few seconds, messages similar to the following are displayed:

```
HP-UX INSTALLATION UTILITY  --  NETWORK CONFIGURATION



                                  This system's hostname:

  Internet protocol address (eg. 15.2.56.1) of this host:

       Default gateway routing internet protocol address:

       The subnet mask (eg. 255.255.248.0 or 0xfffff800):
          Is this networking information only temporary?  [ No  ]




 [   OK   ]                 [ Cancel ]                          [  Help  ]
```

At the prompts, enter the **system name** and **IP address information**. Press the Tab key to navigate between fields. After all the fields have been populated, tab to **OK** and press the Return key.

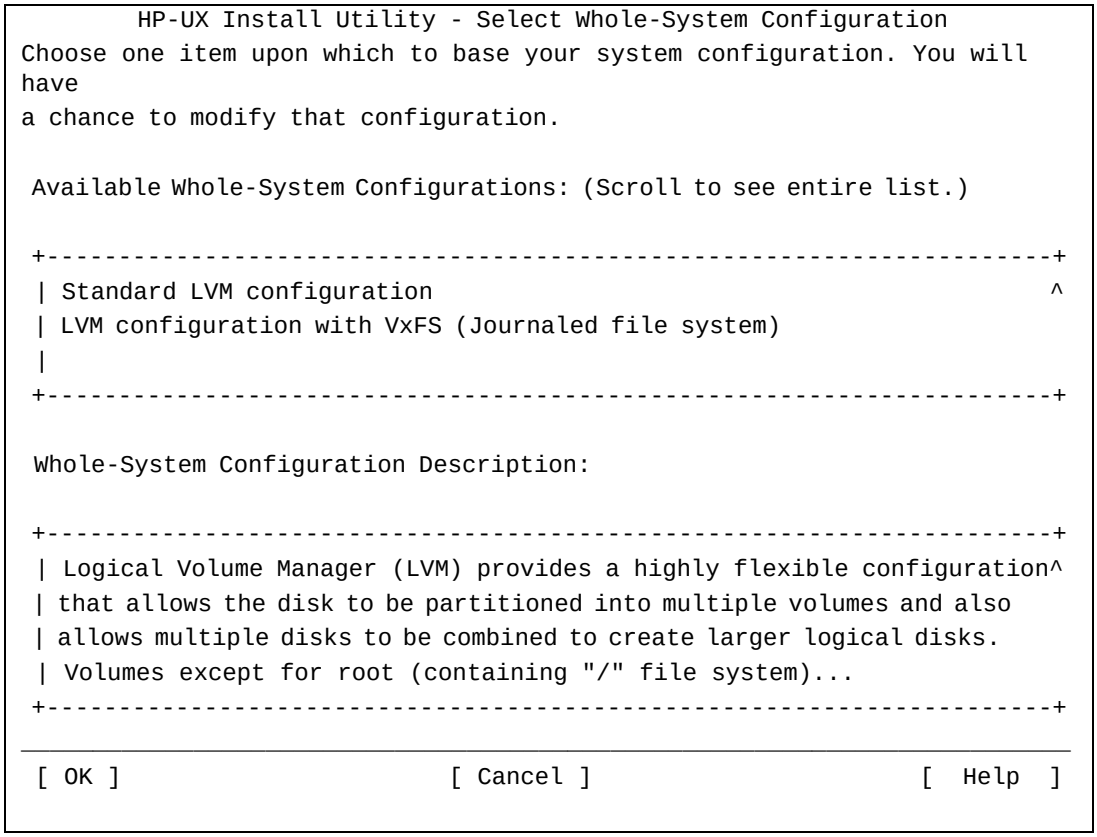
NOTE:
The system name can be eight characters or less; it must begin with a lower case alphabetic character; the intermediate characters can be lower case alphabetic, digit, or an underscore (_); the last character can be alphabetic or digit.

Messages similar to the following are displayed:

```
HP-UX Install Utility - Select System Root Disk

The install utility has discovered the following disks attached to your
system.  You must select one disk to be your system root disk.  When
configured, this disk will contain (at least) the boot area, a root file
system and primary swap space.

  Hardware                    Product            Size
  Path                        ID                 (Megabytes [Mb])

_____________________________________________________________________________
  10/0.6.0                    ST15150W           4095                 ^
  10/0.5.0                    ST15150W           4095
  10/0.4.0                    ST15150W           4095
  10/0.3.0                    ST15150W           4095
  10/0.2.0                    ST15150W           4095


                                                                       v
_____________________________________________________________________________
_____________________________________________________________________________
[ OK ]                    [ Cancel ]                    [  Help  ]
```

16. At the prompt, select disk **10/0.6.0**

Messages similar to the following are displayed:



17. At the prompt, select **LVM configuration with VxFS (Journaled file system)**.

Messages similar to the following are displayed:

```
HP-UX Install Utility - View/Modify Basic Configuration

You may modify the following basic configuration parameters.  Press OK to
save your changes.

  Primary Swap Size            [ 512Mb  ->]
  Secondary Swap Size          [ None   ->]
  Software Selection           [ CDE Runtime Environment          ->]
   Load ONC + Networking Enhancements [ True ->]
  Software Language            [ English       ->]
  Locale Setting               [ default (C)                       ->]
  File system file name length  [ Long   ->]
  /home Configuration           [ Minimal       ->]
  How many disks in root group  [ One         ->]
  Make volatile dirs separate   [ True   ->]
  Create /export volume         [ False  ->]

[   OK   ]                     [ Cancel ]                     [  Help  ]
```

This is where swap space is set up on the host. For our configuration, both primary and secondary swap spaces will be used. The following table shows the total Primary/Secondary Swap Size needed for each host machine.

Model	Primary Swap Size (MB)	Secondary Swap Size (MB)
K360/K380	768	768
K460/K580 with 2 CPUS	1280	
K460/K580 with 4 CPUs	1152	1152
K580 with 6 CPUs	1152	1152

Based on the model processor that you have, check the amount of swap space needed. The screen you are now on will not let you allocate more than 512 megabytes for each swap space. You will need to allocate the remainder in a later step.

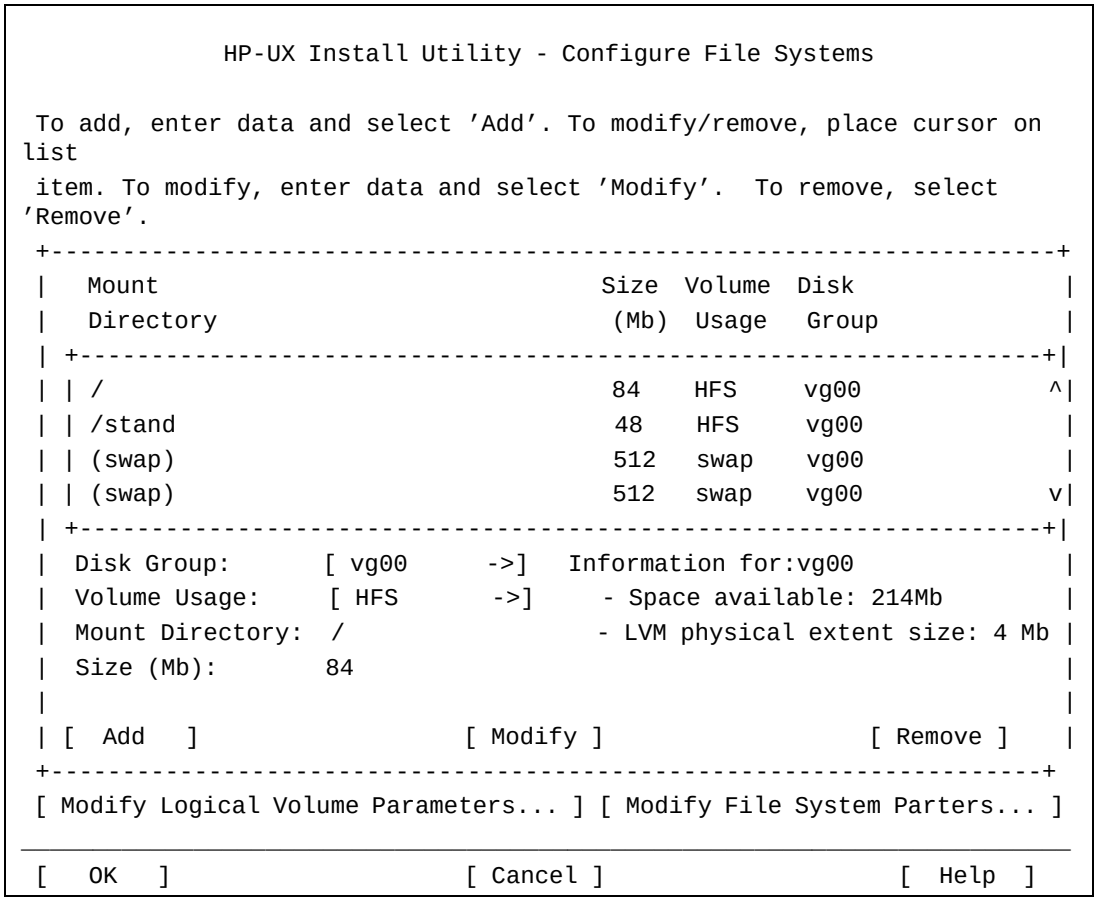
18. Set the primary swap size to 512MB by tabbing to the field and pressing the Return key. Tab through the rest of the fields to **OK** and press the Return key.

    Messages similar to the following are displayed:

```
            HP-UX Install Utility - System Configuration
Any data on the following disks will be destroyed ... :
  Hardware Path       Product ID    Size (Mb)  Disk Use   Volume Group
+-------------------------------------------------------------------------+
| 10/0.6.0            ST15150W      4095       LVM        vg00          ^
|
|                                                                         v
+-------------------------------------------------------------------------+
 - Unconfigured space from those disks: 2140 Mb

File systems and swap space to be created:
  Mount Directory          Size (Mb)   Usage     Disk Group
+-------------------------------------------------------------------------+
| /                        84          HFS       vg00                    ^
| /stand                   48          HFS       vg00
| (swap)                   512         swap      vg00
| (swap)                   512         swap      vg00
| /home                    20          HFS       vg00                    v
+-------------------------------------------------------------------------+
For more advanced configuration options...  [  Modify Disk Parameters...]
                                            [  Modify FS Parameters...    ]

[  OK  ]                        [ Cancel ]                      [ Help ]
```

19. Press the Tab key until **Modify FS Parameters...** is highlighted, then press the Return key.

Messages similar to the following are displayed:



20. 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 Tab key until the cursor is on the Size (Mb): field.
21. Enter the new size for the file system and press the Tab key until **Modify** is highlighted. Press the Return key.
22. Repeat the previous steps to configure the file system sizes, as shown in Table 3-1 and Table 3-2 immediately following this procedure for these file systems:
    /, */stand*, */opt*, */var*, */usr*, */tmp*, */home*, (swap1), and (swap2).
23. When finished, tab to **OK** and press the Return key.

NOTE:
If this system has already been loaded with UNIX, you will see a prompt indicating there may be an HP-UX system already loaded on the disk. You may continue.

```
        HP-UX Install Utility - Messages Dialog
_____________________________________________________________________
 Before continuing, you must address any errors listed below.
 You may choose to continue in the presence of warnings or
 notes.  (You may have to scroll to see the entire list.)

 WARNING: The disk at: 10/0.6.0 (ST15150W) appears to contain a
 file system and boot area.  Continuing the installation will
 destroy any existing data on this disk.




_____________________________________________________________________
        [ Continue...  ]       [ Modify Configuration... ]
```

24. Select **Continue...**

    The following prompt is displayed:

```
        HP-UX Install Utility - Enter SD-UX swinstall information

The SD-UX software distribution utility, swinstall, will actually load the
 HP-UX software on your system.  (This will take place after the disks and
 file systems are configured.)

 The software selections you have already specified should be sufficient,
but you might want to interact with SD-UX swinstall to view or modify the
 software selections.

  Do you want to interact with SD-UX swinstall?  [ No   ->]




_____________________________________________________________________
 [   OK   ]                    [ Cancel ]                    [  Help  ]
```

25. At the interact with SD-UX swinstall, select **No**.

26. Select **OK**.

    The following messages are displayed, indicating that file systems are being created:

```
* Starting system configuration...
     * Creating LVM physical volume: /dev/rdsk/c0t6d0 (10/0.6.0)
     * Creating volume group: vg00
     * Creating logical volume: vg00/lvol1 (/stand)
     * Extending logical volume: vg00/lvol1 (/stand)
     * Creating logical volume: vg00/lvol2 (swap)
     * Extending logical volume: vg00/lvol2 (swap)
     * Creating logical volume: vg00/lvol3 (/)
     * Extending logical volume: vg00/lvol3 (/)
     * Creating logical volume: vg00/lvol4 (swap)
     * Creating logical volume: vg00/lvol5 (/home)
     * Creating logical volume: vg00/lvol6 (/opt)
     * Creating logical volume: vg00/lvol7 (/tmp)
     * Creating logical volume: vg00/lvol8 (/usr)
     * Creating logical volume: vg00/lvol9 (/var)
     * Making HFS filesystem for: /, (/dev/vg00/rlvol3)
     * Making HFS filesystem for: /stand, (/dev/vg00/rlvol1)
     * Making HFS filesystem for: /home, (/dev/vg00/rlvol5)
     * Making HFS filesystem for: /opt, (/dev/vg00/rlvol6)
     * Making HFS filesystem for: /tmp, (/dev/vg00/rlvol7)
```

Once the initial file systems are built, the HP-UX installation automatically continues.

The Core OS installation should take approximately thirty minutes to complete.

Disk space partitions

The following tables show required disk space partitions.

Table 3-1. Disk Partitions for 9GB-based Systems with PM Support

Disk No. (Size)	Mount Point	K360/K380	K380/K580 (2 CPUs)	K580 (4 CPUs/6CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#0 (9GB)	Swap1 / /stand /opt /var /usr /home /tmp (Total Used)	768MB*2 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 3GB	1024MB*2 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 3.3GB	2560MB 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 3.5GB
	dbspace	dbspe1_1G	dbspe1_1G	dbspe1_1G
VG#1 (9GB)	/snc /tools /reports	6GB 600MB 1.8GB	6GB 600MB 1.8GB	6GB 600MB 1.8GB
VG#2 (9GB)	dbspace pmspace	dbsp1_1G pmsp{1,3}_2G	dbsp1_1G pmsp{1,3}_2G	dbsp1_1G pmsp{1,3}_2G
VG#3 (9GB)	Swap2 dbspace dbspace pmspace	 dbsp2_1G dbsp3_1G pmsp{4,6}_2G	dbsp2_1G pmsp{4,6}_2G	 dbsp2_1G pmsp{4,6}_2G
VG#4 (9GB)	dbspace dbspace pmspace pmspace	 pmsp{7,8}_2G pmsp{9,10}_2G	dbsp3_1G dbspe2_2G pmsp{7,8}_2G	dbsp3_1G dbspe2_2G pmsp{7,8}_2G
VG#5 (9GB)	/data dbspace dbspace pmspace	4GB pmsp{11,12}_2G	 dbsp4_1G dbsp5_2G pmsp{9,10}_2G	 dbsp4_1G dbspe3_2G pmsp{9,10}_2G
VG#6 (9GB)	dbspace pmspace		 pmsp{11,14}_2G	dbsp5_2G pmsp{11,12}_2G
VG#7 (9GB)	pmspace		pmsp{15,18}_2G	pmsp{13,16}_2G
VG#8 (9GB)	pmspace		pmsp{19,22}_2G	pmsp{17,20}_2G

Disk No. (Size)	Mount Point	K360/K380	K380/K580 (2 CPUs)	K580 (4 CPUs/6CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#9(9GB)	pmspace		pmsp{23,26}_2G	pmsp{21,24}_2G
VG#10 (9GB)	pmspace		pmsp{27,28}_2G	pmsp{25,28}_2G
	/data		4GB	
VG#11 (9GB)	pmspace			pmsp{29,32}_2G
VG#12 (9GB)	pmspace			pmsp{33,36}_2G
VG#13 (9GB)	pmspace			pmsp{37,40}_2G
VG#14 (9GB)	pmspace			pmsp{41,44}_2G
VG#15 (9GB)	pmspace			pmsp{45,48}_2G
VG#16 (9GB)	pmspace			pmsp{49,52}_2G
VG#17 (9GB)	pmspace			pmsp{53,56}_2G
VG#18 (9GB)	pmspace			pmsp{57,60}_2G
VG#19 (9GB)	/data			4GB
	/var/opt/omni			4GB

Table 3-2. Disk Partitions for 9GB-based Systems without PM Support

Disk No. (Size)	Mount Point	K360/K380	K380/K580 (2 CPUs)	K580 (4 CPUs/6CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#0 (9GB)	Swap1 / /stand /opt /var /usr /home /tmp (Total Used)	768MB*2 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 4.5GB	1024MB*2 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 4.5GB	2560MB*2 100MB 100MB 1024MB 1024MB 512MB 100MB 512MB 5GB
	/reports	2GB	2GB	2GB
	dbspace	dbsp3_1G		
VG#1 (9GB)	swap2 /snc /tools dbspace	 6GB 600MB dbsp2_1G	 6GB 600MB dbsp3_1G	 6GB 600MB dbsp3_1G
VG#2 (9GB)	dbspace pmspace dbspace /data	dbsp1_1G pmsp{1-2}_2G dbspe_1G 2GB	dbsp1_1G pmsp{1}_2G dbspe_1G 4GB	dbsp1_1G pmsp{1}_2G dbspe_1G 4GB
VG#3 (9GB)	dbspace pmspace		dbsp2_1G pmsp{2}_2G	dbsp2_1G pmsp{2}_2G
VG#4 (9GB)	dbspace dbspace pmspace		dbsp4_1G dbsp5_2G pmsp{}_2G	dbsp4_1G dbspe2_2G pmsp{}_2G
VG#5 (9GB)	dbspace dbspace pmspace		 pmsp{9,10}_2G	dbsp5_2G dbspe3_2G pmsp{9,10}_2G
VG#6 (9GB)	pmspace		pmsp{11,14}_2G	pmsp{11,12}_2G
VG#7 (9GB)	pmspace		pmsp{15,18}_2G	pmsp{13,16}_2G
VG#8 (9GB)	pmspace		pmsp{19,22}_2G	pmsp{17,20}_2G
VG#9(9GB)	pmspace		pmsp{23,26}_2G	pmsp{21,24}_2G

Disk No. (Size)	Mount Point	K360/K380	K380/K580 (2 CPUs)	K580 (4 CPUs/6CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#10 (9GB)	pmspace		pmsp{27,28}_2G	pmsp{25,28}_2G
	/data		4GB	
VG#11 (9GB)	pmspace			pmsp{29,32}_2G
VG#12 (9GB)	pmspace			pmsp{33,36}_2G
VG#13 (9GB)	pmspace			pmsp{37,40}_2G
VG#14 (9GB)	pmspace			pmsp{41,44}_2G
VG#15 (9GB)	pmspace			pmsp{45,48}_2G
VG#16 (9GB)	pmspace			pmsp{49,52}_2G
VG#17 (9GB)	pmspace			pmsp{53,56}_2G
VG#18 (9GB)	pmspace			pmsp{57,60}_2G
VG#19 (9GB)	/data			4GB
	/var/opt/omni			4GB
	/opt/omni			300MB

HP-UX Configuration

Configuring HP-UX

The following procedure is used for HP-UX system configuration.

Procedure: Configuring HP-UX

1. Prior to loading HP-UX, you will see the following screen:

```
                        Welcome to HP-UX!

Before using your system, you will need to answer a few questions.

The first question is whether you plan to use this system on a network.

Answer "yes" if you have connected the system to a network and are ready
to link with a network.

Answer "no" if you:

     * Plan to set up this system as a standalone (no networking).

     * Want to use the system now as a standalone and connect to a
       network later.

Are you ready to link this system to a network?

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

2. At the prompt, enter **Y** and press the Return key.

The following screen is displayed:

```
Before you begin using this system, you need to obtain the
following information from your local network administrator:

   * Your system name (host name).

   * Your Internet Protocol (IP) address.

   * Your time zone.

 If you do not have this information, you may stop now and restart
 your system once you have it.

Do you wish to continue?

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

WARNING:
The system name, IP address, and time zone of your server must be specified to properly install the WaveStar SNMS application.

At the prompt, enter **Y** and press the Return key.

The following screen is displayed:

```
For the system to operate correctly, you must assign it a unique
system name or "hostname".  The hostname can be a simple name or
an Internet fully-qualified domain name.  A simple name, or each
dot (.) separated component of a domain name, must:

   * Contain no more than 64 characters.

   * Contain only letters, numbers, underscore (_), or dash (-).

   * Start with a letter.

NOTE:
   * Uppercase letters are not recommended.

   * The first component should contain 8 characters
     or less for compatibility with the 'uname' command.

The current hostname is snch.

Enter the system name, then press [Return] or simply press [Return]
to retain the current host name (snch):
```

3. At the prompt, enter the **system name** and press the Return key.

   The system name constraints are:

   - the system name can be eight characters or less
   - the first character must be lower case alphabetic
   - the intermediate characters can be lower case alphabetic, digit, or an underscore "_"
   - the last character can be alphabetic or digit

   You may press the Return key if you are satisfied with the name entered previously. For example:

```
Enter the system name, then press [RETURN] snch Return
```

The following acknowledgement appears:

```
You have chosen snch as the name for this system.
Is this correct?

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

4. At the prompt, enter **Y** and press the Return key.

   The following screen is displayed:

```
_____________________________________________________________________

The following procedure enables you to set the time zone.

Select your location from the following list:

  1) North America or Hawaii

  2) Central America

  3) South America

  4) Europe

  5) Africa

  6) Asia

  7) Australia, New Zealand
_____________________________________________________________________


Enter the number for your location (1-7) then press [Return]
```

5. At the prompt, enter the number for your location and press the Return key.
6. You are then prompted to enter additional information further specifying the location of this machine, the local date and time, and the time zone.

   You are then prompted to enter a root password. Record the password in a safe place.

CAUTION:
If the root password is lost or forgotten, you cannot perform certain system administration tasks and need to completely reload the HP-UX operating system.

The following screen is displayed:

```
If you wish networking to operate correctly, you must assign the
system a unique Internet Protocol (IP) address.  The IP address must:

   * Contain 4 numeric components.

   * Have a period (.) separating each numeric component.

   * Contain numbers between 0 and 255.

   For example:  134.32.3.10

Your current address is 135.16.92.10.  To retain this address,
just press [Return].

Enter your IP address, then press [Return] or press [Return] to select
the current address (135.16.92.10):
```

7. At the prompt, enter the **IP address** and press the Return key.

   You may press the Return key if you are satisfied with the IP Address previously entered.

   For example:

```
Enter your Internet Protocol address, then press [RETURN] 135.16.92.10
Return
```

The following acknowledgement is displayed:

```
You have chosen 135.16.92.10 as the IP address for this system.
Is this correct?

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

8. At the prompt, enter **Y** and press the Return key.

   The following screen is displayed:

```
_____________________________________________________________________

You may configure some additional network parameters at this time:

   * Subnetwork Mask and Default Gateway

   * Domain Name System (DNS)

   * Network Information Service (NIS)

Your local network administrator can tell you which if any of these
parameters should be configured for your system, and provide you the
appropriate values.

If you do not have these values now, you can configure them later.

_____________________________________________________________________

Do you want to configure these additional network parameters?

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

9. At the prompt, enter **Y** and press the Return key.

The following screen is displayed:

```
Additional Network Parameters: Subnetwork Mask and Default Gateway

This section enables you to specify the subnetwork mask and default
network gateway.  This information is necessary if your network has
gateways and you wish to communicate beyond your local subnetwork.

You will need to know the following information:

  * Subnetwork mask

  * Default gateway host name

  * Default gateway IP address

Do you wish to specify this information?

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

10. At the prompt, enter **Y** and press the Return key.

    If you do not wish to enter the information right now, enter **N** at the prompt and press the Return key. Then, skip to Step 14.

The following message is displayed:

```
Additional Network Parameters: Subnetwork Mask and Default Gateway

Enter the subnetwork mask and default gateway information.

Example:

    Subnetwork mask:    255.255.255.0
    Gateway host name:  lab_gw
    Gateway IP address: 135.16.92.1

Current Settings:

 -> Subnetwork mask:    255.255.255.0
    Gateway host name:  (not set)
    Gateway IP address: 135.16.92.1

Enter the subnetwork mask, then press [Return] or just press [Return]
to select the current netmask (255.255.255.0):
```

11. At the prompt, enter the **Subnetwork Mask** and press the Return key.

    You may press the Return key if you are satisfied with the Subnetwork Mask previously entered.

    For example:

```
Enter the subnetwork mask, then press [RETURN] 255.255.255.0 Return
```

The following message is displayed:

```
Additional Network Parameters: Subnetwork Mask and Default Gateway

Enter the subnetwork mask and default gateway information.

Example:

    Subnetwork mask:    255.255.255.0
    Gateway host name:  lab_gw
    Gateway IP address: 135.16.92.1

Current Settings:

    Subnetwork mask:    255.255.255.0
 -> Gateway host name:  (not set)
    Gateway IP address: 135.16.92.1

Enter the gateway host name, then press [Return]
```

12. At the prompt, enter the **Gateway Host** and press the Return key.

    For example:

```
Enter the gateway host name, then press [RETURN] snc_gw Return
```

The following message is displayed:

```
_____________________________________________________________________________

  Additional Network Parameters: Subnetwork Mask and Default Gateway

  Enter the subnetwork mask and default gateway information.

  Example:

      Subnetwork mask:    255.255.255.0
      Gateway host name:  lab_gw
      Gateway IP address: 135.16.92.1

  Current Settings:

      Subnetwork mask:    255.255.255.0
      Gateway host name:  snc-gw
      Gateway IP address: 135.16.92.1
_____________________________________________________________________________

Are the parameters above correct?

Press [y] for yes, [n] for no or [c] to cancel then press [Return]
```

13. At the prompt, enter **Y** and press the Return key.

    The following prompt may be displayed:

```
-----------------------------------------------------------------------
Note: Your system appears to have 2 network interfaces installed.
This procedure only configures the default network interface.
Use SAM to configure additional network interface cards.
-----------------------------------------------------------------------

Press [Return] to continue…
```

14. At the prompt, press the Return key.

The following message is displayed:

```
Additional Network Parameters: Domain Name System (DNS)

This section enables you to configure the Domain Name System
or DNS (also known as BIND), which enables this system to query
a DNS server for names and/or addresses of other network systems.

To configure DNS you will need to know the:

  * Local domain name

  * DNS server host name

  * DNS server IP address

Do you wish to specify this information?

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

15. At the prompt, enter **N** and press the Return key.

    The following message is displayed:

```
This section enables you to configure the system as a Network Information
 Service (NIS) client in order to access the various information provided
 by an NIS server.

 You will need to know the following information:

   * The NIS domain name.  The NIS domain name is
     not related to the DNS domain name.

   * Whether you want your system to wait during
     bootup on the availability of an NIS server
     for the specified NIS domain.  There is no
     limit to how long it will wait.
```

```
Do you wish to specify NIS client information?
Press [y] for yes or [n] for no, then press [Return]
```

16. At the prompt, enter **N** and press the Return key.

    The following message is displayed:

```
_____________________________________________________________________

  You can configure your system as a font server or you can skip this
  configuration step for now.

  Select one of the following letters and then press [Return].

    * [c] -- configure the system as a font server

    * [s] -- skip this configuration step

    * [h] -- help (more information about your choices)
_____________________________________________________________________


Please enter a letter choice and then press [Return]
```

17. At the prompt, enter **S** and press the Return key.

    The following prompt is displayed:

```
You have chosen to skip this configuration step, is that correct?

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

18. At the prompt, enter **Y** and press the Return key.

The following prompt is displayed:

```
_____________________________________________________________________

  Note: As installed, your system does not have all of its disk space
        available for immediate use.  If this system was factory
        installed, this was done to allow flexibility in configuring
        your system.  You may use the LVM (Logical Volume Manager)
        portion of SAM to allocate more disk space for your use.

  You currently have a total of 1128 megabytes of disk space unallocated
  in 1 Logical Volume group(s).

  After the system has finished starting up, you may run /usr/sbin/sam
  to allocate this space to your needs.

_____________________________________________________________________
Press [Return] to continue...
```

19. At the prompt, press the Return key.

    The following message is displayed:

```
_____________________________________________________________________

Congratulations!  Your system is now configured for networking, with
system name snch, and IP address 135.16.92.10!

You may later want to set up (or finish setting up) additional network
parameters for routing (gateways), DNS, and/or NIS.  If so, please run
the following command (you may want to note this for later reference):

     /sbin/set_parms addl_netwrk [Return]

To fully utilize the capabilities of your system, you may have to
perform some additional system configuration tasks using the HP-UX
"sam" (System Administration Manager) command.  Consult your local
administrator or the "HP-UX System Administration Tasks" manual for
more information.

The system will now complete its boot process, and allow you to login
as 'root'.

_____________________________________________________________________


Press [Return] to continue...
```

20. At the prompt, press the Return key.

    The following message is displayed:

```
HP-UX Start-up in progress
     _____________________________

     Mount file systems ..................................... OK
     Setting hostname ....................................... OK
     Set privilege group .................................... N/A
     Display date ........................................... N/A
     Save system core image if needed ....................... N/A
     Enable auxiliary swap space ............................ OK
     Start syncer daemon .................................... OK
     Configure LAN interfaces ............................... OK
     Start Software Distributor agent daemon ................ OK
     Configuring all unconfigured software filesets ......... OK
     Recover editor crash files ............................. OK
     Clean UUCP ............................................. OK
     List and/or clear temporary files ...................... OK
     Clean up old log files ................................. OK
     Start system message logging daemon .................... OK
        .
        .
        .
```

    The system completely boots up and a Console Login: prompt is displayed.

HP-UX "trusted mode" system (optional)

In addition to the security mechanisms available in the standard UNIX environment, HP-UX offers a utility for converting a host system into a "trusted" system which offers greater security via more stringent password and authentication policies.

This conversion process:

- creates a new protected password database (shadow password files) in */tcb/files/auth/*.
- replaces the password field in /etc/passwd with an asterisk (*).
- forces all users to use passwords.
- creates an audit ID number for each user.

- sets the audit flag on for all existing users.

NOTE:
Conversion to a trusted system should take place only after a successful coldStart has been completed (see **Informix Dynamic Server and OrbixMT Installation** later in this chapter). ColdStart must again be run after the conversion. However, the system must be converted back to non-trusted mode before re-running coldStart.

Before converting to a trusted system, the locally defined NIS server and client have to be removed using the HP SAM tool. Otherwise the conversion will not proceed. If the conversion still fails after removing NIS server/client, check the file */etc/rc.config.d/namesvrs* to make sure that NIS_MASTER_SERVER, NIS_SLAVE_SERVER and NIS_CLIENT are all set to 0.

Procedure: Converting to Trusted Mode System (optional)

1. Using the HP SAM tool, highlight **Auditing and Security** and activate **Open** to get to the **Convert to Trusted System** prompt.
2. Select **Convert to Trusted System**.
3. At the confirmation prompt, press **Y** to begin the conversion process.

NOTE:
After the system has been converted to a trusted system, each user's security policy must be modified using the following steps.

4. Select **Account for Users and Groups**, then select **Users**.
5. Highlight the desired user and select **Modify Security Policy**.
6. Make sure the **Password Format Policies** has the default settings; **Password Aging Policies** is set to **Disable Aging**; **General User Account Policies** has **Infinite** for **Account Life Time**; **None** for **Max Period of Inactivity on Account**; **20** for **Unsuccessful Login Tries Allowed**.
7. Select **OK** to confirm the changes.

NOTE:
To verify the new user password and authentication changes, look for the following messages after logging in:

```
Last successful login for root: Tue June 20 18:38:53 GMT 2000
Last unsuccessful login for root: NEVER
```

8. Upon the very first login, the new converted trusted system will prompt for password change. From now on, any changes to user accounts should be done using the SAM tool.

HP-UX Multi-User License Installation (Optional)

Installing HP-UX multi-user license

The following procedure is used to install the HP-UX multi-user license. The procedure takes approximately fifteen minutes.

NOTE:
A multi-user license must be obtained from HP prior to installation.

Procedure: Installing HP-UX Multi-User License

1. Insert the HP-UX Applications CD into the CD-ROM drive.
2. At the # prompt, enter the command:

   mount /dev/dsk/*/SD_CDROM**

   (***=the device location)
3. At the # prompt, enter the command:

   swinstall

   The following screen is displayed:

```
Specify Source (snch)

 Specify the source type, then host name, then path on that host.

 Source Depot Type:  [ Network Directory/CDROM  ->]

 [ Source Host Name... ] snch

 [ Source Depot Path... ] /SD_CDROM

 [ Software Filter... ] None
_____________________________________________________________________
[ OK ]                  [ Cancel ]                  [ Help ]
```

4. Specify the Source Depot Type: **Local CD Rom**.
5. Select **OK**.

The following message is displayed on the screen:

```
                              Note snch

The source "snch:/SD_CDROM" is a CD-ROM with part number
"B3920-13645". This CD-ROM contains both protected and unprotected
software.  No codeword or customer ID was entered and no valid saved ones
were found for this CD-ROM. A valid codeword is not required to access
unprotected software.  Use the "Add New Codeword" action in the Software
Selection Window to unlock protected software.
_____________________________________________________________________________
[ OK ]
```

6. Select **OK**.
7. Select **Actions→Add New Codeword** and press the Return key.

   The following message is displayed on the screen:

```
                Codeword Entry (snch)

Source: snch:/SD_CDROM

Enter the codeword and customer ID to access protected software.
Previously entered codewords are remembered.

  CD Number:  B3920-13645

Customer ID:  _____________________________

   Codeword:  ____________________________________________________
_____________________________________________________________________
   [ OK ]               [ Cancel ]                 [  Help  ]
```

8. Enter the **Customer ID** and **Codeword** for your system.

   This information is provided by Hewlett-Packard.

The following message is displayed on the screen:

```
 ===            SD Install - Software Selection (snch) (1)
File View Options Actions                                              Help
                     Press CTRL-K for keyboard help.
Source: snch:/SD_CDROM
Target:  snch:/

Only software compatible with the target is available for selection.
_____________________________________________________________________________
Top (Bundles and Products)                              1 of 14 selected
_____________________________________________________________________________
Marked?    Name                  Revision        Information
_____________________________________________________________________________
B1905BA_APZ     ->     B.01.30        OpenSpool for HP9000 Ser ^
          B1956CA_APZ     ->     A.02.10       OmniBackII 2.1 for HP900
          B3919CA_A      ->      B.10.20       HP-UX 16-User License
          B5425AA_APZ      ->    A.G1.18       ALLBASE/SQL REPLICATE for
          J2157A_APZ      ->     B.10.20.00     FDDI/9000 Series 800
          J2166A_APZ      ->     B.10.20.00     Token Ring/9000HPPB Ser
          J2250A_APZ      ->     B.10.20.00     Token Ring/9000 HPPB Ser
          J2455A_APZ      ->     B.04.02.00     HP ISDN BRI Link for the
          J2467B_APZ      ->     B.10.20.01     EISA RS-232 MUX Software v
<                                                                       >+
```

9. Select the file set **HP-UX 16-User License**.
10. Select **Actions→Install (analysis)...**

    The following window may be displayed on the screen:

```
                          Error (snch)

The software item "B3919CA_AGL,r=B.10.20,a=HPUX_B.10.20_800,v=HP" is a
bundle (or a product, subproduct or fileset contained within a
bundle). This item was successfully marked, but difficulties were
encountered while marking some items that it depends on. The messages below
show which software items encountered difficulties and exactly what these
difficulties were:
The software "UserLicense.16-USER,r=B.10.20,a=HP-UX_B.10.20_800,v=HP" was
successfully marked, but it depends on the following software items which
could not be found in the source. However, these items may already be in
the target. This will be checked during the Analysis Phase:
 OS-Core.CORE-KRN,r>=B.10.20.%12,a=HP-UX_B.10.20_800,v=HP
_____________________________________________________________________________
[ OK ]
```

11. Select **OK**.

    The following prompt is displayed:

```
 ===              Install Analysis (snch) (2)

 After Analysis has completed, press 'OK' to proceed, or 'CANCEL'
 to return to prior selection screen(s).


 Target             :  snch:/
 Status             :  Ready
 Products Scheduled :  1 of 1

 [ Products... ] [ Logfile... ] [ Disk Space... ] [ Re-analyze ]
_____________________________________________________________________
[   OK   ]                [ Cancel ]                [  Help  ]
```

12. Select **OK**.

    A prompt similar to the following may be displayed:

```
                          Confirmation (snch)

Installation will now begin.  Only those products which passed
Analysis will be installed.

If you need more information on Analysis results, reply "No" to this dialog,
and in the Analysis Window, press the "Disk Space", "Logfile" or "Product
Summary" button.

Once Installation begins, you will not be able to go back to
Selection or Analysis until it is complete.  Do you still wish to
begin Installation?
---------------------------------------------------------------------
[ Yes ]                                                 [  No  ]
```

13. Select **Yes**.

A prompt similar to the following is displayed:

```
                        Confirmation (snch)

Before starting Installation, you should be aware of the following:

Kernel filesets will be installed on the local system.   The
Installation process will include building a new kernel.

The system will be rebooted as soon as Installation is complete.

Do you still wish to start Installation?
_____________________________________________________________________
[ Yes ]                                              [  No  ]
```

14. At the prompt, select **Yes**.

    The CD begins to be read. Installation of all 16 user file sets takes approximately three minutes to be completed.

    The following status window is displayed:

```
===             Install Window (snch) (3)

Press 'Products' and/or 'Logfile' for more target information.

Target             :  snch:/
Status             :  Ready
Percent Complete   :  100%
Kbytes Installed   :  17 of 17
Time Left (minutes):  0
Loading Software   :

[ Products... ] [ Logfile... ]
_____________________________________________________________________
[  Done  ]                                           [  Help  ]
```

    When the installation is finished, the Status changes to Ready.

15. Select **Done.**

The following prompt is displayed:

```
Your local system will be rebooted when you press "OK" in this
window.  Check the logfile "/var/adm/sw/swagent.log" after reboot
to see if there were any software configuration problems.
_____________________________________________________________________
[[ OK    ]]
```

16. Select **OK.**

    The system reboots automatically.

17. Remove the HP-UX Application Software CD from the CD-ROM drive.

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

Installing HP-UX 100MB LAN card drivers

The following procedure is used to install the HP-UX 100MB LAN card drivers. The procedure takes approximately 20 minutes.

Procedure: Installing HP-UX 100MB LAN Card Drivers

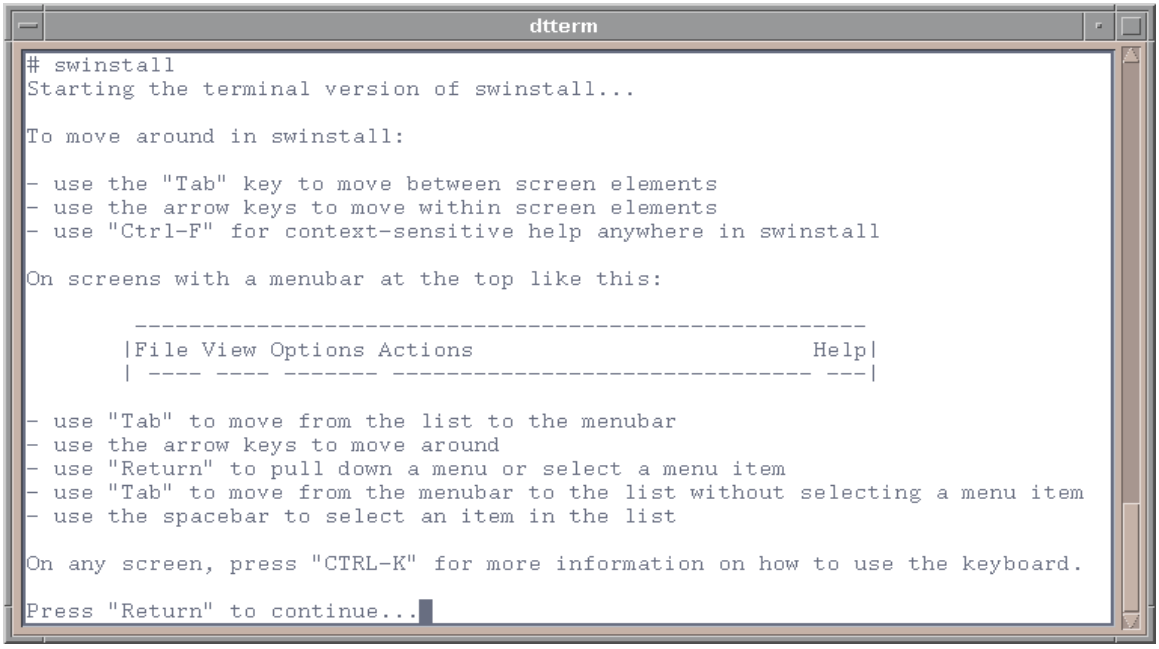
1. Insert the HP-UX application CD (disk 1 0f 4) into the CD-ROM drive.
2. At the # prompt, enter the command:

   mount /dev/dsk/*/SD_CDROM**

   (***=the device location)
3. At the # prompt, enter the command:

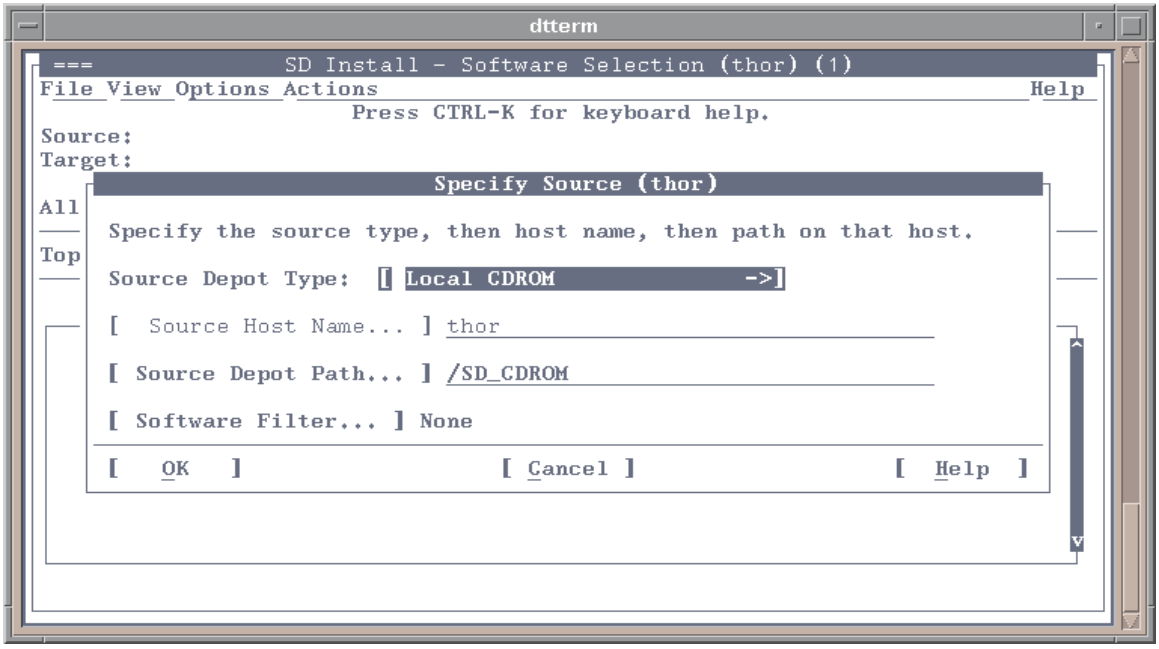
   swinstall

   The following screen is displayed:



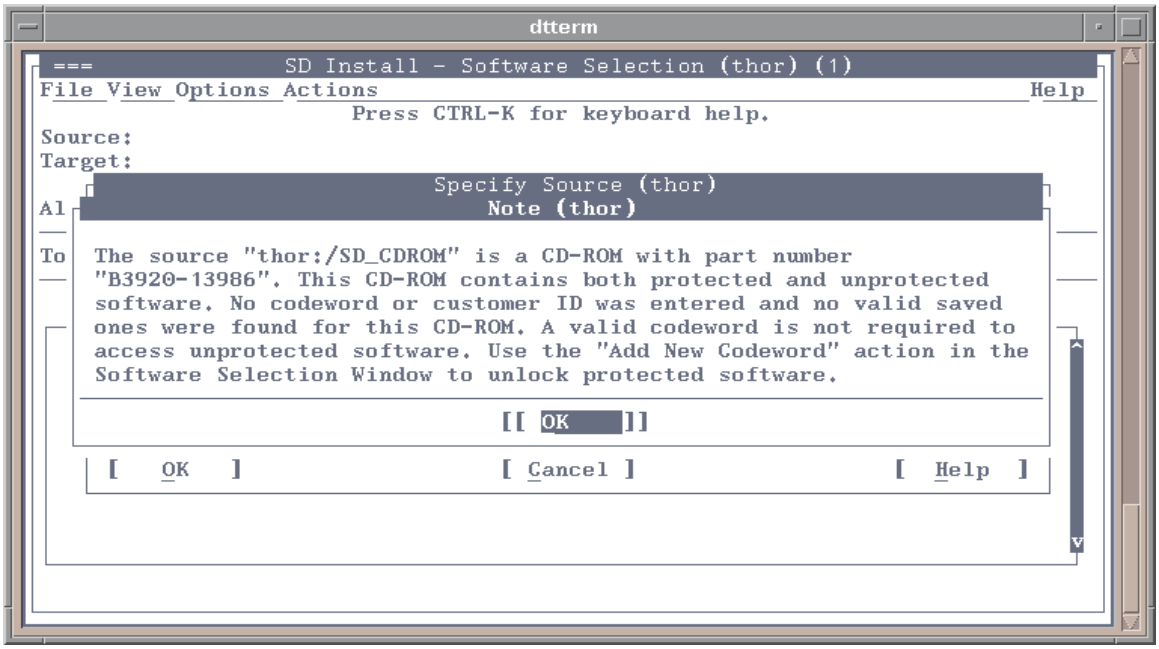
4. Press the Return key to continue.

The following screen is displayed:



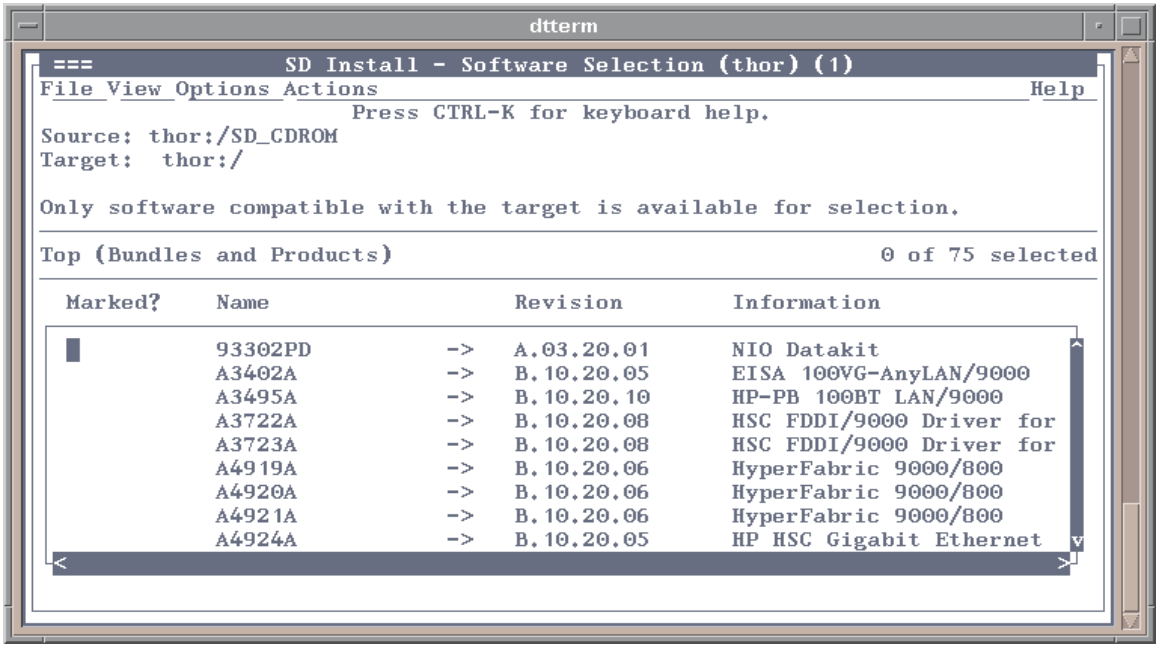
5. Specify the Source Depot Type: Local CD-ROM and select **OK.**

   The following screen is displayed:

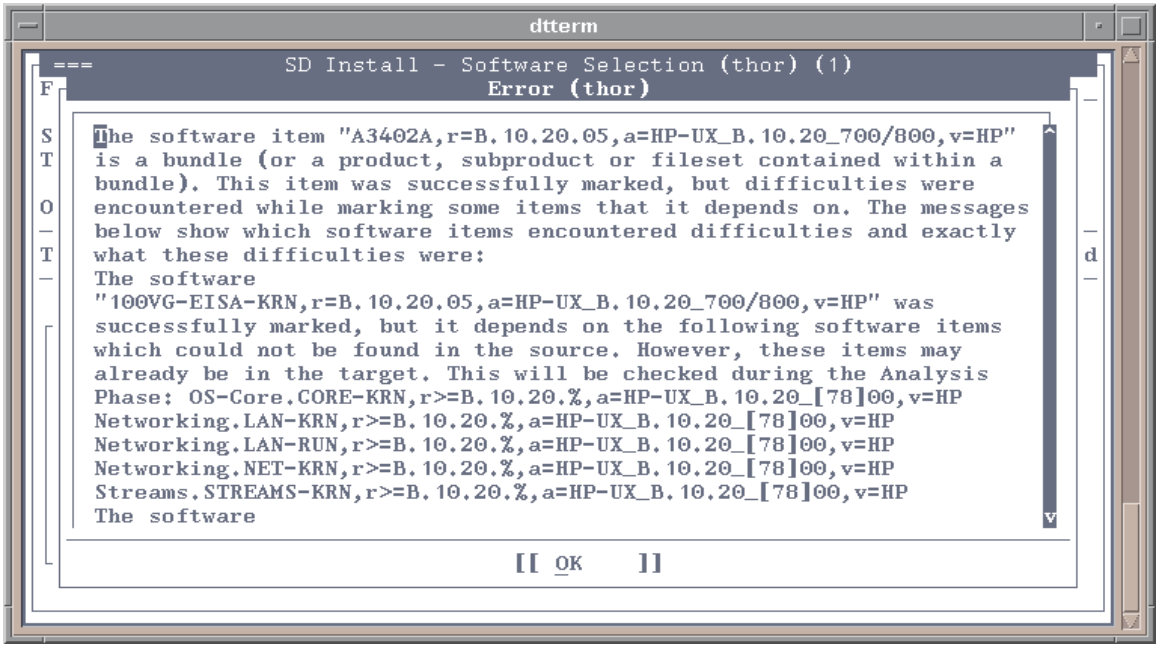


6. Select **OK**.

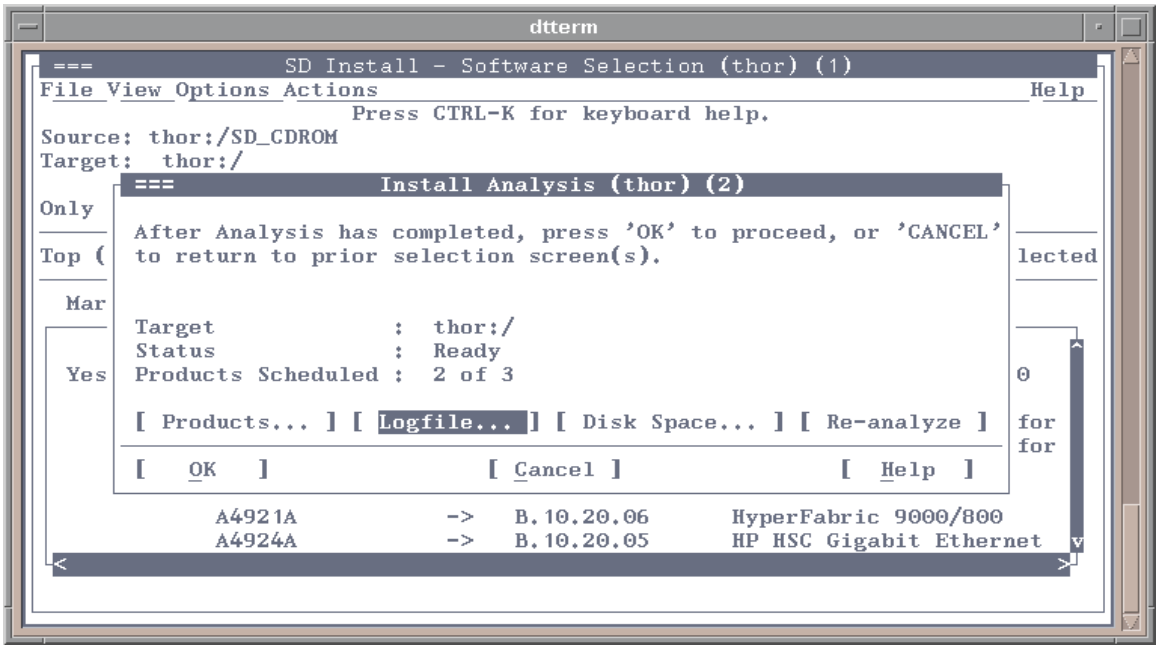
The following screen is displayed:



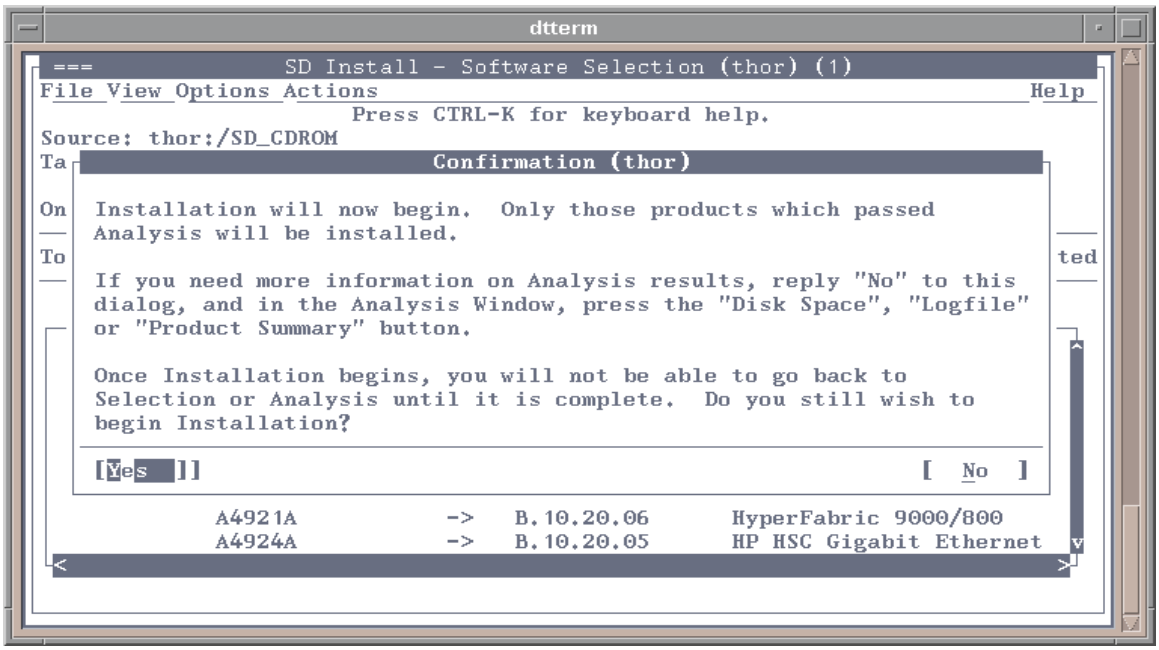
7. Scroll down the list and highlight the appropriate LAN card (check the model number on the LAN card to determine this).
8. Select **Actions→Install (analysis)...**The following screen is displayed:



9. Select **OK** to continue. The following screen is displayed:.



10. Select **OK**. The following screen is displayed:



11. Select **Yes**. The system will then reboot.

HP-UX Patch Installation

Installing HP-UX patches

The following procedure is used to install all essential patches for the core operating system. The procedure takes approximately twenty minutes. The following patches are installed in this procedure: **PHSS_8508, PHCO_15453, PHCO_16591, PHCO_17389, PHKL_7765, PHKL_16751, PHKL_16957, PHKL_17254,PHKL_17858, PHKL_18198, PHKL_18522, PHNE_17730, PHNE_19710, Y2K-1020S800.**

NOTE:
Do not load any other PHSS patches, as these must be loaded after HP Openview is installed.

When installing the HP-UX patches, an error may be reported and a patch excluded if it is already installed or is superseded by other patches. These types of errors can be ignored.

The following patches are required by HP 100mb BaseT LAN card and must be installed on any host with this card: **PHCO_10947, PHNE_18172, PHNE_18924**. (These patches do not have to be installed if there is no 100mb LAN card).

Procedure: Installing HP-UX Patches

1. At the Console Login prompt, log in as `root.`

   A # prompt is displayed.

2. Insert the Cold Start CD into the CD-ROM drive. (Use **`ioscan -fn`** to find the CD device location).

3. Enter the following commands:

   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

     (***=the device location)

4. At the # prompt, enter the command:

   swinstall -v -s /SD_CDROM

   The following message is displayed:

```
The DISPLAY environment variable is set to "vt100", but
the current configuration won't allow swinstall to run on that display.

The DISPLAY environment variable may be incorrect, or, if you are
```

```
running swinstall remotely, you may need to allow the remote system
to access your local X server by typing
      /usr/bin/X11/xhost +palau
on your local machine.

Do you want to proceed using the terminal version of swinstall?
(yes or no) [yes] yes
```

5. Select **yes** by pressing the Return key.

   The following messages are displayed:

```
Starting the terminal version of swinstall...

To move around in swinstall:

- use the "Tab" key to move between screen elements
- use the arrow keys to move within screen elements
- use "Ctrl-F" for context-sensitive help anywhere in swinstall

On screens with a menubar at the top like this:

        ------------------------------------------------------
       |File View Options Actions                         Help|
       | ---- ---- ------- ------------------------------ ---|

- use "Tab" to move from the list to the menubar
- use the arrow keys to move around
- use "Return" to pull down a menu or select a menu item
- use "Tab" to move from the menubar to the list without selecting a menu
item
- use the spacebar to select an item in the list

On any screen, press "CTRL-K" for more information on how to use the key-
board.

Press "Return" to continue...
```

6. Press the Return key.

The following message may be displayed:

```
                        Note snch
The default source "/var/spool/sw" does not exist or is not a valid
source and there are no other registered depots on snch.  You can
type in the depot path on this host or choose a different host.
_____________________________________________________________________
[ OK ]
```

7. Select **OK .**

   The main *swinstall* selection screen is displayed:

8. Select the following patches from the GUI: **PHSS_8508, PHCO_15453, PHCO_16591, PHCO_17389, PHKL_7765, PHKL_16751, PHKL_16957, PHKL_17254,PHKL_17858, PHKL_18198, PHKL_18522, PHNE_17730, PHNE_19710, Y2K-1020S800.**

NOTE:
Do not load any other PHSS patches, as these must be loaded after HP Openview is installed.

The following patches are required by HP 100mb BaseT LAN card and must be installed on any host with this card: **PHCO_10947, PHNE_18172, PHNE_18924**. (These patches do not have to be installed if there is no 100mb LAN card).

9. Select **Actions→Install (analysis)...**,
10. Select **OK** on the Install Analysis screen.

    When the installation of the patches is finished, the Status changes to `Completed`.

11. After the patches installation is completed, select **Done**.
12. Press the Tab key to move to the menubar.
13. Select **File→Exit** and press the Return key to exit the *swinstall* program.

NOTE:
Depending on the date of the HP-UX CD that is used, some patches may fail.

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

Installing X.25 software

The following procedure is used to install the ACC X.25 file set to support X.25 communications. The file set contains all the necessary customization scripts to configure the file set. This file set will rebuild the kernel and automatically restart the system.

Procedure: Installing X.25

1. At the Console Login prompt, log in as `root`.

   A # prompt is displayed.

2. Insert the Cold Start CD into the CD-ROM drive. (Use **`ioscan -fn`** to find the CD device location).

3. Enter the following commands:

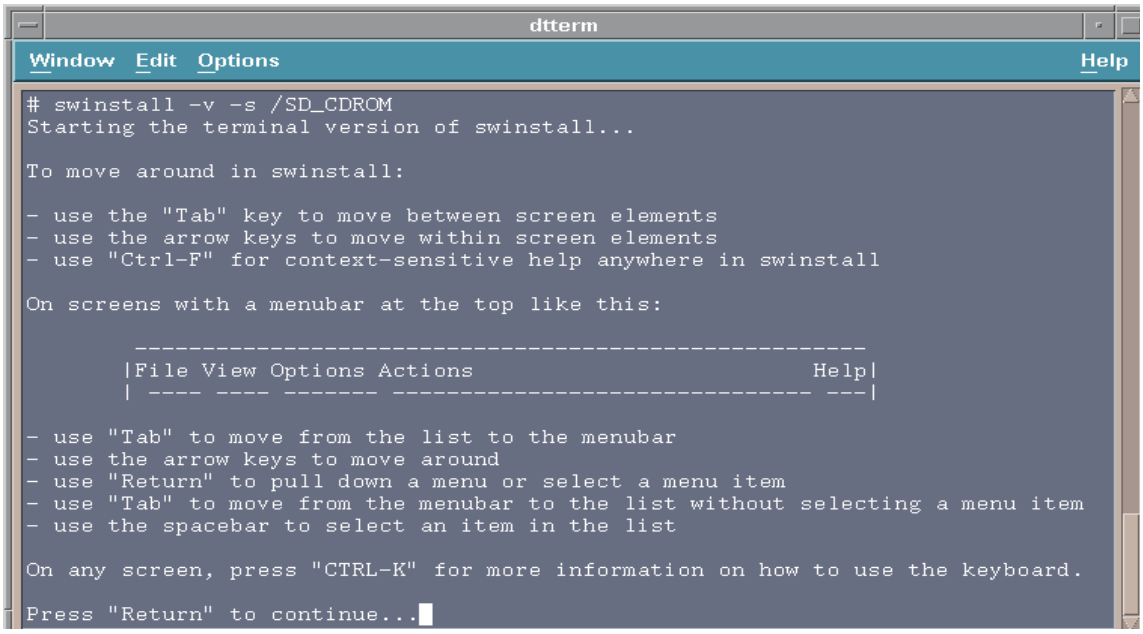
   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

     (***=the device location)

4. At the # prompt, enter the command:

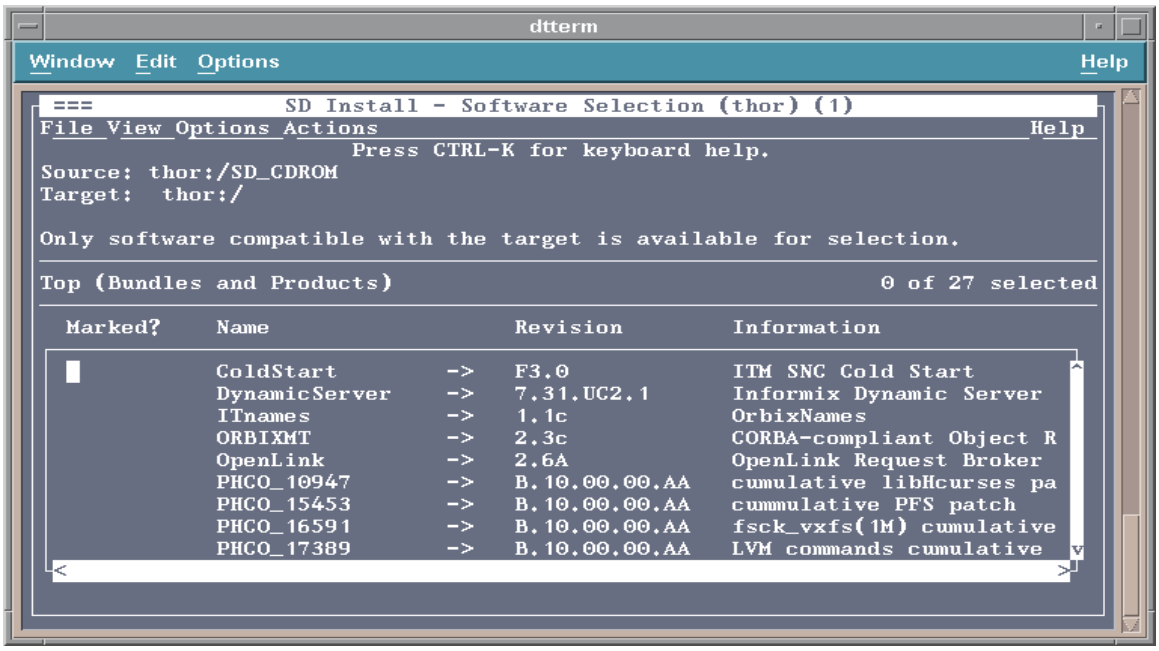
   swinstall -v -s /SD_CDROM

   The following screen is displayed:



5. Select **yes** by pressing the Return key.

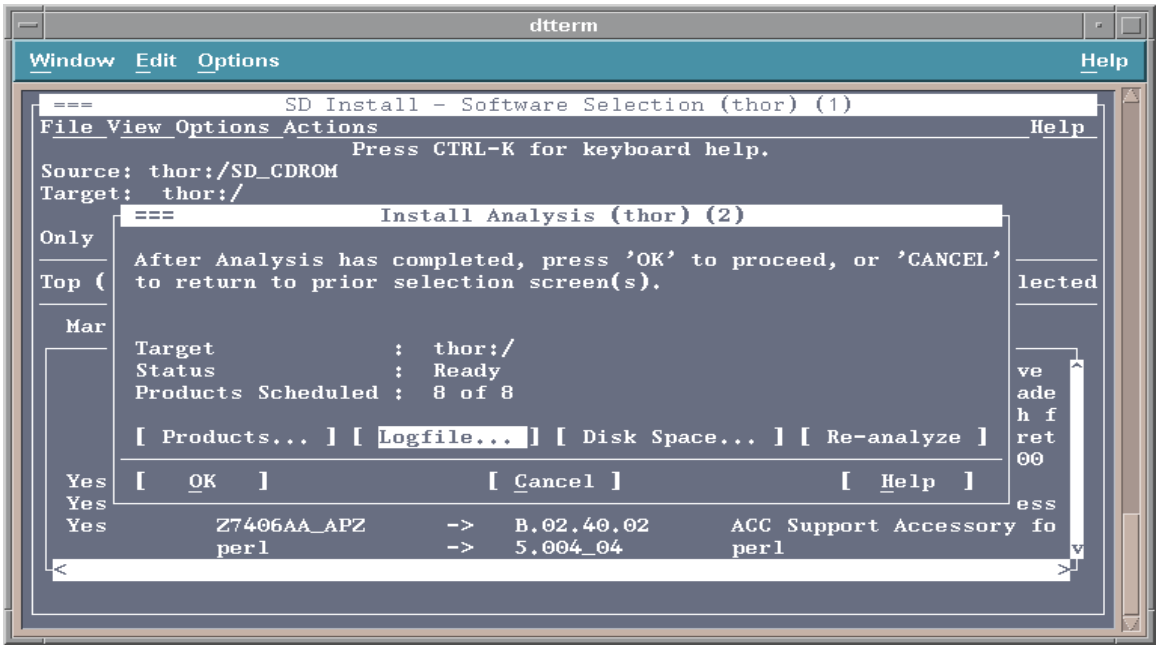
   The following screen is displayed:



6. Scroll down to the bottom of the screen and select **Z7299A_APZ**, **Z7404AA_APZ, and Z7406AA_APZ** which comprise the X.25/ACC Bundled Product file set.

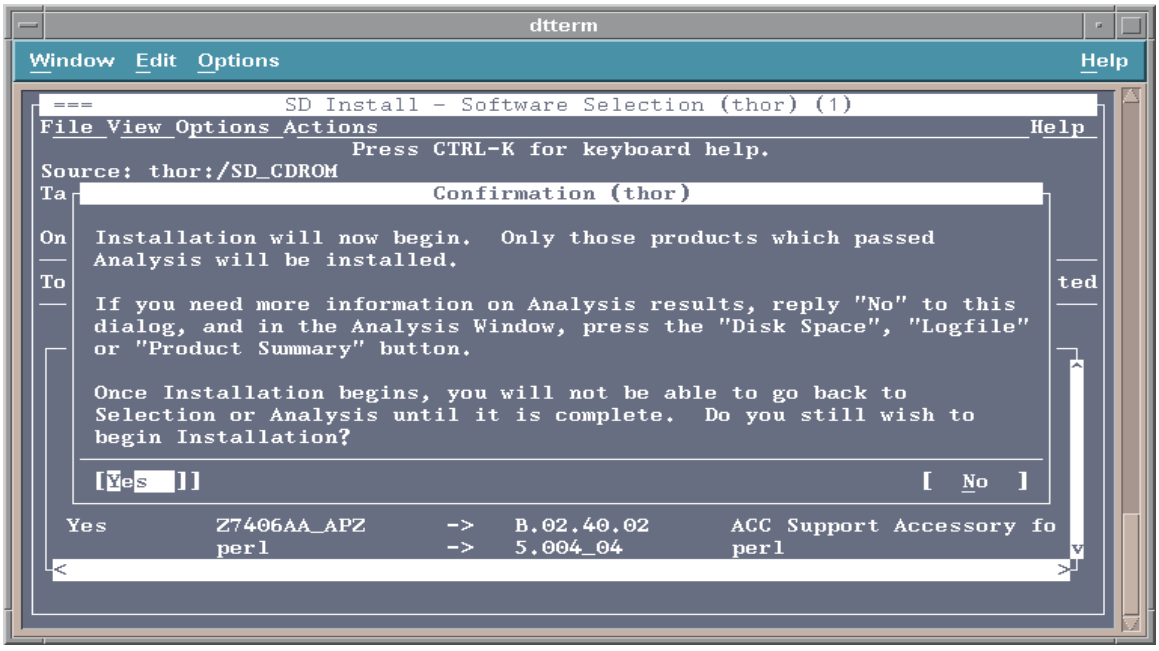
7. **Select Actions→Install (analysis)...**

The following screen is displayed:



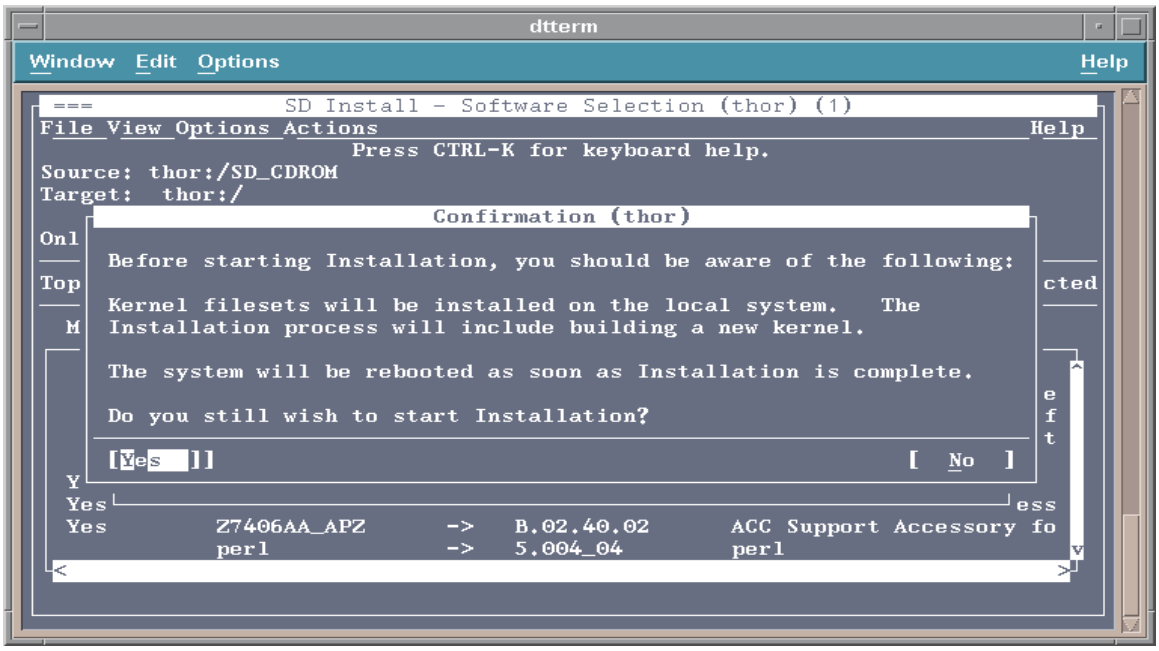
8. Select **OK** on the Install Analysis screen.

   The following screen is displayed:



9. Select **Yes**.

   The following screen is displayed:



10. Select **Yes.**
11. After the x.25 file sets installation is completed, select **Done**.
12. Press the Tab key to move to the menubar.
13. Select **File→Exit** and press the Return key to exit the *swinstall* program.

WaveStar SNMS Cold Start

WaveStar SNMS cold start

The WaveStar SNMS Cold Start file set 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.

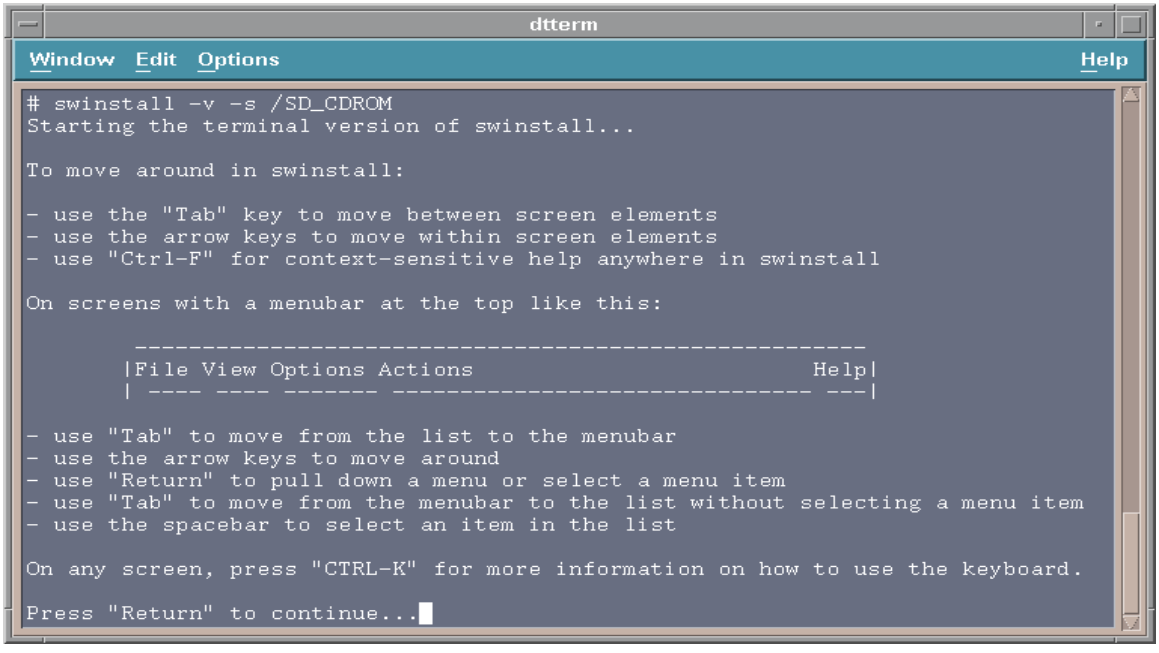
Procedure: WaveStar SNMS Cold Start

1. At the Console Login prompt, log in as `root.` A # prompt is displayed.
2. Insert the Cold Start CD into the CD-ROM drive. (Use **`ioscan -fn`** to find the CD device location).
3. Enter the following commands:
   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

     (***=the device location)
4. At the # prompt, enter the command:

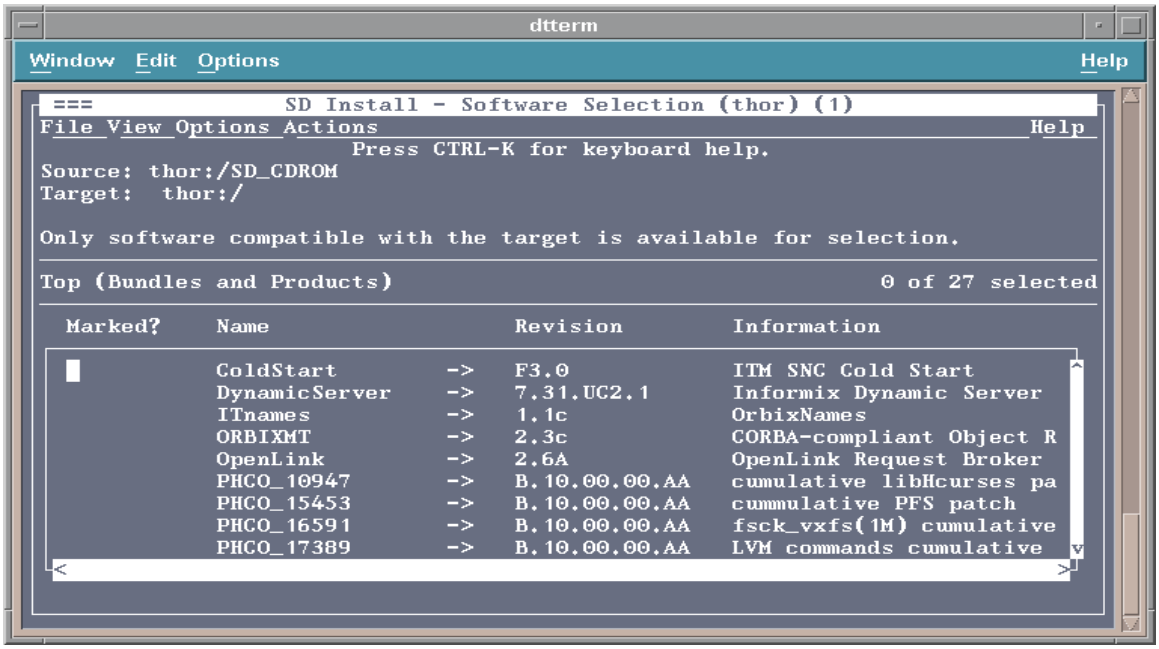
   swinstall -v -s /SD_CDROM

The following screen is displayed:



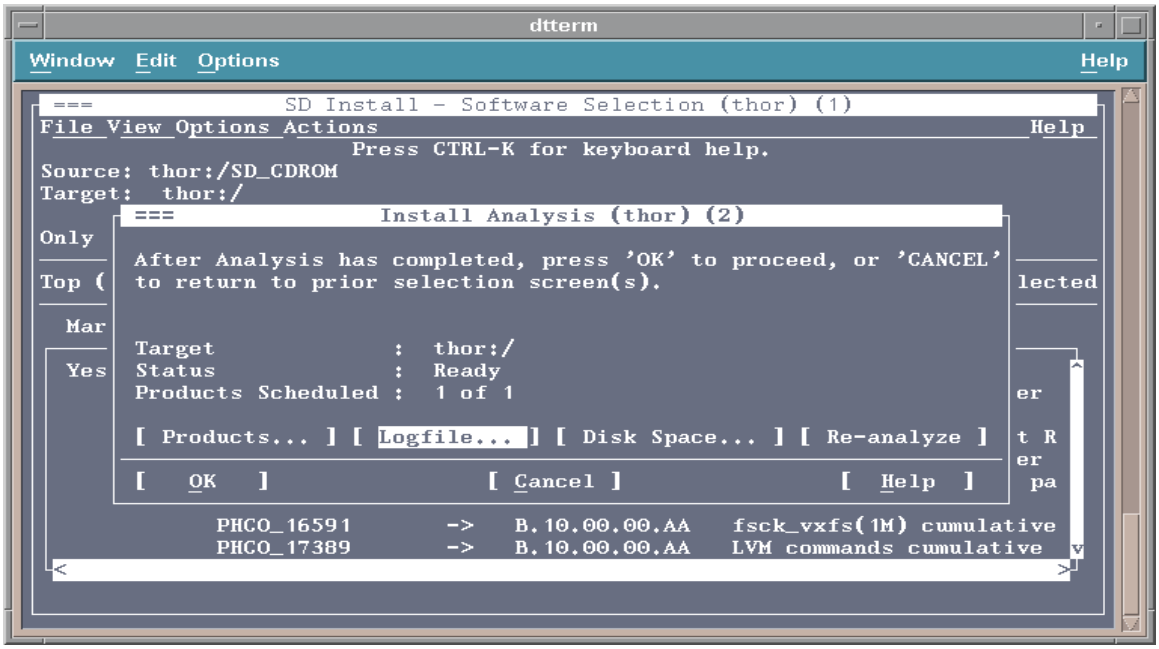
5. Select **yes** by pressing the Return key.

The following screen is displayed:



6. Press the Return key.
7. Select **ColdStart**.
8. Select **Actions→Install (analysis)...**

The following screen is displayed:



9. Select **OK** on the Install Analysis screen
10. After the ColdStart file set installation is completed, select **Done**.
11. Press the Tab key to move to the menubar.
12. Select **File→Exit** and press the Return key to exit the *swinstall* program.
13. After installing the ColdStart file set, at the # prompt, enter the command:

    cd /tmp

14. At the # prompt, enter the command:

    ./init_disk

    This command configures the hard disks.

WARNING:
For a system employing a 20 disk configuration, the "maxvgs" kernel parameter must be set to 40. This parameter can be edited using the HP System Administration Manager (SAM) tool. This parameter should be set to maxvgs=40 before ./init_disk is run.

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. The init_disk process saves the collected configuration data in the *ems/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 */ems/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.

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.

Procedure: Undo Disk

1. cd /tmp
2. Enter command ./undo_disk
3. Undo_disk will prompt you for each undo task. You can choose:

   y - to undo one specific configuration

   n - not undo one specific configuration

   all - to undo every configuration
4. Use ls -l /dev/vg* and bdf command to verify that the system is restored to its original configuration.
5. Reboot the system.

The following messages are displayed when **./init_disk** is run:

```
Script started on Tue Mar 21 14:25:22 2000 # ./init_disk

============================================================
START: INSTALLATION Tue Mar 21 14:25:36 EST 2000

This is a fresh start of coldStart

Search CD-Rom/DVD-Rom drive on this machine...

Found DVD-Rom drive /dev/dsk/c2t2d0

Search TAPE drive on this machine...

Found TAPE drive

------------------------------------------------------------------------
init_disk performs ckPMConfig() function .....

Do you want this host to support PM configuration (y/n)? n
------------------------------------------------------------------------
init_disk performs ckHostModel() function .....

checking if this model is supported ...

Good... K380, This model is supported!

checking number of CPU...

Good...You have 2 CPU(s)
------------------------------------------------------------------------
init_disk performs ckLan() function .....

 Checking if this system has at least one LAN interface

Good...You have 1 LAN Interface Card(s)
------------------------------------------------------------------------
init_disk performs ckMux() function .....

 Checking if this system has at least one ACC Mux interface

No ACC Mux Card
WARNING: HARDWARE DISCREPANCY - No X.25 ACC Mux Card Detected.
9000/800/K380 requires at least one X.25 ACC Mux Card.
Add ACC Mux interface if X.25 communication is required.
```

```
Installation will continue
Press ENTER to continue

--------------------------------------------------------------------------
init_disk performs ckMem() function .....

 checking memory...

Less Than Required RAM:
ERROR: HARDWARE DISCREPANCY - Found 1023 MB of system RAM
9000/800/K380 requires at least 768 MB of system RAM.
Upgrade the host RAM to 1024 RAM after installation completes.
Installation will continue.
Press Enter to continue

--------------------------------------------------------------------------
init_disk performs checkDISK() function .....

checking disk capacity...

DISK                    CAPACITY            USED
/dev/rdsk/c0t8d0        8891556              n
/dev/rdsk/c0t10d0       8891556              n
/dev/rdsk/c1t5d0        8891556              n
/dev/rdsk/c1t9d0        8891556              y
/dev/rdsk/c1t11d0       8891556              n

5 disks with total 44457 MB disk capacity on this system
--------------------------------------------------------------------------
init_disk performs CreatePVK380() function .....
Creating Physical volume for vg01...
Physical volume “/dev/rdsk/c0t8d0” has been successfully created.
Increased the number of physical extents per physical volume to 2170.
Volume group “/dev/vg01” has been successfully created.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf
Done.
Creating Physical volume for vg02...
Physical volume “/dev/rdsk/c0t10d0” has been successfully created.
Increased the number of physical extents per physical volume to 2170.
Volume group “/dev/vg02” has been successfully created.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Done.
Creating Physical volume for vg03...
Physical volume “/dev/rdsk/c1t5d0” has been successfully created.
Increased the number of physical extents per physical volume to 2170.
```

```
Volume group “/dev/vg03” has been successfully created.
Volume Group configuration for /dev/vg03 has been saved in /etc/lvmconf/
vg03.conf
Done.
Creating Physical volume for vg04...
Physical volume “/dev/rdsk/c1t11d0” has been successfully created.
Increased the number of physical extents per physical volume to 2170.
Volume group “/dev/vg04” has been successfully created.
Volume Group configuration for /dev/vg04 has been saved in /etc/lvmconf/
vg04.conf
Done.
---------------------------------------------------------------------
init_disk performs CreateLVK380() function .....
Logical volume “/dev/vg00/reports” has been successfully created with character
device “/dev/vg00/rreports”.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/
vg00.conf
Logical volume “/dev/vg00/reports” has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/
vg00.conf
Logical volume “/dev/vg01/tools” has been successfully created with character
device “/dev/vg01/rtools”.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf
Logical volume “/dev/vg01/tools” has been successfully extended.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf
Logical volume “/dev/vg01/snc” has been successfully created with character
device “/dev/vg01/rsnc”.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf
Logical volume “/dev/vg01/snc” has been successfully extended.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf
Done.
Creating SNC File System... version 3 layout
6144000 sectors, 6144000 blocks of size 1024, log size 1024 blocks
unlimited inodes, 6144000 data blocks, 6141360 free data blocks
188 allocation units of 32768 blocks, 32768 data blocks
last allocation unit has 16384 data blocks
first allocation unit starts at block 0
overhead per allocation unit is 0 blocks
Done.
Creating REPORTS File System... version 3 layout
2048000 sectors, 2048000 blocks of size 1024, log size 1024 blocks
unlimited inodes, 2048000 data blocks, 2046392 free data blocks
63 allocation units of 32768 blocks, 32768 data blocks
```

```
last allocation unit has 16384 data blocks
first allocation unit starts at block 0
overhead per allocation unit is 0 blocks
Done.
Creating TOOLS File System... version 3 layout
614400 sectors, 614400 blocks of size 1024, log size 1024 blocks
unlimited inodes, 614400 data blocks, 613160 free data blocks
19 allocation units of 32768 blocks, 32768 data blocks
last allocation unit has 24576 data blocks
first allocation unit starts at block 0
overhead per allocation unit is 0 blocks
Done.
------------------------------------------------------------------------
init_disk performs CreateDBK380() function .....
Creating Informix DBsp1_1G on vg02...Logical volume “/dev/vg02/DBsp1_1G”
has been successfully created with character device “/dev/vg02/rDBsp1_1G”.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Logical volume “/dev/vg02/DBsp1_1G” has been successfully extended.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Done.
Creating Informix DBsp2_1G on vg01...
Logical volume “/dev/vg01/DBsp2_1G” has been successfully created with
character device “/dev/vg01/rDBsp2_1G”.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf Logical volume “/dev/vg01/DBsp2_1G” has been successfully
extended.
Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/
vg01.conf Done.
Creating Informix DBsp3_1G on vg00...
Logical volume “/dev/vg00/DBsp3_1G” has been successfully created with
character device “/dev/vg00/rDBsp3_1G”.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/
vg00.conf
Logical volume “/dev/vg00/DBsp3_1G” has been successfully extended.
Volume Group configuration for /dev/vg00 has been saved in /etc/lvmconf/
vg00.conf
Done.
Creating Informix DBspe1_1G on vg02...
Logical volume “/dev/vg02/DBspe1_1G” has been successfully created with
character device “/dev/vg02/rDBspe1_1G”.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Logical volume “/dev/vg02/DBspe1_1G” has been successfully extended.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
```

```
Done.
------------------------------------------------------------------------
init_disk performs CreatePMK380() function .....

Creating PM Space pmsp1_2G on vg02...
Logical volume “/dev/vg02/pmsp1_2G” has been successfully created with
character device “/dev/vg02/rpmsp1_2G”.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Logical volume “/dev/vg02/pmsp1_2G” has been successfully extended.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Done.
Creating PM Space pmsp2_2G on vg02...
Logical volume “/dev/vg02/pmsp2_2G” has been successfully created with
character device “/dev/vg02/rpmsp2_2G”.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Logical volume “/dev/vg02/pmsp2_2G” has been successfully extended.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Done.
------------------------------------------------------------------------
init_disk performs CreateDTK380() function .....
Logical volume “/dev/vg02/data” has been successfully created with character
device “/dev/vg02/rdata”.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf
Logical volume “/dev/vg02/data” has been successfully extended.
Volume Group configuration for /dev/vg02 has been saved in /etc/lvmconf/
vg02.conf

Creating DATA File System... version 3 layout
2048000 sectors, 2048000 blocks of size 1024, log size 1024 blocks unlimited
inodes, 2048000 data blocks, 2046392 free data blocks
63 allocation units of 32768 blocks, 32768 data blocks
last allocation unit has 16384 data blocks
first allocation unit starts at block 0
overhead per allocation unit is 0 blocks
Done.

END: INSTALLATION Tue Mar 21 14:26:52 EST 2000
============================================================
# #
```

Use vi to verify disk setup by checking *init_disk.log* for errors.

Informix DynamicServer, OrbixMT, and OrbixNames Installation

Installing Informix and Orbix software

This file set 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: Installing Informix and Orbix

1. At the Console Login prompt, log in as `root.` A # prompt is displayed.
2. Insert the Cold Start CD into the CD-ROM drive. (Use **`ioscan -fn`** to find the CD device location).
3. Enter the following commands:
   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

     (***=the device location)
4. At the # prompt, enter the command:

   swinstall -v -s /SD_CDROM

   The following message is displayed:

```
The DISPLAY environment variable is set to "vt100", but
the current configuration won't allow swinstall to run on that display.

The DISPLAY environment variable may be incorrect, or, if you are
running swinstall remotely, you may need to allow the remote system
to access your local X server by typing

      /usr/bin/X11/xhost +palau

on your local machine.

Do you want to proceed using the terminal version of swinstall?
(yes or no) [yes] yes
```

5. Select **yes** by pressing the Return key.

   The following messages are displayed:

```
Starting the terminal version of swinstall...

To move around in swinstall:

- use the "Tab" key to move between screen elements
- use the arrow keys to move within screen elements
- use "Ctrl-F" for context-sensitive help anywhere in swinstall

On screens with a menubar at the top like this:

        ------------------------------------------------------
       |File View Options Actions                          Help|
       | ---- ---- ------- ------------------------------ ---|

- use "Tab" to move from the list to the menubar
- use the arrow keys to move around
- use "Return" to pull down a menu or select a menu item
- use "Tab" to move from the menubar to the list without selecting a menu
item
- use the spacebar to select an item in the list

On any screen, press "CTRL-K" for more information on how to use the key-
board.

Press "Return" to continue...
```

6. Press the Return key.
7. Select **DynamicServer, ORBIXMT**, and **ITnames** (OrbixNames).

NOTE:
Installation of ITnames (OrbixNames) is optional and needed for Northbound interface only.

8. Select **Actions→Install (analysis)...**

   A screen is displayed that confirms the number of files to be installed.

9. Select **OK**.

   A screen is displayed that shows the status of the installation. When the installation is finished, the Status changes to `Completed`.

10. After the installation is completed, select **Done**.
11. Go to the main *swinstall* selection screen.
12. Select **File→Exit** and press the Return key to exit the swinstall program.
13. At the # prompt, enter the following commands:

    cd /tmp
    ./coldStart

    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.

14. The system will prompt you for the following:
    - Home Directory /snc
    - User Groups
    - User Names
    - Informix and Orbix License Information
      - Informix DynamicServer Serial Number
      - Informix DynamicServer key
      - OrbixMT License Code
      - OrbixNames License Code
    - DNS Domain prompt (for Northbound only)

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

NOTE:
If coldstart is running for the very first time on your system, it will solicit information such as Informix/Orbix license information, etc. Coldstart saves the collected data for future use.

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

- You can choose to use previously collected EMS data, skip previously performed configuration steps, or you can choose to start the whole coldstart process from scratch.
- If you choose to use previously collected EMS data, coldstart will display information such as EMS home directory, user ID, group ID, etc., for you to review. You have the choice to change particular data, or you can choose to use the saved data.
- If coldstart was interrupted before its completion in the previous run, coldstart remembers where it was interrupted. For the configuration steps, you then have the choice to skip one particular step, run the step again, or run the step as well as all subsequent steps.

```
# ./coldStart
============================================================
START: INSTALLATION Tue Mar 21 14:35:39 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)?
SNC_HOST_MODEL_NUM=K380
SNCROOT=/snc
SNC_GID=200
INFORMIX_GID=201
SNC_UID=200
INFORMIX_UID=201
TL1_UID=203
```

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

INFORMIX LICENSE INFORMATION:

License information is required to validate the INFORMIX file set.

Do you wish to specify INFORMIX license information at this time (y/n/q)?
Please enter the Serial Number for the INFORMIX DynamicServer package:
You have entered XXX#A123456 as INFORMIX DynamicServer Serial Number.
Is this correct?
Press [y] for yes or [n] for no, then press [Return].
Please enter the Key for the INFORMIX DynamicServer package:
You have entered ABCDEF as INFORMIX DynamicServer Key.
Is this correct?
Press [y] for yes or [n] for no, then press [Return].
---------------------------------------------------------------------
coldStart performs getOrbix() function .....
ORBIX MT LICENSE INFORMATION:

License information is required to validate the ORBIX file set.

Do you wish to specify ORBIX license information at this time (y/n/q)?
Please enter the License String for the ORBIX package:
You have entered 12345678-1234xx12-12345678-1123x123-12123x12 as
ORBIX License Key.
Is this correct?
Press [y] for yes or [n] for no, then press [Return].
---------------------------------------------------------------------------------
coldstart performs getOrbixNames() function.....
Do you wish to specify OrbixNames license information at this time (y/n/q)?
Please enter the License String for the OrbixNames package:
You have entered 12345678-12345678-12345678-1123x123-x1234567 as
OrbixNames License Key.
Is this correct?
Press [y] for yes or [n] for no, then press [Return].
---------------------------------------------------------------------
Please enter your local DNS domain name (blank for none):
You have entered as local DNS domain name.
Is this correct?
Press [y] for yes or [n] for no, then press [Return].
```

INPUT REVIEW
The following is a review of the required information:

1. EMS Home Directory = /snc
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 = XXX#A123456
8. INFORMIX DynamicServer Key = ABCDEF
9. ORBIX MT License Code = 12345678-1234xx12-12345678-1123x123-12123x12
10. OrbixNames License Code = 12345678-12345678-12345678-1123x123-x1234567
11. Local DNS Domain Name =

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 [1-10 or s][q to quit]:

EMS System Initialization will continue automatically.
Check /tmp/cold_start.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) >

WARNING!
This software, and its authorized use and number of users, are subject to the applicable license agreement with Informix Software, Inc. If the number of users exceeds the licensed number, the excess users may be prevented from using the software. UNAUTHORIZED USE OR COPYING MAY SUBJECT YOU AND YOUR COMPANY TO SEVERE CIVIL AND CRIMINAL LIABILITIES.

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/snmpr
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!
This software, and its authorized use and number of users, are subject to the applicable license agreement with Informix Software, Inc. If the number of users exceeds the licensed number, the excess users may be prevented from using the software. UNAUTHORIZED USE OR COPYING MAY SUBJECT YOU AND YOUR COMPANY TO SEVERE CIVIL AND CRIMINAL LIABILITIES.

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.....
Done for installing Orbix!!!
---
coldStart performs setUpOrbixNames() function .....

```
Install OrbixNames License......
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...
/usr/ccs/bin/ld: (Warning) Linker features were used that may not be supported in
future releases. The +vallcompatwarnings option can be used to display more
details, and the ld(1) man page contains additional information. This warning can
be suppressed with the +vnocompatwarnings option.
Kernel rebuild successfully
Installing new kernel
Shutdown at 14:39 (in 1 minute) [pid 6777]

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

END: INSTALLATION Tue Mar 21 14:38:36 EST 2000
============================================================
```

15. To ensure the Informix server runs on the correct sockets using TCP/IP do the following:

    - If the host is setup with dns or nis, make sure the file /etc/nsswitch.conf contains the following information

    services: files [NOTFOUND=continue] nis [NOTFOUND=continue] dns

---

Generating X.25 config files

Procedure: Generating x25_config.answ and x25_config.0* files

1. At the # prompt, enter the command:

   cd /tmp

2. At the # prompt, enter the command:

   ./x25_config.GEN

   This command generates the *x25_config.answ* and *x25_config.0** files in */tmp*.

The output to this command prompts you for the number of PVCs and SVCs to be used per MUX interface port. It is similar to the following:

```
Checking for X.25 MUX Cards...Success!!!

Found 2 X.25 NACC Card(s).



How Many PVC's per port (0-255)?: 6

How Many SVC's per port (0-255)?: 6

Building /tmp/x25_config.ipmap file ... Done.
Building /tmp/x25_config.answ file ... Done
Building /tmp/x25_config.* files ... Done
```

3. Change directory to /tmp and move the *x25_config.answ* file using the following command:

   mv x25_config.answ /opt/acc/cfg

4. Move all of the other x25 files by entering the command:

   mv x25* /etc/x25

HP Openview Installation (Optional - Supports 400G)

Installing HP Openview

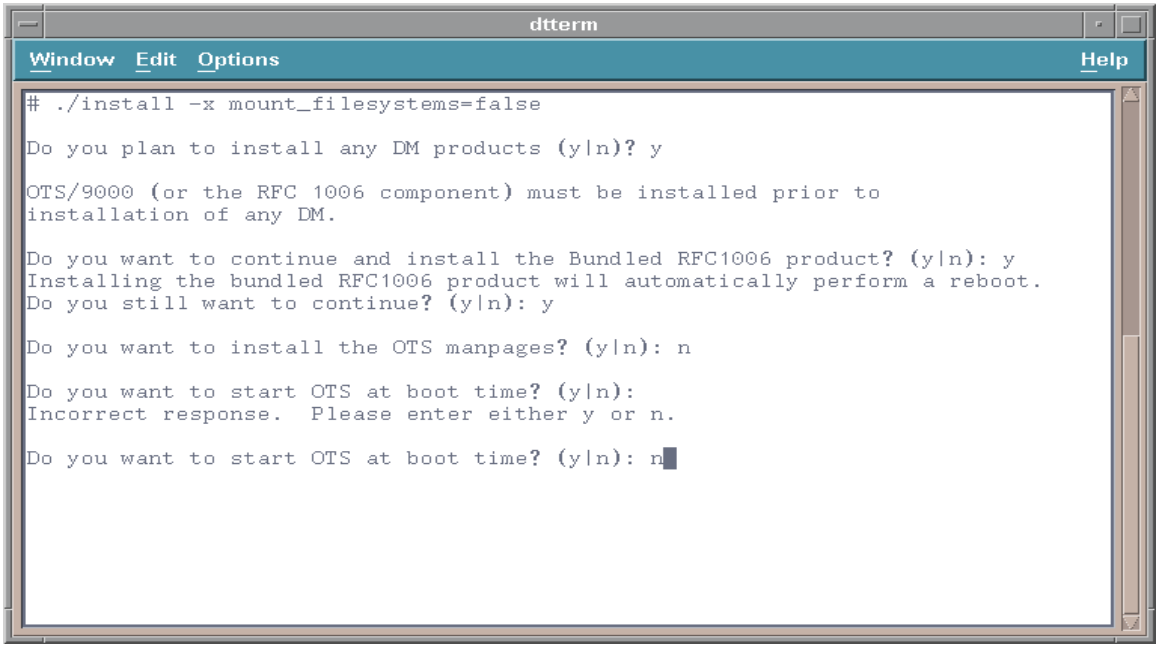
The following procedure is used to install HP Openview.

NOTE:
Before loading HP Openview, patch **PHSS_8508** must first be loaded. Please verify by typing swlist | grep PHSS. Do not attempt to load HP Openview if this patch is not loaded first.

Procedure: Installing HP Openview

1. Login as `root` and mount the HP OpenView CD
2. Enter the following command:
   - **mount /dev/dsk/*** /SD_CDROM**
3. **cd /SD_CDROM**
4. **./install -x mount_all_filesystems=false**

The following window is displayed:

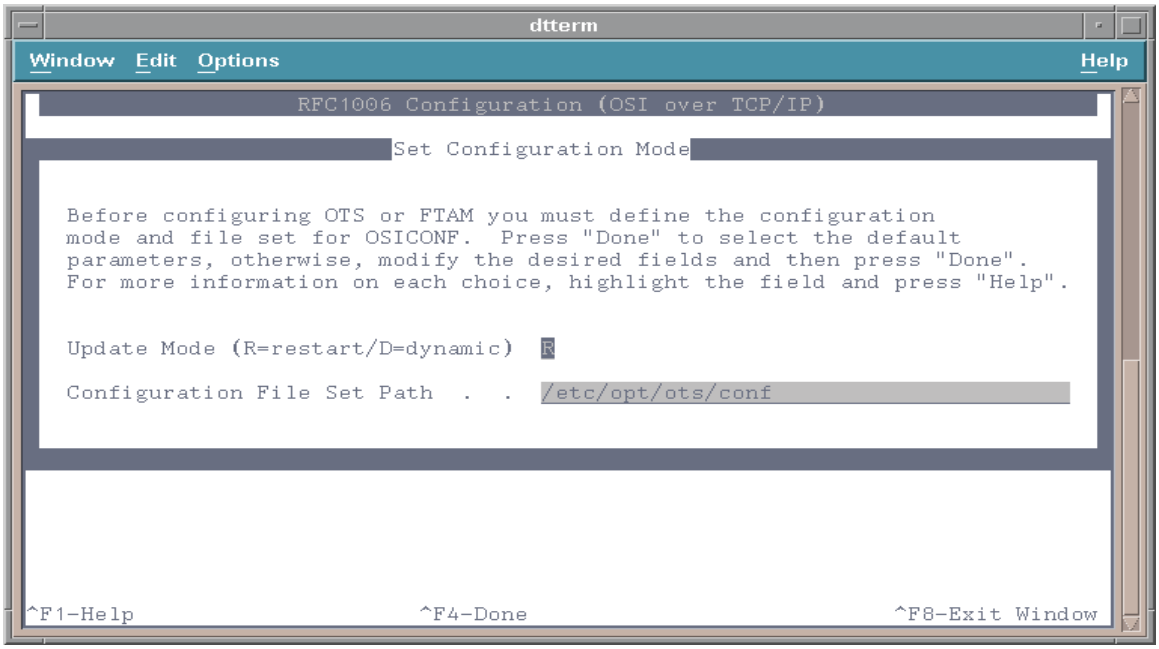


5. Respond to the prompts as follows:
   - Install DM Products **Y**

- Install Bundled RFC1006 component **Y**
- Installing the bundled RFC1006 product will automatically perform a reboot (this is normal). Continue **Y**
- Install OTS Man pages **N**
- Start OTS at boot time **N**

6. You must now configure an IP address for RFC 1006. The script will start the OTS configuration tool. Exit the tool after you have configured the IP address. The installation script will complete the OTS installation. Press the Return key to start the configuration tool.

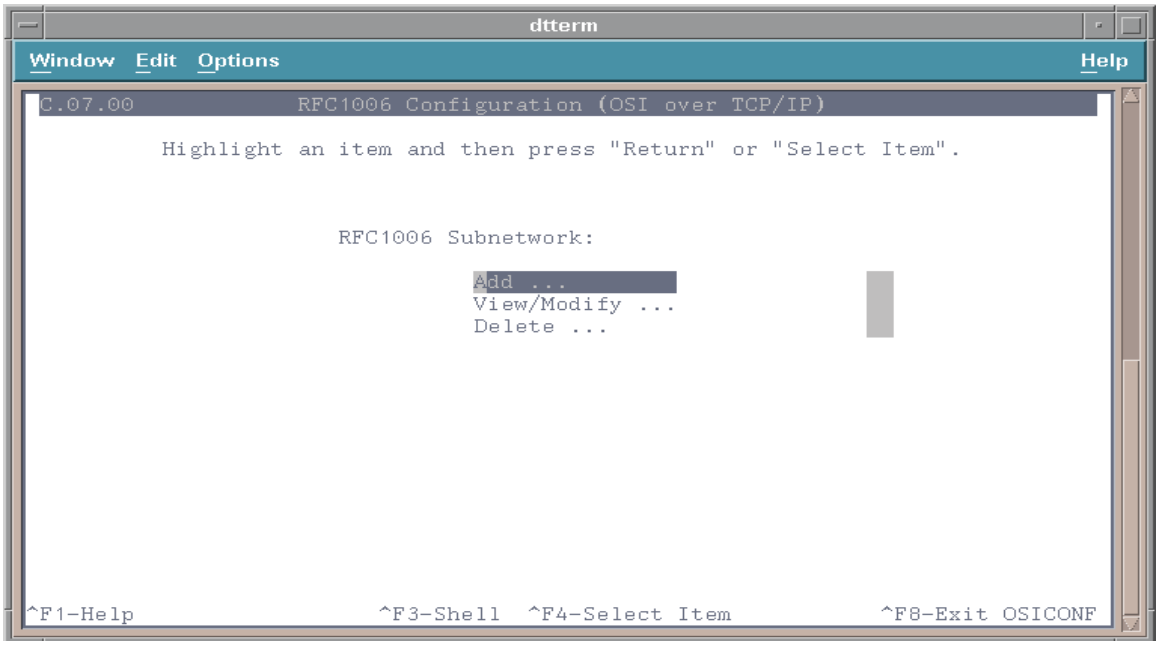
The Set Configuration Mode window appears.



7. Make no changes and press **Control F-4**.

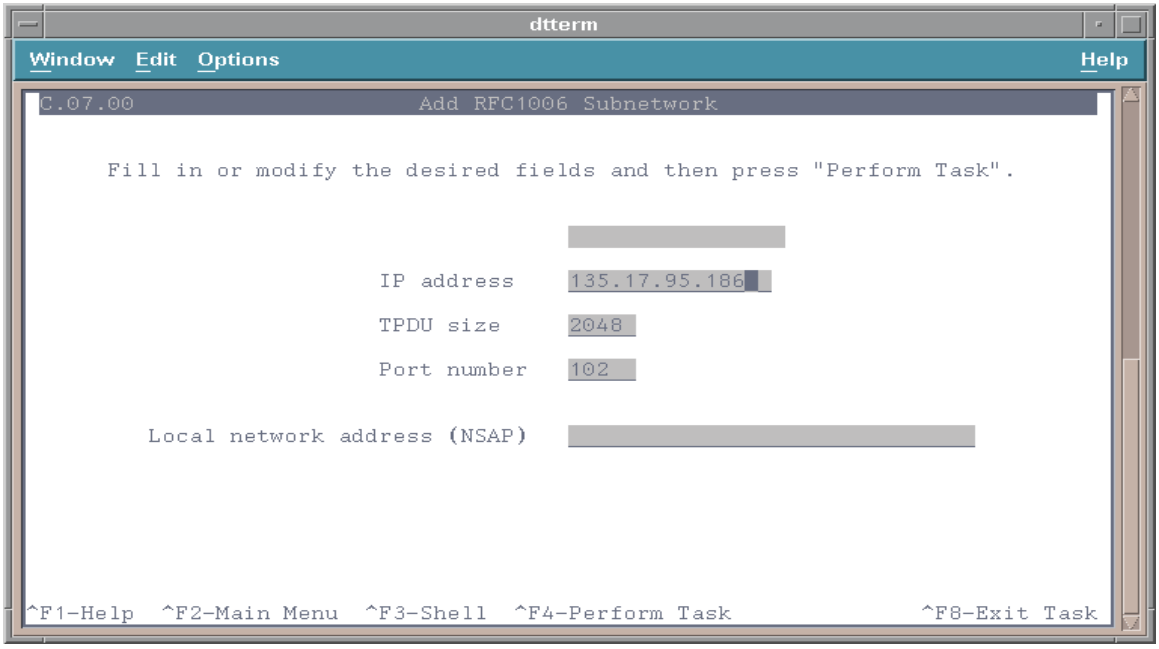
NOTE:
If using a system console, press the **F-4** key rather than **Control F-4**.

The following RFC1006 Configuration window appears:



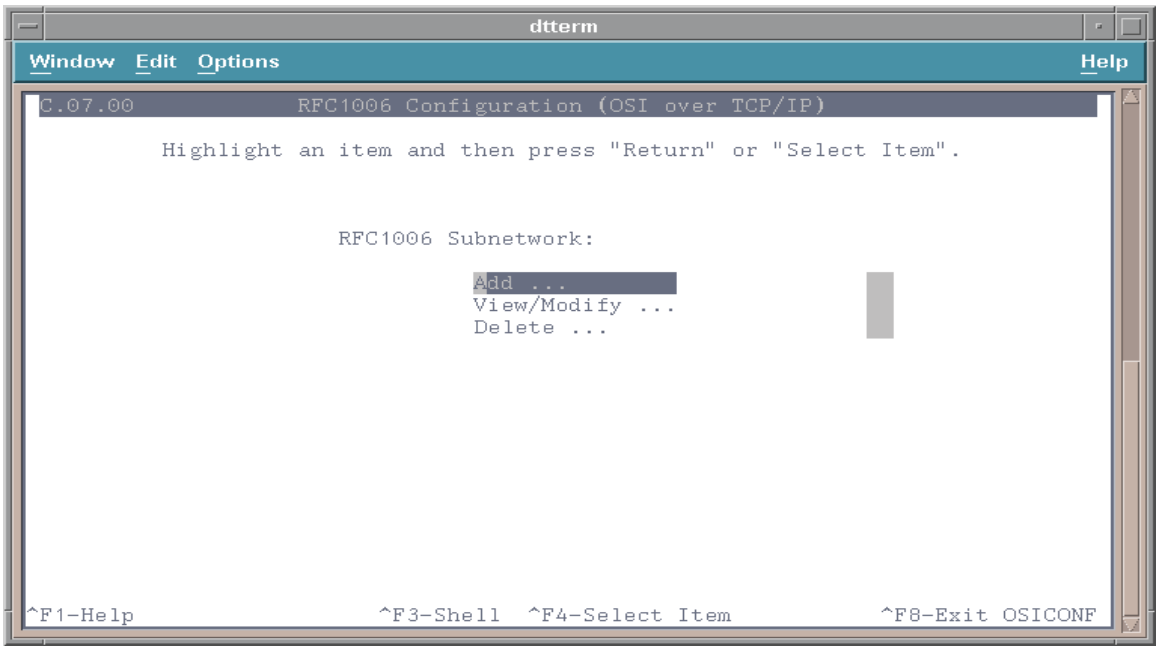
8. Select **add** using the **Control F-4** key (Add, View/Modify, Delete).

The following window appears:



9. Enter the following information:
   - Input the **IP address** of the Host Machine (TCP/IP LAN) (for example, 135.17.13.198)
   - TPDU size 2048
   - Port Number 102
   - Local network address (NSAP) LEAVE THIS BLANK
10. Use **Perform task** to execute the changes.

The following window reappears:



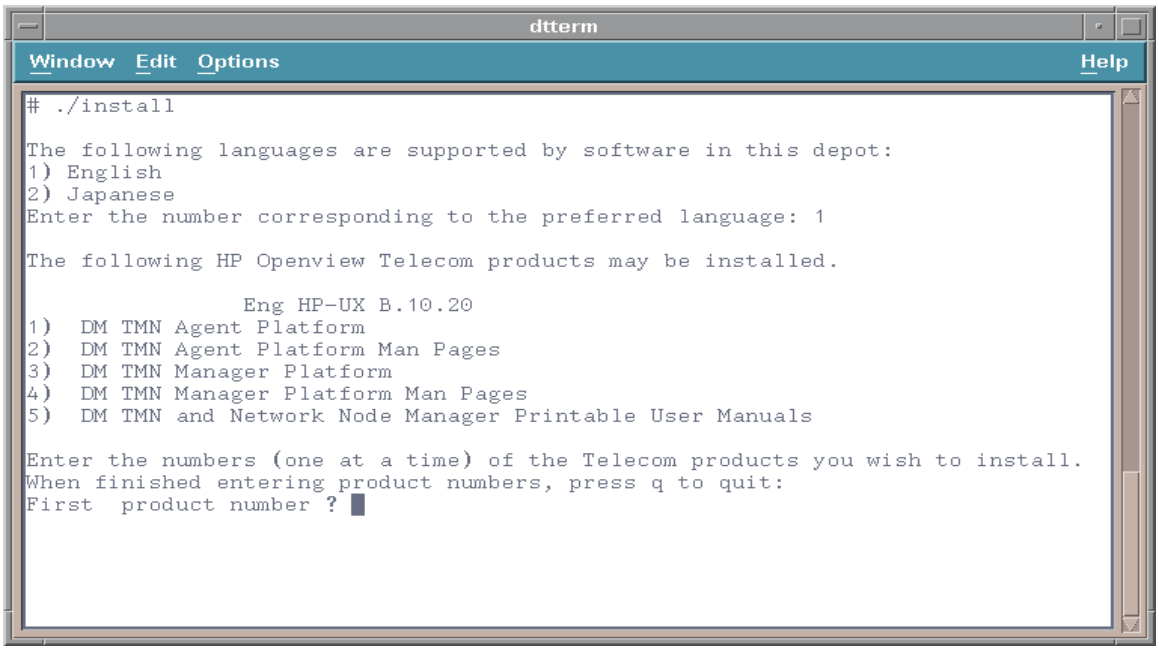
11. Now select exit OSICONF by pressing **Control F-8**

NOTE:
If using a system console, press the **F-8** key rather than **Control F-8**.

12. System will reboot & the system shutdown message will say Your installation was successful. Refer to /var/adm/sw/swagent.log
13. Login as root
14. Mount the HP Open View CD
    - **mount /dev/dsk/*** /SD_CDROM**
15. **cd /SD_CDROM**

16. **./install**

The following screen appears:

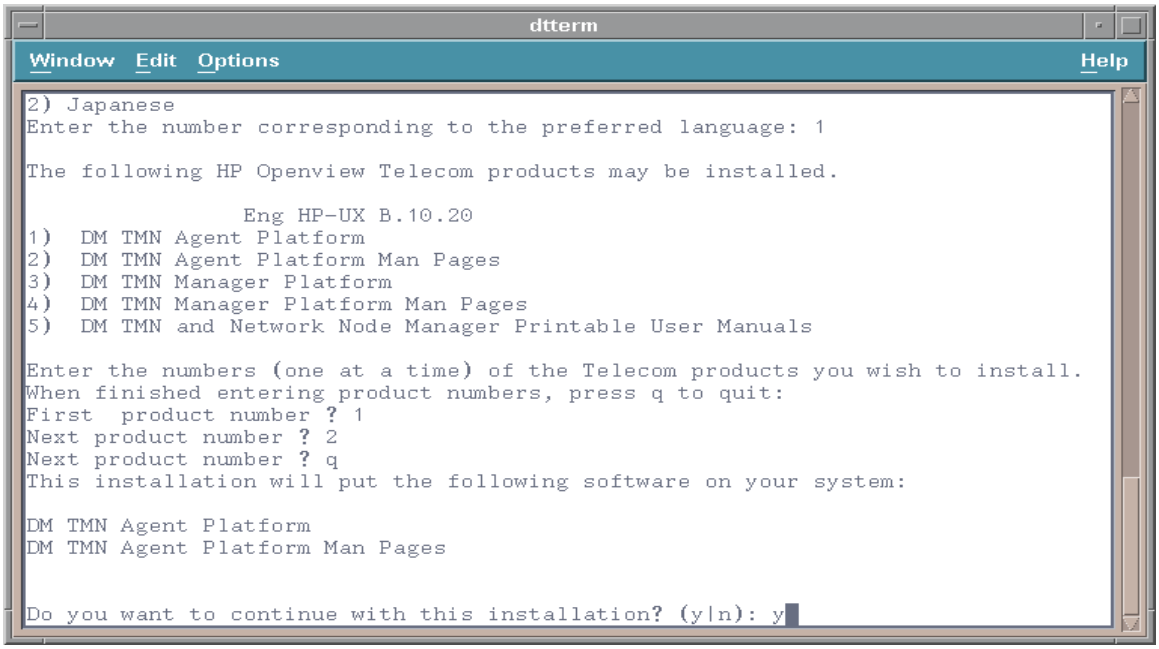


17. Enter the preferred Language **1=English** (Choices are English & Japanese)

18. Next, enter (one at a time) the products you would like to install (There are 5 choices)

    - Select **1**, **2**, and **Q** for quit (DM TMN Agent Platform, DM TMN Agent Platform MAN pages)

The following screen appears:



19. Enter **Y** to continue with this installation.
20. Patch PHSS_11842 will load automatically
21. Verify the /dev/osipi was created properly (use ls -l /dev/osipi)
    - crw-rw-rw- 1 root sys 72 0x00005a Nov 18 09:09 /dev/osipi
22. Verify that the patch was loaded: **swlist | grep PHSS** (You should see PHSS_8508, PHSS_11842 already loaded).
23. **cd /tmp**
24. **./installPF3000**
    - This loads pmd patch PHSS_16027 and PHSS_21580.
25. Set up HP OpenView environment variables
    - **. /opt/OV/bin/ov.envvars.sh** (. Space /)
    - **env | grep OV** -to verify the variables have been setup

26. To get the HP OV Host Target ID, Permanent ID & SPV Target ID

    - **/opt/ifor/ls/bin/i4target -v**

    Output similar to the following is displayed:

    Permanent Target ID: f003d9 (Matches LAN 0)

    SPU Target ID: 37894361

27. Now type the following to begin the installation of the HP OV license

    - **$I4LS_CONF/i4config** (/opt/ifor/ls/conf)
    - Choose Server Configuration option 2
    - Choose Advanced Configuration option 2
    - Hit return to show a list of cells
    - Set up an Alternate Cell option 2
    - Start the iFOR/LS License Server Option Y
    - Server network names: LEAVE BLANK NO NAMES NEEDED

28. The procedure to add the permanent license differs depending on the type of HP OpenView license. (i4admin and nodelock).

    The following is a sample script to load the i4admin license information: $I4LS_BIN/i4admin -a -v "'Hewlett-Packard OpenView' '670985ac8b34.02.0f.02.71.2b .00.00.00' '6haek2qxxk6qy'" -p "'DM TMN Agent Platform' '5.XPERM' 'wms6xabnzrmucvks2xcczrnunietybpr' 'DM PERM 31 DEC 2020 1 M * N'"

    To add the permanent license with a nodelock license:

    Edit the /var/opt/ifor/nodelock file.

    Enter the license that you get from HP. (For example, put in all as one line): 670985ac8b34.02.0f.02.71.2b.00.00.005rbjms7enwfvfvvmnd32au64isc48 "DM PERM 31 D EC 2020 1 M * N" "5.XPERM"

29. Verify the output prior to starting HP OpenView (/opt/ifor/ls/os/hpux/bin)

    - $I4LS_BIN/i4tv - check that license server is active (running)
    - $I4LS_BIN/i4admin -s -checks that license is being used

      Product Status Report appears (Available=1, in Use=0)

30. 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

NOTE:
The IP address of LAN1 must be on a separate subnet than the local TCP/IP Lan. This must be completed before you can continue.

- Select Networking and Communications
- Network Interface Cards
- Select LAN1
- Action Configure

WaveStar SNMS Application Installation

Installing the WaveStar SNMS application

The WaveStar SNMS application file set will load BaseWorX, Java, and the WaveStar SNMS application. The following procedure is used to install the WaveStar SNMS application.

Procedure: Installing WaveStar SNMS Application

1. Log in as `snc` and su to `root`
2. Put in the WaveStar SNMS application CD
   - Mount the SNMS application CD (use ioscan -fn to find the CD device location)
3. Enter the following commands:
   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

   (***=the device location)
4. **/tmp/loadSnc**
   - If using CD ROM edit **/dev/rmt/0m** to **/SD_CDROM**

The following is the contents of the loadSnc script:

swinstall -v -s `/dev/rmt/0m` -x mount_all_filesystems=false -x reinstall=true SNC-2000.snc-install

5. At the # prompt run installSnc
   - Choose #3 **Install/upgrade ITM Software**
   - System prompts for DB Conversion (Y/N)
   - Prompt: tape or CDROM
   - Load SNMS application **Yes**
   - Informix database configuration
   - SONET Directory Services locally YES (if SNMS is going to be DSA)
   - NE protocols (Default=7 CMISE, OSI, X.25)
   - OSI configuration (Lancard, NSAP, Redundant)
   - ATOS license

- Dib Information
- NSAP Address
- CMISE protocol setup (if CMISE selected)
- EMS name

6. Exit all the way out to the login prompt and then login as snc.

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

```
# installSnc

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

The current EMS run level is “Shutdown”.

============================================================
EMS INSTALLATION AND CONFIGURATION PROGRAM        03-22-00

Current EMS Version:

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 Redundancy
6) 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

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]? **1**

Saving existing SNC 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 /snc/dt_bin ...
Removing files from /snc/bin ...
Removing files from /snc/Orbix/Interfaces ...
Removing files from /snc/tbin ...
Removing files from /snc/lib ...

```
Removing files from /snc/etc ...
Removing files from /snc/bwx6.2 ...
Insert the delivery CD and mount it to /SD_CDROM.

Hit <CR> to continue .....

Reading table of content on CDRom ....

The $MEDIA contains the following filesets:

          FILESET                        SIZE(KB)       DESCRIPTION

SNC-2000.snc-install.sncInstall            153.1     “SNC-2000 installation
SNC-2000.snc-install.snclibc              2024.1     “Shared Library”
SNC-2000.sncConfig.sncLocBWXConf           130.4     “Local bwx config_data”
SNC-2000.sncConfig.sncLocConf             1292.3     “Local SNC tbin area”
SNC-2000.sncFixDir.sncBWX_Van            15815.0    “Basic BaseWorX package
SNC-2000.sncFixDir.sncInterfaces           724.9      “interface files for Orbix”
SNC-2000.sncFixDir.sncRogue               5461.6     “RogueWave library for SNC”
SNC-2000.sncRelease.snc-2000            226332.1     “snc-2000 application
SNC-2000.sncRelease.sncBWXConf             130.4     “Provisioned BaseWorX confi
SNC-2000.sncRelease.sncBWXProvBin         2807.1     “Provisioned BaseWorX bin

SNCROOT          1405631.8
/tools             22001.5

Total            1427633.3

Available space at /snc is: 2139056 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

=======  03/22/00 15:03:03 EST  BEGIN swinstall SESSION
              (non-interactive)

* Session started for user “root@ajax”.

* Beginning Selection
* Target connection succeeded for “ajax:/”.
* “ajax:/SD_CDROM”:  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:               /SD_CDROM
* Targets:              ajax:/
* Software selections:
        SNC-2000.sncBWX_Vani,r=9.0,v=SNC-2000
        SNC-2000.sncInterfaces,r=9.0,v=SNC-2000
        SNC-2000.sncRogue,r=9.0,v=SNC-2000
* Selection succeeded.

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

* Beginning Execution
*The execution phase succeeded for "ajax:/".
* Execution succeeded.

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

=======  03/22/00 15:28:48 EST  END swinstall SESSION (non-interactive)

OS and Package files loaded.

=======  03/22/00 15:28:49 EST  BEGIN swinstall SESSION
                (non-interactive)

* Session started for user "root@ajax".

* Beginning Selection
* Target connection succeeded for "ajax:/snc".
* "ajax:/SD_CDROM":  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:               /SD_CDROM
* Targets:              ajax:/snc
* Software selections:
        SNC-2000.snc-2000,r=9.0,v=SNC-2000
        SNC-2000.sncBWXConf,r=9.0,v=SNC-2000
        SNC-2000.sncBWXProvBin,r=9.0,v=SNC-2000
* Selection succeeded.
```

* Beginning Analysis
* Session selections have been saved in the file
“/var/adm/sw/sessions/swinstall.last”.
WARNING: “ajax:/snc”: There will be no attempt to mount file systems
that appear in the file system table.
* Analysis succeeded.

* Beginning Execution

WARNING: “ajax:/snc”: 1 post install or post remove scripts had warnings.
* Execution succeeded.

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

======= 03/22/00 15:54:22 EST END swinstall SESSION (non-interactive)

Please mount 2nd CD into CD Rom drive.
Press Enter to continue
x bin/mask34, 20532 bytes, 41 tape blocks....
======>
======>
======>
x tbin/PM_CnvtDate, 603592 bytes, 1179 tape blocks
ITM SNC release files are loaded.
snc
The /etc/inetd.conf file has been updated.

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 SNC configuration.

WARNING:
The ITM SNC 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): **y** (Select **NO** if R3.1 database
already exists.)
(c)Copyright 1983-1996 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

Setting up the SNC environments at SNCROOT = /snc....

Running selectEnv to assign system resources.
Running SNC_Config to produce the *.t and service files.
Running SNC_ConfigRT to produce the SNC.rt and rc.
rm: /snc/etc/ccp_rt_base/* non-existent

--CANNOT dot /snc/bwx6.2/config_data/maa/app_setup for BaseworX.
It will not be possible to bring up a new instance of either
BaseworX or the ITM SNC application.
Both app_setup.t and ajax.dat must exist.

WARNING: This command will re-initialize Infromix On-Line and
all SNC databases will be destroyed.

Do you want to continue? (y,n): Set up configuration files...

Reinitialize informix online...
Waiting for system related databases to be built...

WARNING: This command will re-initialize the INFORMIX raw slice.
All SNC databases will be destroyed.

Do you want to continue? (y,n):
Parse configuration file and start to create dbspaces...
WARNING: /dev/informix/pmsp3_2G is not available, pm1_dbs skipped....
WARNING: /dev/informix/pmsp4_2G is not available, pm2_dbs skipped....

```
WARNING: /dev/informix/pmsp5_2G is not available, pm2_dbs skipped....
WARNING: /dev/informix/pmsp6_2G is not available, pm2_dbs skipped....
WARNING: /dev/informix/pmsp7_2G is not available, pm2_dbs skipped....
WARNING: /dev/informix/pmsp8_2G is not available, pm2_dbs skipped....
WARNING: /dev/informix/pmsp9_2G is not available, pm2_dbs skipped....
WARNING: /dev/informix/pmsp10_2G is not available, pm2_dbs skipped....
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Verifying physical disk space, please wait ...
Space successfully added.

** WARNING ** A level 0 archive of Root DBSpace will need to be done.
Re-start Informix Online ...
```

11 dbspace(s) created and 0 chunks added successfully ..

++++++++++++++++++++++++++++++++++++++

Informix configuration completed

You have to re-login as snc to establish variables
before move-on.

++++++++++++++++++++++++++++++++++++++
logout

Press any key to continue.

NE PROTOCOL INFORMATION

Network element protocol information is required to optimize data communication setup information. You will be prompted for transport and protocol information.

Do you wish to activate SONET Directory Services (y/n)?: **y**

Supported protocols:

1) CMISE only
2) OSI TL1 only
3) CMISE and OSI TL1
4) X.25 TL1 only
5) CMISE and X.25 TL1
6) OSI TL1 and X.25 TL1
7) ALL (CMISE, OSI TL1 and X.25 TL1)

Please enter the network element protocol (s) which will be used: **7**

You have entered 7 as your choice.
Is this correct (y/n)? **y**

OSI LAN INTERFACE SETUP

OSI licensing and network service access point (NSAP) information is required to access LAN based network elements.

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

Do you wish to configure OSI LAN interfaces at this time (y/n/q)? **y**

Do you wish to configure REDUNDANT OSI LAN interfaces (y/n/q)? **n**

1. lanmux 0 10/4/8
2. lanmux 1 10/4/16
3. lan 2 10/12/6
q. Quit

Enter the item number for the PRIMARY OSI LAN interface ? 2

You have entered lan 1 as the PRIMARY OSI LAN interface.

Is this correct (y/n) ? **y**

Please enter the 6-digit Organization Identifier [Default=000000]:

You have entered 000000 as the Organization Identifier.
Is this correct (y/n) ? **y**

Please enter the 4-digit Routing Domain [Default=0000]:

You have entered 0000 as the Routing Domain.
Is this correct (y/n) ? **y**

Please enter the 4-digit OSI Area [Default=0000]:

You have entered 0000 as the OSI Area.
Is this correct (y/n) ? **y**

OSI LAN REVIEW

The following is a review of OSI configuration information:

---

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

Enter “a” to specify additional OSI interfaces.
Enter “d” to delete an OSI interface.
Enter “s” to save the above input and continue.

What would you like to do [q to quit]: **s**

RFC 1006 SUPPORT:

An IP address is required to support OSI over TCP/IP. This information must be entered regardless of whether RFC1006 will be used or not.

Please enter the IP address of LAN interface which will be used to support OSI over TCP/IP communication (135017013082): 017017017158 (Enter the IP address in this format only)

You have entered 017017017158 as the OSI LAN IP address.
Is this correct (y/n) ? **y**

License information is required to validate the ATOS OSI package.

Do you wish to specify ATOS license information at this time (y/n)? **n** (if the ATOS license is already installed, select NO here)

Please check the license.dat file under /opt/OV/osiam/osiam26F.
If this file does not exist or the content is incorrect,
please modify it or create it manually later.

CMISE PROTOCOL SETUP

Site specific information is required to configure the EMS CMISE Agent.
You will be prompted for customer location and network element information.

DIRECTORY INFORMATION BASE PREFIX INFORMATION

Please enter the Country Name up to two characters [Default=US]:

You have entered US as the Country Name.
Is this correct (y/n) ? **y**

Please enter the Organization Name up to 64 characters: **LUCENT**

You have entered LUCENT as the Organization Name.
Is this correct (y/n) ? **y**

Please enter the Organization Unit Name: **LUCENT1**

You have entered LUCENT1 as the Organization Unit Name.
Is this correct (y/n) ? **y**

Will Wavestar OLS-400G be monitored by this EMS host (y/n/q)? **y**

WAVESTAR OLS-400G INFORMATION:

Wavestar OLS-400G software release information is required
to successfully configure the EMS host.
Which release of the OLS- 400G will be monitored by this host:

1) 400G Release 1.0
2) 400G Release 2.0

Please enter the software release which will be monitored: **2**

You have entered 400G Release 2.0
Is this correct (y/n) ? **y**

CMISE INFORMATION REVIEW

1. EMS Name = snc123
2. DIB Country Name prefix = US
3. DIB Organization Name prefix = LUCENT
4. DIB Organization Unit Name prefix = SNC1; SNC2
5.Presentation Selector = 70737431
6. Session Selector = 73657331
7.Transport Selector = 747030
8.OLS-400G Software Release = OLS-400G Release 2.0

Enter the item number [1-8] to change the current value.
Enter “s” to save the above input and continue.
What would you like to do [1-8, or s] [q to quit]: **s**

Updating the profile to reflect new settings for:
SNCROOT = /snc
CSNCROOT = /snc
SNC_DBNAME = snc_db
APPTAG = SNC

#SHMKEY CCDPORT EM_PORT EM_CCD CMMPORT WSPORT APPTAG USR SNCROOT

Setting up the SNC environments at SNCROOT = /snc....

Running sncSetup from scratch to generate all templates.
Running selectEnv to assign system resources.
#SHMKEY CCDPORT EM_PORT EM_CCD CMMPORT WSPORT APPTAG USR SNCROOT
Running SNC_Config to produce the *.t and services files.
Running SNC_ConfigRT to produce SNC.rt and rc.

```
BaseworX is being reconfigured.

Your SNC environments are:
        RAPIDROOT=/tools/bwx6.2
        SNCROOT  =/snc
        ROAMCNFG =/snc/bwx6.2
        APPTAG   =SNC

Invoking envcnfg ...
Invoking machadd ...

Validating configuration file ....

Successful Validation.
Invoking demoncnfg ...

Validating configuration file ....

Successful Validation.

The application is currently in the <Shutdown> runlevel.
Demon Configuration modifications will take effect the
next time the application is started.
Invoking ancnfg ...
Invoking ccdcnfg ...

You have updated the master copy of the ccd file.
If the CCD is running, you must execute the ccpoam
command that sends a re-read request to the CCD in
order for the changes to take effect.

Invoking patactmod ...

Validating configuration file ....

Successful Validation.

Currently the fm_manager is not running.
The Pattern Action File modifications will take effect
the next time the fm_manager is started with this
Pattern Action File.
Invoking logdecnfg ...

The logdaemon is currently not running
The Destination Configuration File changes will take
effect the next time the logdaemon is started.
Invoking ccdmcnfg ...
```

You have updated the master copy of the manager ccd file.
If the Distributed Execution Management CCD is running, you
must execute:

env [SUB_NET_TYPE]=$EM_CCDPORT CCDHOST=‘uname -n‘ oamccp -R

where SUB_NET_TYPE is:

CCDPORT	for CCP CCD TCP/IP Address
CCDPIPE	for CCP CCD Streams Pipe Address
DKITCCDPORT	for CCP CCD Datakit VC Address
SVCCCDPORT	for CCP CCD X.25 SVC Address
UNIXCCDPORT	for CCP CCD Unix Domain Socket Address

to send a re-read request to the manager’s CCD in order for
the changes to take effect.

Invoking ecfadd ...

Validating configuration file ....

Successful Validation.

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**

After installSnc exited, you may be logged out automatically.
If not, logout yourself. Login again as a SNC user, then
start SNC with the “chexstat” command or the ”up” command.

Thank you for using “installSnc”!

#

NOTE:
After the installSnc script completes execution, log out completely from the host, (log out of root and snc user). Then log in again as snc user and type **up** to bring up the WaveStar SNMS application.

GUI Installation on Microsoft NT 4.0

Overview

The platform for the WaveStar SNMS GUI running as a standalone application is a PC running Windows NT 4.0 (see **Chapter 2, System Requirements**). This section describes how to install the GUI client onto the PC server.

There are 3 disks associated with the GUI software:

- SNMS installation disk
- North American Service Pack 4.0 disk
- International Service Pack 4.0 disk

At most, two disks are necessary for the software installation. The SNMS installation disk is necessary for the installation of the GUI application. The other disk containing Service Pack 4.0, is used for upgrading the NT4.0 operating system for Y2K compliance.

Service Pack files

There are three Service Packs associated with the SNMS installation:

- *SP4_NorthAmerica.exe* is a standard download of the Microsoft Service Pack for the North American market. It includes all the files necessary to upgrade the NT Workstation 4.0 OS for Y2K compliance.
- *SP4_International.exe* is a standard download of the Microsoft Service Pack for the English speaking European and Asian markets. It includes all the files necessary to upgrade an NT Workstation 4.0 for Y2K compliance.
- Wtsi386.exe is the Service Pack 4.0 download for NT Server4.0 Terminal Server Edition. It includes all the files necessary to upgrade an NT Terminal Server for Y2K compliance.

Installation of Service Pack 4.0 is only necessary if the NT computer has not already been upgraded. To check whether a specific NT computer has already been upgraded, reboot the computer. During the reboot procedure, a blue screen is displayed which shows the currently installed Service Pack.

Associated with Service Pack installation is the installation of Internet Explorer 4.0. IE4 installation files are included on both versions of the Service Pack disks.

Service Pack installation

The following procedure is used for Service Pack 4.0 installation.

Procedure: Installing Service Pack 4.0

1. Insert the appropriate Service Pack disk into the disk drive.
2. Log in as administrator.
3. Open the *My Computer* desktop icon and click on the CD-ROM disk drive.
4. Double click on either the **SP4_NorthAmerica.exe** or the **SP4_International.exe** file to begin installation.
5. Select both check boxes on the bottom of the end user license agreement screen and click on the ***Install*** button.

When installation is complete, the following prompt message is displayed:

```
Windows NT Workstation 4.0 Service Pack 4 installation is
complete. You must restart your computer for the service pack
update to take effect.

If you install any additional Windows NT Workstation
components from the original NT Workstation CD, you should
then reinstall service pack 4 to insure new components are
updated.
```

6. Press the ***Restart*** button to reboot your computer.

Internet Explorer 4 for NT Workstation

Internet Explorer 4 is included on the CD-ROM installation media. If the system is already equipped with IE4, you do not need to install Internet Explorer 4.

To install Internet Explorer 4, log in as Administrator and run the setup.exe program in the IE4 directory. Follow the prompts except for choosing an explorer desktop. Do **not** choose the explorer desktop option.

Service Pack 4 Hot Fixes for NT Workstation

The hot fixes for Service Pack 4.0 need to be installed once IE4 installation is complete. To install the hot fixes, log in as Administrator and execute the CD-ROM disk program sp4hfixi.exe. Once launched, the program installs all patch files automatically.

Once the hot fixes are installed, the workstation must be rebooted.

SNMS server definition

All the WaveStar SNMS Servers must be defined in the TCP/IP Hosts file used by the NT operating system. This file is almost identical to the */etc/hosts* file used on UNIX systems. In fact, you can FTP the */etc/hosts* file on the SNMS HP server and use it on the NT workstation, but make sure to capture all predefined host entries before overwriting the file on the NT workstation.

For a Windows NT system, the Hosts file is contained in the directory
\Winnt\system32\drivers\etc
or

For an NT Terminal Server system, the Hosts file is contained in the directory
\WTSRV32\system32\drivers\etc

User login creation

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. The EMS user account should already have been created on NT Terminal Server systems.

1. Log in as Administrator and launch the User Manager For Domains application. This application can be reached from the Start button, via the following cascading menus:

Start button->Programs->Administrative Tools (Common)->User Manager For Domains

2. A screen titled *User Manager* should be displayed. The screen should contain a menu bar and scrolled table showing all defined users.
3. To create a new user, access the *User* pull-down menu item and select the ***New User...*** menu item. This should result in a new screen titled *New User*.
4. On the new screen enter the following information:

Parameter	Value
Username	ems
Full Name	EMS/NMS Manager
Password	ems123
Confirm Password	ems123

5. Put a check in the box labeled *Password Never Expires* and press the ***Add*** button. The screen should clear in preparation of adding another user.
6. Press the ***Close*** button on the screen titled *New User* in order to stop adding new users.

7. Once the ems user id is created, the User Manager application can be exited. Access the *User* pull-down menu and select the ***Exit*** menu item.

Adobe Acrobat installation

NOTE:
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.

The Adobe Acrobat installation file is named **ar40eng.exe.** To install Acrobat Reader, 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. Double click on the **ar40eng.exe** file to launch the Acrobat installation program. Use the default configuration parameters to install the program.

Install Adobe Acrobat under the directory C:\Program Files\Adobe\Acrobat 4.0.

NOTE:
For NT Terminal Server systems, the default install directory is M:\Program Files\Adobe\Acrobat 4.0. Because the boot partition is very small, the installer must change the default drive directory from M: to C:. Therefore the default acrobat reader install directory must be changed to C:\Program Files\Adobe\Acrobat 4.0.

Installation of Japanese Font Pack for Acrobat Reader

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

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). To perform the installation, use the Administrator log in.

To install the Japanese font pack, open the *My Computer* desktop icon and click on the CD-ROM disk drive. This will open a screen listing all the files on the CD-ROM. Double click on the **jpnfont.exe** file to launch the Acrobat installation program. Use the default configuration parameters to install the program.

GUI installation

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 single workstation. For instance, a release 2.0 SNMS GUI, a release 3.0 GUI, and a release 3.1 GUI can co-exist on the same NT workstation. It is recommended that all versions of the GUI reside on the same disk.

Procedure: Installing the GUI

1. Insert the SNMS installation disk in the CD-ROM drive.
2. Open the *My Computer* desktop icon and click on the CD-ROM disk drive. A screen appears listing all the files on the CD-ROM.
3. Double click on the **snms.exe** file to launch the installation program. The installation program displays a Winzip screen requesting a directory for installation.

NOTE:
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:

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

Once launched, the disk administrator program will graphically depict the server disk formatting.

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.

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 ***Yes To All*** button to continue the installation.
5. The GUI installs in the root directory named \snmsR3.1.

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. An MS-DOS window can be launched using the start button, via the following cascading menus:

Start button->Programs->Command Prompt

At the MS-DOS prompt, change directory to the root directory of the GUI application. To launch an SNMS GUI, execute the command:

SNMS -host <hostname>

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.

Before creating any shortcuts, the icon file **starlogo.ico** should be copied from the CD-ROM disk to the \Winnt\system32 directory.

1. 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:

   New->Shortcut

2. This displays the *Create Shortcut* screen. The first screen prompt asks for the MS-DOS command line to invoke when opening the shortcut.
3. Enter the full path name of the snms.bat file and the corresponding command input options.
4. Click the ***Next*** button and the screen prompt requests the name of the shortcut. Enter the desired name for the shortcut and click the ***Finish*** button.
5. 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 *Start In* and *Change icon* properties to reflect the appropriate data.
6. Press the **OK** button to save the changes and the desktop shortcut is created.

GUI Installation on Solaris Workstation

Installation procedure

NOTE:
The WaveStar SNMS CD-ROM disk contains support software for Solaris, as well as other UNIX platforms.

Procedure: Installing the GUI on a Solaris Workstation

Step 1 - Creation of EMS User Login

NOTE:
No Solaris user ids 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.

To create a user account, log in as root and execute the command: **admintool**

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:

User Name:	ems
Login Shell:	Korn
Create Home Directory:	<button pushed>
Path:	/home/ems

Press the **OK** button to create the user account. Exit the tool when complete.

Step 2 - Name Resolution Configuration

NOTE:
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.

The definition of name servers is stored in the file /etc/resolv.conf. The following example resolve.conf file defines the IP domain name and defines two name servers:

```
domain      ho.lucent.com
nameserver  135.17.1.12
nameserver  135.3.1.13
```

The file /etc/nsswitch.conf can be used to specify in which IP name resolution. To specify that the /etc/hosts file should be checked before making a DNS query, find the line that begins with the hosts: flag and specify the following:

```
hosts: files dns
```

Both configuration files are text files and are editable using vi.

Step 3 - Adobe Acrobat Installation

NOTE:
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.

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**.

Log in as root, and then insert the disk into the CD-ROM drive. Solaris will automatically mount the disk under the directory /cdrom/cdrom0 and display a graphical browser displaying the contents of the disk.

From the CDE toolbar, 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 **solaris.arws-40.tar** into the directory.

Unpack the tar file using the command,

```
tar -xvf solaris.arws-40.tar
```

Unpacking the tar file creates a directory called SSOLRS.install. Change directory into the SSOLRS.install directory and execute the INSTALL script. In other words, perform the following:

```
cd SSOLRS.install
./INSTALL
```

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:

ln. -s /opt/acrobat4/bin/acquired /us/bin/acquired

To clean up the Acrobat install files, delete the contents of the temporary directory.

cd /
rm -rf <temporary diectory>

Installation of Japanese Font Pack For Acrobat Reader

NOTE:
If Japanese language support is not required for this installation, this procedure can be skipped.

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.

At the shell prompt, make a temporary directory and copy the file **/cdrom/cdrom/0/jpnfont.tar** into the directory. Unpack the tar file using the following command:

tar -xvf jpnfont.tar

Unpacking the tar file creates a directory called JPNKIT. Change directory into the JPNKIT directory and execute the INSTALL script. In other words, perform the following:

cd JPNKIT
./INSTALL

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:

cd /
rm -rf <temporary directory>

Step 4 - GUI Installation

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.

The commands to copy and set permissions of the SNMS GUI are:

cp /cdrom/cdrom0/snms.tar /home/ems
chmod 777 /home/ems/snms.tar

When complete, eject the CD-ROM from the disk drive using the command:

eject cdrom0

Log out as root and log in as the EMS user. To unpack the GUI tar file, use the command:

tar -xvf snms.tar

Unpacking the tar file will create a subdirectory with all the java files in their proper location.

Step 5 - 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. Change directory to the root directory of the GUI application. For example, to change to the root directory of a release 3.1 SNMS GUI, execute the command:

cd snmsR30.

To launch a WaveStar SNMS GUI, execute the command:

snms.sh -host <hostname>

UNIX Thin Client Installation

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+

Installation procedure

Procedure: Installing UNIX Thin Client Software

Step 1 - Creation of EMS User Login

For Solaris:

To create a user account on a Solaris system, log in as `root` and execute the command: **admintool**.

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:

User Name:	ems
Login Shell:	Korn
Create Home Directory:	<button pushed>
Path:	/home/ems

Press the **OK** button to create the user account. Exit the tool when complete.

For HP-UX:

To create a user account on an HP-UX system, log in as `root` and execute the command: **sam.**

SAM is a graphical user tool for administering the HP-UX workstation. Double click on the icons "*Accounts for Users and Groups*" and "*Local Users*" to reach the user account management screen. Under the Actions menu item, use the **add button** to add a user account. The following parameters should be configured:

User Name:	ems
Start-up program:	/usr/bin/ksh
Create Home Directory:	<button pushed>
Home Directory:	/home/ems

Press the **OK** button to create the user account. Exit **sam** when complete.

For AIX:

To create a user account on an AIX system, log in as `root` and execute the command: **smit**

Step 2 - 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 2.7 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

Login to the NT Terminal server using the appropriate login (e.g. `ems` or `administrator`) and launch an MS-DOS window:

Start button -> Programs -> Command Prompt

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:

ftp <IP address of workstation>

When prompted for a login identification, use `root` 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:

bin
put <ica tar file>

End the ftp session by typing **exit** and log out of the NT Terminal server.

Step 3 - Unpack the tar file

Log in as `root`. To unpack the tar file, execute the command:

tar -xvf *I*{*solaris*|*hp*|*aix*}.**ica.tar**

This will create the directory */usr/add-on/ui/tools/ICA* that contains all the ICA files.

Step 4 - 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 options on the setup_ems.sh command are:

-h <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
-d <directory of GUI software>	The disk and directory of the GUI software
-t <IP address of NT Terminal Server>	The IP address of the NT Terminal Server
-snms	Flag indicating SNMS GUI
-nt	Flag indicating NT desktop

To configure ICA to launch an SNMS GUI, located in directory c:\snms3.1, on a host called dino for an NT Terminal Server with IP address 135.17.95.127, execute the following command:

setup_ems.sh -host dino -d c:\\snms3.1 -t 135.17.95.127 -snms

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 135.17.95.127, execute the following command:

setup_ems.sh -t 135.17.95.127 -nt

Each invocation of the setup_ems.sh file creates an alias definition in the ems_aliases file, located in the directory /usr/add-on/ui/tools/ICA. This alias file can be invoked from each users profile (e.g., .vueprofile, .dtprofile, or .profile) so that the alias definition will be defined in the current shell at user login.

Step 5 - Updating User Profile and Testing the GUI

Log out as `root` and log in as the `ems` user. Add the following line to the user's profile:

. /usr/add-on/ui/tools/ICA/ems_aliases

When complete, execute the profile in the current shell by executing the command:

.**/{.vueprofile | .dtprofile | .profile}**

Then try each alias created in the user profile. In the above example, try the following:

tobago
dino
nt

NT Terminal Server Platform

Introduction

This section discusses the NT Terminal Server platform and the software configuration of this platform and associated client workstations.

Background

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 dump 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.

Installation and configuration

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

Configuration of NT server 4.0 Terminal Server edition

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.

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.

   (a) For the IP address tab, select the radio button labeled **Specify an IP address** 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 **ping** command (via MS-DOS window).

   If more that one gateway needs to be configured, select the Advanced button and add all the applicable gateways.

   (b) 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.

(c) All other tabs are optional information. To save the entered information, press the OK button.

No configuration is necessary for the Protocols, Adapters, or Bindings tabs. Press OK to save the configuration.

Paging Size Configuration

Background

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.

Configuring the Paging Space

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.

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 ***Change*...** button.

The ***Change*...** button should display a new screen titled Virtual Memory. Select C drive from the drive list and enter 1024 for both the *Initial Size (MB)* and *Maximum Size (MB)* input parameters. Press the **Set** button to apply the parameters. Press the **OK** button to exit the screen and the **Close** button to exit the System Properties screen.

In order to re-initialize the paging file, the system will display a dialog box indicating that a system reboot is necessary. Press **OK** to commence the reboot procedure.

Service Pack 4 Upgrade

NOTE:
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.

Checking The Installed Service Pack

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.

Service Pack Installation

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 **Wtsi386.exe**. Double click on the **Wtsi386.exe** file to begin installation.

The following prompts may be displayed during the installation:

```
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?
```

Affirm this answer by pressing the **Yes** button.

The next screen display the end user license agreement. At the bottom there are two check boxes labeled

- Accept this license agreement (must accept before installing the Service Pack)
- Backup file necessary to uninstall this Service Pack at a later time

Select both check boxes and press the **Instal**l button.

The next prompt may be displayed on some North American systems:

```
Your system is installed with 128 bit security. Do you wish to
install this service pack?
```

Affirm this request by pressing the **Yes** button.

The final prompt should be a completion message:

```
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.

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.
```

Press the **Restart** button to reboot your computer.

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). 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.

Log in to the server using the `Administrator` 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. When the My Computer screen is displayed, double click on the CD-ROM device to launch the Metaframe installation software.

To start the installation process, press the button labeled **Metaframe Setup**. This should display the Metaframe license agreement screen. Press the **I Agree** button on the license agreement screen. This will commence the installation process.

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 table indicates the input data that will be required:

NOTE:
Metaframe installation changes two significant features of the computer. First, the default boot device is changed to drive M and the CD-ROM is changed to drive N. Second, each user's desktop will be equipped with a Metaframe task bar.

Prompt	Installer Response
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.
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.
Add Modems	Modems are NOT supported so avoid this prompt
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.

When complete, the system will automatically reboot.

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.

License Activation

License Retrieval

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.

The Metaframe License can be retrieved from the Citrix Licensing Screen. Log in as `Administrator` and select the Metaframe task bar. The Metaframe taskbar should contain a set of buttons, each with an associated tool tip. Passing the cursor over the each button should display the tool tip.

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.

You can leave this screen open, since it will be needed to enter the activation code for this license.

Activation Code Retrieval

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

Go to the URL www.citrix.com/activate 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.

Example registrant information is:

Company: Lucent Technologies

Address 1: Room 1c-537

Address 2: 101 Crawfords Corners Road

City/State/Zip: Holmdel, NJ, 07733

Home: 732-332-6295

FAX: 732-949-8149

Name: John Liggio

Email: jliggio@lucent.com

Reseller Information:

Name: Sage Technology Group

City/State: Edison,NJ

Other Citrix queries include the following information:

Server CPU information: P3 Xeon

Processors: 2

Memory: 1 GB

Manufacturer: Dell or HP

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.

License Activation

The Metaframe license is activated from the Citrix Licensing screen. 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.

Go to the menu bar pull-down labeled License and select the **Activate License** menu item. This should pop up a dialog box for the license to be activated. Enter the Activation Code in the associated text field and press OK when complete.

A confirmation dialog should indicate that the license is now activated. Once the license is activated, you can close the Citrix Licensing Screen.

Server disk configuration

To perform disk configuration, log in as `Administrator` and launch the Disk Administrator utility. This application can be reached from the start button, via the following cascading menus:

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

Once launched, the disk administrator program will graphically depict the server disk formatting.

Changing the CD-ROM Drive Letter To D

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. Next, display the popup menu for the CD-ROM by pressing the right hand mouse button in the selected box.

From the popup menu, choose the option labeled **Assign Drive Letter**. A dialog box should be displayed indicating the available drive letter choices. Assign the drive to letter D and press the **OK** button. A confirmation dialog indicates that the assignment will be performed immediately and ask whether you wish to continue. Press **Yes** to affirm the change.

Creating a New C Drive

In the graphical picture depicting Disk 0, go to the box labeled Free Space. The size of the space should approximately 15 GBs.

Use the left hand mouse button to select the free space box. Next, display the associated popup menu by pressing the right hand mouse button in the selected box. Select the **Create** menu item from the popup menu.

Once Create is selected, a dialog box is displayed indicating that this new partition may not work with MS-DOS. Press the **Yes** button to continue the operation.

A new screen titled *Create Primary Partition* 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 **OK** button to complete the operation.

NOTE:
The label on the selected box should have changed to unformatted.

Display the popup menu again by pressing the right hand mouse button in the selected box. Select the ***Assign Drive Letter*** 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 **OK** button.

NOTE:
The drive letter on the selected box should have changed to C.

Display the popup menu again by pressing the right hand mouse button in the selected box. Select the ***Commit Changes Now*** menu item from the popup menu. A dialog box should be displayed asking whether the change should be written to disk. Press **Yes** to affirm the change. A dialog box should be displayed indicating successful completion. Press the **OK** button to continue.

Display the popup menu a fourth time by pressing the right hand mouse button in the selected box. Select the ***Format*** 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 **Start** button. Press **OK** for all subsequent dialog box warning and status messages.

NOTE:
The label on the selected box should have changed to NTFS.

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 **Exit** menu item.

WaveStar SNMS user configuration

Background

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.

Configuring the WaveStar SNMS User

To perform user configuration, log in as `Administrator` and launch the User Manager For Domains application. This application can be reached from the Start button, via the following cascading menus:

Start button -> Programs -> Administrative Tools (Common) -> User Manager For Domains

A Screen titled User Manager should be displayed. This screen should contain a menu bar and a scrolled table showing all defined users. To create a new user, access the *User* pull-down menu item and select the ***New User*** menu item. This should result in a new screen titled New User.

On the New User Screen, enter the following information:

Parameter	Value
Username	ems
Full Name	ems user
Password	ems123
Confirm Password	ems123

Also, put a check in the box labeled Password Never Expires. Then press the **Add** button. If no error occurs, the screen should clear in preparation of adding another user. Press the **Close** button on the screen titled New User in order to stop adding new users.

Once the `ems` user id is created, the User Manager application can be exited. Access the User pull-down menu and select the **Exit** menu item.

Terminal server client configuration

Background

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."

Configuring Session Reset

To perform session configuration, log in as `Administrator` and launch the Terminal Server Connection Configuration application. This application can be reached from the Start button, via the following cascading menus:

Start button -> Programs -> Administrative Tools (Common) -> Terminal Server Connection Configuration

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:

ica-tcp tcp Citrix ICA 3.0

rdp-tcp tcp Microsoft RDP 4.0

Double-click on the line specifying the ica-tcp connection. This should display a new screen titled *Edit Connection*. Press the **Advanced** button, which should result in the display on an additional screen titled *Advanced Connection Settings*.

Near the bottom of this screen, there is a configuration parameter labeled:

```
On a broken or timed-out connection <disconnect > the session
```

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:

```
On a broken or timed-out connection <reset > the session
```

Press the **OK** 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 **OK** to acknowledge the message.

On the Edit Connection Screen, press the **OK** button. This should close the Edit Connection Screen. On the Terminal Server Connection Configuration screen, access the User pull-down menu and select the **Exit** menu item.

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 Installation

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.

Interface Setup

4

Contents

OSI-Based Communications

Overview

The WaveStar SNMS IAO-LAN interface provides an OSI standard, high-speed communications path to NEs. It enables the reduction of performance bottlenecks by providing faster communications between the EMS and NEs. The OSI LAN interface provides up to three high bandwidth communication paths or OSI associations to NEs. This communication model is based on the standard 7-layer OSI stack reference model.

For increased system availability, WaveStar SNMS supports IAO-LAN redundancy. WaveStar SNMS is connected to a subnetwork of NEs via two separate IAO-LAN connections/hubs. Both connections are active. In the event that one IAO-LAN connection fails, WaveStar SNMS detects the failure and automatically switches to the other connection.

Configuring OSI

The following procedure is used for configuring OSI in the WaveStar SNMS host. The LAN card should be configured before running install.

Procedure: Configuring OSI in the SNMS Host

1. Bring down the SNMS application by typing **dn**
2. su to root
3. Get the number or MAC address of the LAN card by using lanscan (This is also done automatically)

lanscan must be root to run

```
Hardware Station        Crd Hardware  Net-Interface       NM  MAC     HP DLPI Mjr
Path     Address        In# State     NameUnit State      ID  Type    Support
Num

20.1 0x080009BAC2FA 1   UP            lan1        UP      4   ETHER   Yes    185
56.1 0x08000981B8C4 0   UP            lan0        UP      5   ETHER   Yes    185
```

4. Run installSnc
5. Select 4) Configure ITM SNC - making the provisioned parameters effective

Output similar to the following is obtained:

The root node for the SNMS application is /snc.

<CR> if OK, (q) to exit, or change to:

The current SNC run level is "Shutdown".

==========

EMS INSTALLATION AND CONFIGURATION PROGRAM 12-29-99

Current EMS Version: E10.0-175-btest-12/01/99

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 Redundancy
6) Display EMS system information
0) Exit

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

Specify your choice by number: **4**

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

Press any key to continue.

The HYBRID_FLAG is used to detect the running environment
of connection manager. It is a bit map variable. The possible
bit/values are:
CMISE 1
OSI TL1 2
X.25 TL1 4

The value for the HYBRID_FLAG should be the sum of the bits
specified before. For example: If the running environment is
CMISE and OSI TL1 only then HYBRID_FLAG = 3

Do you want to configure HYBRID_FLAG now (y/n): **y**

Supported protocols:

1) CMISE only
2) OSI TL1 only

3) CMISE and OSI TL1
4) X.25 TL1 only
5) CMISE and X.25 TL1
6) OSI TL1 and X.25 TL1
7) ALL (CMISE, OSI TL1 and X.25 TL1)

Specify your choice by number: **7**
Do you want this SNC instance to support OSI (y/n)? **y**

OSI LAN INTERFACE SETUP
OSI address information is required to access LAN based network elements.
You will be prompted for OSI routing and domain information.

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

Do you wish to configure OSI LAN interfaces at this time (y/n/q) ?

Do you wish to configure REDUNDANT OSI LAN interfaces (y/n/q) ?

1. lanmux 0 10/4/8
2. lanmux 1 10/4/16
3. lan 2 10/12/6
q. Quit

Enter the item number for the PRIMARY OSI LAN interface?

You have entered lanmux 1 as the PRIMARY OSI LAN interface.

Is this correct (y/n) ?

Please enter the 6-digit Organization Identifier [Default=000000]:
You have entered 000000 as the Organization Identifier.
Is this correct (y/n) ?

Please enter the 4-digit Routing Domain [Default=0000]:
You have entered 0000 as the Routing Domain.
Is this correct (y/n) ?

Please enter the 4-digit OSI Area [Default=0000]:
You have entered 0000 as the OSI Area.
Is this correct (y/n) ?

OSI LAN REVIEW

The following is a review of OSI configuration information:
---
1. lanmux 0 10/4/8 - TCP/IP
2. lanmux 1 10/4/16 - Primary 000000 0000 0000
3. lan 2 10/12/6 - N/C

Enter "**a**" to specify additional OSI interfaces.
Enter "**d**" to delete an OSI interface.
Enter "**s**" to save the above input and continue.

What would you like to do [q to quit]:
Please enter the OSI LAN IP address (135017013082):
You have entered 017017017248 as the OSI LAN IP address.
Is this correct (y/n) ?

Do you want to input the license information for ATOS stack (y/n)?
Please enter very carefully for the following information!
Please enter the station address of your lan0:
Please enter the expiration date of your Atos license (08-jan-98):
Please enter how many user-license do you have:
Please enter the license code:

Notes:

1. You will need a separate LAN card for the OSI LAN. There needs to be one LAN card for the SNMS local LAN and another card for the OSI to Network Element communications.
2. It is also recommended that each LAN card is connected to a different hub, as the hubs can sometimes cause communication problems.
3. For LAN redundancy you will need 2 LAN cards for OSI. You should also put a separate hub for each LAN card for extra redundancy. (Remember you cannot use the workstation LAN card for redundancy. You will need to purchase another LAN card for OSI support.)
4. LAN Cards 0 and 1 are part of the HP machine. They can be found on the back of the host. The HP host counts LAN cards from top left to bottom right.
5. When using external LAN cards you must power down the machine and move the LAN card jumpers from INT to EXT. The front two jumpers should be on.
6. Both LAN cards should be on a different SUBNET.

TCP/IP-Based Communications

Overview

WaveStar SNMS supports OSI connections with NEs over a TCP/IP backbone network. In OSI over TCP/IP communications, an NCC or OLS 400G is required to perform OSI protocol conversion, as a transport bridge, for messages/ responses handled to/from the EMS and NEs.

If the WaveStar NE has a direct OSI/LAN connection with the EMS and is not communicating over a TCP/IP network, a transport bridge is not needed.

NCC setup

An NCC can be provisioned to serve two main functions:

- Directory Services Agent (DSA) for SONET Directory Services (SDS)
- Transport bridge for TCP/IP to OSI protocol conversion for OSI-connected WaveStar BWM NEs communicating with WaveStar SNMS over a TCP/IP backbone network

An NCC can be designated as a DSA and/or transport bridge.

Each NCC has 2 RJ45 connectors on the main cards. The RJ45 is labeled RJ45 ETH, the NCC uses one or the other connector, not both at the same time.

Using TL1 to Verify the NCC Configuration

The following commands can be issued at the NCC CIT in TL1 mode:

Set Upper Layer Stack - Layer 3 Parameters

ENT-ULSDCC-L3:NGN-NCC::189:::131v2is=enable;
ENT-ULSDCC-L3:NGN-NCC::192:::L3AREA=0030;

Set Upper Layer Stack Information - Layer 4

ENT-ULSDCC-L4:NGN-NCC::194:::141ftm=10
ENT-ULSDCC-L4:NGN-NCC::195:::14lftm=5;
ENT-ULSDCC-L4:NGN-NCC::196:::14etof=enable;
ENT-ULSDCC-L4:NGN-NCC::197:::14etpf=enable;
ENT-ULSDCC-L4:NGN-NCC::198:::14etrf=enable;

Retrieve Upper Layer Stack Information

RTRV-ULS:NGN-NCC::186;

##Retrieve Upper Layer Stack Information - Layer 3

RTRV-ULSDCC-L4:NGN-NCC::193;

Retrieve Upper Layer Stack Information - Layer 4

RTRV-ULSDCC-L4:NGN-NCC::197;

Retrieve NE Level Parameters

RTRV-NE:NGN-NCC::210;

Router Configuration Information

If using a router instead of a Network Element, the router must be setup as follows:

- IS-IS Routing Protocol 10589
- TARP - TID Access Resolution Protocol (Bellcore standard GR-253 formerly TR-252)
- IEEE 802.3 Compliant
- OSI 7 layer stack

400G transport bridge configuration

From the network element side the following commands are necessary to provision the 400G to be both a Transport Bridge and a Registration Manager:

1. Enter System command gives an IP address to the NE's OS port. Do this if the NE is going to be a transport bridge.
   ENT-SYS:TID::CTAG:::[Spec_block];

The following is an example. It is on separate lines only to make it easier to read:

ENT-SYS:WSOLS400G-----12345678-::XXX:::
IP_ADDRESS=123.456.789,DFLTRTR_IPADDRESS=123.456.789,
LOCAL_SUBNETMASK=255.255.255.0;

a. The IP address is the IP address given to the Network Element by the network administrator.

b. The dfltrtr ip address is the IP address of the default gateway.

c. The NE will reset if the subnet mask is entered.

The **RTRV-SYS:TID::CTAG**; looks like this:
[16-Jul-99 2:23:16 PM] RTRV-SYS:WSOLS400G-----12345678-::XXX;

[16-Jul-99 2:23:19 PM] IP XXX
<
[16-Jul-99 2:23:21 PM] WSOLS400G-----12345678- 99-07-16 14:20:31
M XXX COMPLD
"tid=WSOLS400G-----12345678-

,std=SONET,netype=4F_END_80,ip_address=123.456.789,eth_adrs=00-00-0D-00-00-00,dfltrtr_ipaddress=123.456.789,local_subnetmask=255.255.255.0";

2. Enter Registration Manager.
   ENT-RMA:TID:SYSTEM:CTAG:::[Spec_block];

ENT-RMA:WSOLS400G-----12345678-:SYSTEM:XXX1:::
RM_ACTIVE=ENABLE,DSA_PSEL=0123,DSA_SSEL=012345,
DSA_TSEL=012345,
PRI_DSA_NSAP=1339840F800000000000000000xxxxxxxxxxxx,
PREFIX_COUNTRY=US,PREFIX_ORG=LUCENT,PREFIX_SUBORG1=SNMS1
;

   a. The primary DSA NSAP is the NSAP of SNMS southbound LAN card prefixed with a 13 for a total of 40 characters. Use this parameter only if not using a transport bridge.

   b. The PSEL, SSEL, and TSEL (presentation, session and transport layers) are the recommended values.

The **RTRV_RMA:TID::CTAG**; looks like this:
[16-Jul-99 2:25:02 PM] RTRV-RMA:WSOLS400G-----12345678-::XXX;

[16-Jul-99 2:25:05 PM] IP XXX
<
[16-Jul-99 2:25:09 PM] WSOLS400G-----12345678- 99-07-16 14:22:18
M XXX COMPLD

"rm_active=ENABLE,psel=0123,ssel=012345,tsel=012345,prinsap=1339840F800000000000000000xxxxxxxxxxxx,sec1nsap=00,sec2nsap=00,sec3nsap=00,country=US,org=LUCENT,suborg1=SNMS1";

3. Enter Transport Bridge. **ENT-TSB:TID:SYSTEM:CTAG:::[spec_block];** This needs to be entered in addition to the ent-sys command.

ENT-TSB:WSOLS400G-----12345678-:SYSTEM:XXX:::
PRI_TSB_NSAP=1339840f800000000000000000xxxxxxxxxxxx,
PRI_DSA_IP_ADDRESS=123.456.789;

   a. The PRI_TSB_NSAP is the NSAP of the transport bridge NE. Obtain the ethernet address of the NE using the WaveStar CIT interactive mode RTRV-SYS command.

   b. The DSA IP Address is the IP address of SNMS southbound LAN.

The **RTRV-TSB:TID::CTAG**; looks like this:
[16-Jul-99 2:35:17 PM] RTRV-TSB:WSOLS400G-----12345678-::XXX;

[16-Jul-99 2:35:19 PM] IP XXX
<

[16-Jul-99 2:35:22 PM] WSOLS400G-----12345678- 99-07-16 14:32:28
M XXX COMPLD

"pritsbnsap=1339840f800000000000000000000xxxxxxxxxxxx,sectsbnsap=00,prii
paddr=123.456.789;
Note that the priipaddr is the SNMS Southbound LAN as the DSA.

All the NEs in the network should now register themselves with SNMS.

X.25 Interface

Overview

WaveStar SNMS supports a TL1 over X.25 Southbound interface that takes advantage of the Gateway NE (GNE) function of the NEs to provide the protocol conversion from TL1 over an X.25 short stack to encapsulated TL1 over the seven-layer OSI stack using the SONET DCC. WaveStar SNMS supports multiple X.25 Virtual Circuits (VCs) to the GNE with various options for which VCs are used for which messages. The GNE maps its OSI connections to each of the subtending NEs so that they use the same VCs for the same functions as are used for the GNE. For example, if one VC is used for command/response messages to the GNE and another VC is used for autonomous messages from the GNE, those same VCs are used for the same messages for all the other subtending NEs. Although WaveStar SNMS supports direct X.25 connections to the GNEs, connections are generally through a Packet Switched Network (PSN). The customer chooses and is responsible for the type of link concentration equipment which forms the X.25 PSN for connecting WaveStar SNMS to the GNEs.

SNMS setup for X.25

The ACC X.25 software enables an HP computer to interface to an X.25 PSN. Global Link Settings and Specific Link Settings can be configured for each X.25 port on the computer. This section explains the SNMS setup for X.25.

NOTE:
Before starting to configure the host machine for X.25, the physical address of the Mux interface cards must be known. The addresses can be found by typing the following command (must be `root` to do this):

```
# ioscan -f | grep acc
nacc     0  10/4/4     nacc0     CLAIMED   INTERFACE ACC MUX
nacc     1 10/4/12     nacc0     CLAIMED   INTERFACE ACC MUX
```

Global link settings

The global link settings are, normally, Line Speed, Synchronous Timing Source, and Virtual Channel characteristics. These are Level 2 specifications that are used to gain the "synchronization" needed before data can be sent.

Procedure: Setting up X.25 Global Link Settings

1. The global links file (sometimes called the "answer file") must be set up. It can be found in the following directory. (HP-UX Rel 10.20)

   cd /opt/acc/cfg/

2. Next you will vi the x25_config.answ file and define the physical address of the Mux card (see above for the correct address). Below is a small part of the x25_config.answ file.

   Interface-Definition

   * mx# bus#:slot#

   Mux 0 10:4:4 /opt/acc/mux/abs/x25.zabs

   Mux 1 10:4:12 /opt/acc/mux/abs/x25.zabs

3. Now it is time to configure the timing source and the line speed. Ports 0 through 7 have been set for external timing and a line speed of 57600 (56k). If using the RS232 Mux interface panel, the line speed must be configured as 9600, as the RS232 port cannot support 57600. Below is a small part of the x25_config.answ file.

   Port-Definition

   Port 00:00 RS232 57600 Ext SDLC x1 NRZ

   Port 00:01 RS232 57600 Ext SDLC x1 NRZ

   Port 00:02 RS232 57600 Ext SDLC x1 NRZ

   Port 00:03 RS232 57600 Ext SDLC x1 NRZ

   Port 00:04 RS232 57600 Ext SDLC x1 NRZ

   Port 00:05 RS232 57600 Ext SDLC x1 NRZ

   Port 00:06 RS232 57600 Ext SDLC x1 NRZ

   Port 00:07 RS232 57600 Ext SDLC x1 NRZ

4. The first line in each port's Terminal Definition defines the specific X.25 driver to use and its Logical Presence Type (DTE or DCE). For SNMS, always use the X.25.LAPB driver.

   * device file: zx25m0p0 mux: 0 port: 0

   * mknod zx25m0p0 c 125 0x0300 2>/dev/null

   Term 0001 0:0 X25.LAPB 0000h 4BEAh 10 0 0 0 0 "L2 DCE"

   no_autostart

5. The remaining lines in each ports Terminal Definition specifies the Virtual Channels on this link. The two (2) types of Virtual Channels used are *x25.pvc* and *x25.svc.io*

Configured for SVC Communication

Term 020 0:0 x25.svc.io 0000h 0200h 99 0 0 0 0 "L3 svc"

Term 021 0:0 x25.svc.io 0000h 0200h 99 0 0 0 0 "L3 svc"

Term 022 0:0 x25.svc.io 0000h 0200h 99 0 0 0 0 "L3 svc"

Term 023 0:0 x25.svc.io 0000h 0200h 99 0 0 0 0 "L3 svc"

Configured for PVC Communication

```
Term 100 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 101 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 102 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 103 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 104 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 105 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 106 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 107 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 108 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
Term 109 0:0 x25.pvc    0000h 0200h 99 0 0 0 0 "L3 pvc"
```

NOTE:
For direct connects, when building the term channels, you should leave room for growth purposes. As a rule of thumb, start each Term and add 100 to each starting point. (that is, Term 0001 (m0p0) start at 100 and term 0002 (m0p1) start at 200 etc.).

Also numbers must run consecutively on each port; space between ports is allowed.

Specific link settings

/etc/x25/x25_config.XX - This file defines the Level 3 characteristics of a specific X.25 port on the SNMS computer. There must be one of these files for each port you wish to use. These files are often referred to as the X.25 "config" files.

NOTE:
This file must be manipulated by hand using a text editor such as "vi".

A sample file (with inserted comments) looks like:

```
#
#   X.25 Initialization FileCreated: Fri June 16, 1995#
#
#SNC-2000 - AI LINK DEFINITION for Mux 0, Port 4#
#
#Global Parameters
#
#File:       x25_config.04
#Directory:  /etc/x25
```

The x.121 fields define the Local Address this X.25 link will broadcast as the "Calling Address" when interacting with the PSN. The device and name correspond to the actual UNIX device and name used to create the drivers for this link. This address is normally provided by the PSN administrator and specifies the address where the SNMS computer is connected to the X.25 network.

```
.x.121              408746500400(x.121 Address of SNMS Host)
x.121_packetaddr    408746500400
device    zx25m0p4(Shows Mux interface port)
name      m0p4
```

The Level 2 Parameters designates sizes and thresholds to use for initial X.25 synchronization. The fields are defined as follows:

```
        t1      - Response Timeout    - 3000  = 3 seconds
        t3      - Inactivity Timeout  - 60000 = 60 seconds
        framesize                     - 263   = 263 Octets = (263 * 8 = 2104 bits)
        n2      - Number of Retrys    - 10
        l2window - Level 2 Window Size - 7
#
#Level 2 Parameters
#
t1        3000
t3        60000
framesize  263
n2         10
l2window   7
```

The Level 3 Parameters designate the size and networking controls to use for initial X.25 synchronization. The fields are defined as follows:

networktype - Level 3 Presence - DTE_80, DCE_80, DTE_84 or DCE_84

These parameters must match the equipment to which the SNMS host is connected to (router, X.25 network, etc.).

DTE_80 & DTE_84 are used when connecting to routers, X.25 network

DCE_80 & DCE_84 are used for direct connections and CSU/DSU connections.

NOTE:
*_80 is the ANSI 1980 standard and *_84 is the 1984 ANSI standard

CAUTION:
The network type SHOULD correspond to the L2 Definition specified on the first line of the Terminal Definition for this port in the X.25 Answer file.

```
#
#Level 3 Parameters
#
networktype       DTE_80(For Direct Connections use DCE_80)
```

The Circuit Table Definition designates the Type and number of Virtual Channels (VCs) defined on this port. The LCI column defines the starting Logical Channel Number of the VCs. The TYPE column is either:

pvc - Permanent Virtual Circuit
svc - Switched Virtual Circuit

CAUTION:
This information MUST correspond to the Terminal Definition section for this port in the Answer file (X.25_config.answ).

```
#
#Circuit Table Definition
#
#      LCI     TYPE     HOW MANY
lci    1       pvc      10
lci    11      svc      10
```

The remaining settings configure the way this port interacts with the network. Typically, the default settings are appropriate, but these fields may be modified to suit the PSN. The values for each field are as follows:

flowcontrol - on/off (default = off)

thruputclass - on/off (default = off)

fast_select_accept - enabled/disabled (default = disabled)

thruputclass - enabled/disabled (default = disabled)

neg_inpacketsize - negotiated incoming packet size 256/128 (default = 256)

(required when flowcontrol = on)

neg_outpacketsize - negotiated outgoing packet size 256/128 (default = 256)

(required when flowcontrol = on)

def_inpacketsize - default incoming packet size 256/128 (default = 256)

def_outpacketsize - default outgoing packet size 256/128 (default = 256)

def_inwindow - default incoming window size 2-11 (default = 7)

def_outwindow - default outgoing window size 2-11 (default = 7)

def_inthruputclass - default incoming thruputclass 1-13 (default = 11)

def_outthruputclass - default outgoing thruputclass 1-13 (default = 11)

pvc_inpacketsize - PVC incoming packet size 256/128 (default = 256)

pvc_outpacketsize - PVC outgoing packet size 256/128 (default = 256)

pvc_inwindow - PVC incoming window size 2-11 (default = 2)

pvc_outwindow - PVC outgoing window size 2-11 (default = 2)

```
#
#Flow Control, Throughput Class, Fast Select and Reverse Charge Settings
#
flowcontrol       off
thruputclass      off
fast_select_accept          disabled
```

```
reverse_charge          disabled
def_inpacketsize  256
def_outpacketsize 256
def_inwindow      7
def_outwindow 7
def_inthruputclass        11
def_outthruputclass        11
pvc_inpacketsize          256
pvc_outpacketsize          256
pvc_inwindow      2
pvc_outwindow     2
#
#IP Parameters
#
ipaddress        130.9.192.4
idletimer        45
holdtimer         30
mtu              2048
```

X.25 setup for network elements

Before the WaveStar SNMS host computer can access a GNE via the X.25 PSN, the X.25 port on the NE must be configured to match the configuration as set in WaveStar SNMS. This section describes how to configure the GNE to match the virtual configuration setup in WaveStar SNMS for specific NE types. Note that:

- Each GNE may use unique PVCs/SVCs for its communication to WaveStar SNMS.
- Each VC is provisioned for types of autonomous messages and command/response functions (with some variation dependent upon the NE type).
- Each NE under a GNE uses the SONET DCC to communicate with the GNE.

Before a GNE is stored in the WaveStar SNMS database, it must:

- successfully communicate with the WaveStar SNMS host computer on its unique PVCs/SVCs and
- have privileged logins and passwords defined.

The system allows virtual circuits to be configured on both the application and NE. The virtual circuit configuration for a GNE must match the virtual circuit configuration that has been defined in WaveStar SNMS. For example, WaveStar SNMS may have two X.25 virtual circuits configured for the GNE as follows:

Logical Channel	Channel Type	Function
1	SVC	Command and Response, Autonomous DB Change
2	PVC	Autonomous Messages and Alarms

Lucent Technologies' LCT

SVC Setup

To configure an SVC channel for use with WaveStar SNMS, perform the following:

1. Log into the LCT using the CIT and Centerlink software.
2. From the menu select:
   `Security→Enter Channel Identifier→security`
3. From the menu, select the appropriate OS Type:
   MT, MA, CMDR, OTHR, RST, NONE (if using one PVC, you must select OTHR).
4. Enter svc calling address (CALLADDR).

PVC Setup

To configure a PVC channel for use with WaveStar SNMS, perform the following:

1. Log into the LCT using the CIT and Centerlink software.
2. From the menu select:
   `Security→Enter Channel Identifier→security`
3. Select **pvc**.
4. From the menu, select the appropriate OS Type:
   MT, MA, CMDR, OTHR, RST, NONE (if using one PVC, you must select OTHR).

Table of Channel Types

OS Type	Function
MT	maintenance all autonomous message but REPT DBCHG
MA	memory-admin all REPT DBCHG messages
CMDR	cmt-response no autonomous messages
OTHR	all autonomous messages
RST	all autonomous messages but REPT EVT
NONE	Nothing

WaveStar NE Setup

Overview

The NEs supported by WaveStar SNMS R3.1 include:

- Lucent Technologies' WaveStar Bandwidth Manager (BWM)
- Lucent Technologies' WaveStar OLS 2.5G
- Lucent Technologies' WaveStar OLS 10G (STM-64)
- Lucent Technologies' WaveStar OLS 400G

When setting up the NE's, the NSAP must equal the following, where the first 26 digits are the same as the SNMS host.

39840f800000000000000000000XXXXXXXXXXXX

{Where XXXXXXXXXXXX= the MAC address of the NE 12 digits}

BWM Setup

Uses the J175 or J177 DB9 connector for OSI communications. This can be found on the back of the control shelf.

WARNING:
WaveStar SNMS and the CIT must be plugged into separate ports in the back panel of the main controller. It is recommended that the J175 and J177 DB9 connectors found along the right-hand side of the system controller bay be used. Do not use the front connector or there will be a problem with connectivity.

RTRV-ULSDCCL3:tid:aid:ctag; TL1 Syntax

ENT-ULSDCCL3:tid:aid:ctag:::spec_block; TL1 Syntax

Spec_Block Table

l3dfi ***l3dfi*** NSAP DSP (Domain Specific Part) Format Identifier. This is a 1 octet (2-digit hexadecimal) field to specify the format for the rest of the address. The initial value is **80** hex, which identifies the SONET DSP format.

L3org ***l3org*** NSAP Organization Identifier Field. This is a 3 provision into the NSAP address the allocated Company Code assigned by the ANSI- administered USA Registration Authority for OSI Organization Names. The initial value for this parameter is the Company Code assigned to Lucent Technologies for Lucent SONET Products (**000000** hex).

L3res ***l3res*** NSAP Reserved Field. This is a 2 octet (4-digit hexadecimal) field that currently has not been assigned a specific purpose by the standards. Until the standard use of this field has been defined, users should not assign a value that is different from the initial value. The initial value for this parameter is **0000** hex.

L3rd ***l3rd*** NSAP Routing Domain. This NSAP field identifies a unique Routing Domain within an administrative domain. Standard use of this parameter has not been defined in the standards. Until the standard use of this field has been defined, users should not assign a value that is different from the initial value. This has a 2 octet (4-digit hexadecimal) value with the initial value of **0000** hex.

L3area ***l3area*** NSAP Area Identifier Field. This field identifies the area within the Routing Domain to which the NSAP address belongs. This parameter has a 2 octet (4-digit hexadecimal) value with the initial value of **0000** hex.

L3lv2is ***l3lv2is*** Starting with Release 1.2, this parameter enables or disables the network element specified by the ***tid*** as a Level 2 IS in addition to being a Level 1 IS. Values:
\xb7 **DISABLE**
\xb7 **ENABLE**. The initial value is **DISABLE**.

L3esct ***l3esct*** This is a future parameter. End System Configuration Timer. This field is used when the network element is acting in the End System role. Values: **1**-**1000** seconds. The initial value is **10** seconds.

L3isct ***l3isct*** Intermediate System Configuration Timer. This field is used when the network element is acting in the Intermediate System role. Values: **1**-**1000** seconds The initial value is **10** seconds. ***l3lc*** CLNP Lifetime Control parameter. Starting with Release 1.2, the value of this parameter determines whether a received PDU should be forwarded or discarded. Values: **2 - 255 hops**. The initial value is **255** hops.

maldfi ***ma1dfi*** Multiple Area Address One DSP Format Identifier. This is a 1 octet (2-digit hexadecimal) field. The initial value is **80** hex which identifies the SONET DSP format.

malorg ***ma1org*** Multiple Area Address One Organization Identifier Field. This is a 3 octet (6-digit hexadecimal) field. The initial value for this parameter is an empty value; that is, it has no value until provisioned by the user.

malres ***ma1res*** Multiple Area Address One Reserved Field. This is a 2 octet (4-digit hexadecimal) field. The initial value for this parameter is an empty value; that is, it has no value until provisioned by the user.

malrd ***ma1rd*** Multiple Area Address One Routing Domain Field. It has a 2 octet (4-digit hexadecimal) value with the initial value of an empty value; that is, it has no value until provisioned by the user.

Malarea ***ma1area*** Multiple Area Address One Area Identifier Field. This parameter has a 2 octet (4-digit hexadecimal) value with the initial value of an empty value; that is, it has no value until provisioned by the user.

Ma2dfi ***ma2dfi*** Multiple Area Address Two DSP Format Identifier. This is a 1 octet (2-digit hexadecimal) field. The initial value is **80** hex which identifies the SONET DSP format.

Ma2org ***ma2org*** Multiple Area Address Two Organization Identifier Field. This is a 3 octet (6-digit hexadecimal) field. The initial value for this parameter is an empty value; that is, it has no value until provisioned by the user.

mares ***ma2res*** Multiple Area Address Two Reserved Field. This is a 2 octet (4-digit hexadecimal) field. The initial is a 2 octet (4-digit hexadecimal) field. The initial value for this parameter is an empty value; that is, it has no value until provisioned by the user.

Ma2rd ***ma2rd*** Multiple Area Address Two Routing Domain Field. It has a 2 octet (4-digit hexadecimal) value with the initial value of an empty value; that is, it has no value until provisioned by the user.

Ma2area ***ma2area*** Multiple Area Address Two Area Identifier Field. This parameter has a 2 octet (4-digit hexadecimal) value with the initial value of an empty value; that is, it has no value until provisioned by the user.

Replacing DCC32 Pack on Main Controller of BWM

If the DCC32 in the main controller fails and replacement is necessary, the following steps must be followed to bring up communication with the NE:

1. Insert the new DCC32 pack.
2. On the BWM CIT, use the following command to determine the NSAP of the new DCC32 card.

   RTRV-ULSDCCL3:tid:aid:ctag;

   Output similar to the following is displayed:

   WBM 00-01-18 14:50:45
   M 0 COMPLD
   “L3IDP=39840F”
   “L3DFI=80”

"L3ORG=000000"
"L3RES=0000"
"L3RD=0000"
"L3AREA=0000"
"L3SYS=00000DOC0000"
"L3SEL=00"
"L3LV2IS=DISABLE"
"L3ISCT=10"

3. The above information will give you the NSAP of the DCC32 card. After the card is installed, the BWM must be rebooted.

2.5G setup

Uses the J41 (DCC LAN3) RJ45 or J45 (DCC LAN2) RJ45 connector for OSI communications. These are located in the front of the cards.

NOTE:
Uses the same commands as BWM setup described previously in this section.

400G OSI configuration

The 400G uses the J32OS DB9 connector located in the system bay interconnect panel.

Command to Retrieve the current OSI Configuration

RTRV-OSI:TID::ctag; Syntax for TL1 command. Retrieves current OSI Configuration.

Example of Retrieve Command

RTRV-OSI:OLS-400G::rsf;

IP 789012
<
OLS-400G 93-10-26 16:42:11
M 789012 COMPLD
"localaddress=39000080,isislvl=Level-2,drp=64"

Command to Enter or Change the OSI Configuration
ENT-OSI:TID::CTAG:{GEN_BLOCK}{:{:{SPEC_BLOCK}}}; Syntax for TL1 command

Changes or Enters the OSI configuration.

gen_block = General Block. This optional parameter field provides the capability to extend the usefulness of this command beyond the limits of those fields specified in Bellcore TR-199, Issue 1. For Wavestar OLS applications, the general block must be null.

Spec_block = Specific Parameter Block. Parameters set within the specific block are positionally independent and are set using construct such as: PARAMETER=value in a comma-separated list. Furthermore, each parameter listed below may appear at most once within the specific block for a single command.

localaddress = Local Address. This is used to identify the area to which this node belongs. The address is a 13 byte string whose value ranges between the hexadecimal numbers 000 to FFFFFFFFFFFFFFFFFFFFFFFFF.

isislvl = This parameter is used to identify the ISIS protocol of the network layer (layer 3) of the OSI stack.

This parameter must have one of the following values:
Level -1 ISIS Level-1 for both node and LAN
Level -2 ISIS Level-2 for both node and LAN

If this parameter is not set, then ISIS Level-2 is assumed.

drp = Designated Router Priority. This is used to identify the designated router priority of a node. The value is in the range of 0 (lowest priority) to 127 (highest priority). The designated router priority only applies if the LAN or the node IS/IS level is Level-2.

Example of the Enter Command
ent-osi:OLS-400G::rsf:::localaddress=0439000080,isislvl=Level-2,drp=64;

IP 123456
<
    400G 93-10-26 16:42:11
M 123456 COMPLD

System Administration

5

Contents

Overview

Description

WaveStar SNMS system administration is done through GUI windows and UNIX commands. Key administrative functions include system start-up and shutdown, definition of user access to NEs and commands, configuration of data communications and the network model, and backing up and restoring the WaveStar SNMS database.

The WaveStar SNMS administrator creates, deletes, and modifies users and their access permissions. Before any user can access the system, the system administrator must create their login and assign appropriate Target and Command Group access permissions.

Rebooting the Simplex (Non-redundant) System

Overview

The WaveStar SNMS application runs continuously on the host computer under normal operating conditions, gathering and routing network information. The procedures in this section describe how to start and stop the execution of the WaveStar SNMS application on a simplex (non-redundant) host computer should this become necessary.

NOTE:
Ordinarily the WaveStar SNMS application is stopped only under the following conditions:

- The host computer needs to be rebooted
- The WaveStar SNMS database needs to be restored
- A power outage affects the host computer
- A WaveStar SNMS problem needs to be corrected

Bringing down the WaveStar SNMS application

Procedure: Bringing Down the WaveStar SNMS Application

1. Log on to the WaveStar SNMS host computer using the snc login.
2. At the system prompt type **dn** and press the Return key.
3. After it's down, confirm that the application is in shutdown mode by typing **appstat** and then pressing the Return key.

Bringing up the WaveStar SNMS application

Procedure: Bringing Up the WaveStar SNMS Application

1. Log on to the WaveStar SNMS host computer using the snc login.
2. At the system prompt type **up** and press the Return key.
3. When your screen displays a prompt asking whether to delete trace files, respond with **y** and press the Return key, unless the trace files are needed to diagnose a system problem.
4. Confirm that the application is running and that processes are not respawning by typing **appstat** and then pressing the Return key.

Rebooting the WaveStar SNMS application using shutdown command

The Shutdown Command can be used to reboot the WaveStar SNMS application. This command will gracefully shut down the WaveStar SNMS application and Informix database and reboot the system.

NOTE:
Before rebooting the WaveStar SNMS application using the Shutdown command as described below, the system console **must** be powered on.

Procedure: Rebooting the WaveStar SNMS Application using Shutdown Command

1. Log in as `root` to the WaveStar SNMS host computer. A # prompt is displayed.
2. **cd /**
3. At the system prompt type **/etc/shutdown -r -y 0** and press the Return key

   (r=reboot, y=yes, 0=now)

Database Backup and Restore

Overview

Maintaining tape backups of the database is critical to the overall reliability of WaveStar SNMS. If a hardware failure or other mishap occurs, service disruptions resulting from loss of data can be minimized when a recently backed-up version of the database is available.

The routine of generating backups at weekly intervals and maintaining copies taken over several months improves the success rate of data restoration. It is a good practice to store the backups made immediately after database changes involving your network configuration at an off-site location to ensure a successful disaster recovery.

Backing up the database requires using UNIX commands and commands that are specific to the Informix database software. To use these commands, you need to open an xterm window and log on to the WaveStar SNMS host. To run a command, type it at the system prompt and press the Return key.

This section provides basic procedures for backing up and restoring the WaveStar SNMS database and exporting the database. Before attempting a backup or a restore, refer to Informix documentation for a complete discussion of Informix archival procedures.

Consider the following items as you prepare for database backups:

- You must be able to physically access the WaveStar SNMS host computer to insert and remove backup tapes.
- The database should be backed up at least once a week (more frequently when disk activity is high).
- In addition to the above recommendations, a backup should be verified and saved permanently off-site every six months. This is an additional safeguard against problems resulting from a faulty tape and/or tape drive.
- WaveStar SNMS system performance is not affected during database backups.
- A WaveStar SNMS database backup requires one or more tapes depending upon the size of the database.
- Be sure to label backup tapes with the date and contents of the tape as instructed by the Informix backup and restore processes.
- Restoring the WaveStar SNMS database requires that you bring the WaveStar SNMS system down and take the Informix database program off-line.

CAUTION:
These procedures assume that you are working with a WaveStar *SNMS database from the same release. If you are converting or backing up a WaveStar SNMS database from a different release, call 1-800-225-4672 for technical assistance.*

Backing up the WaveStar SNMS database

Informix uses Log partitions to ensure data can be reliably modified in a database. The Logical Log partition maintains a record of all the changes made to a database since the last full archive.

A full backup of the Informix database is also known as an archive. An archive is performed as follows:

NOTE:
The system does not have to be brought down to perform an archive.

Procedure: Backing Up the WaveStar SNMS Database

1. Insert a tape into the tape drive of the SNMS host computer.
2. To archive the database, you must log in as the Informix user. You can do this while logged in using your normal login by typing **su - informix** and pressing the Return key.
3. At the system prompt, type **ontape -s -L 0** and press the Return key.

   The following prompt is displayed:

   ```
   Please mount tape 1 on /dev/rmt/0m and press the Return key to
   continue.
   10 percent done.
   100 percent done.
   ```

NOTE:
Performing an archive can take anywhere from 30 minutes to several hours depending on the amount of data.

4. When the archive is complete, messages similar to the following appear:

   ```
   Please label this tape as number 1 in the arc tape sequence.
   This tape contains the following logical logs:
   126
   Program over.
   ```

Restoring the WaveStar SNMS database

The following procedure is used for restoring the WaveStar SNMS database.

NOTE:
The system **must** be down to execute the restore procedure, and you **must** have the same database configuration.

Procedure: Restoring the WaveStar SNMS Database:

1. Log into the WaveStar SNMS host using the `snc` login.
2. Bring the WaveStar SNMS application down by typing **dn** and pressing the Return key at the system prompt.
3. Log into Informix by entering **su - informix** at the system prompt. Press the Return key.
4. Make sure you have a correct *onconfig* file, *sqlhosts* file, and *.profile* in /tools/informix/etc directory.
5. Type **onmode -ky** to bring the Informix server offline.
6. To start the restore process, type **ontape -r** at the system prompt and press the Return key. Messages similar to the following are displayed:

```
Please mount tape 1 on /dev/rmt/0m and press Return to
continue......
Archive Tape Information
Tape type:Archive Backup Tape
Online version:Informix Dynamic Server Version 7.31.UC2XM
Archive date:<archive date is displayed here>
User id:informix
Terminal id:/dev/pts/2
Archive level:0
Tape device:/dev/rmt/0m
Tape blocksize (in k):16
Tape size (in k):1024000
Tape number in series:1
Spaces to restore:
1    [rootdbs]
2    [snc_dbs]
3    [cf1_dbs]
4    [cf2_dbs]
5    [eo_dbs]
6    [fm1_dbs]
7    [cdr_dbs]
8    [index_dbs]
9    [fm2_dbs]
```

```
10  [pm1_dbs]
11  [pm2_dbs]
Archive Information
Informix Dynamix Servier Copyright(c) 1986-1998 Informix
Software, Inc.
Initialization Time:  12/02/1999 12:03:13
System Page Size:2048
Version:6
Archive CheckPoint Time:12/21/1999 11:31:54
Dbspaces
```

Number	flags	fchunk	nchunks	flags	owner	name
1	1	1	1	N	informix	rootdbs
2	1	2	1	N	informix	snc_dbs
3	1	3	1	N	informix	cf1_dbs
4	1	4	1	N	informix	cf2_dbs
5	1	5	1	N	informix	eo_dbs
6	1	6	1	N	informix	fm1_dbs
7	2001	7	1	N T	informix	temp_dbs
8	1	8	1	N	informix	cdr_dbs
9	1	9	1	N	informix	index_dbs
10	1	10	1	N	informix	fm2_dbs
11	1	11	1	N	informix	pm1_dbs
12	1	12	1	N	informix	pm2_dbs

```
Chunks
```

Chk/dbs	offset	size	free	bpages	flags	pathname
1	1	0	250000	178385	PO-	/dev/informix/dbsp1_1G
2	2	250000	10000	99427	PO-	/dev/informix/dbsp1_1G
3	3	350000	150000	122715	PO-	/dev/informix/dbsp1_1G
4	4	0	150000	123451	PO-	/dev/informix/dbsp2_1G
5	5	150000	150000	139571	PO-	/dev/informix/dbsp2_1G
6	6	300000	100000	98921	PO-	/dev/informix/dbs2_1G
7	7	400000	50000	49947	PO-	/dev/informix/dbs2_1G
8	8	450000	50000	49899	PO-	/dev/informix/dbs2_1G
9	9	0	150000	113778	PO-	/dev/informix/dbs3_1G

10	10	150000	350000	297284	PO-	/dev/informix/dbs3_1G
11	11	0	1000000	998068	PO-	/dev/informix/pmsp1_2G
12	12	0	1000000	999435	PO-	/dev/informix/pmsp2_2G

7. Prompts are displayed similar to:

```
Continue Restore (y/n): y
Do you want to back up the logs? (y/n): n
Restore a level 1 archive? (y/n): n
Do you want to restore log tapes? n
/tools/informix/bin/onmode -sy

Program over.
```

   The restore process is interactive and its prompts guide you through the process. When the restore process is complete, the Informix software is in quiescent (administrative) mode.

8. Type **onmode -m** and press the Return key to put Informix in online mode.
9. To confirm Informix is in online status, type **onstat -** and press the Return key. The output is similar to the following:

   INFORMIX-OnLine Version 7.23.UC1 --On-Line--Up 00:23:56 --- 116936 Kbytes

10. Log out of Informix.
11. Start the WaveStar SNMS application by typing **up** and pressing the Return key at the system prompt.

Exporting the database

A copy of the database can also be exported to an ASCII text format. This would allow you to transfer the database schema to another Informix environment that is configured differently. A minimum of three tapes are needed for this.

The following procedure is used to perform a database export:

NOTE:
The WaveStar SNMS application **must** be shut down before doing a database export. Backup /snc/dsa directory to ensure system consistency after restart.

Procedure: Exporting the Database to a Directory

1. Log in as snc.
2. Bring the WaveStar SNMS application down.

3. At the UNIX prompt, use the following commands to back up the WaveStar SNMS database to a directory (execute each command individually):

   dbexport $SNC_DBNAME -c -ss -o /<directory>

   dbexport $PM_DBNAME -c -ss -o /<directory> (only if PM is collected)

   dbexport $NQ_DBNAME -c -ss -o /<directory> (only for northbound CMISE)

4. After each DB export command, the message “dbexport complete” indicates the procedure has been successfully completed.

Procedure: Exporting the Database to Tape

1. Log in as snc.
2. Bring the WaveStar SNMS application down.
3. At the UNIX prompt, use the following command to back up the WaveStar SNMS database to tape:

   dbexport $SNC_DBNAME -c -ss -t /dev/rmt/0m -b 512 -s 2000000

   dbexport $PM_DBNAME -c -ss -t /dev/rmt/0m -b 512 -s 2000000

   dbexport $NQ_DBNAME -c -ss -t /dev/rmt/0m -b 512 -s 2000000

4. After each DB export command, the message “dbexport complete” indicates the procedure has been successfully completed..

Importing the database

A copy of the database can also be “imported” from a text format. The following procedure is used to perform a database import:

NOTE:
The WaveStar SNMS application **must** be shut down before doing a database import. You must restore /snc/dsa directory to ensure system consistency after restart.

Procedure: Importing the Database from a Directory

1. Log in as snc. If a WaveStar SNMS database exists, drop it by running the following command at the UNIX prompt (be careful using this command):

   drdb

Messages similar to the following are displayed:.

```
Do you want to drop DSA database /snc/dsa (y/n)? y
...Database "snc_db" dropped...
...Database "pm_db" dropped...
....Database "q3nb_db" dropped....
```

2. Use the following commands at the UNIX prompt:

   dbimport $SNC_DBNAME -d snc_dbs -c -i /<directory>
   db_logging -U snc_db

   dbimport $PM_DBNAME -d pm1_dbs -c -i /<directory>
   db_logging -U pm_db

   dbimport $NQ_DBNAME -d nq1_dbs -c -i /<directory>
   db_logging -U q3nb_db

3. After each DB import command, the message “dbimport complete” indicates the procedure has been successfully completed.

Procedure: Importing the Database from Tape

1. Log in as snc. If a WaveStar SNMS database exists, drop it by running the following command at the UNIX prompt **(be careful using this command)**:

   drdb

2. Next, use the following commands at the UNIX prompt:

   dbimport $SNC_DBNAME -d snc_dbs -c -t /dev/rmt/0m -b 512 -s 2000000
   db_logging -U snc_db

   dbimport $PM_DBNAME -d pm1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000
   db_logging -U pm_db

   dbimport $NQ_DBNAME -d nq1_dbs -c -t /dev/rmt/0m -b 512 -s 2000000
   db_logging -U q3nb_db

3. After each DB import command, the message “dbimport complete” indicates the procedure has been successfully completed.

Redundant Operations

Overview

WaveStar SNMS uses HP's HA (High Availability) 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 locally 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 Electronic Data Replication (EDR).

Operations and commands for redundant systems

Procedure: Rebooting the Active SNMS Host

1. Login as snc to the active host (snmsa).
2. Use the **cmviewcl -v | more** command to verify that snmsa is the active host (shows if the snc package is running).
3. Check the replication status on snmsa by using the **er_status** command to verify it is in the active state and replications are active from snmsa to the standby host (snmsb).
4. Verify that the standby host is running by using the **appstat** command.
5. Manually switch over to the standby host by executing the **ps -ef | grep orbix** command. Kill the orbix process.
6. Verify that package switching is disabled by executing **cmviewcl -v**.
7. Execute **er_remove snmsa** to remove ER.
8. Execute **showtop** to verify that the primary server is marked down. If not, edit the /snc/etc/HA_Topology.cfg file on the secondary server and change the standby to **down**. Then execute **HA_MgrClient -u OAM -m geInitHostConf**.
9. Send the **/etc/shutdown -r -y 0** command to reboot the primary server.

The following shows sample output:

snmsa:**cmviewcl -v | more**

```
CLUSTER      STATUS
sncCluster         up

NODE    STATUS    STATE
snmsa        up        running
```

```
Network_Parameters:
INTERFACE     STATUS      PATH      NAME
PRIMARY          up        10/12/6      lan0
PRIMARY          up        8/12/1/0     lan1
PRIMARY          up         8/12/2/0    lan2
STANDBY          up        14/12/1/0    lan5
STANDBY          up         4/12/2/0    lan6

Serial_Heartbeat:
DEVICE_FILE_NAME      STATUS       CONNECTED_TO
/dev/tty0p6 up                snmsb            /dev/tty0p6

PACKAGE     STATUS     STATE      PKG_SWITCH     NODE
sncPkg       up running   enabled      snmsa

snmsa:er_status
server information
----------------------------------------------------
snmsadr        active
snmsbdr         active

replication information
----------------------------------------------------
active        sa                  (Standby to active)
inactive      as                   (Active to standby)
```

Procedure: Starting the SNMS Application on the Primary Server When the Secondary Server is Active

1. Login as `snc` to the primary server host (snmsa) which is down.
2. Issue the **appstat** command to verify the SNMS application is down.
3. Use the **showtop** command to verify which is the active host on both hosts.
4. Verify that the showtop command completes on the active server. The following shows sample output:

   ```
   Establishing connection to HA_Mgr.
   Operation mode: Active
   ```

5. su to root (no minus in command).
6. Login as `snc` and su to root.
7. Run the **/snc/etc/rejoin** command.

NOTE:
The **rejoin** command is only used to bring a downed host's database into sync with an active one. If neither host is up, do not use the **rejoin** command; use the **cmrunpkg** command instead.

The following shows sample output:

snmsa:showtop
```
**********************************************
#
#         Redundancy topology
#
TopologyDefinition_Begin
{hostname=,site=,status=,ipaddress=}
{hostname=snmsb,site=local_secondary,status=active,ipaddress=135.17.13.153}
{hostname=snmsa,site=local_primary,status=standby,ipaddress=135.17.13.152}
End_TopologyDefinition
**********************************************
snc   414   223   0 22:55:39 ?       0:00 HA_Mgr -server HA_Mgr -lockfile/tmp/
HA_Mgr.lock
Establishing connection to HA_Mgr.
Operation mode: STANDBY
```

Procedure: Rebooting a Standby Host

1. Login as snc to the standby host (snmsb).
2. Use the **cmviewcl -v | more** command to verify that snmsb is the standby host.
3. su to root and disable package switching on the active server by executing **cmmodpkg -d sncPkg**.
4. Remove snmsb from the cluster using the **cmhaltnode -f -v snmsb** command.
5. If the application is up you can use the **dn** command to bring it down. (This can only be done this way on the standby host.)
6. Verify that package switching is disabled by executing **cmviewcl -v**.
7. Execute **er_remove snmsa** to remove ER.
8. Execute **showtop** to verify that the primary server is marked down. if not, edit the /snc/etc/HA_Topology.cfg file on the secondary server and change the standby to **down**. Then execute **HA_MgrClient_u OAM -m gelnit HostConf**.
9. Send the **/etc/shutdown -r -y 0** command to reboot the primary server.

Procedure: Switching from an Active Host to a Standby Host

1. Login to the active host (snmsa) as snc.
2. Use the **cmviewcl -v | more** command to verify that you are logged into the active host. (Make sure that the snc package is enabled and switching is also enabled.)
3. Login to the standby host and make sure SNMS is up by issuing the **appstat** command.
4. Issue the **ps -ef | grep orbix** command.
5. Kill the orbix process.

The following shows sample output:

snmsa:**cmviewcl -v**

```
Node_Switching_Parameters:
NODE_TYPE      STATUS      SWITCHING      NAME
Primary           up          enabled       snmsa
Alternate         up          enabled       snmsb
```

snmsa:**ps -ef | grep orbix**

```
snc   230    223    0 22:55:14 ?              0:00 orbixd -u -c /snc/bwx6.2/
config_data/fm/log/data/OrbixCheckp
snc  2334  7820  1 23:01:18 pts/0           0:00 grep orbix
```

snmsa:kill -9 230

Procedure: Bringing up a Standby Host

1. Login as snc to the standby host (snmsb).
2. Take informix offline by issuing the following command: **runas informix onmode -ky**.
3. To bring informix back online type **runas informix oninit**.
4. Su to root and execute **/snc/etc/rejoin**

NOTE:
In a redundant configuration, the SNMS application does not come up automatically.

The **dn** and **up** command should not be used on an active host.

Troubleshooting

6

Contents

Overview

Introduction

This chapter is designed to aid the system administrator in isolating the source of a problem if one is encountered when using the system. Techniques and tools are described here in order to pinpoint the possible cause of problems and to offer suggestions on how they may be resolved. The user should refer to this chapter prior to requesting customer assistance.

This chapter consists of the following sections:

- Investigating the WaveStar SNMS Application
- Investigating Informix
- Investigating Data Communications Problems
- Testing LAN Connectivity

Troubleshooting tools

The following table lists the most commonly used commands and utilities to administer and troubleshoot WaveStar SNMS. All of the commands can be executed while logged in as the user `snc`. However, certain tasks require you to log in as either `informix` or `root`. These cases will be addressed in the appropriate sections which follow.

Area	Command	Login	Description
WaveStar SNMS application	appstat	snc	Checks for WaveStar SNMS processes that have respawned.
	up	snc	Starts the WaveStar SNMS application.
	dn	snc	Stops the WaveStar SNMS application.
	cmtool	snc	Displays communication status for NEs.
	gui_probe	snc	Displays present GUI information.
INFORMIX	dbaccess	informix or snc	Displays Informix version and serial number.
	locks	informix or snc	Displays any locks held on the database.
	onstat	informix or snc	Displays database space usage.
	finderr	informix or snc	Displays Informix error messages associated with database error codes.
UNIX	top	any	Checks for processes using large amounts (>5%) of CPU time.
	bdf	any	Confirms that all filesystems are not at more than 80% capacity.
	ps -ef	any	Looks for WaveStar SNMS processes that are > 2400 KB in size.

COMM	osiopu	any	Monitors the OSI stack on the host.
	ping	any	Tests TCP/IP connection between two devices.
	X25_check	any	Displays X.25 server and Level 2 status.
	X25stat	any	Displays detailed information about a specific X.25 link.
400G	sb400goam	any	Shows the association status of the 400G NEs.

Investigating the WaveStar SNMS Application

APPSTAT

The **appstat** command reports the WaveStar SNMS application status.

At the UNIX prompt, enter the command: **appstat**

If the application is up, the following is displayed:

```
------------------------------------------------------------
quazar:appstat

CURRENT RUN LEVEL IS: Running

DEMONS:

Demon Name       Pid   Process Name      Strt Persist  Respawns
                                          Opt

ccd               3697 ccd -f $CCP_DIR -e / R Yes        0
logdaemon         3699 SNC_LogDaemon        R Yes        0
orbixd            3702 orbixd -u -c $ROAMLO R Yes        0
stackHpov         3704 startksh OsiStack /t R Yes        0
ifr               3787 ifr -L > $ROAMLOG/IF R  No        0
DsaStack          3794 DsaStack /tmp/dsa.lo R  No        0
HA_Mgr            3968 HA_Mgr -server HA_Mg R  No        0
GUI_TrcServer     4356 GUI_TrcServer TRACE_ R  No        0
DSA_Prov          4402 DSA_Prov             R  No        0
OL_Manager        4404 OL_Manager -d $OL_DE R  No        0
LM_Logger         4409 LM_Logger -s $LML_SI R  No        0
LM_Browser        4418 LM_Browser -k /tmp/L R  No        0
PM_DbManager      4434 PM_DbManager -server R  No        0
PM_DbServer       4435 PM_DbServer -server  R  No        0
CM_Server         4439 CM_Server -l /tmp/CM R  No        0
NEH_Server        4454 NEH_Server -server N R  No        0
SDS_Server        4467 SDS_Server -l /tmp/S R  No        0
CS_SbOsi          4514 CS_SbOsi -s CS_SbOsi R  No        0
CS_Southbound     4519 CS_Southbound -s CS_ R  No        0
SB_TL1Mgr         4527 SB_TL1Mgr -server SB R  No        0
CF_NeAgent        4532 CF_NeAgent -server C R  No        0
CF_Network        4559 CF_Network -server C R  No        0
CF_DbServer       4568 CF_DbServer -server  R  No        0
CF_Val_PathSvr    4647 CF_Val_PathSvr -serv R  No        0
SNC_Mon           4705 SNC_Mon SNC_Mon FM_S R  No        0
FM_DbServer       4955 FM_DbServer FM_Db /t R  No        0
FM_Server         4963 FM_Server FM_Server  R  No        0
FM_Prov           5038 FM_Prov FM_Prov /tmp R  No        0
BR_bacres         5057 BR_bacres -server BR R  No        0
SM_Security       5159 SM_Security -lockfil R  No        0
GDB_Server        5175 GDB_Server GDB_Serve R  No        0
```

```
GDB_ServerFile    5176 GDB_ServerFile GDB_S R  No        0
GDB_ServerNtwk    5177 GDB_ServerNtwk GDB_S R  No        0
OBR_Main          5180 OBR_Main -server OBR R  No        0
OBR_Main3K        5191 OBR_Main3K -server O R  No        0
SWM_Gateway       5205 SWM_Gateway -server  R  No        0
TLA_MsgHandler    5329 TLA_MsgHandler -serv R  No        0
TLA_CmdHandler    5369 TLA_CmdHandler -serv R  No        0
CN_Northbound     5695 CN_Northbound -t5 -T R  No        0
OAM_Scheduler     5728 OAM_Scheduler -serve R  No        0
GUI_Server        5761 GUI_Server GUI_Serve R  No        0
GUI_AdminServer   5763 UI_AdminServer GUI_A R  No        0
GUI_JvmLauncher   5764 GUI_JvmLauncher      R  No        0
PM_FTAM           5765 PM_FTAM -server PM_F R  No        0
PM_Dc             5770 PM_Dc -server PM_Dc  R  No        0
OAM_BcServer      5910 OAM_BcServer -server R  No        0
DeviceMon         5923 DeviceMon FM_server  R  No        0
quazar:
```

The following is displayed for CMISE and 400G NEs only:

```
------------------------------------------------------------
linda:appstat

CURRENT RUN LEVEL IS: Running

DEMONS:

Demon Name       Pid   Process Name      Strt Persist  Respawns
                                          Opt

ccd               5738 ccd -f $CCP_DIR -e / R Yes        0
logdaemon         5740 SNC_LogDaemon        R Yes        0
orbixd            5743 orbixd -u -c $ROAMLO R Yes        0
stackHpov         5745 startksh OsiStack /t R Yes        0
ifr               5837 ifr -L > $ROAMLOG/IF R  No        0
DsaStack          5840 DsaStack /tmp/dsa.lo R  No        0
HA_Mgr            6404 HA_Mgr -server HA_Mg R  No        0
GUI_TrcServer     6441 GUI_TrcServer TRACE_ R  No        0
DSA_Prov          6447 DSA_Prov             R  No        0
OL_Manager        6449 OL_Manager -d $OL_DE R  No        0
LM_Logger         6502 LM_Logger -s $LML_SI R  No        0
LM_Browser        6507 LM_Browser -k /tmp/L R  No        0
PM_DbManager      6523 PM_DbManager -server R  No        0
PM_DbServer       6524 PM_DbServer -server  R  No        0
SB_Q3_400g01      6529 startksh run400gq3 - R  No        0
SB_Q3_400g02      6588 startksh run400gq3 - R  No        0
CM_Server         6641 CM_Server -l /tmp/CM R  No        0
NEH_Server        6655 NEH_Server -server N R  No        0
SDS_Server        6707 SDS_Server -l /tmp/S R  No        0
```

```
CS_SbOsi          7073 CS_SbOsi -s CS_SbOsi R  No       0
CS_Southbound     7091 CS_Southbound -s CS_ R  No       0
SB_TL1Mgr         7099 SB_TL1Mgr -server SB R  No       0
CF_NeAgent        7104 CF_NeAgent -server C R  No       0
CF_Network        7122 CF_Network -server C R  No       0
CF_DbServer       7146 CF_DbServer -server  R  No       0
CF_Val_PathSvr    7154 CF_Val_PathSvr -serv R  No       0
SNC_Mon           7156 SNC_Mon SNC_Mon FM_S R  No       0
FM_DbServer       7169 FM_DbServer FM_Db /t R  No       0
FM_Server         7187 FM_Server FM_Server  R  No       0
FM_Prov           7214 FM_Prov FM_Prov /tmp R  No       0
SB_Q3Gateway      7219 SB_Q3Gateway -f $SNC R  No       0
BR_bacres         7232 BR_bacres -server BR R  No       0
SM_Security       7252 SM_Security -lockfil R  No       0
GDB_Server        7267 GDB_Server GDB_Serve R  No       0
GDB_ServerFile    7268 GDB_ServerFile GDB_S R  No       0
GDB_ServerNtwk    7269 GDB_ServerNtwk GDB_S R  No       0
OBR_Main          7274 OBR_Main -server OBR R  No       0
OBR_Main3K        7337 OBR_Main3K -server O R  No       0
SWM_Gateway       7365 SWM_Gateway -server  R  No       0
TLA_MsgHandler    7758 TLA_MsgHandler -serv R  No       0
TLA_CmdHandler    7774 TLA_CmdHandler -serv R  No       0
CN_Northbound     7794 CN_Northbound -t5 -T R  No       0
OAM_Scheduler     7843 OAM_Scheduler -serve R  No       0
GUI_Server        7863 GUI_Server GUI_Serve R  No       0
GUI_AdminServer   7864 UI_AdminServer GUI_A R  No       0
GUI_JvmLauncher   7866 GUI_JvmLauncher      R  No       0
PM_FTAM           7867 PM_FTAM -server PM_F R  No       0
PM_Dc             7880 PM_Dc -server PM_Dc  R  No       0
OAM_BcServer      7911 OAM_BcServer -server R  No       0
q3nb_mon          7916 q3nb_mon -n 2 >> $RO R  No       0
DeviceMon         7917 DeviceMon FM_server  R  No       0
linda:
```

The WaveStar SNMS processes are as follows:

- *SNC:AF_rpServer*- LAN Printer Server
- *SNC:BR_bacres*- NE Backup and Restore Module
- *SNC:CF_NeAgent*- NE Configuration Module
- *SNC:CF_Network*- NE Configuration Module
- *SNC:CM_CommMgr*- Communications Manager
- *SNC:CN_Northbound*- Communications Northbound Module
- *SNC:EI_Security*- Security Management Module
- *SNC:FM_Alarms*- Fault Management Module
- *SNC:NW_model*- Network Topology Module

- *SNC:OA_LogBrowser*- Trace Log Module
- *SNC:Scheduler*- Process Scheduling Module
- SNC:*TLA_CmdHandler*- TL1 Commands Module
- *SNC:TLA_MsgHandler*- TL1 Messages Module

If the application is down, the following message is displayed:

```
CURRENT RUN LEVEL IS: Shutdown
```

There are three states for the application:

- Shutdown—The WaveStar SNMS application is not up.
- Administrative—The WaveStar SNMS application is in transition (coming up or going down).
- Running—The WaveStar SNMS application is up.

The `Respawns` field should be 0 for every process. If any of these fields has a number larger than 0, then that process terminated and automatically restarted for some reason.

The `Pid` field should have a number greater than 0 for every process. If any of these fields has a 0, then that process terminated and is no longer running. The application must be restarted.

NOTE:
If you execute the **appstat** command, everything may look normal but the process may not be bound to Orbix. The **psit** command shows you if the appstat is true. Use the following command to see if the process is running and bound to Orbix:

psit | more

UP

The **up** command starts the WaveStar SNMS application.

At the UNIX prompt, enter the command: **up**

You see the following messages:

```
Setting up the SNC environments at SNCROOT = /snc...

Your SNC environments are:

        RAPIDROOT=/tools/bwx5.1

        SNCROOT  =/snc

        ROAMCNFG =/snc/bwx5.1

        APPTAG   =SNC

...

ovstart: 0: Thu Apr  1 10:06:56 EST 1999Do you want to clear old
logs before SNC startup, (y/n)? y

The old log will be cleared.

Current SNC Version: E8.0-83-dtest-03/08/99

...Creating R8.0 Database...

...Database "snc_db" previously created...

CF Tables and stored procedures 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 ...


Process id=12600.  Started.

exec touch /tmp/stackHpov.lock
```

```
Process id=12601.  Started.

Process id=12601.  Completed.

Process id=13207.  Started.

exec SNC_sequence /tmp/OAM_RpServer.lock

Process id=13208.  Started.

Process id=13208.  Completed.

NEW RUN LEVEL:  Running
```

DN

The **dn** command stops the WaveStar SNMS application. The usage of this command is as follows:

dn

At the UNIX prompt, enter the command: **dn**

You see the following messages:

```
CURRENT RUN LEVEL:  Running

Killing Demon Processes ...

Process <ifr> killed.
Process <GUI_TrcServer> killed.
Process <LM_Logger> killed.
Process <LM_Browser> killed.
Process <NEH_Server> killed.
Process <SB_Q3_400g> killed.
Process <CM_Server> killed.
Process <SDS_Server> killed.
Process <CS_SbOsi> killed.
Process <CS_Southbound> killed...
...
Killing Persistent Demons ...

Process <ccd> killed.
Process <logdaemon> forcibly killed.
Process <orbixd> killed.
Process <stackHpov> killed.

NEW RUN LEVEL:  Shutdown
```

CMTOOL

The cmtool utility allows you to do a couple of things. First, it allows you to check the communication status of your network elements.

At the UNIX prompt, enter the command: **cmtool -a**

A message similar to the following is displayed when no CMISE or 400G NEs are present.

```
quazar:cmtool -a
-----------------------------------------------------------------
NE TID                      NE  Comm      Channel  Link   Login  VC
VC   VC
                           Act Type      Id       Status Status Type
Port Info
-----------------------------------------------------------------
  1 DSFDS                   Y   TCPIP/RT  88       Down   Off
  2 EWRWER                  Y   TCPIP/RT  88       Down   Off
  3 SIM-AM-100              Y   IP/GNE    88        Up    On
  4 KEYSTONE                Y   TL1/RT    136       Up    On
                                          137       Up    On
  5 STEAMBOAT               Y   TL1/GNE   136       Up    On
                                          137       Up    On
  6 TELLURIDE               Y   TL1/RT    136       Up    On
                                          137       Up    On
  7 VAIL                    Y   TL1/RT    136       Up    On
                                          137       Up    On
  8 SNC-NCC-B               Y   TL1/TCP   1         Up    On
  9 SNMS-BWM-A              Y   TL1/OSI   58        Up    On
 10 SNMS-BWM-B              Y   TL1/OSI   124       Up    On
 11 SNMS-NCC-C              Y   TL1/TCP   4         Up    On
 12 SNMS-OC192-A            Y   TL1/TCP   10       Down   Off
 13 SNMS-OC192-B            Y   TL1/TCP   7        Down   Off
 14 SNMS-OC48-A             Y   TL1/OSI   73        Up    On
 15 SNMS-OC48-B             Y   TL1/TCP   46       Down   Off
 16 SNMS-OC48-C             Y   TL1/TCP   19       Down   Off
 17 SNMS-STM64-A            Y   TL1/OSI   109       Up    On
 18 SNMS-STM64-B            Y   TL1/OSI   106       Up    On
 19 SNMS-STM64-D            Y   TL1/OSI   169       Up    On
 20 SVT9                    Y   TL1/OSI   103      Down   Off
quazar:
```

A message similar to the following is displayed when only CMISE and 400G NEs are present:

```
iliad:cmtool -a
------------------------------------------------------------------------
NE TID                       NE  Comm      Channel  Link   Login  VC
VC   VC
                            Act Type      Id       Status Status Type
Port Info
------------------------------------------------------------------------
  1 FORCE                    Y   CMISE/TCP 4          Up    On
  2 JEDI                     Y   CMISE/TCP 1         Down   Off
  3 YUNG1                    Y   CMISE/TCP 10        Down   Off
iliad:
```

A message similar to the following is displayed for AllMetro NEs only.

```
linda:cmtool -a
------------------------------------------------------------------------
NE TID                       NE  Comm      Channel  Link   Login  VC
VC   VC
                            Act Type      Id       Status Status Type
Port Info
------------------------------------------------------------------------
  1 CAROLINA                 Y   IP/GNE    34         Up    On
  2 CURLY                    Y   IP/GNE    7          Up    On
  3 LARRY                    Y   IP/GNE    31        Down   Off
  4 DONALD                   Y   TCPIP/RT  13        Down   Off
  5 HARPO                    Y   TCPIP/RT  13         Up    On
  6 ZEPPO                    Y   IP/GNE    13         Up    On
  7 GROUCHO                  Y   TCPIP/RT  10        Down   Off
  8 MARYANN                  Y   IP/GNE    10         Up    On
  9 MOE                      Y   TCPIP/RT  10        Down   Off
 10 GILLIGAN                 Y   TCPIP/RT  4          Up    On
 11 SKIPPER                  Y   IP/GNE    4          Up    On
linda:
```

As you can see from the preceding displays, you can see information such as the network element TID, the communications type, channel it is communicating on, link status, and port information.

The cmtool also allows you to activate/deactivate your network elements.

To deactivate a network element, type the following:

cmtool -n <TID> -o d

```
siren:cmtool -n 400G-Test -o d
[29581: New Connection
(135.17.13.171,IT_daemon,*,snc,pid=11009,optimised) ]
[29581: New IIOP Connection (135.17.13.171:1596) ]
```

To activate a network element type the following:

cmtool -n <TID> -o a

```
siren:cmtool -h siren -n 400G-Test -o a
[29645: New Connection
(135.17.13.171,IT_daemon,*,snc,pid=11009,optimised) ]
[29645: New IIOP Connection (135.17.13.171:1596) ]
```

To see the complete list of cmtool features that can be utilized:

eel: **cmtool -l**

1. All GNE LinkStatus
2 One NE LinkStatus
3. One GNE LinkStatus
4. NE Activate/Deactivate
5. Resync config file
6. Switch primary/backup GNEs
7. Change NE password

Please select functional index.

cmtool usages:

cmtool [-a] display all Ne status
cmtool [-h hostname]
cmtool [-s] option for switch primary/backup GNE with -p -b options
cmtool [-p primary GNE tid] [-b backup GNE tid]
cmtool [-l] list all tool features for select
cmtool [-f functional_index] [-n|g netid [-o op]]

cmtool [-n Netid] display Ne status
cmtool [-g Gnetid] display Gne status
cmtool [-c netid] change ne password
cmtool [-o [a|d]] option of activate/deactivate
cmtool [-?] for help

GUI_PROBE

This command shows the present GUIs, who is logged in on them, and what IP they are from.

Command Syntax: **GUI_Probe <hostname> :GUI_Server**

Brings you into the GS prompt

```
[25616: New Connection
(135.17.13.171,IT_daemon,*,snc,pid=6436,optimised) ]

[25616: New IIOP Connection (135.17.13.171:2000) ]

:GUI_Server is online! Type ? or help for options
```

GS> **?** Gives you the HELP menu

COMMAND	KEY	DESCRIPTION
help	h/?	Show these options
clients	c	Show clients connected to GUIServer
queues	q	Show info about all queues
exit	quit	Exit program

GS> **clients** Shows you Which GUIs are running

USER	From Host	Login Time	Sockid
snc	135.17.95.127 rocky	Tue 12:57:39 PM	22

USER	From Host	Login Time	Sockid
snc	135.17.95.20 rocky	Tue 10:47:23 AM	31
snc	135.17.95.117 rocky	Tue 03:32:22 PM	32
snc	135.17.13.18 source.ho.lucent.com	Tue 01:32:18 PM	34

GS> **queues**

QUEUE	LENGTH
Main I/P Queue	0
Trace Queue	0
EventQueue#0	0
EventQueue#1	0
EventQueue#2	0
EventQueue#3	0
EventQueue#4	0
ClientSockId22	0
ClientSockId31	0
ClientSockId32	0
ClientSockId34	0

GS>**exit**

SB400GOAM

This command shows the association status of the 400G NEs.

Use the snc login and execute **sb400goam**. Enter the desired command at the prompt ---->.

Command	Usage
assocstatus	Shows the status of all 400G's
assocstatus (NE name)	Shows the status of one NE
trace	Set trace level
quit	Exits the program
help	Shows all commands

Command	Usage
listtxn	Lists active transactions
shutdown	Shutdown
logcontrol	Set logcontrol level
assocnt	Report number of active, confirmed associations
assocabort	Association abort
assocreq	Association setup
watchdog	Activate watchdog
statistics	Display statistics
overload	Change state of overload controls
assocthread	Start association request on threads
assocandabort	Association request followed by abort

The following is sample output for the assocstatus command:

```
---->assocstaus
assocstatus
connected to server 123.45.678.90 at port 12345
sbq3adm received assocstatus   !
Association <ET-1.0:0> is CONFIRMED ASSOCIATION, Last Message:11/1/99
16:53:15
Association <ET-2.0:0> is CONFIRMED ASSOCIATION, Last Message:11/1/99
16:56:38
Association <REPEATER.0:0> is CONFIRMED ASSOCIATION, Last Message:11/1/99
16:48:19
```

Investigating Informix

Overview

The following section verifies the Informix application. The WaveStar SNMS Release 3.1 software uses Informix Dynamic Server Release 7.31 to maintain a relational database about the SONET network.

All of the commands below can be executed while logged in as the user `informix` or `snc`.

Utilities

Informix Software Version

The Informix version and serial number loaded on the WaveStar SNMS host can be retrieved.

At a UNIX prompt, enter: **dbaccess -v**

You should see messages similar to the following:

```
INFORMIX Version 7.31.uc2xc
Software Serial Number AAA#C533980
```

Each system has a unique software serial number for its location.

The Informix version, however, should be as stated above.

Database Locks

The locks that the WaveStar SNMS application are holding on the database can be retrieved.

At a UNIX prompt, enter: **locks**

You see messages similar to the following:

```
    7       21592      CM_CommManager
```

The first column is the number of database locks being held. The next two columns are the PID and process name, respectively, which are holding the locks.

The above line is a normal occurrence. It is not unusual for the message shown above to be displayed. If the *NW_model* process appears and is holding a large number of locks (more than 20), then the system may be experiencing some congestion. If the situation persists, the WaveStar SNMS application may need to be restarted.

Database Space Usage

The database space usage can be retrieved.

At a UNIX prompt, enter: **onstat -d**

Messages similar to the following are displayed:

```
INFORMIX Version 7.31.uc2xc -- Up 9 days 03:37:42 -- 39952 Kbytes

Dbspaces
address  number   flags    fchunk   nchunks  flags    owner    name
c177f108 1       1       1       1       N       informix rootdbs
c177fa60 2       2001    2       1       N T     informix temp_dbs
c177fad0 3       1       3       1       N       informix snc_dbs
c177fb40 4       1       4       1       N       informix cf1_dbs
c177fbb0 5       1       5       1       N       informix fm1_dbs
c177fc20 6       1       6       1       N       informix index_dbs
c177fc90 7       1       7       1       N       informix cf2_dbs
c177fd00 8       1       8       1       N       informix eo_dbs
c177fd70 9       1       9       1       N       informix fm2_dbs
 9 active, 2047 maximum

Chunks
address  chk/dbs offset   size     free     bpages   flags pathname
c177f178 1   1   0        250000   178929            PO-   /dev/
informix/dbsp1_1G
c177f3a0 2   2   250000   100000   99947             PO-   /dev/
informix/dbsp3_1G
c177f478 3   3   250000   250000   249499            PO-   /dev/
informix/dbsp1_1G
c177f550 4   4   0        250000   243627            PO-   /dev/
informix/dbsp2_1G
c177f628 5   5   250000   250000   249907            PO-   /dev/
informix/dbsp2_1G
c177f700 6   6   0        250000   235976            PO-   /dev/
informix/dbsp3_1G
c177f7d8 7   7   0        250000   245259            PO-   /dev/
informix/dbsp4_1G
c177f8b0 8   8   250000   250000   235323            PO-   /dev/
informix/dbsp4_1G
c177f988 9   9   0        1000000  979467            PO-   /dev/
informix/dbsp5_2G
 9 active, 2047 maximum
```

Verify that the free column for the dbspace partitions is not approaching 0. If it is, it indicates that the database is running out of free space.

Error Messages

The text and possible solutions for error codes can be displayed.

At a UNIX prompt, enter: **finderr xxx**

Messages similar to the following are displayed:

```
INFORMIX Error Tool
siren:finderr 203
-203    An illegal integer has been found in the statement.

Where an integer value is expected, an unacceptable numeric constant
appears. Inspect the statement and look for numbers that should be
integers but that contain a decimal point or the letter e or that
are larger than 2,147,483,647 ((2 to the 31st power) - 1).
```

Investigating Data Communications Problems

Overview

The following section provides information on checking the communications from the WaveStar SNMS host's point of view. The utilities can be used independently of the WaveStar SNMS application and should be used to isolate potential communication problems external to the WaveStar SNMS application.

X.25 utilities

Checking Level 2 Status of X.25 Network Connections

To display a status of each X.25 port on the SNMS host, at the UNIX prompt, enter the command: **x25_check *[Mux #]***

where ***[Mux #]*** is an optional parameter (0 to 3).

The default = 0 (MUX Card 0)

You see a message similar to the following:

```
                X.25 Driver Release 2.2 detected
                ***X25 PROCESSES STATUS***
[/etc/zmasterd] IS UP
[zmlog] IS UP
[zmon] IS UP
[znode] IS UP
                ***X25 PORTS STATUS***
X25 PORT [zx25m0p0] IS UP
X25 PORT [zx25m0p1] IS UP
X25 PORT [zx25m0p2] IS DOWN
X25 PORT [zx25m0p3] IS DOWN
X25 PORT [zx25m0p4] IS DOWN
X25 PORT [zx25m0p5] IS UP
X25 PORT [zx25m0p6] IS DOWN
X25 PORT [zx25m0p7] IS DOWN
                ***X25 STATUS SUMMARY***
X25 SYSTEM IS UP AND READY FOR TRAFFIC ON PORTS THAT ARE UP.
```

The first four lines indicate the low-level X.25 processes are running. Verify that these all report as status of UP.

NOTE:
If any of the X.25 processes report a status of DOWN, the X.25 connection needs to be restarted.

The second section of the message, titled X.25 Port Status, displays the current Level 2 synchronization status for each link.

- Up—indicates the SNMS computer has synchronized with the PSN connected to this port.
- Down—indicates that Level 2 synchronization cannot be achieved on this port.

Check the following:

1. Is a Synchronous Modem Eliminator required?
2. Is the timing source set correctly in the X.25 answer file?

   For HP-UX Release 10.0, this file is found under */opt/acc/cfg/x25_config.answ*
3. Is the Data Rate set properly?
4. Have the Level 3 DTE/DCE network types been set properly in the X.25 *answer* file and specific X.25 *config* file?
5. Does the PSN support a V.35 interface?
6. Is the V.35 cable good?
7. Is the V.35 cable connected to the correct port?

   The following sections only apply to ports that have reported as UP to the **X25_check** command. Examples shown in the following sections pertain to various details about Connector J4 on MUX Panel 0 (m0p4)**.**

Checking X.25 Level 3 Communication Status

Varying levels of detail can be displayed about a specific X.25 port by using the **x25stat** command.

The format for the command is as follows:

x25stat -d *device_file* [*options*]

where *device_file* is of the form: **/dev/zx25MMPP,** for example: **/dev/zx25m0p0**

The last four characters indicate the MUX Card (*MM*) and Port number (*PP*) to report on.

In the example above, MUX Card 0, Port 0 (Connector J0) has been specified.

The device files for all possible ports (if equipped) are described in the following table:

	MUX Card 0	MUX Card 1	MUX Card 2	MUX Card 3
Port 0:	/dev/zx25mop0	/dev/zx25m1p0	/dev/zx25m2p0	/dev/zx25m3p0
Port 1:	/dev/zx25m0p1	/dev/zx25m1p1	/dev/zx25m2p1	/dev/zx25m3p1
Port 2:	/dev/zx25m0p2	/dev/zx25m1p2	/dev/zx25m2p2	/dev/zx25m3p2
Port 3	/dev/zx25m0p3	/dev/zx25m1p3	/dev/zx25m2p3	/dev/zx25m3p3
Port 4:	/dev/zx25m0p4	/dev/zx25m1p4	/dev/zx25m2p4	/dev/zx25m3p4
Port 5:	/dev/zx25m0p5	/dev/zx25m1p5	/dev/zx25m2p5	/dev/zx25m3p5
Port 6:	/dev/zx25m0p6	/dev/zx25m1p6	/dev/zx25m2p6	/dev/zx25m3p6
Port 7:	/dev/zx25m0p7	/dev/zx25m1p7	/dev/zx25m2p7	/dev/zx25m3p7

X.25 Virtual Channel Status

A status of the virtual channels on a specific X.25 port can be obtained.

At a UNIX prompt enter: **x25stat -d /dev/zx25m0p4**

You see a message similar to:

```
LCI   VC Type   Local Address    Foreign Address   VC Open Time  VC
State
   1  PVC          ---            ---          73.58.14     connected
   2  PVC          ---            ---          73.58.14     connected
   3  PVC      408746500400        ---          04.36.42     connected
   4  PVC          ---            ---          73.58.14     connected
   5  PVC          ---            ---          73.58.14     connected
   6  PVC          ---            ---          73.58.14     connected
   7  PVC          ---            ---          73.58.14     connected
   8  PVC      408746500400        ---          02.45.01     connected
   9  PVC          ---            ---          73.58.13     connected
  10  PVC          ---            ---          73.58.13     connected
  20  SVC-2way  408746500400     9089492000   04.36.46     connected
```

All channels of VC type PVC appear whether they are in use or not. If the `Local Address` field has dashes, the PVC is defined but not actively in use. If the `Local Address` field has an X.121 Address displayed (this had been previously defined in the X.25 *config* file for this

port), then the PVC has been restarted and communication *may* be established.

SVC channels that are currently in use appear after the last PVC channel. If no SVC channels are in use, then none are reported. However, they still are defined.

The above display shows that PVCs 3 and 8 have been reset and *may* be in use. SVC 20 is active and connected to X.121 address 9089492000.

NOTE:
If the x25stat command is run on a port that is not connected to a PSN or is not configured properly, you will see the following message:

```
x25stat WARNING:  Level 2 is DOWN
```

Check the following:

1. Were the right MUX and Port queried?
2. Does the PSN support a V.35 interface?
3. Is the V.35 cable connected to the right port on the PSN?
4. Is the V.35 cable connected to the right port on the SNMS computer?
5. Is the V.35 cable good?

X.25 Virtual Channel Non-Data Packet Statistics

A status of the virtual channel non-data packet statistics on a specific X.25 port can be obtained.

At a UNIX prompt enter: **x25stat -d /dev/zx25m0p4 -p**

You see a message similar to the following:

```
LCI    VC State          VC User       Interrupt Msgs    Inb. Resets
   1   connected      No current user              0              1
   2   connected      No current user              0              1
   3   connected      Level-3 Prog. Access         0              4
   4   connected      No current user              0              1
   5   connected      No current user              0              1
   6   connected      No current user              0              1
   7   connected      No current user              0              1
   8   connected      No current user              0              3
```

```
 9   connected      No current user              0            1
10   connected      No current user              0            1
20   connected      Level-3 Prog. Access         0            0
```

All channels appear as in the previous section except that the VC type is not specified. The `VC User` is the protocol that is active on this virtual channel.

In the display above, VCs 3 and 20 have an active Level-3 (packet level) Programmatic Access user on them. This indicates that a machine is sending and receiving X.25 data over these channels. The next section will give you a clearer picture of this.

NOTE:
VC 8, however, shows no current user. Even though the display in the previous section showed PVC 8 was connected, the fact is, the VC was successfully reset but no further data was exchanged on the channel.

X.25 Virtual Channel Data Counters

A status of the virtual channel data counters on a specific X.25 port can be obtained.

At a UNIX prompt enter: **x25stat -d /dev/zx25m0p4 -t**

You see a message similar to:

```
LCI   VC State        Imsgs   Omsgs    Ipackets Opackets  Ioctets
Ooctets
  1  connected          0       0          0        0        0        0
  2  connected          0       0          0        0        0        0
  3  connected        154      50       1912      270    18564     1898
  4  connected          0       0          0        0        0        0
  5  connected          0       0          0        0        0        0
  6  connected          0       0          0        0        0        0
  7  connected          0       0          0        0        0        0
  8  connected          0       1          0        2        0       32
  9  connected          0       0          0        0        0        0
 10  connected          0       0          0        0        0        0
 20  connected        137      87       1709      643    20858     3360
```

All channels appear as in the previous sections and the VC type is not specified.

In the sample output above, `Imsgs`, `Ipackets`, and `Ioctets` refer to messages *received* over the X.25.

`Omsgs`, `Opackets`, and `Ooctets` refer to messages *transmitted* over the X.25.

In the display above, VCs 3 and 20 appear to have traffic flowing in **both** directions. Typically, there are more messages received than transmitted. As the SNMS system sends single commands to the NEs, the responses are sometimes long and received in several pieces (packets).

NOTE:
VC 8, however, appears to be having a problem. Messages have been transmitted, but none received. The first display in the previous section showed VC 8 was connected. The next sections provide a more accurate picture. There is no current user because the VC is not transmitting **and** receiving data in both directions.

Check the following:

- If the VC is a PVC:
  1. Has the PVC been mapped correctly through the PSN?
  2. Is SNMS using the right PVC?
- If the VC is an SVC:

  Is the Called X.121 Address correct?
- Other items to be checked (if attempting *pvctest* or *svctest*):
  1. Is the TID of the NE correct?
  2. Is the NE connected to the PSN?

X.25 Log Files

The X.25 software on the HP computer maintains a log of any unusual events that may have occurred during the day. These files are located in the */var/opt/acc/log* directory.

There is one log file for each day of the week. The files are named as follows:

mon.tlog *tue.tlog* *wed.tlog*

thu.tlog *fri.tlog* *sat.tlog*

sun.tlog

NOTE:
Be careful to check the date and time stamp of each file. If today is Friday, but the date and time stamp for the *fri.tlog* file is old, then that file is from a previous Friday and no messages have been logged to the file today. This is very common and indicates there was no unusual activity on the X.25.

Every X.25 message that appears on the console terminal is also echoed to the appropriate log file.

Here are two of the more common messages that may be found in a log file:

Sample #1:

```
----------------------------------------------------------------
Wed Mar 27 14:32:19 1996: zmlog: message logging resumed
----------------------------------------------------------------
14:32:19 x25cn 00811 1 Link ZLU 5 DOWN: Link disc. on loss of carrier
14:32:35 x25cn 00812   Link ZLU 5 Link established
14:32:35 x25cn 00820   Link ZLU 5 Link restarted
```

The ZCOM Logical Unit (ZLU) Link number is actually the Physical Port Number +1. On the MUX Panel, the ports are labeled J0 through J7 for ports 0 to 7. The ZLU links are numbered 1 to 8, respectively.

Therefore, the above message indicates that Port 4 lost carrier at 14:32:19 on Wed March 27. The link then came back at 14:32:35 and successfully established and restarted Level 2 synchronization.

Sample #2:

```
----------------------------------------------------------------
Sat Mar 23 11:55:55 1996: zmlog: message logging resumed
----------------------------------------------------------------
11:54:04 zcom  00000   System bootup
11:55:55 zmon  00002   Resource manager (Rev 1.31) for ZCOM 4.3.0.0
11:55:55 zmon  00005   Stopping system ...
11:55:55 zmon  00075   ZCOM system stopped
11:55:55 zmon  00002   Resource manager (Rev 1.31) for ZCOM 4.3.0.0
11:55:55 zmon  00003   Cold start with: /usr/zcom/cfg/x25.tmem
11:55:56 zmon  00100   Card 0 starting up ...
11:56:04 zmon  00110   Card 0 startup successful, card READY
11:56:04 zmon  00020   Cold start completed, ZCOM system ready
```

```
11:56:04 zmon  00004   Waiting for ZMON requests ...
11:56:04 zcom  00165   Node 123 comes UP
11:56:05 x25cn 00000   X.25 Control Rev 12.2.11p2 - 940303
11:56:05 x25cn 00000   Logical terminal area X25CNT: 88 Bytes
11:56:05 x25cn 00139   Trace logging disabled
11:56:05 x25cn 00000   COLD start : HGrp# [1-10] : HGrp size [1-20]
11:56:05 x25cn 00816   Link ZLU 1 X.25 shutdown complete
11:56:06 x25cn 00811 1 Link ZLU 1 DOWN: Link disc. on loss of CTS
11:56:06 x25cn 00816   Link ZLU 2 X.25 shutdown complete
11:56:06 x25cn 00816   Link ZLU 3 X.25 shutdown complete
11:56:06 x25cn 00811 1 Link ZLU 2 DOWN: Link disc. on loss of CTS
11:56:06 x25cn 00811 1 Link ZLU 3 DOWN: Link disc. on loss of CTS
11:56:06 x25cn 00816   Link ZLU 4 X.25 shutdown complete
11:56:06 x25cn 00816   Link ZLU 5 X.25 shutdown complete
11:56:07 x25cn 00816   Link ZLU 6 X.25 shutdown complete
11:56:07 x25cn 00811 1 Link ZLU 6 DOWN: Link disc. on loss of CTS
11:56:07 x25cn 00816   Link ZLU 7 X.25 shutdown complete
11:56:07 x25cn 00811 1 Link ZLU 7 DOWN: Link disc. on loss of CTS
11:56:07 x25cn 00816   Link ZLU 8 X.25 shutdown complete
11:56:08 x25cn 00812   Link ZLU 8 Link established
11:56:08 x25cn 00811 1 Link ZLU 5 DOWN: Link NOT established on
ENABLE
11:56:10 x25cn 00812   Link ZLU 5 Link established
11:56:10 x25cn 00820   Link ZLU 5 Link restarted
11:56:12 x25cn 00812   Link ZLU 4 Link established
11:56:12 x25cn 00813   Link ZLU 8 reset: Reset due to received SABM
11:56:12 x25cn 00820   Link ZLU 4 Link restarted
11:56:15 x25cn 00820   Link ZLU 8 Link restarted
```

The preceding message indicates that the X.25 processes were restarted at 11:54:04 and finished re-establishment of communications at 11:56:15. The software download to the MUX Card was successful. If there was a problem with the MUX Card, it would have been reported here.

The Link ZLU lines at the bottom of the display report which links re-established Level 2 synchronization.

You can retrieve the Level 2 status by using the **X25_check** command at any time.

Resetting an X.25 MUX Port

A specific X.25 port may be reset without disrupting other data communication links.

To restart a specific link, perform the following:

1. Log in as `root`, or `su` (super-user).

2. At the # prompt, enter the command: **/usr/sbin *device_file***

   where ***device_file*** is of the form: **/dev/zx25*MMPP*,** for example: **X25stop -d /dev/zx25m0p4**

   This shuts down MUX Card 0, Port 4. You may specify any MUX/Port equipped in the computer.

   There will be no output to this command.

3. At the # prompt, enter the command: **/usr/sbin/x25init -c /etc/x25/x25_config.*MP***
4. where ***MP*** is the MUX Card and Port Number, for example: **x25_config.04** identifies MUX Card 0, Port 4.

   This re-initializes MUX Card 0, Port 4. You may specify any MUX/Port equipped in the computer.

   If the re-initialization was successful, there will be no output to this command.

NOTE:
If there was a failure or inconsistency of some kind, you will receive an error message.

Check the following:

- Refer to the HP-UX NACC X.25 section and verify that the relationships between the X.25 *answer* file and this X.25 *config* file are correct.
- It is possible that restarting a link may not work even though everything appears to be set up properly.

  In that case, it is best to restart the X.25 processes again (See the next section, **Restarting X.25 Processes**).

Restarting X.25 Processes

The X.25 communication server can be reset to clear potential communication problems. Restarting the X.25 will drop all connections to the PSN and re-establish them.

To restart X.25, perform the following:

1. Log in as `root` or "`su`" to root.
2. At the # prompt, enter the command: **/etc/x25/x25_config.rc**

Messages similar to the following are displayed:

```
# /etc/x25/x25_config.rc
Initializing X.25 driver REL 2.2

The axin_server process [PID=8377] owned by [root] is being brought
down by SIGKILL ...

The axin_server process [PID=8377] is down.

The zmlog process [PID=8393] owned by [root] is being brought down
by SIGKILL ...

The zmlog process [PID=8393] is down.

The zmon process  [PID=8424] owned by [root] is being brought down
by SIGKILL . . .

The zmon process  [PID=8424] is down.

The zmon process  [PID=15060] owned by [root] is being brought down
by SIGKILL . . .

The zmon process  [PID=15060] is down.

The zmaster process  [PID=8423] owned by [root] is being brought down
by SIGKILL ..

The zmaster process  [PID=8423] is down.

ttgen: END$  0 Disasters, 0 Errors, 0 Warnings
       * Initializing: /etc/x25/x25_config.00
       * Initializing: /etc/x25/x25_config.01
       * Initializing: /etc/x25/x25_config.02
       * Initializing: /etc/x25/x25_config.03
       * Initializing: /etc/x25/x25_config.04
       * Initializing: /etc/x25/x25_config.05
       * Initializing: /etc/x25/x25_config.06
       * Initializing: /etc/x25/x25_config.07
       * Initializing: /etc/x25/x25_config.10
       * Initializing: /etc/x25/x25_config.11
       * Initializing: /etc/x25/x25_config.12
       * Initializing: /etc/x25/x25_config.13
       * Initializing: /etc/x25/x25_config.14
       * Initializing: /etc/x25/x25_config.15
       * Initializing: /etc/x25/x25_config.16
       * Initializing: /etc/x25/x25_config.17
The x25server output => /usr/adm/x25server.log
```

Deactivating and Reactivating System Links to NEs

If there is loss of communications to all SNMS GNEs, and previous troubleshooting measures described in the **Investigating Data Communication Problems** section have failed to recover communications, the problem may be a “hang” in the system X.25 drivers. This can occur if a PVC link to an NE is lost. The following procedure can be used to remove the X.25 “hang.”

NOTE:
You must identify the NE with the failed connection before using this procedure.

1. Log in as `snc`.
2. Deactivate system links using the following command:
   cmtool -n <TID> -o d
3. Repeat this step for any GNEs that have a problem.
4. Reactivate system links using the command:
   cmtool -n <TID> -o a

   Repeat this step for all GNEs *except* for the failed one.

Testing Communication to Network Elements

Three utilities have been developed that enable you to test communication to NEs via a PVC or SVC connection. These utilities are run independently of the WaveStar SNMS application and are used to verify X.25 PSN connectivity before an NE is added to the SNMS database, or to verify communication to an existing network element.

GNEVCINFO

The **gneVcinfo** utility provides PSN information for GNEs. This utility should be used in conjunction with **pvctest** and **svctest**.

The usage for the **gneVcinfo** command is:

1. At the UNIX prompt, enter the command: **gneVcinfo**

   You will see output similar to the following:

```
squash:gneVcinfo

squash:
```

TargetId	Total VCs	CR1 VCType	Auto VCType	CR2 VCType	X121Address	Psn
10G25-XL	1	SVC 15				Osi
WBM2-R20	1	15				Osi
WBM3-R20	1	15				Osi
10G25-MERCY	1	SVC15				Osi
LCT-FT	1	SVC			7329492000	m0p0
400G-OLS	1	PVC				Osi

PVCTEST

The **pvctest** utility exercises communication via a specified PVC to a network element.

Once an NE has been entered into the WaveStar SNMS database, the application will automatically try to gain communication to that element. If you wish to run a **pvctest** to a network element which has already been databased, you must first deactivate the network element using the **cmtool** command. (See the cmtool command section for a description of the deactivate options.)

The usage for the **pvctest** command is:

1. At the UNIX prompt, enter the command: **pvctest**

   You will see the following messages and prompt:

   ```
   pvctest parameters can be entered from the command
   line:
       pvctest <TID> <port> <pvc> <login> <password>
   Ex: pvctest NODE1 m0p0 1 XXX01 DDM-2000

   TID:
   ```

2. Enter the NE TID.

   For example: **XXX-123456789012345B**

   You see the following prompt:

   ```
   Port (e.g. m0p2):
   ```

3. Enter the X.25 Port.

   For example: **m0p4**

   You see the following prompt:

   ```
   PVC Number:
   ```

4. Enter the X.25 PVC number.

   For example: **3**

   You see the following prompt:

   ```
   login:
   ```

5. Enter a privileged login.

   For example: **LUC01**

   You see the following prompt:

   ```
   passwd:
   ```

6. Enter the password for the privileged login.

   You see the following messages and prompt:

   ```
   The string "[P]" will indicate the end of a packet.
   NE Type 1=DDM, 2=FT, 3=FLM:
   ```

7. Select the appropriate NE Type.

   You see the following menu:

```
1) ACT-USER  2) CANC-USER  3) RTRV-EQPT  4) RTRV-HDR  5)
Enter CMD  99) Exit
Pick a command:
```

8. Select Menu Option 1 (ACT-USER).

   You will see the line appear:

   ```
   ACT-USER:XXX-123456789012345B:XXX01:700::******;
   ```

   If the command was successful, you see a response similar to:

```
   XXX-123456789012345B 96-02-26 14:08:28
M  700 COMPLD
   "XXX01:02-26 14-04-50,0"
  /*  LUCENT TECHNOLOGIES FT-2000 OC-48 Lightwave
      System
       Release 6.0.2-ADR
       User Privilege Level: GENERAL
                LUCENT TECHNOLOGIES - PROPRIETARY
       THIS SOFTWARE CONTAINS INFORMATION OF AT&T
       AND IS NOT TO BE DISCLOSED OR USED EXCEPT
       IN ACCORDANCE WITH APPLICABLE AGREEMENTS.

NOTICE: THIS IS A PRIVATE COMPUTER SYSTEM.
USE OF THIS SOFTWARE IS GOVERNED
SOLELY AS EXPRESSLY AUTHORIZED IN THE
RELEVANT AGREEMENT BETWEEN LUCENT TECHOLOGIES AND
CUSTOMER.
UNAUTHORIZED ACCESS OR USE MAY LEAD TO
PROSECUTION.
```

```
   */
;[P]
```

If a response similar to the one above is received, then the PVC channel has been successfully tested to this NE. Proceed to Step 9.

NOTE:
If you do not receive a response from the NE, press Ctrl **C** or the Delete key to break out of the program.

Check the following:

- Is the NE powered up and operational?
- Is the NE connected to the X.25 network?
- Is the TID of the NE set properly?
- Are the channel maps in the local PSN (on the WaveStar SNMS side) set correctly?
- Are the channel maps in the remote PSN (on the NE side) set correctly?

9. Select Menu Option 2 (CANC-USER).

   You see the line appear:

   ```
   CANC-USER:XXX-123456789012345B:XXX01:701;
   ```

   If the command was successful, you see the following response displayed:

   ```
   IP 701
   <[P]

     XXX-123456789012345B 96-02-26 14:08:34
   M  701 COMPLD
   ;[P]
   ```

10. Select Menu Option 99 (Exit).

SVCTEST

The **svctest** utility exercises communication via a specified SVC address to an NE.

The usage for the **svctest** command is:

1. At the UNIX prompt, enter the command: **svctest**

You see the following messages and prompt:

```
svctest parameters can be entered from the command
line:
    svctest <TID> <port> <X.121 address> <login>
     <password>
Ex: svctest NODE1 m0p0 9085551212 XXX01 DDM-2000

TID:
```

2. Enter the NE TID.

   For example: **XXX-123456789012345B**

   You see the following prompt:

   ```
   Port (e.g. m0p2):
   ```

3. Enter the X.25 Port.

   For example: **m0p4**

   You see the following prompt:

   ```
   Address::
   ```

4. Enter the X.25 X.121 Address for the NE.

   For example: **9089492000 30 1**

NOTE:
Time-out and sub-address parameters should be added to the end of the Calling Address. These only work on the command line. The default value for time-out is 30 and for sub-address is 1. Even though SNMS will work with one VC, software management will not. It must have the second channel.

You see the following prompt:

```
login:
```

5. Enter a privileged login.

   For example: **LUC01**

   You see the following prompt:

   ```
   passwd:
   ```

6. Enter the password for the privileged login.

   You see the following messages and prompt:

```
The string "[nnn]" will indicate the end of a message
segment.
"nnn" indicates the number of bytes in the message segment.
NE Type 1=DDM, 2=FT, 3=FLM:
```

If you see the above menu, it means that the SVC Call Request was processed successfully by the PSN.

NOTE:
On occasion, you may receive an error message indicating the SVC call was not successful, such as “connection refused.” This would imply that there is a problem in the PSN trying to route the call.

Check the following:

- Do the PVC and SVC definitions on the PSN match the PVC and SVC definitions on the host?
- Is the SVC Address translation in the PSN mapped correctly?

7. Select Menu Option 1 (ACT-USER).

   The following line is displayed:

   ```
   ACT-USER:XXX-123456789012345B:XXX:700::******;
   ```

   If the command was successful, you see a response similar to:

   ```
     XXX-123456789012345B 96-02-26 14:08:28
   M  700 COMPLD
      "LUC01:02-26 14-04-50,0"
     /*  Lucent Technologies FT-2000 OC-48 Lightwave
          System
          Release 6.0.2-ADR
          User Privilege Level: GENERAL
           Lucent Technologies - PROPRIETARY
          THIS SOFTWARE CONTAINS INFORMATION OF
           Lucent Technologies
          AND IS NOT TO BE DISCLOSED OR USED EXCEPT
          IN ACCORDANCE WITH APPLICABLE AGREEMENTS.

          NOTICE: THIS IS A PRIVATE COMPUTER SYSTEM.
          USE OF THIS SOFTWARE IS GOVERNED SOLELY AS
         EXPRESSLY AUTHORIZED IN THE RELEVANT
         AGREEMENT BETWEEN AT&T AND CUSTOMER.
         UNAUTHORIZED ACCESS OR USE MAY LEAD TO
           PROSECUTION.
   ```

   If a response similar to the one above is received, then the SVC address has been successfully tested to this NE. Proceed to Step 8.

NOTE:
If you do not receive a response from the NE, press Ctrl **C** or the Delete key to break out of the program.

Check the following:

- Is the NE powered up and operational?
- Is the NE connected to the X.25 network?
- Is the TID of the NE set properly?
- Is the SVC Address translation in the PSN mapped correctly?

8. Select Menu Option 2 (CANC-USER).

   The following line is displayed:

   ```
   CANC-USER:XXX-123456789012345B:XXX:701;
   ```

   If the command was successful, you see the following response displayed:

   ```
   IP 701
   <[9]
   XXX-123456789012345B 96-02-26 14:08:34
   M  701 COMPLD
   ;[62]
   ```

9. Select Menu Option 99 (Exit).

OSI troubleshooting

OSIOPU

The **osiopu** command allows you to monitor the OSI stack on the WaveStar SNMS host. Type **osiopu** at a UNIX prompt to start. Once the process is running, you can send TARP requests to the network elements to which you want to communicate.

osiopu - this starts the process

siren:**osiopu**

```
OPER [0033] sending ADM_REQ to dlp process
OPER [0016] Command mode is DEFAULT Prefix <dlp>
OSIAM Operator Task - (c) Marben Product V2.6F (October 97)
OPER [0001] *** Received ADM_CNF from TASK dlp
```

tarp getnsap C<TID> - this allows you to send a tarp request to a particular network element.

NOTE:
There is a complimentary command to the tarp getnsap C command. The command is:

tarp gettid H (nsap of the network element you would like the TID for)

tarp getnsap SNC WBM-1152

```
dlp 15:47:53[5100] TARP_GET_NSAP_CNF [req was GetNsap]
dlp 15:47:53[5100]    result:   OK[0]
dlp 15:47:53[5100]    Net:
39840f8000000000000000000008006a1b380c00
dlp 15:47:53[5100]    TID: SNC WBM-1152 [534e432d4f43332d4a]
dlp 15:47:53[5100]    origin:  From network
```

The above example is a completed tarp request. The origin is from the network. If the origin says from TDC, you must flush the TDC cache.

tarp tdc flush

Here is an example.

tarp getnsap SNC WBM-1152

```
dlp 15:45:51[5100] TARP_GET_NSAP_CNF [req was GetNsap]
dlp 15:45:51[5100]    result:   OK[0]
dlp 15:45:51[5100]    Net:
39840f8000000000000000000008006a1b380c00
dlp 15:45:51[5100]    TID: SNC WBM-1152 [534e432d4f43332d4a]
dlp 15:45:51[5100]    origin:  From TDC
```

tarp tdc flush

```
dlp 15:47:41[5100] TARP_RESULT_CNF [req was TDC Flush]
dlp 15:47:41[5100]    result:   OK[0]
```

To exit the osiopu command, type **$exit**. This will return you to a UNIX prompt.

NOTE:
The user must exit osiopu sessions before bringing WaveStar SNMS down and then up, or problems may occur.

Testing LAN Connectivity

Utilities

Verifying IP Addresses and Names

Network device IP addresses and names are stored in the file */etc/hosts* on WaveStar SNMS hosts and workstations. Enter the command:

cat /etc/hosts | pg

This allows you to view the */etc/hosts* file.

Each line contains an IP address and name for systems on the same network:

```
192.60.66.1 holmws
```

> All WaveStar SNMS system names must be *six* characters or less, and begin and end with a *letter*.

Hosts and other network devices that are in the same physical location are either connected via 10baseT unshielded twisted pair cables through a hub or they are connected to each other directly by coaxial cable.

Network devices that are not at the same location are connected over T1 lines using Channel Service Units/Data Service Units (CSU/DSUs) and routers.

Testing Connectivity

The **ping** utility is used to check IP connectivity to other devices on the same network.

Log onto the host system as `snc` and enter the following command:

cat /etc/hosts | pg

Take note of the name of the host, workstation, or device to be tested and use **ping** to test the connection, as follows:

/etc/ping *name*

Wait a few seconds for the system to transmit packets of data to the remote workstation and get them back.

Press Ctrl **C** to stop the test.

If the test was successful, the percentage of packet loss is 0%. High percentages of packet loss or messages like `Network is unreachable` indicate a need for further testing.

Try to ping the next device *closer* to you (usually a router) at the remote or local site, enter:

/etc/ping *router*

Testing Twisted Pair Wiring

If the router responds positively and workstation did not, then check the following possibilities for networks that use twisted-pair wiring:

- Devices are powered off or unplugged.
- Loose connections or broken wires between the workstation and hub or hub and router.

If pinging the workstation still fails, reboot the workstation, log onto it, and enter:

/etc/reboot

If pinging the workstation still fails, try rebooting both the router and hub (by turning them off and back on).

If the trouble persists, try replacing wiring and swapping out the hub.

Testing Stations Connected Via Coaxial Cable

If the router responds positively and the workstation did not, then check the following possibilities for networks that use coaxial cable:

- Devices are powered off or unplugged.
- AUIs are loosely connected.
- Improperly connected or non-terminated cable between nodes.

If pinging the workstation still fails, then reboot the workstation and router.

If this does not solve the problem, try swapping AUIs and replacing cables.

SNMS/NM Interface Troubleshooting

Overview

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

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

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

TL1 northbound interface troubleshooting

To verify that the northbound interface is operational, you can telnet into the same port used by NM and check the port is active. To telnet to the port, enter the command: **telnet <TCP/IP hostname or IP address> 10160**

This should connect you a TL1 command session. If the telnet session hangs or fails, check the hostname/IP address of the server. Ping the server to insure there is LAN connectivity.

To log in, enter the following command:

act-user:<SNMS hostname>:itm:::itm123;

A valid response displays the COMPLD response token. To log out, enter the command:

canc-user::itm::;

To break out of your telnet session, press the following keys CNTL +] and type quit at the telnet prompt.

If the TL1 northbound interface is not working, contact a customer engineer about the detailed problem. If the interface is working, check with the NM configuration team to make sure that NM is configured with the correct SNMS IP address.

GUI-to-GUI interface setup

Configuration File

A configuration file, called *sncFint.cfg*, is delivered with each release of SNMS. This file will define the operation of the F-interface. The configuration parameters defined by this file are:

1. whether debugging is enabled for the F-interface software
2. the idle-session timeout for the F-interface.
3. mapping of the SNMS software version number to directories containing SNMS GUI software on the NT Terminal Server
4. override username and password settings for SNMS login

The file is a flat, ASCII text file editable by the notepad program. Configuration parameters are defined as name value pairs. Help text in the file explains the purpose of each parameter.

The path of the default F-interface configuration file is:

<default root directory of SNMS/SNMS GUI directory>/snc/fint/sncFint.cfg

The file is identical across all versions of SNMS software.

For the F-interface to work properly, this file must be properly configured and a copy of this file MUST be installed in the NM GUI software directory location:

/jui/jnm/itm/southbound/snc/sncFint

Debugging Configuration Parameter

The default debugging parameter configuration file entry is:

debug false

The valid values for the true and false. The value should be set to true when the F-interfce is not working and more detailed information about the fault is required.

When debugging is enabled on the F-interface, the debug output will be captured in the NM output log file.

Idle Timeout Configuration Parameter

The default idle session timeout configuration file entry is:

idleTimeout 600

This timeout value overrides the SNMS GUI timeout defined on the Global Security Parameter Screen because the F-interface is a resource intensive interface and it should not be allowed to remain active as long as an individual SNMS user login session.

The timeout value is defined in seconds so the default timeout value, as displayed above, is ten minutes. The idle session timeout can be disabled by setting the value to 0.

Release Number/GUI Directory Mappings

When an EMS is defined in the NM database, the type of EMS is defined and the release number of the EMS Software is also defined. When the F-interface is invoked, this release number is used by the F-interface software to find the correct version of the SNMS GUI Software.

Valid release numbers can be any string, but typical values are: R3.0, R2.1. The configuration file must define a directory for each release number defined in NM.

The default configuration file entries for these mappings are:

```
release     default      \snmsR2
release     R10.0        \snmsR3
release     R9.0         \snmsR21
release     R8.0         \snmsR2
release     R6.0         class=itm.southbound.snc.sncfint.SncFint
```

The first line defines the GUI software that will be used when an undefined release number is found by the F-interface. In this case, when a unknown release number is sent via the F-interface, the GUI contained in the \snmsR2 directory will be used.

IMPORTANT: these definitions assume that the NM GUI and the SNMS GUIs are located on the same drives (generally C drive).

Username and Password Configuration Parameters

By default, the user login name for the F-interface is itm and the password is itm+123. For security reasons, default passwords are not defined in the configuration file. However, if configuration parameter entries are entered in the configuration file, the defined entries will override the default values.

Valid configuration file entries for username and password are:

```
user        itm
password    itm123
```

NM Software Configuration

Since some SNMS java code runs in the NM JVM, a single instance of the SNMS GUI must be included in the NM classpath. The NM classpath is defined in the file:

/jui/bin/run_jnm.bat

Generally, the NM is preconfigured to invoke an SNMS R3 GUI located in the \snmsR3 directory. If an SNMS R3 GUI does not exist in \snmsR3 directory on the NT Terminal Server, the NM configuration file will need to be changed.

The typical classpath definition for a SNMS CLASSPATH in the run_jnm.bat file is:

SNCDIR=%3\sncR10
SNCPATH=%SNCDIR%;%SNCDIR%\jars\swing.jar;%SNCDIR%\jars\IE.jar;%SNCDIR%\jars\org.jar

CLASSPATH=<NM Classpath>;%SNCPATH%

SNMS R2.1 and SNMS R3.1 Cut-through Inter-operability

Due to functionality changes between SNMS R2.1 and SNMS R3.1, the data communicated on the F-interface is different between the two releases of GUI software. Therefore, the data file (i.e. java class file) from the SNMS R3.1 software must be copied into the snmsR2.1 directory.

To copy the file, execute the following command on at the MS_DOS prompt:

copy \snmsR3\snc\fint\sncFintObject.class\snmsR2.1\snc\fint\sncFintObject.class

In addition, the *\jui\jnm\run_jnm.bat* needs to be changed so that the SNMS R3.1 replaces the SNMS R2.1 classpath in the NM startup script: */jui/bin/run_jnm.bat.*

GUI-to-GUI interface troubleshooting

To test the NM to SNMS Cut-Through, go to the NM controllers map, place the mouse over the center of the SNMS icon, and click the mouse button that brings up the popup menu. Select the VCIT menu item via the cascading menus:

Session->Virtual Craft Interface Terminal

If the NM GUI is not working perform the following steps to resolve the problem:

1. Invoke the SNMS GUI as a standalone application

   To invoke the SNMS GUI as a standalone application, change directory to the SNMS GUI software directory and execute the following command:

   [snms -host <hostname> -nobs -up itm itm+123

If the login is successful, continue on to [2] otherwise,

a) If the password validation fails, you will need to check the password of the itm login. If the password is not itm+123, it might be itm123. If you need to define an itm password that is NOT itm+123, edit the configuration file to override the default itm password for the F-interface.

b) If the GUI displays an error indicating that the “EMS is not running”, log in to the SNMS server and execute the command:

appstat

If the SNMS application is not running, bring up the application using the command:

up

If the SNMS application is running, execute the command:

psit | grep GUI_Server

If a line like the following is displayed,

```
GUI_Server * cdr tcp 2000 manual --- 13735
```

then SNMS is working fine and the NM host is using a host name that is mapping to the wrong SNMS server IP address. Check the IP addressing in the file:

M:{Winnt|Wtsrv}\system32\drivets\etc\hosts

If no command output from the psit command is displayed, restart the GUI_Server via the command:

chexstate -p GUI_Server -a restart

Once it is complete, retry the command:

psit | grep GUI_Server

If no output is displayed, check the file ${ROAMLOG}/GS.out for possible problems. Consult with SNMS support for detailed problem resolution.

2. Check NM batch file for the correct SNMS classpath.

Edit the file */jui/bin/run_jnm.bat*. The SNMS classpath should be defined for each NM CLASSPATH definition.

3. Check F-interface configuration file for correctness and enable debugging. The F-interface configuration file is:

/jui/jnm/itm/southbound/snc/sncFint/sncFint.cfg.

Check to see whether each release in the configuration file maps to the correct GUI software directory. Once editing is complete, try again to launch the SNMS interface via the controllers map and the VCIT menu item.

If the cut-through still fails, you will need to examine the NM debug log to determine the problem. The name of the debug log is displayed at NM startup

time and the file is always located in the /jui/logs directory. If you examine the log immediately after the cut-through failure, then the debug output should be near the end of the log. Check the following:

- determine whether the configuration file was found by the software.
- whether the correct GUI software was being launched for the specified SNMS host.

The log file contents should indicate whether the proper instance of the SNMS GUI software is being launched. Unless a new bug emerges in the software, the problem is always the result of the wrong version of SNMS GUI software being launched.

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.

1xN 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.

E

Electrical Carrier, Level 1 (EC-1)
An electrical interface signal at the SONET rate of STS-1.

Electromagnetic Compatibility (EMC)
A measure of equipment tolerance to external electromagnetic fields.

Electromagnetic Interference (EMI)
High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

Electronic Industries Association (EIA)
A trade association of the electronic industry that establishes electrical and functional standards.

Electrostatic Discharge (ESD)
Static electrical energy potentially harmful to circuit packs and humans.

Entity
A specific piece of hardware (usually a circuit pack, slot, or module) that has been assigned a name recognized by the system.

Entity Identifier
The name used by the system to refer to a circuit pack, memory device, or communications link.

Equipped (EQ)
Status of a circuit pack or interface module that is in the system database and physically in the frame, but not yet provisioned.

Erbium
A soft rare earth element used in metallurgy and nuclear research.

Erbium Doped Fiber Amplifier (EDFA)
An amplifier that performs by having a light signal pass through a section of erbium-doped fiber and using the laser pump diode to amplify the signal.

Errored Seconds (ES)
A performance monitoring parameter. ES “type A” is a second with exactly one error; ES “type B” is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

Establish
: A user initiated command, at the WaveStar CIT, to create an entity and its associated attributes in the absence of certain hardware.

Event
: A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Event Driven
: A required characteristic of network element software system: NEs are reactive systems, primarily viewed as systems that wait for and then handle events. Events are provided by the external interface packages, the hardware resource packages, and also by the software itself.

Externally Timed
: An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency.

Extra traffic
: Unprotected traffic that is carried over protection channels when their capacity is not used for the protection of working traffic.

F

Facility
: A one- or two-way circuit that carries a transmission signal.

Failures in Time (FIT)
: Circuit pack failure rates per 10^9 hours as calculated using the method described in *Reliability Prediction Procedure for Electronic Equipment*, BellCore Method I, Issue 5, September 1995.

Far End (FE)
: Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

Far-End Block Error (FEBE)
: An indication returned to the transmitting node that an errored block has been detected at the receiving node. A block is a specified grouping of bits.

Far-End Receive Failure (FERF)
: An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI.

Fault
: Term used when a circuit pack has a hard (not temporary) fault and cannot perform its normal function.

Fault Management
Collecting, processing, and forwarding of autonomous messages from network elements.

Fiber Distributed Data Interface (FDDI)
Fiber interface that connects computers and distributes data among them.

Flash EPROM
A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

Folded Rings
Folded (collapsed) rings are rings without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Forced
Term used when a circuit pack (either working or protection) has been locked into a service-providing state by user command.

Frame
The smallest block of digital data being transmitted.

Frame Relay (FR)
A form of packet switching that relies on high-quality phone lines to minimize errors. It is very good at handling high-speed, bursty data over wide area networks. The frames are variable lengths and error checking is done at the end points.

Framework
An assembly of equipment units capable of housing shelves, such as a bay framework.

Free Running
An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000 ADR
Lucent Technologies' OC-48 rate Add/Drop Rings lightwave Terminal for 2-fiber BLSRs. It is designed primarily for interoffice applications. It supports adds, drop, and through connections for DS3/EC-1, OC-3, IS-3, and OC-12.

G

Gateway Network Element (GNE)
A network element that passes information between other network elements and management systems through a data communication network.

Gateway Network Element (GNE)
A Network Element that provides a means of communication between an OS and remote Network Elements over the SONET DCC.

In a primary/secondary GNE pair:

The active GNE is the GNE (primary or secondary) that is currently serving as the GNE for the subnetwork.

The primary GNE is the first GNE associated with a subnetwork that initially serves as the GNE for the subnetwork.

The secondary GNE is the second GNE that is associated with the primary GNE for a subnetwork, and can take over communications in the event there is a failure in the communications via the primary GNE.

The standby GNE is the GNE (primary or secondary) that is currently serving as the backup GNE for the subnetwork in the event there is a failure in communications via the active GNE.

H

Hard Failure
An unrecoverable nonsymptomatic (primary) failure that causes signal impairment or interferes with critical network functions, such as DCC operation.

High Level Data Link Control (HDLC)
OSI reference model datalink layer protocol.

Holdover
An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

Host
The host is an HP 9000/800 series platform running HP-UX.

Hot Standby
A circuit pack ready for fast, automatic placement into operation to replace an active circuit pack. It has the same signal as the service going through it, so that choice is all that is required.

Human Machine Language (MML)
A standard language developed by the ITU for describing the interaction between humans and dumb terminals.

I

Idle
An output port not cross-connected to an input port.

Idle Code
A signal transmitted downstream automatically from an idle output port. It can also be transmitted downstream by a manual command from a cross-connected output port.

Insert
To physically insert a circuit pack into a slot, thus causing a system initiated restoral of an entity into service and/or creation of an entity and associated attributes.

In-Service (IS)
A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

Integrated Transport Management Network Module (ITM NM)
Lucent Technologies' integrated network management system that provides a broad end-to-end view of the SONET network.

Integrated Transport Management SubNetwork Controller (ITM SNC)
Lucent Technologies' SONET element management layer system that provides fault, configuration, and security functions through the use of a GUI.

Intelligent Alarm Filtering
The filtering of symptomatic alarms and events that are associated with a reported root-cause or symptomatic condition.

Interconnect Signal-3 (IS-3)
The logical equivalent to an OC-3 signal that uses a proprietary interface that allows short-range operation at a lower cost than an OC-3.

Interface Capacity
The total number of STS-1 equivalents (bidirectional) tributaries in all transmission interfaces with which a given transmission interface shelf can be equipped at one time. The interface capacity varies with equipage.

InterLATA
Circuits that cross outside the LATA and to an interexchange carrier.

IntraLATA
Circuits with both end-points within the LATA.

J

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

L

Lead Time
: The time interval between placement of a product order and receipt of the product.

Lightguide Build-Out (LBO)
: An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

Line
: A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

Line Build Out (LBO)
: An equalizer network that guarantees the proper signal level and shape at the DSX panel.

Line Controller Local Area Network (LCLAN)
: The internal local area network that provides communications between the controlled circuit packs.

Line Protection
: The optical interfaces can be protected by line protection. Line protection switching protects against failures of line facilities, including the interfaces at both ends of a line, the optical fibers, and any equipment between the two ends. Line protection includes protection of equipment failures.

Line Timing
: Refers to a network element that derives its timing from an incoming OC-N signal.

Link
: The mapping between in-ports and out-ports. It specifies how components are connected to one another.

Literal Character
: A letter, digit, or symbol that is entered in a command. The first hyphen in UNIT-{1-64} is a literal character; the braces and the second hyphen are not literal characters.

Local Area Network (LAN)
A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

Location
An identifier for a specific circuit pack, interface module, interface port, or communications link.

Lockout of Protection
The WaveStar CIT command that prevents the system from switching traffic to the protection line from a working line. If the protection line is active when a “Lockout of Protection” is entered – this command causes the working line to be selected. The protection line is then locked from any Automatic, Manual, or Forced protection switches.

Lockout State
The Lockout State shall be defined for each working or protection circuit pack. The two permitted states are: None – meaning no lockout is set for the circuit pack, set meaning the circuit pack has been locked out. The values (None & Set) shall be taken independently for each working or protection circuit pack.

Loopback
Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

Loop Timing
A special case of line timing. It applies to network elements that have only one OC-N/STM-N interface. For example, terminating nodes in a linear network are loop timed.

Loss Budget
Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

Loss of Frame (LOF)
A failure to synchronize to an incoming signal.

Loss of Pointer (LOP)
A failure to extract good data from a signal payload.

Loss of Signal (LOS)
The complete absence of an incoming signal.

M

M23-Format
A standard framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3 (sometimes referred to as M13 format, without C-bit parity).

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.

N

Network Element (NE)
A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

Network Monitoring and Analysis (NMA)
An operations system designed by Bellcore which is used to monitor network facilities.

Network Service Access Point (NSAP) Address
Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

Node
A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Preemptible Protection Access (NPPA)
Non-preemptible protection access increases the available span capacity for traffic which does not require protection by a ring, but which cannot be preempted.

Non-Revertive Switching
In non-revertive switching, an active and stand-by line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the stand-by line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Volatile Memory (NVM)
Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

No Request State
This is the routine-operation quiet state in which no external command activities are occurring.

Not Monitored (NMON)
A provisioning state for equipment that is not monitored or alarmed.

O

Open Ring Network
: A network formed of a linear chain-shaped configuration of network elements. Each network element connects to two others, one on each side, except for two network elements at the ends which are connected on only one side. A closed ring can be formed by adding a connection between the two end nodes.

Open Systems Interconnection (OSI)
: Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

Operations Interface
: Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, WaveStar CIT, office alarms, and all telemetry interfaces.

Operations Interworking (OI)
: The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SONET network or from a centralized operations system.

Operations System (OS)
: A central computer-based system used to provide operations, administration, and maintenance functions.

Operations System for Intelligent Network Elements (OPS/INE)
: A Bellcore configuration management operations system.

Operator
: A user of the system with operator-level user privileges.

Optical Carrier N (OC-N)
: An optical carrier signal at the SONET rate of N, where n equals 1, 3, 12, 48, or 192. The basic rate of an OC-1 signal is 51.84 Mb/s, equivalent to an STS-1, with other values of N direct multiples of this basic rate.

Optical Channel
: A OC-N wavelength within an optical line signal. Multiple channels, differing by 1.5µ 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-Nsignals.

Optical Line Signal
: A multiplexed optical signal containing multiple wavelengths or channels.

Optical Multiplexer Unit (OMU)
A circuit pack responsible for combining multiple signals into one signal. The combined signal is called the Optical Line Signal.

Optical Translator (OT)
A system feature used in conjunction with WaveStar OLS that concatenates multiple OLS terminals, regenerates signals in the 1.3 and 1.5 μ ranges, prevents wavelength blocking via wavelength interchange, provides wavelength add/drop (WAD) capabilities, and establishes open interfaces with multi-vendor signal compatibility.

Optical Translator Port Module (OTPM)
A circuit pack that can electrically regenerate incoming OC-12/STM-4 and OC-3/STM-1 signals into specific outgoing signals of the same type.

Optical Translator Unit (OTU)
A circuit pack that can electrically regenerate incoming OC-N/STM-N signals (1.3 or 1.5 μ ranges) into specific outgoing signals of the same type.

Orderwire (OW)
A dedicated voice-grade line for communications between maintenance and repair personnel.

Original Value Provisioning
Preprogramming of a system's original values at the factory. These values can be overridden using local or remote provisioning.

Outage
A disruption of service that lasts for more than one second.

Out-of-Service
The circuit pack is not providing its normal service function (removed from either the working or protection state) either because of a system problem or because the pack has been removed from service.

P

Packet Assembler/Disassembler (PAD)
An interface between a device and an X.25 packet-switched network. The PAD converts the protocol used by the device and the X.25 protocol used by the network, allowing terminals to exchange data with other packet mode terminals and hosts.

Packet-Switched Network (PSN)
An X.25 network that transmits groups of bits as a unit through the network. Packets usually include data and control information such as addressing, identification, and error-control fields.

Parameter
A variable that is given a value for a specified application. A constant, variable, or expression that is used to pass values between components.

Parity Check
: Tests whether the number of ones (or zeros) in an array of binary bits is odd or even; used to determine that the received signal is the same as the transmitted signal.

Pass-Through
: Paths that are cross-connected directly across an intermediate node in a network.

Path
: A logical connection between the point at which a standard frame format for the signal at the given rate is assembled, and the point at which the standard frame format for the signal is disassembled.

Path Overhead (POH)
: Informational bytes assigned to, and transported with the payload until the payload is demultiplexed. It provides for integrity of communication between the point of assembly of a virtual container and its point of disassembly.

Path Terminating Equipment
: Network elements in which the path overhead is terminated.

Performance Monitoring (PM)
: Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

Peripheral Control and Timing Facility Interface (PCTFI)
: A proprietary physical link interface supporting the transport of 21×2 Mb/s signals.

Platform
: A family of equipment and software configurations designed to support a particular application.

Plesiochronous Network
: A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant.

Polarization Mode Dispersion (PMD)
: Output pulse broadening due to random coupling of the two polarization modes in an optical fiber.

Port (also called Line)
: The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between network elements. The words “port” and “line” may often be used synonymously. “Port” emphasizes the physical interface, and “line” emphasizes the interconnection. Either may be used to identify the signal being carried.

Port State Provisioning
: A feature that allows a user to suppress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service, and not monitored) for low-speed ports.

Preprovisioning
: The process by which the user specifies parameter values for an entity in advance of some of the equipment being present. These parameters are maintained only in NVM. These modifications are initiated locally or remotely by either a CIT or an OS. Preprovisioning provides for the decoupling of manual intervention tasks (for example, install circuit packs) from those tasks associated with configuring the node to provide services (for example, specifying the entities to be cross-connected).

Proactive Maintenance
: Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect.

Protection
: Extra capacity (channels, circuit packs) in transmission equipment that is not intended to be used for service, but rather to serve as backup against equipment failures.

Protection Access
: To provision traffic to be carried by protection tributaries when the port tributaries are not being used to carry the protected working traffic.

Protection Group Configuration
: The members of a group and their roles, for example, working protection, line number, etc.

Protection Path
: One of two signals entering a path selector used for path protection switching or dual ring interworking. The other is the working path. The designations working and protection are provisioned by the user, whereas the terms active path and standby path indicate the current protection state.

Protection State
: When the working unit is currently considered active by the system and that it is carrying traffic. The “active unit state” specifically refers to the receive direction of operation — since protection switching is unidirectional.

Provisioned (PROV)
: Indicating that a circuit pack is ready to perform its intended function. A provisioned circuit pack can be active (ACT), in-service (IS), standby (STBY), provisioned out-of-service (POS), or out-of-service (OOS).

Provisioning
: The modification of certain programmable parameters that define how the node functions with various installed entities. These modifications are initiated locally or remotely by either a CIT or an OS. They may arrive at the node via the IAOLAN, CIT port, or any DCC channel. The provisioned data is maintained in NVM and/or hardware registers.

Q

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

R

Reactive Maintenance
: Refers to detecting defects/failures and clearing them.

Receive-Direction
: The direction towards the Network Element.

Regeneration
: The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

Reliability
: The ability of a software system performing its required functions under stated conditions for a stated period of time. The probability for an equipment to fulfill its function. Some of the ways in which reliability is measured are: MTBF (Mean Time Between Failures) expressed in hours; Availability = (MTBF)/(MTBF+MTTR)(%) [where MTTR = mean time to restore]; outage in minutes per year; failures per hour; percentage of failures per 1,000 hours.

Remote Defect Indication (RDI)
: An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure. [Previously called far-end-receive failure (FERF).]

Remote Failure Indication (RFI)
: A signal that alerts upstream STS-1 path terminating equipment that a downstream failure has been alarmed along the STS-1 path. This action prevents multiple alarms from being activated for the same failure and ensures that a technician is dispatched to correct the failure. (Previously called yellow signals.)

Remote Network Element
: Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

Return to Zero
: A code form having two information states (termed zero and one) and having a third state or an at-rest condition to which the signal returns during each period.

Revertive
: A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the working equipment is active, and the protection equipment is standby) after any failure conditions that caused a protection switch to occur, clear, or after any external switch commands are reset. (See “Non-Revertive Switching.”)

Revertive Switching
: In revertive switching, there is a working and protection high-speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service “reverts” to the working line.

Ring
: A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over the protection capacity.

Router
: An interface between two networks. While routers are like bridges, they work differently. Routers provide more functionality than bridges. For example, they can find the best route between any two networks, even if there are several different networks in between. Routers also provide network management capabilities such as load balancing, partitioning of the network, and trouble-shooting.

S

Section
: The portion of a transmission facility, including terminating points, between a terminal network element and a line-terminating network element, or two line-terminating network elements.

Section Layer
: The second of the four levels in a standard SONET signal, used to transport an STS frame across a physical medium. This layer uses the photonic layer to form the physical transport.

Self-Healing
: A network’s ability to automatically recover from the failure of one or more of its components.

Server
: Computer in a computer network that performs dedicated main tasks which generally require sufficient performance.

Serving Area
: A user-defined grouping of Network Elements. It most commonly consists of Network Elements located in a central office (CO) and the subnetworks to which they belong.

Severely Errored Seconds (SES)
: This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

Service
: The operational mode of a physical entity that indicates that the entity is providing service. This designation will change with each switch action.

Signal-to-Noise Ratio (SNR)
: The relative strength of signal compared to noise.

Signal Rate
: An attribute that defines the bit-rate and format of the signal. The signal rate is defined by the STS-N path-level signal bit-rate and format including the presence or absence of concatenation.

Single-Ended Operations
: Provides operations support from a single location to remote Network Elements in the same SONET subnetwork. With this capability you can perform operations, administration, maintenance, and provisioning on a centralized basis. The remote Network Elements can be those that are specified for the current release.

Single-Mode Fiber (SM)
: An 8-μ diameter low-loss, long-span optical fiber typically operating at either 1310 nm, 1550 nm, or both.

Site Address
: The unique address for a Network Element.

Slot
: A physical position in a shelf designed for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

Software Backup
: The process of saving an image of the current network element's databases, which are contained in its NVM, to a remote location. The remote location could be the WaveStar CIT or an OS.

Software Download
: The process of transferring a generic (full or partial) or provisioned database from a remote entity to the target network element's memory. The remote entity may be the WaveStar CIT or an OS. The download procedure uses bulk transfer to move an uninterpreted binary file into the network element.

Software ID
: Number that provides the software version information for the system.

Span
: An uninterrupted bidirectional fiber section between two network elements.

Span Growth
: A type of growth in which one wavelength is added to all lines before the next wavelength is added.

Squelch Map
: This map contains information for each cross-connection in a ring and indicates the source and destination nodes for the low-speed circuit that is part of the cross-connection. This information is used to prevent traffic misconnection in rings with isolated nodes or segments.

Standby
: The circuit pack is in service but is not providing service functions. It is ready to be used to replace a similar circuit pack either by protection or by duplex switching.

Standby Path
: One of two signals entering a constituent path selector, the standby path is the path not currently being selected.

State
: The state of a circuit pack indicates whether it is defective or normal (ready for normal use).

Status
: The indication of a short-term change in the system.

STS-1E
: Now referred to as EC-1. A signal typically carried by coaxial cables from one equipment location to another. The term EC-1 refers to the organization and data rate of the signal and also to the voltage template the signal must conform to and the impedances for which the voltage template is valid.

STS-1
: The basic building block logical signal in the SONET standard with a data rate of 51.84 Mb/s.

Subnetwork
: A group of interconnected/interrelated Network Elements. The most common connotation is a synchronous network in which the Network Elements have Data Communications Channel (DCC) connectivity.

Supervisory Signal
: An optical signal originating with the telemetry circuit pack that is used to communicate maintenance information.

Suppression
: A process where service-affecting alarms that have been identified as an “effect” are not displayed to a user.

Symptomatic Alarm
: An alarm that is not indicative of an actual failure itself, but rather of a secondary manifestation.

Synchronization Messaging
: Synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

Synchronous
: The essential characteristic of time scales or signals such that their corresponding significant instances occur at precisely the same average rate, generally traceable to a single Stratum-1 source.

Synchronous Digital Hierarchy (SDH)
A hierarchical set of digital transport structures, standardized for the transport of suitable adapted payloads over transmission networks.

Synchronous Network
The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

Synchronous Optical Network (SONET)
The North American standard for the rates and formats that defines optical signals and their constituents.

Synchronous Payload
Payloads that can be derived from a network transmission signal by removing integral numbers of bits from every frame. Therefore, no variable bit-stuffing rate adjustments are required to fit the payload in the transmission signal.

Synchronous Payload Envelope (SPE)
The combined payload and path overhead of an STS-1, STS-3c, STS-12c or STS-48c signal.

Synchronous Transport Signal (STS, STS-N)
The basic logical building block signal for SONET with a rate of 51.84 Mb/s for an STS-1 signal and a rate of N times 51.84 Mb/s for an STS-N signal.

Synchronous Transport Signal, Level N, Concatenated (STS-Nc)
A concatenated SONET payload signal at the STS-N rate, where N equals 3, 12, or 48. For example, an STS-3c signal is constructed by concatenating three STS-1 signals into a signal that uses a single path overhead, rather than three.

T

T1
A carrier system that transmits at the rate of 1.544 Mb/s (a DS1 signal).

T2
A carrier system that transmits at the rate of 6.312 Mbps (a DS2 signal).

T3
A carrier system that transmits at the rate of 44.736 Mbps (a DS3 signal).

Target Group
An administrator-defined group that defines to which Network Elements a user has access.

Target Identifier (TID)
A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up 20 characters where the characters are letters, digits, or hyphens (-).

Telemetry Feed-Through
: Operations capability for 4-fiber applications which allows the DCC to go from one OLS End Terminal (one subnetwork) through to the other collocated end terminal (separate subnetwork), thereby extending the OLS operations domain.

Through (or Continue) Cross-Connection
: A cross-connection within a ring, where the input and output tributaries have the same tributary number but are in lines opposite each other.

Threshold-Crossing Alert (TCA)
: A message type sent from a Network Element that indicates that a certain performance monitoring parameter has exceeded a specified threshold.

Through Timing
: Refers to a network element that derives its transmit timing in the east direction from a received line signal in the east direction and its transmit timing in the west direction from a received line signal in the west direction.

Time Division Multiplexing (TDM)
: A technique for transmitting a number of separate data, voice, and/or video signals simultaneously over one communications medium by interleaving a portion of each signal one after another.

Time Slot Assignment (TSA)
: A capability that allows any tributary in a ring to be cross-connected to any tributary in any lower-rate, non-ring interface or to the same-numbered tributary in the opposite side of the ring.

Time Slot Interchange (TSI)
: The ability of the user to assign cross-connections between any tributaries of any lines within a Network Element. Three types of TSI can be defined: Hairpin TSI, Interring TSI (between rings), and Intraring TSI (within rings).

Transaction Language One (TL1)
: A machine-to-machine communications language that is a subset of ITU's human-machine language.

Transmit-Direction
: The direction outwards from the Network Element.

Tributary
: A path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth, for example, an STS-1 tributary within an OC-N port.

True Wave™ Optical Fiber
: Lucent Technologies' fiber generally called non-zero dispersion-shift fiber, with a controlled amount of chromatic dispersion designed for amplified systems in the 1550/1310 nm range.

Two-Way Point-to-Point Cross-Connection
: A two-legged interconnection, that supports two-way transmission, between two and only two tributaries.

Two-Way Roll
The operation which moves a two-way cross-connection between tributary i and tributary j to a two-way cross-connection between the same tributary i and a new tributary k with a single user command.

U

Unavailable Seconds (UAS)
In performance monitoring, the count of seconds in which a signal is declared failed or in which 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

Upstream
At or towards the source of the considered transmission stream, for example, looking in the opposite direction of transmission.

User Privilege
Permissions a user must perform on the computer system on which the system software runs.

User-to-Network Interface (UNI)
The specifications for the procedures and protocols between a user and the Asynchronous Transfer Mode (ATM) network.

V

Value
A number, text string, or other menu selection associated with a parameter.

Variable
An item of data named by an identifier. Each variable has a type, such as int or Object, and a scope.

Violation Monitor and Removal (VMR)
A provisionable mode for DS3 output that causes parity violations to be monitored and corrected before the DS3 signal is B3ZS encoded.

Virtual
Refers to artificial objects created by a computer to help the system control shared resources.

Virtual Circuit
A logical connection through a data communication (for example, X.25) network.

Virtual Tributary (VT)
A structure designed for transport and switching of sub-STS-1 payloads. There are currently four sizes: VT1.5 (1.728 Mb/s), VT2 (2.304 Mb/s), VT3 (3.456 Mb/s), and VT6 (6.912 Mb/s).

Virtual Tributary Group (VT-G)
A 9-row by 12-column structure (108 bytes) that carries one or more VTs of the same size. Seven VT groups (756 bytes) are byte interleaved with the VT-organized synchronous payload envelope.

Voice Frequency (VF) Circuit
A 64 kilobit per second digitized signal.

Volatile Memory
Type of memory that is lost if electrical power is interrupted.

VT1.5 Tributary
A SONET logical signal with a data rate of 1.728 Mbps. In the nine-row structure of the STS-1 SPE, a VT1.5 occupies three columns. VT-structured STS-1 SPEs are divided into seven VT groups. Each VT group occupies twelve columns of the nine-row structure and, for VT1.5s, contains four VTs per group.

W

Wait-to-Restore (WTR)
Applies to revertive switching operation. The protection group enters the WTR state when all Equipment Fail (EF) conditions are cleared, but the system has not yet reverted back to its working line. The protection group remains in the WTR state until the Wait-to-Restore timer completes the WTR time interval.

Wait to Restore Time (WRT)
Corresponds to the time to wait before switching back after a failure has cleared, in a revertive protection scheme. This can be between 0 and 15 minutes, in increments of one minute.

Wavelength Add/Drop (WAD)
The process of adding and dropping wavelengths to provide more efficient transmission.

Wavelength Division Multiplexing (WDM)
A means of increasing the information-carrying capacity of an optical fiber by simultaneously transmitting signals at different wavelengths.

Wavelength Interchange
The ability to change the wavelength associated with an OC-N signal into another wavelength.

WaveStar™ Optical Line System
Lucent Technologies' lightwave transmission system. Utilizing DWDM technology, the system combines multiple signals of different wavelengths, transmits the resulting signal over a single fiber, and then demultiplexes the signal at the receive end.

Wide Area Network (WAN)
A communication network that uses common-carrier provided lines and covers an extended geographical area.

Wideband Communications
: Voice, data, and/or video communication at digital rates from 64 kb/s to 2 Mb/s.

Working
: Label attached to a physical entity. In case of revertive switching the working line or unit is the entity that is carrying service under normal operation. In case of non-revertive switching the label has no particular meaning.

Working State
: The working unit is currently considered active by the system and that it is carrying traffic.

X

X.25 Interface / Protocol
: The ITU packet-switched interface standard for terminal access that specifies three protocol layers: physical, link, and packet for connection to a packet-switched data network.

X-Terminal
: Workstation that can support an X-Windows interface.

Z

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

Index

A

B

C

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

X

Y