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Bell Labs Innovations

Integrated Transport Management SubNetwork Controller (ITM SNC)

Operations, Administration and Maintenance Guide

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About This Document

Overview

Purpose

This document provides the system administrator with application information for the installation, turn-up and configuration of the Element Management System (EMS). The system administrator should also understand the user features described in the *ITM SNC 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 EMS. The user should have thorough knowledge of the UNIX® operating system and 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 X.25 and 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, database backup and restore, and remote printer operations.
- **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 are shown in the following typeface: **rlogin**
- The names of directories and files are shown in the following typeface: */path/filename*
- Messages that appear on a screen are shown in the following typeface: `Error message`
- Text that you type on a screen is shown in the following typeface: itm snc
- Keyboard keys that you press to enter text or issue commands are shown as follows: Return

Related information

The EMS family includes the following documents and training courses:

Documents

- *ITM SNC User Guide (190-223-100)*
- *ITM SNC Operations, Administration & Maintenance Guide (190-223-101)*
- *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 ITM SNC hardware components:

- ITM SNC 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

- *Integrated Transport Management SubNetwork Controller (ITM SNC) User Training (Course No. TR3510)*
- *Integrated Transport Management SubNetwork Controller (ITM SNC) System Administration Training (Course No. TR3511)*
- *WaveStar SubNetwork Management System (SNMS) User Training (Course No. TR4510)*
- *WaveStar SubNetwork Management System (SNMS) System Administration Training (Course No. TR4511)*

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Introduction

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System Overview

Description

Lucent Technologies' Element Management System (EMS) provides support for Synchronous Optical Network (SONET) network elements (NEs) such as Lucent Technologies' DDM-2000 OC-3 or FT-2000 ADR NEs. It provides a set of standard and value-added functions that increase the network manager's ability to manage a variety of NE types in a mixed multi-vendor environment. EMS uses the intelligence of the NEs to create an intelligent operations environment. It allows managers to see and control transmission equipment at the Element Management Level (EML), Network Management Level (NML), and Service Management Level (SML). EMS provides functions for fault, configuration, performance, and security management via a graphical user interface (GUI). It provides NE, port, cross-connection, and path provisioning, as well as flow-through from provisioning Operations Systems (OSs) to NEs.

Capabilities

The system supports such Operations Interworking (OI) features as Northbound and Southbound operations system (OS)/NE interfaces with the system acting as the TL1 GNE, an Intra-Office Local Area Network (IAO-LAN) interface as an alternate higher -speed communications path to NEs, and Software Management functions for NE version software. It is able to support communication multiplexing or concentration, to provide network security, and to record all database changes. It supports software management functions for NE version software. It also provides a TL1 cut-through capability, allowing the user to access an NE through a native command set.

Year 2000 compliance

The system has been designed to comply with the Year 2000[1] initiative to ensure correct date presentation and date/time calculation processing for events that occur in the year 2000 and beyond, including data that is received by the system from the supported NEs.

1 ITM SNC Release 8.0 and UNIX Release 10.20 is year 2000 compliant (only when required UNIX patches are installed). See patch numbers below. (Year 2000 Solutions)

PHCO_15808, PHCO_16049, PHCO_10123, PHCO_10124, PHCO_10125, PHCO_10175, PHCO_10576, PHCO_9014, PHCO_9508, PHCO_9895, PHKL_9921, PHNE_10010, PHNE_10011, PHNE_9081, PHNE_9860, PHNE_9381.text, PHKL_10142, PHKL_10512

Features

Overview

EMS provides a set of standard and value-added features used to administer the SONET NEs. These are grouped into the following catagories:

- Fault Management
- Performance Management
- Configuration Management
- Security Management
- Log Management
- Cut-Through Capability

Fault management

Fault Management monitors alarms and conditions in the subnetwork. The system receives autonomous alarm messages from network elements 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. The system supports the following Fault Management tasks:

- Alarm status indication on the network map, for equipment, trail failures, and updates
- Hierarchical alarm status indication at the NE, bay, shelf, and circuit pack levels
- Textual alarm summary report
- Alarm provisioning at the NE level
- Alarm provisioning at the EMS level
- Synchronize NE alarms
- Autonomous alarm handling
- Alarm correlation

Performance management (only LCT and OLS 2.5G, 40G)

The system 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 45 days). The system 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

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

The system provides flow-through provisioning between a network provisioning system, such as Operations System for Intelligent Network Elements (OPS/INE), and NEs. The GUI supports the following configuration management tasks:

Subnetwork Configuration Management

- Network Map discovery/update/display
- Ring Map discovery/update/display
- Aggregate management/display

NE Configuration Management

- Equipage discovery/update/display
- Equipment (bay, shelf, slot, port) provisioning and pre-provisioning
- Cross-connection provisioning/display
- Sync management
- Protection switch management
- Cross-connection roll
- Ring management

Security management

All users are required to have a login and password to communicate with the system. Command and Target Groups may be set up according to the type of tasks the users are performing such as maintenance, provisioning, or monitoring. The system administrator is responsible for defining the parameters of all Command and Target Groups.

This EMS release contains two kinds of security management:

- EMS security management
  - — defines EMS users (userid 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 userid and password
  - — NEs takeover on initial link establishment

Log management

Log Management provides services to various system modules including:

- Writing log messages to database tables
- Retrieving log messages from database tables
- Periodically purging old log messages from the database tables

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 purposes.

Cut-through capability

In order for the user to execute NE native commands that may not be supported explicitly by a particular release, a cut-through capability is available. The NE commands are available over an X.25 or OSI interface. The system allows the user access only to the NEs and associated commands defined by the Target and Command Groups for which the user is validated.

Hardware Architecture

Overview

ITM SNC consists of a Hewlett-Packard host processor, and Windows PC workstations, all connected via an 802.3 Ethernet Local Area Network (LAN), with the option to interface via a Wide Area Network (WAN).

For communications to the network element, a Packet Switched Network (PSN) is recommended for large, geographically dispersed configurations to concentrate access from ITM SNC to the SONET access NEs (X.25 GNEs or NEs with IAO LAN). The same PSN can also be used to access other Network Management systems or other OSs. Every ITM SNC installation requires data connections to the managed subnetwork: direct connections (for example, RS232), or network connections (X.25 PSN or OSI/LAN/WAN).

The Southbound PSN from ITM SNC to the NEs must support an X.25/TL1 interface and/or an OSI/LAN interface. The Northbound PSN from ITM SNC to other OSs can either be X.25/TL1, TCP/IP/TL1, or asynchronous/TL1, as described in the System Interfaces section.

Host platform

The system hardware architecture consists of two main components:

- HP 9000/800 K-series server platform and associated peripherals (console, terminals, and printers)
- System GUI Personal Computer with Windows NT® 4.0

Server

The host is an HP 9000/800 K-series server running HP-UX version 10.20. This is the main hardware platform on which most application software is executed.

System console

The system console terminal is connected to the host and is used by the system administrator to enter HP-UX commands and to receive replies and application output.

Terminals (optional)

The Local Terminals are ASCII terminals or terminal emulators connected to the host. These terminals are used at the local site by users to enter TL1 commands to be sent to the NEs. The responses from the NEs are then displayed on these terminals. This facility allows local users centralized access to NEs.

The Remote Terminals are ASCII terminals or terminal emulators that are located remotely and connected via a network to the host. These terminals are used for remote access to the TL1 interface on the host. The terminals may be off the FEP Remote (using its PAD capability) to take advantage of it already being remote over X.25. As in the case of Local Terminals, users enter TL1 commands to be sent to the NEs. Responses from the NEs are then displayed on these terminals. This facility allows remote users centralized access to NEs.

Local printer (optional)

The local printer is connected to the host and is where the application prints alarms and user-requested reports.

Remote printers (optional)

The host system configuration can support up to four remote parallel printers. These printers print autonomous messages in real time. The host communicates with a remote printer via a Transmission Control Protocol/Internet Protocol (TCP/IP) address over an 802.3 LAN. The protocol conversion from TCP/IP packets to parallel output is performed by a Lantronix® print server. The IP address is associated with the Lantronix print server, which is dedicated to a given parallel printer.

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.

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
- Northbound Management Interface
  - X.25 and TCP/IP protocol layer (CS NorthBound)
  - OSI and TCP/IP protocol layer
  - TL1 Handler
- Southbound Management Interface
  - X.25 based protocol layer
  - OSI based protocol layer
  - TL1 Manager
  - Connection Manager
  - Gateway process
  - QA process
  - SONET Directory Service (SDS)
  - TCP/IP
- Performance Management
- Software Management
- Log Management
- Operation, Administration, and Maintenance
  - TL1-based NE data backup/restore
  - FTAM-based NE data backup/restore
  - Log and trace
  - Scheduler
- JAVA-based GUI

Configuration management

ITM SNC automatically creates and dynamically maintains an accurate model of the network with minimal user input using Lucent Technologies' patented DNO process. This model includes both the network configuration (the set of managed NEs and their interconnectivity) and also the configuration of each individual NE within the network.

Fault management

ITM SNC provides for both autonomous and on-demand collection of alarms. ITM SNC collects all the facility and equipment alarms, alarm clearing, and event messages (including environmental alarms) that are autonomously generated by the NEs, and also ITM SNC detected internal alarms and NE to ITM SNC communication alarms. ITM SNC keeps its alarm base current to reflect the real-time alarm state of the network.

NE event handler

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.

The NE Event Handler process is a passive distributor of non-alarm autonomous messages emitted by the NEs. It registers with Southbound for database change messages from TL1 NEs and with Q3 gateway for CMISE NEs. The messages received from CS_SB2 are TL1 message strings as received from the NE, while the CMISE notifications are in MFA structures.

Security management

With the use of ITM SNC as the management system rather than access the NEs directly (such as by using the NEs CITs with security management provided by the NE), the users' access to the network is through ITM SNC with its much more robust and flexible security management capabilities. ITM SNC maintains a set of connections to the NEs that are shared by all ITM SNC users, and administration of individual user logins and passwords is now centralized on ITM SNC rather than distributed across the large number of managed NEs. ITM SNC provides two levels of login security, one for access to the workstation and for access to the ITM SNC application.

Northbound interface

The Element Management System Northbound Q3 interface provides an interface between a TMN Network Management System and this Element Management System. Within the TMN architecture, interactions between a manager and an agent occur through a Q3 interface. The Q3 interface uses OSI management protocols (CMISE and CMIP) to allow the manager and agent to exchange management operations and notifications related to a set of managed objectives. The system performs the agent role in the Northbound Interface. This Q3 interface allows the system to interact with OSI/CMISE TMN Operations Systems, based on a standardized industry model.

TL1 Northbound QA Architecture

The Northbound Q-Adaptor is partitioned into the following major models (these modules correspond to the major functional areas of the Q-adaptor):

- Communication Manager
- CMISE Message Handler
- Object Manager
- MFA API Message Handler
- Gateway Server
- OAM Server

Southbound interface

The Element Management System 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 the MFA, 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 configurable 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 MFA.

- Handle create/modify/delete NEs, store and forward related information.
- Subscribe to notification for NE type incorrect, and send notification to MFA as necessary.

CMISE Southbound

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

- Gateway (GW) process
  - — serves as a bridge process between the 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 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. SDS also receives NE add/delete/modify notifications from the Event Handler (which are sent by the NCC via TL1 notifications). After the SDS local copy has been updated, it sends notifications to MFAs about updates (add/delete/modify). In addition, the SDS provides a text-based interface to the directory administrator to manage the directory (including directory provisioning, resynch commands, and directory querying).

Performance management

ITM SNC supports the remote administration of performance monitoring parameters and thresholds of NEs. NEs are provisioned with default values for these parameters and thresholds. These default values can be changed through ITM SNC as needed, by entering the applicable TL1 commands through the cut-through feature.

Communication software launcher

The Communication Software Launcher (CSL) is used as a central access point for all Lucent communication software products, including this system. In relation to this system, CSL performs the following:

- Administer users. This includes the ability to add/modify/delete a user (login and password only). CSL uses the client programs provided by the system to perform these operations. Any system-specific security administration, such as target/command groups, is administered locally via the GUI.
- Provide the ability to launch the GUI whenever needed.
- Provide the ability to kill the GUI whenever needed.

Log management

Log Management provides logging, browsing, and purging services of other modules in the system, in order to keep track of information regarding system performance and actions. Log Management consists of three modules:

- Logger—provides one-way services to log messages into a system database.
- Log Browser—provides services for the GUI to display logged messages.
- Log Purger—purges old log messages from a database or temporal log files generated by system modules. Retention periods can be set.

JAVA-based GUI

ITM SNC R8.0 introduces a new GUI based on Java that provides platform independence, enhances the system performance, and provides numerous enhancements in screen designs, navigational capabilities, and operations process flows.

Supported Network Elements

Overview

ITM SNC R8.0 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 availablity of the NE releases. New NE releases supported by ITM SNC R8.0 are shown in **bold**. All NEs have full support unless otherwise noted.

Table 1-1. Network Elements Supported by ITM SNC R8.0

Managed NEs	Supported Releases
Lucent Technologies	
DDM-2000 FiberReach	2.0, 2.1, 2.2, 3.0, **3.1**
DDM-2000 OC-3	6.2, 7.0, 7.1, 7.2, 8.1, 11.0, 11.1, 13.0, 13.5
DDM-2000 OC-12	2.3, 3.1, 5.1, 5.2, 7.0
FT-2000 ADR	5.0, 6.0, 7.0, 7.1, 7.2, 8.1, **9.0**
SLC-2000 DLC	3.2, 3.3, 4.1, 4.2, 4.4, 4.5, 4.6, 4.6.1
OLS 40G	2.0, 2.1, 3.0
FT-2000 LCT	2.0, 3.0
Fujitsu	
FLM 150	9.1R, 10.0R, 10.0S, 11.0R, 11.0S, 12.0R, 12.0S
FLM 600	9.1R, 10.0R, 10.0S, 11.0R, 11.0S, 12.0R, 12.0S
FLM 2400	8.2R, 9.0R, 9.0S, 9.3S
FLM 2400 BR	9.0BR, 9.0BS
FLM 6	6L
Tellabs	
Titan 5500[1]	5.0

1. The Tellabs Titan 5500 is a DCS. ITM SNC which is an EMS for ADMs, does not provide comprehensive management capabilities for it. ITM SNC management is limited to TL1 cut-through access. However, because the Titan 5500 has an IAO LAN interface and supports operations interworking with the Lucent Technologies and Fujitsu ADMs, it can provide data communications access to those NEs. Thus, in addition to TL1 cut-through access, ITM SNC supports automatic network discovery for Titan 5500 NEs, and they do appear on the ITM SNC Network Map with their connectivity to other (managed) NEs.

System Interfaces

Overview

ITM SNC interfaces can be categorized as follows:

- Southbound interfaces are from the NEs to ITM SNC.
- Northbound interfaces are from ITM SNC to another OS, such as a network management system.

The ITM Southbound communications interface supports TL1 over short stack X.25 and TL1 over the seven-layer OSI LAN. The Northbound communication provides access to NEs for other OSs, supporting security and also gateway functions for NEs communicating with ITM SNC in the IAO-LAN environment.

Southbound interfaces

ITM SNC supports concurrent X.25- and OSI-based communications with NEs. Depending on the NE types, the communications can be either via X.25 or through OSI-LAN (but not both at the same time, to the same subnetwork).

Table 1-2. Southbound Interface Protocols

Network Element Type	Interface	Example
Non IAO-LAN Capable NE	X.25/TL1	Lucent Technologies FT-2000 LCT
IAO-LAN Capable NE	OSI/LAN/TL1	Lucent DDM-2000 OC-3 Rel.13.0 Fujitsu FLM 150 Rel.11.0S

X.25-Based Interface

The ITM SNC 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. ITM SNC 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 ITM SNC supports direct X.25 connections to the GNEs, generally connections are through a PSN. The customer chooses and is responsible for the type of link concentration equipment which forms the X.25 Packet Switched Network (PSN) for connecting ITM SNC to the GNEs.

OSI LAN-Based Interface

ITM SNC supports an OSI LAN interface to the NEs as follows: DDM-2000 OC-3 beginning with R13.0; DDM-2000 OC-12 beginning with R7.0; FT-2000 ADR beginning with R8.0; DDM-2000 FiberReach beginning with R3.0; TITAN 5500 FP5.0; and FLM NEs with 'S' series releases (for example, FLM 150 Release 11.0S). This feature is based on the standard seven-layer OSI stack as specified in Telcordia's GR-253-CORE document. In this configuration ITM SNC directly establishes OSI connections between itself and each managed NE (analogous to the OSI connections between the GNE and each managed NE in the X.25 configuration). At least one NE in the subnetwork must have an IAO LAN interface, to serve as a physical gateway between OSI over the LAN and OSI over the DCC. The OSI LAN reduces performance bottlenecks by providing faster communications between ITM SNC and NEs, making possible functions such as remote software download.

Northbound interfaces

A Northbound interface can be categorized as a Network Management System (NMS) such as ITM NM. NMS is responsible for managing the network or a portion of the network.

Table 1-3. Northbound Interface Protocols

Operations System Type	Interface	Example
Provisioning	X.25/TL1 or TCP/IP/TL1 or Asynchronous/TL1	OPS/NE
Fault	X.25/TL1 or TCP/IP/TL1 or Asynchronous/TL1	NMA-F
Network Management	TCP/IP/TMAG proprietary protocol	ITM NM
Service Management	X.25/TL1 or TCP/IP/TL1 or Asynchronous/TL1	ITM CNC

Provisioning TL1 Interface

ITM SNC provides a TL1 interface to provisioning OSs (for example, Telcordia's OPS/INE), via asynchronous protocols, X.25 using either PVCs or SVCs, or via TCP/IP. This interface supports a flow-through of TL1 provisioning commands to the NE. Two main functions are supported on this interface:

- Security management, which includes password protected access to the NEs, and message screening based on the ITM SNC Command Group to which the OS is assigned.

- TL1 message routing, which includes the receipt of formatted provisioning messages from the OS and routing them to the appropriate NE, and the receipt of completion messages from the NE and forwarding them back to the originating OS. Also, any autonomous database change messages from the NE are forwarded to the OS, to enable database synchronization.

Fault TL1 Interface

ITM SNC provides a TL1 interface to fault management OSs (for example, Telcordia's NMA-F), via asynchronous protocols, X.25 using either PVCs or SVCs, or via TCP/IP. Two main functions are supported on this interface:

- Security management, which includes password protected access to the NEs, and message screening based on the ITM SNC Command Group to which the OS is assigned.
- TL1 alarm, condition, and event (for example, TCAs) message forwarding, following any optional ITM SNC alarm filtering. For example, alarms can be aged, TCAs can be filtered using EPT; or all messages can be sent directly with no internal processing. ITM SNC also accepts fault management related TL1 messages from the OS (for example, retrieve alarms); routes them to the appropriate NE, and sends completion responses back to the originating OS.

Interface to ITM NM

ITM SNC provides an interface to ITM NM that takes advantage of the synergy among Lucent Technologies' products to provide end-to-end management of SONET networks. This interface provides for Fault and Configuration Management, including the flow-through provisioning capability. The ITM NM - ITM SNC interface is continually enhanced, per new ITM SNC releases, to ensure support of new NE types and NE releases.

Customer Service Management TL1 Interface

ITM products can be used in joint service provider and end customer network management environments, to support unbundled access and customer service management applications. This unbundling of shared services is achieved through the use of ITM SNC and the interfacing customer service management system, ITM CNC. The interface between them is the Secure Asynchronous Alarm Interface, which is TL1 over an asynchronous connection. ITM SNC is in the service provider's control center for monitoring equipment failures as well as for managing the entire SONET network. ITM CNC can be used to monitor an end customer's private circuits. It can also have interfaces at a customer's premises to allow them to monitor and control their private networks.

System Requirements

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Hardware Requirements

Overview

ITM SNC runs on a scalable hardware platform to support small to large networks. The ITM SNC software release is independent of platform. The choice of platform is driven by the characteristics and needs of the customer's network. Sizing guidelines, based on Lucent Technologies' field experience and testing, are presented in this chapter and examples are given.

Host configuration

The ITM SNC required host is the HP 9000/800 K-series computer system running HP-UX version 10.20. The configuration of the host is based on the number of equivalent NEs suppported by the system. The following system requirements vary based on the number of NEs being supported:

- Model of the computer
- Memory
- Disk drives
- SCSI
- X.25 circuit packs

The following table outlines the configurations of the Hewlett-Packard 9000 K-Series computer systems

Table 2-1. HP 9000 K-Series Configurations:

HP9000 Hardware	Model K260	Model K360	Model K460/K580 with 2 CPUs	Model K460/K580 with 4 CPUs
HP - UNIX	Release10.20	Release10.20	Release10.20	Release10.20
Number of CPUs	1	1	2	4
RAM	384MB	384MB	640MB	1152MB
Disk Space	27GB	27GB	45GB	54GB
Swap Space	768MB	768MB	1280MB	2304MB
CD ROM Drive	4X/up 600Mb	4X/up 600Mb	4X/up 600Mb	4X/up 600Mb

HP9000 Hardware	Model K260	Model K360	Model K460/K580 with 2 CPUs	Model K460/K580 with 4 CPUs
Tape Drive	1X4Gb DDS	1X4Gb DDS	1X4Gb DDS	1X4Gb DDS
X.25 ports	8	8	16	16
LAN ports	2	2	2	2

PC workstation configuration

The following table shows the recommended PC configuration[1] for the ITM SNC Java GUI running as a standalone application:

Table 2-2. PC Workstation Configuration

Operating System:	Windows NT 4.0
Processor:	Pentium II 200 MHz or better
Monitor:	19 inch screen Resolution: 1280 X 1024 4MB Video Card
RAM:	64MB or greater
Disk:	4GB capacity or greater
Peripherals:	- Video card with at least 4MB RAM - 10/100 MB Network Interface Card - Sound card with speakers

NOTE:
If using NM, use NM specificatons.

1 Although PCs with the recommended configuration are available from many different manufacturers, each manufacturer builds its equipment differently, using a variety of hardware from different sources. In order to avoid troubleshooting GUI problems on a large number of PC platforms, only PC equipment from Compaq, Dell, and HP is supported and recommended.

Sizing the system

This section enables users to estimate the maximum number of NEs that a particular ITM SNC can manage based on the particular NE types supported, their equipage, and their relative numbers. The estimate is made using the ITM SNC Capacity Estimator, which can be accessed via the World Wide Web at the following URL: http://sncweb.ho.lucent.com/perform/capacity.html.

Using the ITM SNC Capacity Estimator

Once the ITM SNC Capacity Estimator has been accessed via a web browser (with JavaScript enabled), the following steps may be performed and repeated to get capacity estimates for different types of NEs managed, configuration factors, and deployment values.

1. Begin with the selection box at the top of the form. Select either "YES" or "NO" to indicate whether or not the ITM SNC will be utilized with a northbound Q3/CMIS interface.
2. Each NE type that the SNC can manage is listed in the first column of the main area of the form. For each NE type that the SNC will be managing, enter a configuration factor into the second column of the form. Only one configuration factor is entered for each NE type. If multiple configurations will be used for an NE type, enter the average configuration factor. The default configuration factor value is 1, for "fully equipped".
3. For each NE type that the ITM SNC will be managing, enter a deployment value into the third column of the form. If only a single NE type will be managed, then enter a deployment value of 1 for that NE type and 0 for all other NE types. The default deployment value is 0.
4. Click the "Calculate" button at the bottom of the form. The total maximum number of NEs that the ITM SNC can manage for each of the four time periods, given the configuration and deployment values entered, appears in the table at the bottom.

Capacity Affecting Network Element Parameters

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

- Number of Managed Object Instances (MOI) for the northbound Q3 interface.
- MFA Database size (number of records).
- Relative Activity (a factor that represents the relative degree of ITM SNC 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.

The estimated values of these parameters are shown in the following table:

Table 2-3. Capacity Affecting Parameters

NE Type		NO. of MOI	MFA DB Size	Relative Activity	No. of LAN Associations	Configuration
OLS 400G (R2)-80wavelengths	Ring (4 fiber)	6,686	13,500	3	1	1
	Ring (2 fiber)	3,345	6,754	1.5	1	1
	End Terminal (4 fiber)	3,346	6,756	1.5	1	1
	Repeater (4 fiber)	1,716	3,464	1	1	1
	Repeater (2 fiber)	3,956	7,987	2	1	1
OLS 40G		N/A	2,700	2	0	1
WaveStar 10G		10,000	10,800	8	0	1
WaveStar 2.5G		2,500	2,700	2	2	1
WBWM	1152	26,743	64,800	24	2	1
	4608	98,252	259,200	96	2	1
	9216	193,897	518,400	192	2	1
LCT (Vail)		N/A	5,400	4	0	1

Overall ITM SNC Capacity Limiting Parameters

The parameters that limit the capacity of the ITM SNC and their values are shown in the following table:

Limiting Parameter	Value
Maximum Number of Relative Activity Units	2289
Maximum Number of MOI (2Q99)	2,000,000
Maximum Number of MOI (4Q99)	5,000,000
Maximum Number of MOI (2Q2000)	10,000,000
Maximum Number of MOI (4Q2000)	16,000,000
Maximum MFA Database Size (records)	25,000,000
Maximum Number of Associations	2,000
Maximum Number of Physical Network Elements	1,000

Notes:
1. These capacity limiting parameters are for a single HP K580 computer with 6 CPUs.
2. The maximum database size excludes the storage of historical data (e.g., activity logs, performance monitoring and alarm history)

Capacity Estimating Rules

This section presents the rules that must be followed for an ITM SNC to support a set of NEs, considering the NE types, configuration factors, and deployment values. The rules are intended to ensure that none of the key capacity affecting boundary parameter is being exceeded. The ITM SNC Capacity Estimator implements an algorithm to calculate values that satisfy these rules. The central logic of the ITM SNC Capacity Estimator is a program written in JavaScript.

Rule 1:
Sum over all NE types n of [(Configuration factor for NE type n) x (No. of MOI for NE type n) x (Number of NEs of type n)] < Maximum of MOI

Note: This rule ensures that the total number of MOIs due to the number and type of NEs does not exceed the maximum number of MOIs supported by ITM SNC. It is based on the number of expected NEs of each type, and their degree of equipage (i.e. the percentage of active circuit packs as reflected by the "Configuration Factor").

Rule 2:
Sum over all NE types n of [(Associations for NE type n) x (Number of NEs of type n)] < Maximum Number of Associations

Note: This rule ensures that the total number of associations does not exceed the maximum number supported by ITM SNC.

Rule 3:
Sum over all NE types n of [(Configuration factor for NE type n) x (MFA DB Size for NE type n) x (Number of NEs of type n)] < Maximum MFA Database Size

Note: This rule ensures that the overall MFA database size adjusted for the degree of equipage (i.e. the percentage of active circuit packs of the NEs as reflected by the "Configuration Factor"), does not exceed the maximum MFA database size supported by ITM SNC.

Rule 4:
Sum over all NE types n of [(Configuration factor for NE type n) x (Relative Activity for NE type n) x (Number of NEs of type n)] < Maximum Number of Relative Activity Units

Note: This rule ensures that the overall activity does not exceed the maximum processing capacity of the ITM SNC computer complex. It is based on the expected number of NEs of each type and their "Configuration Factor".

Rule 5:
Total number of NEs < Max No. of Physical NEs Supported by ITM SNC

Note: This rule ensures that the total number of NEs does not exceed the maximum number of physicals NEs that ITM SNC is expected to support (regardless of their type).

Software Requirements

Application components

The ITM SNC software architecture is platform-based on object-oriented design. The following table shows the software components required for ITM SNC R8.0:

Table 2-4. ITM SNC R8.0 Application Components

SNC Application	Release 8.0
Informix - OnLine	Release 7.23
Informix - SQL	Release 6.05
BaseWorX®	Release 5.1
Orbix MT	Release 2.3
HP JRE (Java GUI Client)	Release 1.1.x
X.25/ACC	Release 2.23

Installation

3

Contents

Getting Started

Overview

This chapter covers the procedures necessary for a new installation of an ITM SNC host. 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 ITM SNC “Cold Start” file set contains software tools to set up a foundation and to configure and verify a new host to support the ITM SNC application. The “Cold Start” software includes logical volumes, file systems, logins, groups, and various support files not included in the SNC application.

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

- The ITM SNC 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 ITM SNC host and workstation configuration specifications were provided to the customer and the customer obtained the necessary hardware directly from the vendor.

ITM SNC has an interactive script-assisted procedure for first-time software installation and for subsequent upgrades. This script-based procedure minimizes the software installation and upgrade effort. The interactive and menu-driven scripts alert users when there are discrepancies and prompt for the appropriate actions to be taken (e.g., to back up the existing database prior to any upgrade).

Before you begin

The following items are needed for the Cold Start installation:

- HP-UX 10.20 CD
- HP-UX 10.20 Multi-User License CD (Optional)
- ITM SNC Cold Start CD
- ITM SNC Application
- GUI Client CD
- License numbers for:
  - UNIX multi-user license (optional)
  - Informix keys and serial numbers
  - Orbix license
  - ATOS license (uses LAN 0)

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 on the host machine.

Procedure: Installing HP-UX 10.20

1. Power on the computer.
2. Insert the HP-UX INSTALL AND CORE OS CD into the CD-ROM drive. The processor boots from the first available device. To continue, 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 the Esc 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       256MB       Configured
      0        1a/b       256MB       Configured

                          ---------
   TOTAL                   512MB

<Press any key to continue>
```

5. Verify that the correct amount of memory is configured (in this example, 512MB has been configured).

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

Model	RAM (Megabytes)
K260/K360	384
K460/K580 with 2 CPUs	640
K460/K580 with 4 CPUs	1152

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
   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 **`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 (for 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**

    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. You must choose lan0 as the lan device to enable.

```
  * 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 must be six characters or less and may *not* end with a number.

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:

```
        HP-UX Install Utility - Select Whole-System Configuration
Choose one item upon which to base your system configuration. You will
have
a chance to modify that configuration.

 Available Whole-System Configurations: (Scroll to see entire list.)

 +-------------------------------------------------------------------------+
 | Standard LVM configuration                                             ^
 | LVM configuration with VxFS (Journaled file system)
 |
 +-------------------------------------------------------------------------+

 Whole-System Configuration Description:

 +-------------------------------------------------------------------------+
 | Logical Volume Manager (LVM) provides a highly flexible configuration^
 | that allows the disk to be partitioned into multiple volumes and also
 | allows multiple disks to be combined to create larger logical disks.
 | Volumes except for root (containing "/" file system)...
 +-------------------------------------------------------------------------+
_____________________________________________________________________________
 [ OK ]                      [ Cancel ]                      [  Help  ]
```

17. At the prompt, select `Standard LVM configuration`.

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          ->]
  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)
K260	768	768
K360	768	768
K460/K580 with 2 CPUS	1280	1280
K460/K580 with 4 CPUs	2304	2304

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:

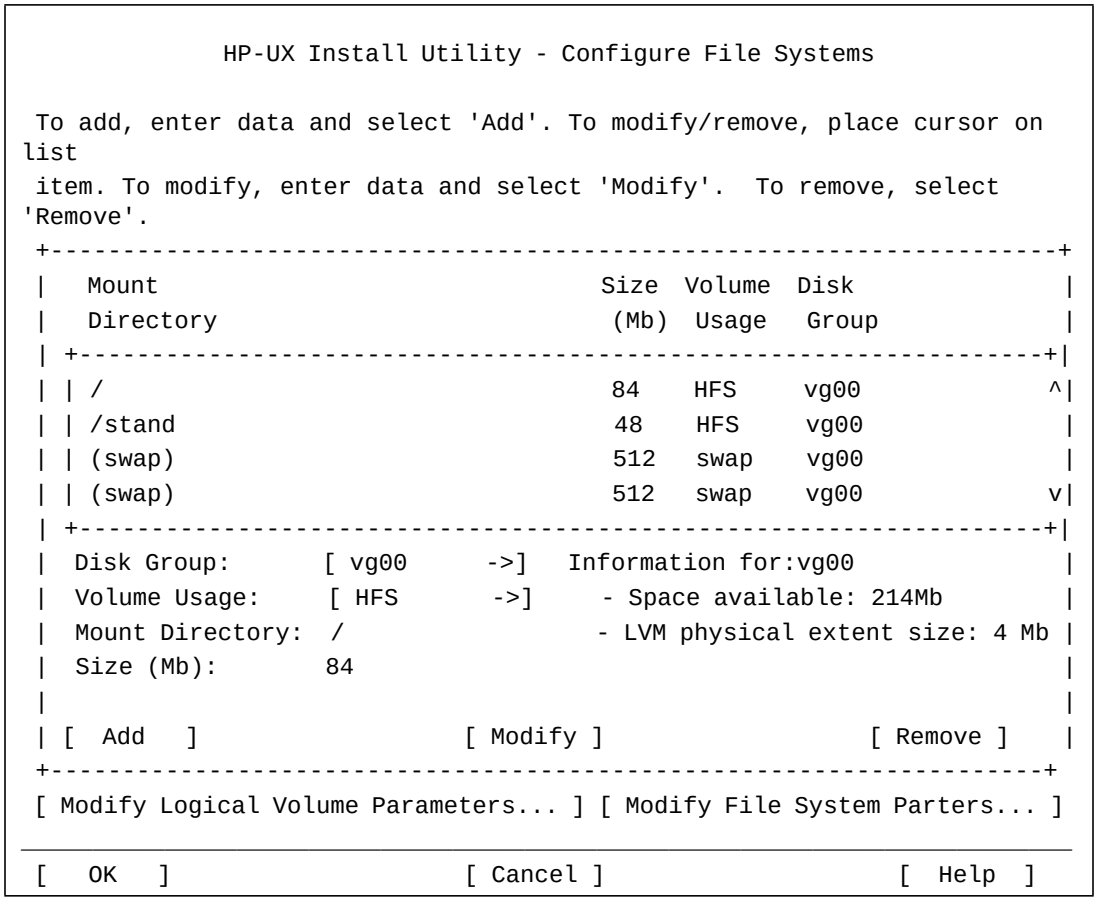
```
             HP-UX Install Utility - System Configuration
Any data on the following disks will be destroyed ... :
  Hardware Path       Product ID    Size (Mb)  Disk Use   Volume Group
+-------------------------------------------------------------------------+
| 10/0.6.0            ST15150W      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*, and */home*.
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 4GB-based Systems

Disk No. (Size)	Mount Point	K260/K380	K460/K580 (2 CPUs)	K460/K580 (4 CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#1 (4GB)	Swap / /stand /opt /var /usr /home /tmp /reports /tools (Not Used)	512MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 640MB 300MB ~1GB	1024MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 640MB 300MB ~400MB	1280MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 640MB 300MB ~200MB
DISK#2 (4GB)	Swap /snc dbsp1_1G pmsp	256MB 2GB 1GB ~512MB	256MB 2GB 1GB ~512MB	256MB 2GB 1GB ~512MB
DISK#3 (4GB)	swap dbsp2_1G pmsp	 1GB ~3GB	 1GB ~3GB	768MB 1GB ~2GB
DISK#4 (4GB)	dbsp3_1G pmsp	1GB ~3GB	1GB ~3GB	1GB ~3GB
DISK#5 (4GB)	dbsp4_1G pmsp	N/A	1GB ~3GB	1GB ~3GB
DISK#6 (4GB)	dbsp5_2G pmsp	N/A	2GB ~2GB	2GB ~2GB
DISK#7 (4GB)	pmsp	N/A	N/A	~2GB

Table 3-2. Disk Partitions for 9GB-based Systems

Disk No. (Size)	Mount Point	K260/K380	K460/K580 (2 CPUs)	K460/K580 (4 CPUs)
		Allocated Space	Allocated Space	Allocated Space
VG#1 (9GB)	Swap / /stand /opt /var /usr /home /tmp /snc /reports /tools (Total Used)	768MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 2GB 640MB 300MB 5,044MB	1280MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 2GB 640MB 300MB 5,556MB	2304MB 100MB 48MB 448MB 300MB 400MB 20MB 256MB 2GB 640MB 300MB 6,580MB
VG#2 (9GB)	dbspace	dbsp1_1G	dbsp1_1G	dbsp1_1G
	dbspace			
	dbspace			
	pmspace	~4GB	~4GB	~4GB
VG#3 (9GB)	dbspace	dbsp2_1G	dbsp2_1G	dbsp2_1G
	dbspace	dbsp3_1G		
	pmspace	~8GB	~4GB	~4GB
VG#4 (9GB)	dbspace		dbsp3_1G	dbsp3_1G
	dbspace			
	pmspace		~4GB	~4GB
VG#5 (9GB)	dbspace		dbsp4_1G	dbsp4_1G
	dbspace		dbsp5_2G	
	pmspace		~4GB	~4GB
VG#6 (9GB)	dbspace			dbsp5_2G
	pmspace			~4GB

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 host name, IP address, and time zone of your server must be specified to properly install the ITM SNC application. The host name must be six characters or less, must end in a letter, and must not start with #.

3. 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):
```

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

NOTE:
BaseWorX requires that a host name be six characters or less and begin and end with a letter. Letters must be lower case.

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]
```

5. 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]
```

6. At the prompt, enter the number for your location and press the Return key.
7. 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):
```

8. 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]
```

9. 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]
```

10. 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]
```

11. 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 15.

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):
```

12. 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] 255.255.255.0Return
```

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]
```

13. 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]
```

14. 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…
```

15. 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]
```

16. 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]
```

17. 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]
```

18. 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]
```

19. 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...
```

20. 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...
```

21. 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 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.

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/c2t2d0 /SD_CDROM`

NOTE:
The path */dev/dsk/c2t2d0 /SD_CDROM* may be different, depending on the host machine.

3. At the # prompt, enter the command:

   `swinstall`

   The following message is displayed on the screen:

```
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 Patch Installation

Installing HP-UX patches

The following procedure is used to install all necessary patches deemed essential by ITM SNC development and Hewlett-Packard for the core operating system. The procedure takes approximately twenty minutes. The following patches are installed in this procedure: PHCO_10123, PHCO_10124, PHCO_10125, PHCO_10175, PHCO_10576, PHCO_14888, PHCO_15808, PHCO_16049, PHCO_9014, PHCO_9508, PHKL_7765, PHNE_10010, PHNE_10011, PHNE_9081, PHNE_9381, PHNE_9860, PHSS_17798, PHSS_8508.

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: PHCO_10123, PHCO-10124, PHCO_10125, PHCO_10175, PHCO_10576, PHCO_14888, PHCO_15808, PHCO_16049, PHCO_9014, PHCO_9508, PHKL_7765, PHNE_10010, PHNE_10011, PHNE_9081, PHNE_9381, PHNE_9860, PHSS_17798, PHSS_8508.
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.

HP-UX X.25/ACC Software Installation

Installing X.25 software

The following procedure is used to install the ACC X.25 file set to support X.25 communications. The fileset 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 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 following message is displayed on the screen:

```
                        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... ]

 [ Software Filter... ] None

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

8. Scroll down to the bottom of the screen and select Z7240A_APZ, which is the X.25/ACC Bundled Product fileset.
9. Select Actions→Install (analysis)...
10. Select OK on the Install Analysis screen.

A pop-up message screen similar to the following is displayed:

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

Only software compatible with the target is available for selection.
-------------------------------------------------------------------------
-----
Top+                          Note (palau)                          +ted
---                                                                  ---
In addition to the software you just marked, other software was
automatically marked to resolve dependencies.  This message will not
appear again.
|-------------------------------------------------------------------|   |
|                              [ OK ]                               |    |
  +-------------------------------------------------------------------+
          PHNE_9081       ->   B.10.00.00.AA   NetTL patch fixes large   |
          PHNE_9381       ->   B.10.00.00.AA   patch for mailx           |
         PHNE_9860       ->   B.10.00.00.AA   megapatch for elm(1)      |
         PatchText       ->                   Patch Documentation File   |
         Z7240A_APZ      ->   B.02.23         X.25/ACC Bundled Product v |
```

11. Select OK.

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

12. After the X.25 filesets installation is completed, select Done.

13. Press the Tab key to move to the menubar.

14. Select File→Exit and press the Return key to exit the *swinstall* program.

    The system displays the following message: `In addition to software just marked, other software was automatically marked to resolve dependencies`. The system will then reboot automatically.

WARNING:
When installing X.25/ACC software on the HP K580 or other servers that have HP extension software patch bundles, the following file modification must be made for the kernel to recompile successfully. This modification may be applied without exiting the swinstall process by using the shell function key (F7) that appears in the swinstall process. This allows swinstall to suspend and escape to a new shell process.

From this new shell, edit the file */usr/conf/sio/pdn0_spc.h*. and insert the following line: *#include ". . /h/buf.h"* . After the file is edited and saved, exiting the shell returns to swinstall. The suspended install can then be resumed. See the following procedure for details.

K580 or K360 with Redundancy X.25 Install Problem (MR snc983075)

1. When installing X.25 on a K580 the Kernel Build will fail. (HP Problem)
2. You may correct the file without existing from swinstall
3. Load the X.25 as usual in the preceding procedure
4. When Kernel Fails you will move onto the next step (Around 65%)
5. There is a hot key F-7 which allows swinstall to suspend and escape into a new shell.
6. Now you can edit the below listed file cd /usr/conf/sio/pdn0_spc.h
7. Add the follow line to the file #include "../h/buf.h"
8. Hit resume and it will rebuild the kernel again

Screen Printout pdn0_spch

```
* $Source: /users/marius/10.0/sources/x25/sio/pdn0_spc.h,v $
* $Revision: 10.10 $
* $Author: marius $
* $State: Exp $
* $Locker:  $
* $Date: 95/12/15 11:48:38 $
* $Log : $
*/
#include "../h/buf.h" Newly Added line
/*
```

ITM SNC Cold Start

ITM SNC cold start

The ITM SNC Cold Start file set is used to verify and configure a new host to support the ITM SNC application. This includes Volume Groups, Logical Volumes, file systems, logins, groups, and various support files.

Procedure: ITM SNC 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 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 Coldstart.
8. Select Actions→Install (analysis)...
9. Select OK on the Install Analysis screen

   When the Coldstart fileset installation is finished, the Status changes to Completed.
10. Go to the main *swinstall* selection screen.
11. After the Coldstart fileset installation is completed, select Done.
12. Go to the main *swinstall* selection screen.
13. Select File→Exit and press the Return key to exit the *swinstall* program.

14. After installing the Coldstart file set, at the # prompt, enter the command:

    cd /tmp

15. At the # prompt, enter the command:

    ./init_disk

    This command configures the hard disks.

Messages similar to the following are displayed:

```
START: INSTALLATION Wed May 27 11:48:43 EST 1998



checking if this model is supported ...
Good... This model is supported!


Checking if this system has at least one LAN interface
Good...You have 2 LAN Interface Cards


Checking if this system has at least one ACC Mux interface
Good...You have 2 ACC Mux Interface Cards


checking memory...



checking disk capacity...
DISKCAPACITYUSED
/dev/rdsk/c0t0d0  2082636  n
/dev/rdsk/c0t1d0  2082636  n
/dev/rdsk/c0t2d0  2082636  n
/dev/rdsk/c0t3d0  2082636  n
/dev/rdsk/c0t4d0  2082636  n
/dev/rdsk/c0t5d0  2082636  n
/dev/rdsk/c0t6d0  2082636  n
/dev/rdsk/c0t8d0  2082636  y
/dev/rdsk/c0t10d0  4194157  n
/dev/rdsk/c1t6d0  1956086  n
```

```
10 disks with total 22811 MB disk capacity on this system
Creating Physical volume for vg01...
Physical volume "/dev/rdsk/c0t0d0" has been successfully created.
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/c0t1d0" has been successfully created.
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/c0t2d0" has been successfully created.
Volume group "/dev/vg03" has been successfully created.
Volume Group configuration for /dev/vg03 has been saved in /etc/lvmconf/
vg03.conf
.
.
Creating TOOLS File System...mkfs (hfs): Warning - inode blocks/cyl group
(22) >= data blocks (16) in last
mkfs (hfs): cylinder group.  This implies 128 sector(s) cannot be allo-
cated.
mkfs (hfs): /dev/vg01/rtools - 266112 sectors in 1728 cylinders of 7
tracks, 22 sectors
272.5Mb in 108 cyl groups (16 c/g, 2.52Mb/g, 384 i/g)
Super block backups (for fsck -b) at:
.
.
Creating SNC File System...newfs (hfs): no space allocated to device /dev/
vg01/rsnc
/dev/vg01/snc: unrecognized file system
Done.
Creating REPORTS File System...mkfs (hfs): Warning - 176 sector(s) in the
last cylinder are not allocated.
mkfs (hfs): /dev/vg02/rreports - 655360 sectors in 1951 cylinders of 12
tracks, 28 sectors
671.1Mb in 122 cyl groups (16 c/g, 5.51Mb/g, 832 i/g)
.
.
```

```
Creating Informix DBsp4_1G on vg07...Logical volume "/dev/vg07/DBsp4_1G"
has been successfully created with

character device "/dev/vg07/rDBsp4_1G".

Volume Group configuration for /dev/vg07 has been saved in /etc/lvmconf/
vg07.conf

Logical volume "/dev/vg07/DBsp4_1G" has been successfully extended.

Volume Group configuration for /dev/vg07 has been saved in /etc/lvmconf/
vg07.conf

Done.

Creating Informix DBsp5_2G on vg08...Logical volume "/dev/vg08/DBsp5_2G"
has been successfully created with

character device "/dev/vg08/rDBsp5_2G".

Volume Group configuration for /dev/vg08 has been saved in /etc/lvmconf/
vg08.conf

Logical volume "/dev/vg08/DBsp5_2G" has been successfully extended.

Volume Group configuration for /dev/vg08 has been saved in /etc/lvmconf/
vg08.conf

Done.


END: INSTALLATION Wed May 27 15:23:19 EST 1998
```

16. Respond to the prompts for group and user logins as appropriate.
17. At the # prompt, enter the command:

    cd /tmp
18. 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
```

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

    mv x25_config.answ /opt/acc/cfg
20. Move all of the other x25 files by entering the command:

    mv x25* /etc/x25

Informix and Orbix 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 Informix and OrbixMT.
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 command:

    ./coldStart

    This command sets up all logins required by SNC 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 Licenses
  - Informix SQL Serial No. and License Key
  - Informix OnLine Serial No. and License Key
  - OrbixMT License String

15. Verify the information on screen and press ‘S’ to save. The system will reboot after this
16. After completion, enter the command:

    cd /tmp

    Use vi to verify the install by checking cold.start.log for errors.

ITM SNC Application Installation

Installing the ITM SNC application

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

NOTE:
Before installing the SNC application, verify that the station address of LAN1 is the OSI LAN. Use *lanscan* and get the station address and NM ID.

Procedure: Installing ITM SNC Application

1. Log in in as SNC and su to root
2. Execute stty erase ^H (this allows you to use the backspace key)
3. Put in the SNC application cd
4. Enter the following commands:
   - **pfs_mountd -v &**
   - **pfsd &**
   - **pfs_mount -o xlat=unix /dev/dsk/*** /SD_CDROM**

   (***=the device location)
5. /tmp/loadSnc (new script for Release 8.0)

The following is the contents of the loadSnc script:

swinstall -v -s /SD_CDROM -x mount_all_filesystems=false -x reinstall=true SNC-2000.snc-install

6. At the # prompt run installSnc
   - Choose #3 Install/upgrade ITM Software
   - System prompts for DB Conversion (Y/N)
   - Load SNC application Yes
   - Workstation Information (Name, IP Address)
7. Exit all the way out to the login prompt
8. Log in as snc and type up

NOTE:
The following pages show screen displays that appear during the ITM SNC application installation:

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


The current SNC run level is "Shutdown".



============================================================
ITM SNC INSTALLATION AND CONFIGURATION PROGRAM    05-12-99


Current SNC Version: E8.0-110-btest-04/12/99

Main Menu:
1) Backup the current SNC database & configuration settings
2) Restore a previously saved SNC database & configuration
settings
3) Install/Upgrade ITM SNC software
4) Configure ITM SNC - making the provisioned parameters
effective
5) Display ITM SNC system information
0) Exit

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

Specify your choice by number: 4


Starting the SNC PROVISIONING process ...


At this time, you may choose a new set of environment param-
eters
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): (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
(c)Copyright 1989-1993  The Open Software Foundation, Inc.
(c)Copyright 1986 Digital Equipment Corp.
(c)Copyright 1990 Motorola, Inc.
(c)Copyright 1990, 1991, 1992 Cornell University
(c)Copyright 1989-1991 The University of Maryland
(c)Copyright 1988 Carnegie Mellon University

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


Setting SNC environments with /snc/bwx5.1/config_data/maa/
app_setup...

Your SNC environments are:
      RAPIDROOT=/tools/bwx5.1
      SNCROOT  =/snc
      ROAMCNFG =/snc/bwx5.1
      APPTAG   =SNC



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

Do you want to continue? (y,n): Set up coniguration files...
Reinitialize informix online...

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

Do you want to continue? (y,n): Verifying physical disk
space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
```

```
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Verifying physical disk space, please wait ...
DBspace/BLOBspace successfully added.
Re-start Informix Online ...

 8 dbspace(s) created successfully at [Wed May 12 14:21:56
EDT 1999] ...

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

    Informix configuration completed.

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

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

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 summ of the bits
specified before. For example: If the running environment is
is CMISE and OSI TL1 only then HYBRID_FLAG = 3

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

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) 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 net-
work 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) ?


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 expiration date of your Atos license (08-
jan-98): Please enter how many user-license do you have:
Please enter the license code:
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/bwx5.1
      SNCROOT  =/snc
      ROAMCNFG =/snc/bwx5.1
      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 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 ecfadd ...

Validating configuration file ....


Successful Validation.
Invoking RTcomp ...
Compilation successful.


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 automati-
cally.
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"!
```

GUI Installation

Background

The platform for the ITM SNC 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.

Installing the GUI client

The following procedure is used for installing the the GUI Client file onto the PC server.

Procedure: Installing the GUI Client

1. Create a directory on the server, that is, /reports/newClient, then tar xv the GUI Client file name from the tape to the server (for example, SNC-0126B.tar)
2. Create a directory on the PC, for example, c:\GUIclient, then cd into this directory.
3. Download WinZip from the internet (i.e. http://www.delrio.com/starting/winzip.html) or if you do not have access to the internet, use the tar.exe file which resides on the server which was read into the directory specified specified as in step (1) above.
4. Double click the SNC-0112.tar icon, and proceed with WinZip extraction by selecting the following in sequence: a) I Agree, b) WinZip Classic, c) Now select Extract, d) Then enter the destination directory to extract to, that is, c:\GUIclient. Or if you do not have WinZip, then open an MS-DOS window on your PC, change the directory to the directory where the GUI Client and the tar.exe both reside, for example c:\GUIclient, and then type the following: tar -xvf SNC-0126B.tar.
5. Either create a batch file or set the path in the Autoexec.bat (for Win95 only) with the location of the GUIclient file, that is, set GUI_INSTALL_PATH=c:\GUIclient (for Autoexec.bat)
6. Now type snc.bat -h hostname, that is, runpc.bat -h Siren.

Interface Setup

4

Contents

X.25 Interface

Overview

ITM SNC 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. ITM SNC 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 ITM SNC supports direct X.25 connections to the GNEs, generally connections are 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 ITM SNC to the GNEs.

SNC 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 SNC setup for X.25.

NOTE:
Before you start to configure the host machine for X.25, you must know the physical address of the Mux interface cards. You can find the addresses by typing the following command (you 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 SNC, 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:
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 SNC 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 SNC computer is connected to the X.25 network.

```
.x.121              408746500400(x.121 Address of SNC 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 designates sizes and networking control 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 the SNC host is connect to (that is, 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 networktype 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
```

Network Element	Type	How Many
DDM-2000	pvc	3
DDM-2000	svc	6
FT-2000	pvc	2
FT-2000	svc	6
OLS	pvc	2
OLS	svc	3

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 ITM SNC host computer can access a GNE via theX.25 PSN, the X.25 port on the NE must be configured to match the configuration as set in ITM SNC. This section describes how to configure the GNE to match the virtual configuration setup in ITM SNC for specific NE types. Note that:

- Each GNE may use unique PVCs/SVCs for its communication to ITM SNC.
- 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 ITM SNC database, it must:

- successfully communicate with the ITM SNC host computer on its unique PVCs/SVCs and
- have privileged logins and passwords defined.

Since ITM SNC Release 2.2, 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 ITM SNC. For example, ITM SNC 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 FT-2000 ADR

Channel definitions may be reconfigured via the Craft Interface Terminal (CIT).

SVC Setup

To configure an SVC table entry for use with ITM SNC, perform the following:

1. At the CIT, log into the FT-2000 using a privileged login (such as ATT01).
2. From the menu select: **`Security→Set→Security→Port`**
3. At the following prompts, enter:

   Type: **`X25`**

   Port Type: **All**

   A response similar to the following is displayed: Channel Type: **`Switched`**

   Table Entry: **`1`** to **`6`**

   OS Type: **`cmd-resp`**

   Calling Address: (**The X.121 address from the X.25 *config* file on the ITM SNC computer**).

NOTE:
Timeout 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 timeout is 30 and for subaddress is 1. Even though SNC will work with one VC, software management will not. It must have the second channel.

CAUTION:
*The Calling Address **must** be correct or the FT-2000 will not allow ITM SNC to log in with privileged access.*

PVC Setup

To configure a PVC channel for use with ITM SNC, perform the following:

1. At the CIT, log into the FT-2000 using a privileged login (such as ATT01).
2. From the menu, select: **Security→Set→Security→Port**
3. At the following prompts, enter:

   Type: **X25**
   Channel Type: **Permanent**
   Table Entry: **1** or **2** (depending on which channel you will be using)
   OS Type: **Other**

Verifying VC Setup

To verify the FT2000 X.25 virtual channel setup, perform the following:

1. At the CIT terminal, log into the FT-2000 using a privileged login (such as LUC01).
2. From the menu select: **Security→Retrieve→Security→Port**
3. At the prompt, enter:

   Port Type: **All**
   A response similar to the following is displayed:

```
   FT-2000-GNE 96-03-12 13:20:20 EDT
M  Retrieve-Security-Port:All: COMPLD
   /* Access Port Security Configuration Report

=================================================================
   Access          Port      Port Type/   Baud Rate/       Inactive
   Port    Channel  Status     OS Type      Calling Address   Timer

=================================================================
   dce              enabled    cit          auto              0
   dte              enabled    cit          auto              0
   dcc     vc-0     enabled    cit                            0
   -----------------------------------------------------------------
   x25     pvc-1               maintenance
   x25     pvc-2               other
```

```
   ----------------------------------------------------------------
   x25     tbl-1               cmd-resp     408746500400
   x25     tbl-2               cmd-resp     -
   x25     tbl-3               cmd-resp     -
   x25     tbl-4               cmd-resp     -
   x25     tbl-5               cmd-resp     -

================================================================
   Access          Port      Port Type/   Baud Rate/       Inactive
    Port    Channel  Status     OS Type      Calling Address   Timer

================================================================
   x25     tbl-6               cmd-resp     -
   */
```

NOTE:
In the above examples, X.25 PVC 2 is provisioned for ITM SNC access. X.25 Table Entry 1 (tbl-1) is set for Command/Response. This *does not* indicate a specific channel number, but instead indicates a list of authorized users who access this NE via any available SVC channel.

Lucent Technologies DDM-2000 OC-12

PVC Setup

To reconfigure a PVC, perform the following:

1. At the CIT, log into the DDM-2000 using a privileged login (such as LUC01).
2. At the < prompt, enter: **`ent-osacmap`**
3. At each prompt, you may enter a question mark (?) to see the valid choices.
4. Enter the following values:

   VC Type: **`pvc`**
   SNPA: **`1`** through **`9`** **(**to match ITM SNC)
   ACID: **`tl1Other`**

SVC Setup

To reconfigure an SVC, perform the following:

1. At the CIT, log into the DDM-2000 using a privileged login (for example, LUC01).
2. At the > prompt, enter: **`ent-osacmap`**

3. At each prompt, you may enter a question mark (?) to see the valid choices.
4. Enter the following values:

   VC Type: **svc**

   SNPA:**1** through **9 (**to match ITM SNC)

   SVC Calling Number: (the X.121 address)

   ACID: **tl1Other**

NOTE:
Timeout 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 timeout is 30 and for subaddress is 1. Even though SNC will work with one VC, software management will not. It must have the second channel.

Verifying VC Setup

To verify the DDM-2000 X.25 VC setup, perform the following:

1. At the CIT, log into the DDM-2000 using a privileged login (such as LUC01).
2. At the < prompt, enter: **rtrv-osacmap**

A response similar to the following is displayed:

```
      In progress...

         DDM-OC12-GNE 70-01-02 23:03:21 DDM-2000 OC-12, R5.0.4
      M  rtrv-osacmap: COMPLD
         /* OS Application Context Map Report

=====================================================================
         VC Type  SNPA Address      ACID

=====================================================================
         pvc      1                 tl1CR
         pvc      2                 tl1Other1
         svc 3               tl1MemoryAdministration
   */
```

Lucent Technologies DDM-2000 OC-3

PVC Setup

To reconfigure a PVC, perform the following:

1. At the CIT, log into the DDM-2000 using a privileged login (e.g. LUC01).
2. At the < prompt, enter: **ent-osacmap**
3. At each prompt, you may enter a question mark (?) to see the valid choices.
4. Enter the following values:

   VC Type: **pvc**
   SNPA:**1** through **9** (to match ITM SNC)
   ACID: **tl1Other**

SVC Setup

To reconfigure an SVC, perform the following:

1. At the CIT, log into the DDM-2000 as a privileged login (such as LUC01).
2. At the < prompt, enter: **ent-osacmap**
3. At each prompt, you may enter a question mark (?) to see valid choices.
4. Enter the following values:

   VC Type: **svc**
   SNPA: **1** through **9** (to match ITM SNC)
   SVC Calling Number: (the X.121 address)
   ACID: **tl1Other**

NOTE:
Timeout 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 timeout is 30 and for subaddress is 1. Even though SNC will work with one VC, software management will not. It must have the second channel.

Verifying VC Setup

To verify the DDM-2000 X.25 VC setup, perform the following:

1. At the CIT, log into the DDM-2000 using a privileged login (such as, LUC01).
2. At the < prompt, enter: **rtrv-osacmap**

   You will see a response similar to:

```
In progress...
```

```
   DDM-OC12-GNE 70-01-02 23:03:21 DDM-2000 OC-12, R5.0.4
M  rtrv-osacmap: COMPLD
   /* OS Application Context Map Report

================================================================
   VC Type  SNPA Address      ACID

================================================================
   pvc      1                 tl1CR
   pvc      2                 tl1Other1
   svc 3                 tl1MemoryAdministration
```

Lucent Technologies SLC-2000

PVC Setup

To reconfigure a PVC, perform the following:

1. At the CIT, log into the DDM-2000 as a privileged login (such as LUC01).
2. At the < prompt, enter: **ent-osacmap**
3. At each prompt, you may enter a question mark (?) to see the valid choices.
4. Enter the following values:

   VC Type: **pvc**

   SNPA:**1** through **9** (to match ITM SNC)

   ACID: **tl1Other**

SVC Setup

To reconfigure an SVC, perform the following:

1. At the CIT terminal, log into the DDM-2000 using a privileged login (such as LUC01).
2. At the < prompt, enter: **ent-osacmap**
3. At each prompt, you may enter a question mark (?) to see the valid choices.

   Enter the following values:

   VC Type: **svc**

   SNPA:**1** through **9** (to match ITM SNC)

   SVC Calling Number: (the X.121 address)

   ACID: **tl1Other**

NOTE:
Timeout 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 timeout is 30 and for subaddress is 1. Even though SNC will work with one VC, software management will not. It must have the second channel.

Verifying VC Setup

To verify the DDM-2000 X.25 VC setup, perform the following:

1. At the CIT, login in to the DDM-2000 using a privileged login (such as LUC01).
2. At the < prompt, enter: **`rtrv-osacmap`**

   A response similar to the following is displayed:

```
 In progress...

    DDM-OC12-GNE 70-01-02 23:03:21 DDM-2000 OC-12, R5.0.4
 M  rtrv-osacmap: COMPLD
    /* OS Application Context Map Report

=====================================================================
         VC Type  SNPA Address      ACID

=====================================================================
         pvc      1                tl1CR
         pvc      2                tl1Other1
         svc 3               tl1MemoryAdministration
```

Fujitsu Lightwave Multiplexing (FLM) network elements

All models of Fujitsu network elements are provisioned for ITM SNC access the same way. The X.25 data communication parameters described in this section are required for preparing Fujitsu NEs for inclusion in the ITM SNC database. All set-up parameters in the Fujitsu FLM NEs are configured using the FLEXR™ Graphical User Interface.

NOTE:
Verify that there are no more than four user logins defined before conditioning. When you add an NE to the ITM SNC database, ITM SNC adds four more users: snc1, snc2, snc3, and sncbkup. The maximum total number of users possible for an FLM is 10.

Getting Started

An IBM compatible computer loaded with the FLEXR software is required to configure a Fujitsu NE. In addition, a cable long enough to reach from the NE being prepared to the PC is also required. Connect the cable from an available serial COM port on the PC to the Craft Interface port on the front of the NE. A standard female DB9 to male DB25 cable modem cable, or female DB25 to male DB25 straight-thru cable may be used.

General Setup

1. Run the FLEXR application
2. Select **File/Preferences** and choose an **Access Mode** of **Direct**.
3. Select **Session/Logon** and proceed to log on to the Fujitsu NE. The network element which SNC will be physically connected to via the OSSI port is known as the Gateway Network Element (GNE).
4. Select **Provisioning/OSS Interface/LAPB Parameters**.
5. Select **Retrieve**

   You should see the following values appear in the window:

Parameter	Value
Window Size	7
Retry Timer	3
Packet Size	2104
Retransmits	10

   If the retrieved values are different, change the values to the ones shown above.

6. Select **OK** and **Yes** to send Command
7. Select **Initialize** and **Yes** to verify for update
8. Click on **Retrieve** and verify that LAPB parameters are correct.
9. Close the ED-OSSI window.
10. Select **Provisioning/OSS Interface/OSS Type and Service State**
11. Select **X25**
12. Select **In Service**
13. Select **OK** and **Yes** to send Command
14. Select **Initialize** and **Yes** to verify for update
15. Select **Retrieve** and verify that X.25 is In-Service.
16. Close the service state window

NOTE:
Only the GNE may have the OSSI port In Service. All other NEs on the ring MUST have their OSSI port Out Of Service (OOS). Otherwise, SNC will not be able to communicate to all the NEs.

PVC Setup

1. Select **Provisioning/OSS Interface/VC Parameters**.

   You will see a window that looks similar to:

   PVC
   SVC Access ID
   Channel Number
   Group Number
   Peer Address

2. Select **PVC** and then click on **Retrieve**.

   You should see a window that displays the currently provisioned PVCs. If there are existing PVCs, compare the parameter values with the following table:

	PVC #1	PVC #2	PVC #3
Access ID	1	2	3
Channel Number	1	2	3
Group Number	0	0	0
Peer Address	1111111	2222222	3333333

If there are no PVCs defined, perform the following steps for each PVC channel:

3. Select an **Access ID** equal to one (1)
4. Enter a **Channel number** of one (1)
5. Enter a **Group number** of zero (0)
6. Enter a unique seven digit **peer address** (1111111)
7. Click on **OK** and **Yes** to send Command
8. Click on **Initialize** and **Yes** to verify for update
9. Click on **Retrieve** and verify that VC parameters are correct.

Continue using the values specified in the table above for PVC #2 and PVC #3. Close the **PVC window.**

1. Select **Provisioning/OSS Interface/X.25 Parameters.**
2. Click on **Retrieve**

You should see a window that displays the currently provisioned X.25 parameters:

ED-X25	
X25 Address	4447771111
Packet Size	128
Window Size	2
Confirmation	N
Restart Timer	180
Request Timeout	200
Reset Timeout	180
Clear Timeout	180

Closed User IDs

Channel Lower 1

Channel Upper 255

NOTE:
For PVCs, the X25 Address and Closed User IDs fields are not necessary.

3. Click on **OK** and **Yes** to send Command
4. Click on **Initialize** and **Yes** to verify for update
5. Click on **Retrieve** and verify that X.25 parameters are correct.
6. Close the ED-X25 window

SVC Setup

1. Select **Provisioning/OSS Interface/VC Parameters**.

   You will see a window that looks similar to:

   PVC

   SVC Access ID

   Channel Number

   Group Number

   Peer Address

2. Select **SVC** and then click on **Retrieve**.

   You will see a window that looks similar to:

   SVC

   Access ID

   Peer Address

   Packet Size

   Window Size

   Confirmation

   Network User ID

You should see a window that displays the currently provisioned SVCs. If there are existing SVCs, compare the parameter values with the following table:

	SVC #1	SVC #2	SVC #3
Access ID	9	10	11
Peer Address	2105202401	2105202401	2105202401
Packet Size	128	128	128
Window Size	2	2	2
Confirmation	N	N	N
Network User ID			

If there are no SVCs defined, perform the following steps for each SVC channel:

3. Select an **Access ID** equal to nine (9)
4. Enter a seven-digit **Peer Address** (This is the X.121 Address of the SNC host)
5. Enter a **Packet Size** of 128
6. Enter a **Window Size** of two (2)
7. Enter a **Confirmation** of no (N)
8. Leave **Network User ID** empty.
9. Click on **OK** and **Yes** to send Command
10. Click on **Initialize** and **Yes** to verify for update
11. Click on **Retrieve** and verify that VC parameters are correct.

Continue using the values specified in the table above for SVC #2 and SVC #3. Close the **SVC window.**

1. Select **Provisioning/OSS Interface/X.25 Parameters**.
2. Click on **Retrieve**

You should see a window that displays the currently provisioned X.25 parameters:

ED-X25

X25 Address	6010502
Packet Size	128
Window Size	2
Confirmation	N
Restart Timer	180
Request Timeout	200
Reset Timeout	180
Clear Timeout	180
Closed User IDs	2105202401
Channel Lower	1
Channel Upper	255

NOTE:
For SVCs, the **X25 Address** field MUST contain the X.25 address of the FLM.

The **Closed User IDs** fields MUST contain the X.121 address of the SNC Host.

For example, if the SNC X.121 address is 2015202401, then the Closed User IDs field must contain the following values:
20152024010&20152024011&20152024012

Notice that there is an extra character appended to each address (0, 1, 2). This will allow SNC to sub-address multiple SVC calls to the same NE. Also, each entry must be separated by the "&" character.

3. Click on **OK** and **Yes** to send Command.
4. Click on **Initialize** and **Yes** to verify for update.
5. Click on **Retrieve** and verify that X.25 parameters are correct.
6. Close the ED-X25 window.

User Login Setup

Before the SNC host can log in to a Fujitsu NE, there are some restrictions and limitations that must be taken into account:

- All FLM NEs allow a maximum of ten (10) user logins.
- ITM SNC will require up to five (5) user logins (snc, sncbm snc1, snc2 & snc3).

1. Select **Session/Logon** and login as **ROOT**.
2. Select **Administration/Show current users**

You will see output similar to the following:

TID:FLM600-123456789012C

Time: Dec 31, 1998 12:23:42

No.	User Name	User Privilege	Active	Auto Time Out
1	ROOT	4	Y	Y
2	SNC	4	Y	Y
3	SNCB	4	N	Y
4	SNC1	4	N	N
5	SNC2	4	N	N

If any of the above IDs are Active (Except Root) perform the following to log them off:

- Close the Show Current Users window
- Select TL1 from the menu bar
- Select the TL1 command: CANC-USER
- Select Param Fill
- Enter the User IDs that were identified as active
- Select OK
- Select Send Cmd
- Repeat this for all the User IDs that were logged in (EXCEPT ROOT).

If the SNC login ID is not defined, perform the following:

Select **Administration/Create User**

Enter **User ID**: **SNC**

Enter **New Password** **SNC123**

Select **User Level** **4**

Enter **Time-out** **Yes**

Select **OK**

If the SNC1, SNC2 or SNC3 login IDs exist, they must be deleted. To delete User Ids, perform the following:

- Select **Administration/Delete User**
- Enter the **User ID** to be removed
- Click on **OK**
- Repeat for any other User IDs to be removed

NOTE:
If a User ID is active, you WILL NOT be able to delete it. You must first log the user off.

OSI LAN Interface

Overview

ITM SNC supports an OSI LAN interface to the NEs as follows: DDM-2000 OC-3 beginning with R13.0; DDM-2000 OC-12 beginning with R7.0; FT-2000 ADR beginning with R8.0; DDM-2000 FiberReach beginning with R3.0; TITAN 5500 FP5.0; and FLM NEs with 'S' series releases (for example, FLM 150 Release 11.0S). This feature is based on the standard seven layer OSI stack as specified in Telcordia's GR-253-CORE document. In this configuration ITM SNC directly establishes OSI connections between itself and each managed NE (analogous to the OSI connections between the GNE and each managed NE in the X.25 configuration). At least one NE in the subnetwork must have an IAO LAN interface, to serve as a physical gateway between OSI over the LAN and OSI over the DCC. The OSI LAN reduces performance bottlenecks by providing faster communications between ITM SNC and NEs, making possible functions such as remote software download.

SNC Setup for OSI

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

Procedure: Configuring OSI

1. Bring down the SNC application by typing dn
2. su to root
3. Run installSnc
4. Select **4) Configure ITM SNC** - making the parameters effective

Output similar to the following is obtained:

```
=======================================================
ITM SNC INSTALLATION AND CONFIGURATION PROGRAM    03-31-99


Current SNC Version: E8.0-83-dtest-03/08/99

Main Menu:
1) Backup the current SNC database & configuration settings
2) Restore a previously saved SNC database & configuration settings
3) Install/Upgrade ITM SNC software
4) Configure ITM SNC - making the provisioned parameters effective
5) Display ITM SNC system information
0) Exit
```

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

Specify your choice by number: 4

Do you want this SNC instance to support OSI (y/n)?: y
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)? 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 lanmux 2 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 - 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]:
s
```

OSI setup for network elements

The OSI parameters must be set up for the NE before OSI associations can be configured in ITM SNC using the Add an NE window. The procedure to configure the NE is as follows:

1. Click on Administer selection on the menubar of the Control Panel or map window. A pull-down menu is displayed.
2. Click on Network Model. A cascade menu appears.
3. Select Network Elements. The Choose a NE window appears.
4. To add a NE, click on Add a New NE button.
5. Enter the TID of the NE. (No spaces are allowed in TIDS)
6. Enter the Alias of the NE.
7. Enter logins and passwords for the NE
8. Select the NE type
9. In the communicate by field select OSI
10. Select 2 AssociationsMaintenance & Memory Admin

For any NE setup, the Network Service Access Point (NSAP) must equal the following, where the first 26 digits are the same as the ITM SNC host and **XXXXXXXXXXXX** is the MAC address of the NE:

39840f80000000000000000000XXXXXXXXXXXX

You can verify the ITM SNC host NSAP address by typing:

echo $SNC_NET

In the commands shown in this section:

tid represents the Target Identifier of the NE to which the command is addressed.

ctag represents the correlation tag, which is included in the command and is repeated by the NE in the response to allow you to associate the command and response messages.

Lucent Technologies DDM-2000 and SLC-2000 network elements

This setup applies to the following NEs and releases:

- DDM-2000 OC-3 Release 13.0
- DDM-2000 OC-12 Release 7.0
- DDM-2000 FiberReach Release 3.0
- SLC-2000 Release 4.4 Wideband Shelf (WBS)

From the CIT, use the following command sequence to retrieve and set up the NE parameters:

1. Enter the command: RTRV-ULSDCC-L3;

   Output similar to the following is obtained:

   ":L3IDP=39840F"
   ":L3DFI=80"
   ":L3ORG=000000"
   ":L3RES=0000"
   ":L3RD=0000"
   ":L3AREA=0000"
   ":L3SYS=08006A112345"
   ":L3SEL=00"
   ":Lv2IS=enable"

   The output parameters are:

   - L3IDP—Initial Domain Part. This is a hard-coded value.
   - L3DFI—A two-digit code that identifies the SONET dsp format. This value should not be changed.
   - L3ORG—The six-digit organization code.
   - L3RES—A four-digit code reserved for future use. This value should not be changed.
   - L3RD—The four-digit routing domain code. This value should not be changed.
   - L3AREA—The four-digit routing domain ID code.
   - L3SYS—The MAC address of the NE. This is a hard-coded value.
   - L3SEL—The two-digit NSAP selector code of the NSAP address. This is used to differentiate multiple NSAP addresses associated with the same end system. Its value is not fixed but is set in a PDU according to its usage. It is set to AF hex when TARP is run over CLNP. It has a value of ID hex when TP4 is run over CLNP. It is set to 00 hex for other uses. Its value is always shown as 00 hex when it is retrieved and displayed.
   - L3V2IS—This parameter indicates whether the NE is enabled or disabled as a Level 2 router. If the NE is serving as a Level 2 router for other areas, then it must be enabled.

The L3ORG, L3RES, L3RD, and L3AREA fields must match the NSAP address of the ITM SNC host.

2. To change any of the editable Level 3 parameters to match the ITM SNC host configuration, enter the command:

   ENT-ULSDCC-L3;

   Step through the prompts and change the L3ORG, L3RES, L3RD, L3AREA, or L3V2IS parameter, if necessary.

3. Enter the command: RTRV-ULSDCC-L4 (this command retrieves the Level 4 timers for OSI).

   Output similar to the following is obtained:

   ":L4TLIF=100"
   ":L4T1TM=15"
   ":L4T2TM=25"
   ":L4T3TM=40"
   ":L4T4TM=20"
   ":L4LFTM=5"
   ":L4LETM=5"
   ":L4ETDC=enable"

   The output parameters are:

   - L4TLIF—The TARP Lifetime parameter.
   - L4T1TM—The maximum time waiting for a response to a TARP Type 1 request.
   - L4T2TM—The maximum time waiting for a response to a TARP Type 2 request.
   - L4T3TM—The maximum time waiting for a response to an Address Resolution request.
   - L4T4TM—This timer starts when L4T2TM expires, and is used for error recovery.
   - L4LFTM—Sets the time period for flushing the TARP Loop Detection Buffer (Flush Timer).
   - L4LETM—Sets the Loop Detection Buffer time period for discarding TARP PDUs with a sequence number equal to zero. Acceptable values are 1 to 10 (minutes).
   - L4ETDC—Specifies if the TARP Data Cache is enabled or disabled. The default value is enable.

4. The default Level 4 timer settings work, so there is no need to change them. If it is necessary to change any of the Level 4 timers, enter the command: ENT-ULSDCC-L4;

   Step through the prompts, and change any of the Level 4 timer values.

Lucent Technologies FT-2000 network elements

From the CIT, use the following procedure to retrieve and set up the NE parameters.

1. Using the CIT software, choose the following menu options:

   Configuration→Retrieve→ULSDCC

2. Select either L3 or L4 and press the F9 key to execute the request.

   The following Level 3 or Level 4 parameters that are retrieved can be set:

   Level 3 parameters

   - Level 2 Router: Enable/Disable
   - Level 3 Organization: six-digit code
   - Level 3 Routing Domain: four-digit code
   - Level 3 Area: four-digit code

   Level 4 Parameters

   - TARP Data Cache: Enable/Disable

3. To set the parameters, choose the following menu options:

   Configuration→Set→ULSDCC

4. Select either L3 or L4 and press the F9 key to execute the request.

Fujitsu network elements

This setup is for Fujitsu NEs connected via OSS2 Port RJ45.

In the following command sequence, use the Retrieve (RTRV) commands to verify the setup of the following parameters, then use the Edit (ED) commands to change the parameters, as needed.

1. RTRV-NLP:*tid*:1:*ctag*;{ED-NLP:*tid*:1:*ctag*:::KEYWORD=DOMAIN;}

   AREAADDRESS=39840F80000000000000000000
   SYSID=00000E3A0811 {MAC ADDRESS, automatically set by NE}
   MAXAREA=3
   MANAREA=:
   ADJSYSID=:

2. RTRV-SDCC:*tid*:1:*ctag*;{ED-SDCC:TID:1:*ctag*:::KEYWORD=DOMAIN:IS;}

   1::K=7:IS
   1::T200=200:IS
   1::T2-3=10:IS
   1::N200=3:IS
   1::N201=512:IS

1::L2CR=PLUS-R:IS

1::AITS:IS

3. RTRV-OSSI:*tid*::*ctag*;{ED-OSSI:*tid*::*ctag*::X25::OOS;}

   {INIT-SDCC:TID:1:*ctag*;}

   X25:K=7:OOS

   X25:T1=3:OOS

   X25:N1=2104:OOS

   X25:N2=10:OOS

4. RTRV-LAN:*tid*::*ctag*;{ED-LAN:*tid*::*ctag*:::TARP=Y:IS;}

   {INIT-OSSI:*tid*::*ctag*;}

   ::TARP=Y:IS

   ::SIZE=1518:IS

   ::LSAP=FE:IS

NOTE:
For any other NE in the same ring as the FLM, the LAN interface must be configured for OOS (out of service). The GNE is responsible for all LAN service and the DCC-to-OSI conversion.

Tellabs TITAN 5500 PF5 network elements

Before using the following command sequence, certain hardware procedures must be folllowed. Refer to the Tellabs documentation for more details.

From the CIT, use the following command sequence to retrieve and set up the NE parameters:

1. RTRV-ROUTER::ROUTER:*ctag*;
2. ED-ROUTER::ROUTER:*ctag*:::ALMPF=3:IS;

   This command puts the router in service.
3. ENTROUTER::ROUTER:*ctag*:::L3AR=*XXXX*,L3ORG=*XXXXXX*, L3ROU=*XXXX*,L3SYS=*XXXXXXXXXXXX*;

   where:

   L3AR is a reserved four-digit code, not to be changed

   L3ORG is a six-digit organization code

   L3ROU is a four-digit routing domain code, not to be changed

   L3SYS is the MAC address of the NE
4. RTRV-TARP::TARP:*ctag*;
5. ED-TARP::TARP:*ctag*:::PROP=ON,TDC=ON,ORIG=ON:IS:

6. This command puts TARP in service.
7. RTRV-LAN::LAN:*ctag*;
8. ENT-LAN::LAN:*ctag*:::ALMPF=3:IS;

   This command puts the LAN in service.

System Administration

5

Contents

Overview

Description

ITM SNC 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 ITM SNC database.

The ITM SNC 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 System

Overview

The ITM SNC 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 ITM SNC application on the host computer should this become necessary.

NOTE:
Ordinarily the ITM SNC application is stopped only under the following conditions:

- The host computer needs to be rebooted
- The ITM SNC database needs to be restored
- A power outage affects the host computer
- An ITM SNC problem needs to be corrected

Bringing down the ITM SNC application

The following procedure is used to bring down the ITM SNC application.

Procedure: Bringing Down the ITM SNC Application

1. Log on to the ITM SNC 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 ITM SNC application

The following procedure is used to bring up the ITM SNC application.

Procedure: Bringing Up the ITM SNC Application

1. Log on to the ITM SNC 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 ITM SNC application using shutdown command

The Shutdown Command can be used to reboot the ITM SNC application. This command will gracefully shut down the SNC application and Informix database and reboot the system.

Procedure: Rebooting the ITM SNC Application using Shutdown Command

1. Log in as `root` to the ITM SNC host computer. A # prompt is displayed.
2. At the system prompt type `shutdown -r y 0` and press the Return key.

Database Backup and Restore

Overview

Maintaining tape backups of the database is critical to the overall reliability of ITM SNC. 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 ITM SNC 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 ITM SNC 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 ITM SNC 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.
- ITM SNC system performance is not affected during database backups.
- An ITM SNC database backup requires two tapes (may require more).
- 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 ITM SNC database requires that you bring the ITM SNC system down and take the INFORMIX database program off-line.

CAUTION:
These procedures assume that you are working with an ITM SNC database from the same release. If you are converting or backing up an ITM SNC database from a different release, call 1-800-225-4672 for technical assistance.

Backing up the ITM SNC 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 ITM SNC Database

1. 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.
2. Type **`ontape -s`** and press the Return key.

   The following prompt is displayed:

   ```
   Please enter the level of archive to be performed (0, 1, or 2)
   ```

   This command is interactive, and its prompts guide you through the archive process. It prompts you for the archive level (level 0 for an ITM SNC database archive). It also prompts you to label and mount new tapes.
3. At the prompt enter: **`0`**

   Performing an archive can take anywhere from a few minutes to over one hour depending on the size of the database.
4. When the archive is complete, you will see messages similar to the following:

   ```
   Please label this tape as number 1 in the archive sequence.


   Level 0 archive is 100 percent completed.

   date:  Thu Apr  4 18:08:19 1996
   ```

```
Tapes required to restore the system to the state
at the beginning of this archive:

Archive level:  0     Archive date:  Thu Apr  4 18:08:19 1996

Logical log unique id at the beginning of the archive:  1664

Program over.
```

An archive may also be performed by accessing **onmonitor** and selecting Archive→Create.

Restoring the ITM SNC database

The following procedure is used for restoring the ITM SNC database.

NOTE:
The system **must** be down to execute the restore procedure, and you **must** have the same database configuration.

Procedure: Restoring the ITM SNC Database:

1. Log into the ITM SNC host using the `snc` login.
2. Bring the ITM SNC application down by typing **dn** and pressing the Return key at the system prompt.
3. Log into INFORMIX by entering **`su - informix`** and pressing the Return key at the system prompt.
4. Make sure you have a correct *onconfig* file under *../etc*.
5. Type **`onmonitor`** and press the Return key at the system prompt.
6. From the INFORMIX main menu, select Mode by typing **`m`** and press the Return key.
7. Select Graceful Shutdown by typing **`g`** and pressing the Return key.
8. Select Take Off-line by typing **`t`** (the letter) and pressing the Return key.
9. From the OnMonitor menu, select Archive by typing **`a`** and pressing the Return key.
10. To start the restore process, select Restore by typing **`r`** and pressing the Return key.

    The restore process is interactive, and its prompts guide you through the process. When the restore process is complete, the Onmonitor menu becomes functional and the INFORMIX software is in quiescent (administrative) mode.

11. Exit the Archive menu by typing **e** and pressing the Return key.
12. Go to the Mode menu by typing **m** and pressing the Return key.
13. Put INFORMIX in on-line mode by typing **o** and pressing the Return key.
14. Leave **onmonitor** by typing **e** and pressing the Return key.
15. Log out of INFORMIX.
16. Start the ITM SNC 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.

NOTE:
The ITM SNC application **must** be shut down before doing a database export

Procedure:Exporting the Database to a Directory

1. Log in as snc.
2. Bring the ITM SNC application down.
3. At the UNIX prompt, use the following command to back up the ITM SNC database to a directory:

   dbexport snc_db -c -ss -o <directory>

4. When done, the message “dbexport complete” indicates the procedure has been sucessfully completed.

Procedure:Exporting the Database to Tape

1. Log in as snc.
2. Bring the ITM SNC application down.
3. At the UNIX prompt, use the following command to back up the ITM SNC database to tape:

   dbexport snc_db -c -ss -t /dev/rmt/0m -b 512 -s 2000000

4. When done, the message “dbexport complete” indicates the procedure has been sucessfully 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 ITM SNC application **must** be shut down before doing a database import.

Procedure:Importing the Database from a Directory

1. Log in as snc. If an ITM SNC database exists, drop it by running the following command at the UNIX prompt:

   drdb

   Messages similar to the following are displayed:.

```
...Database "snc_db" dropped...
...Target group [ALL] removed...
...Node Coordinates file removed...
...Aggregates Data file removed...
warning: commands will be executed using /usr/bin/sh
...DNO and Backup Scheduled jobs removed...
```

2. Use the following commands at the UNIX prompt:

   dbimport snc_db -d snc_dbs -c -i <directory

   db_logging -U snc_db

3. When done, the message “dbimport complete” indicates the procedure has been sucessfully completed.

Procedure:Importing the Database from Tape

1. Log in as snc. If an ITM SNC database exists, drop it by running the following command at the UNIX prompt:

   drdb

2. Insert the tape and verify the tape contains the correct content by running the following command at the UNIX prompt:

   tar tvf <tape device>

   For example:

   tartvf/dev/rmt/0m

3. Next, use the following commands at the UNIX prompt:

   dbimport snc_db -d snc_dbs -c -t /dev/rmt/0m -b 512 -s 2000000

   db_logging -U snc_db

4. When done, the message “dbimport complete” indicates the procedure has been sucessfully completed.

Remote Printer Operations

Configuring remote printers

The ITM SNC host system configuration normally supports up to four remote parallel printers which print autonomous messages in real time. Additional remote printers can be configured on an as-needed basis. The ITM SNC host communicates with a remote printer via a TCP/IP address/Internet address that usually exists on the same network as the ITM SNC host machine. The remote printers are supported by a Lantronix Print Server that interfaces with the network using its IP address. Each remote printer is associated with one or more Target Groups. If no Target Group is specified, the remote printers are associated with the Target Group ALL by default.

The major steps in configuring remote printers for the ITM SNC host are as follows:

1. Specify the unique IP addresses of the remote printers in the */etc/hosts* file.
2. Configure the Lantronix's IP address.
3. Create the necessary Target Groups through the ITM SNC GUI.
4. Assign the Target Group(s) for each remote printer on the ITM SNC Print Server using the **OAM_RpClient** command.
5. Enable the remote printers that are known to the ITM SNC Print Server using the **OAM_RpClient** command.
6. Test remote printer output by simulating an alarm or by sending a test print job using the**OAM_RpClient** command.

Setting up a printer IP address

The following procedure is used to set up a printer IP address.

Procedure: Setting Up a Printer IP Address

1. Log into the ITM SNC host machine.
2. Using the **su** command, log in as super-user.
3. Modify the */etc/hosts* file to include one IP address for each printer on the network. The IP address should be an address that is currently not in use. The entry in */etc/hosts* should look something like this:

   ```
   xxx.xxx.xxx.xxx  printer1 #comment about this device
   ```

   where `xxx.xxx.xxx.xxx` is the IP address..

Print server administration

Configured remote printers that have been identified to the ITM SNC host must be added to the ITM SNC Print Server using the **OAM_RpClient** command. The Target Group(s) that the printer serves must be identified for routing alarms. Once added, a remote printer is enabled to accept ITM SNC alarms and messages. The enable request is sent via the remote printer client.

The **OAM_RpClient** command is used with various options to add, change, or delete printers and associated Target Groups, enable and disable printers, list printer statuses, and send test jobs to print. These remote printer operations are explained below.

Adding a New LAN Printer or Target Group for a Remote Printer

At the UNIX prompt, enter the command:

OAM_RpClient -A -p prn1=*lanptr1* [-g trg1=*tgrp1:trgrp2:trgpr3:...*]

prn1 indicates this is the first LAN printer in the ITM SNC system, **prn2** indicates the second LAN printer, and so forth.

lanptr1 is the name of the Lantronix Print Server defined in the */etc/hosts* file.

The **-g** option is used to specify the Target Group(s) associated with the added printer for alarm routing/printing purposes. Each target group is separated by a colon (:). If no Target Group is specified, the default is [All].

As an example, if you enter:

OAM_RpClient -A -p prn1=sncptr1

you see a response similar to the following:

```
Printer Added
Printer     : sncptr1
TargetGroup : [All]
-------------------------------------------
```

If you specify one or more Target Groups for the newly added printer, enter:

OAM_RpClient -A -p prn2=sncptr2 -g trg2=ddmonly:ftonly

you see a response similar to the following:

```
Printer Added
```

```
Printer     : sncptr2
TargetGroup : ddmonly:ftonly
-------------------------------------------
```

Enabling a LAN Printer

At the UNIX prompt, enter the command:

OAM_RpClient -e -p prn1=*lanptr1*[,prn2=*lanpttr2*,...]

When a remote printer is added, it is enabled, by default.

Disabling a LAN Printer

At the UNIX prompt, enter the command:

OAM_RpClient -d -p prn1=*lanptr1*[,prn2=*lanpttr2*,...]

Removing a LAN Printer or Target Group From a LAN Printer

At the UNIX prompt, enter the command: **OAM_RpClient -D -p prn1=*lanptr1* [-g trg1=*TG1*:*TG2*:*TG3*, trg2=*TG2*,...]**

prn1 indicates this is the first LAN printer in the ITM SNC system.

lanptr1 is the name of the printer defined in the */etc/hosts* file.

trg1 indicates the first set of Target Groups to be dropped from **prn1**. **trg2** indicates the second set of Target Groups to be dropped from **prn1**.

A sample response to this command would be as follows:

```
Printer Dropped
Printer     : sncptr1
-------------------------------------------
```

This command removes the printer or associated Target Group(s) from interaction with the ITM SNC application but does not remove them from the ITM SNC host machine.

Listing the Existing LAN Printers and Statuses

At the UNIX prompt, enter the command: **OAM_RpClient -l**

The output of this command shows the printer, Target Group, Operational State, and Administrative State.

The Operational States are shown in the following table.

Operational State	Meaning
Connection Failed	Printer must be rebooted for new connection
Connection OK	Data can be sent to this printer
Connection in Progress	Wait until connection is made before sending data to printer
Printer Busy	Not all alarm data can be sent to printer
System Broke	Non-recoverable error (for example, wrong IP address)
Connection Broke	Cannot communicate with printer; reboot and try to establish new connection

The Administrative States are Enabled or Disabled.

An example of this command is the following:

```
Printer    TargetGroup    Operational State
Administrative State
-------------------------------------------------------
---------
sncptr1         [All]          ConnectionOK    Enabled
sncptr2         ddmonly        PrinterBusy     Enabled
```

Listing Spooled Messages for a Printer

At the UNIX prompt, enter the command: **OAM_RpClient -L -p prn1=*lanptr1***

All alarm messages to be printed are spooled except for throttled messages. Throttled alarm messages are stored in a separate log file under *$SNCROOT/etc/FM*.

Clearing Spooled Messages from a Printer

At the UNIX prompt, enter the command: **OAM_RpClient -F -p prn1=*lanptr1***

Sending a Test Alarm to a Printer

At the UNIX prompt, enter the command: **OAM_RpClient -S -p prn1=*lanptr1* [-g trg1=*tgrp1*:*trgp2*:*trgp3*, trg2=*tgrp2*,...]**

Sending a Test Print Job to a Printer

At the UNIX prompt, enter the command: **OAM_RpClient -S -P *filename* -p prn1=*lanptr1* [-g trg1=tgrp1:*trgp2*:*trgp3*, trg2=*tgrp2*,...]**

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:

- Network Management System Troubleshooting
- Investigating the ITM SNC Application
- Investigating INFORMIX
- Investigating Data Communication Problems
- Testing LAN Connectivity

Troubleshooting tools

The following table lists the most commonly used commands and utilities to administer and troubleshoot ITM SNC. 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
ITM SNC application	up	snc	Starts the ITM SNC application.
	dn	snc	Stops the ITM SNC application.
	appstat	snc	Checks for ITM SNC processes that have respawned.
	cmtool	snc	Displays communication status for NEs.
	gui_probe	snc	Displays present GUI information.
INFORMIX	locks	snc	Displays any locks held on the database.
	onstat	snc	Displays Informix information.
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 ITM SNC processes that are > 2400 KB in size.

Area	Command	Login	Description
COMM	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.
	pvctest	any	Exercises communication via a specified PVC to a network element
	svctest	any	Exercises communication via a specified SVC address to an NE.
	osiopu	any	Monitors the OSI stack on the host

Network Management System Troubleshooting

Network management system X.25 port definition (NMA)

This section provides information about resolving problems that result from the ITM SNC X.25 interface with the Network Management System (NMS).

Network Management System X.25 Port Definition (NMA Link)

The ITM SNC upstream Network Management System X.25 port definition defaults to MUX 0, Port 6 (m0p6). This port must be configured for SVC traffic only and is only expected to receive incoming calls. ITM SNC *will not* place any outgoing SVC calls to an upstream NMS.

To change the port definition, perform the following:

1. Log in as `snc`.
2. Modify the file */snc/etc/deconfig.local*

   Add the following line to the end of the file:

```
CN_Northbound=CN_Northbound -t5 -T5  -immpp -x \* -
m01 -p10101 -dCM -snx25_01
```

   where **mmpp** is the Mux and Port number (for example, m0p7).

NOTE:
This change will not take affect unless BaseWorX is reconfigured.

Setting Up a Secure ASCII Alarm Interface (SAAI) Session

ITM SNC provides an ASCII version of the NMS upstream OS interface known as the Secure ASCII Alarm Interface (SAAI).

The following procedure describes how to establish an SAAI session.

1. Create an NMA-type user in the ITM SNC application. On the ITM SNC Map window, select `Administer→Security→Logins`
2. Select `Add a New User`
3. Enter the login name, followed by the Tab key.
4. Enter the name of the new user, followed by the Tab key.
5. Select a current user from the Copy from User list (select NMA).
6. Click OK. The Modify User window is displayed.
7. Enter the Password, followed by the Tab key.
8. Re-enter the Password, followed by the Tab key.

9. Select the User Type: `Normal`, `NMA`, or `OPSINE`

   To observe autonomous messages/alarms and for command/response capability, select the type `NMA`.

   To observe database change (RPT-DBCHG) messages and for command/response capability, select the type `OPSINE`

   To observe only commands/responses, select `Normal`

   > It is recommended that you select the type `NMA` for alarm message monitoring.

10. Select a Command and Target Group for the new user.
11. Click OK. The new user is added to the Choose a User List.

Establishing an SAAI/NMA Session

The following procedure describes how to establish an SAAI/NMA session.

1. Using a workstation, PC, or dumb ASCII terminal, gain access to an HP host login prompt.

   From a workstation:

   a. Issue **`telnet <`*`hostname`*`>`**

      Do not use the **`rlogin`** method.

   b. At the `login:` prompt, enter the login **`tll`**

   c. Wait for 10 seconds; you may be prompted with `TERM[hp]`. If so, enter your terminal type (for example, `vt100`, `hp`).

   d. Press the Enter key several times and the cursor advances with no prompt presented.

2. Select an NE to log into for observing autonomous alarms using the ACT-USER command.

The following is a sample login session. In the example shown, the ITM SNC user is `nma`, but you will want to use the new NMA-type user as shown in the **Setting Up a Secure ASCII Alarm Interface (SAAI) Session** section. For this example, the DDM-2000 OC-3 NE, 'SNC-OC3-K' was selected for observing autonomous alarms. Also, note that proper TL1 command syntax must be used; otherwise, you will either receive an error message or no message at all indicating that there is a problem.

A semi-colon (;) character at the end of the input shown in the sample session replaces the Enter key; therefore, the Enter key is not required. The form of the ACT-USER command used in the example is as follows:

act-user:<*TID*>:<*SNC user login*>:<*ctag*>::<*SNC user password*>;

where:

TID is the TID you wish to survey.

SNC user login is the new ITM SNC user you created

ctag is a unique command identifier tag used for command response cross reference (such as **123** or **xyz**).

SNC user password is the password you assigned to the new ITM SNC user login.

Be sure to put the colon (:) and semicolon (;) characters as shown in the example; otherwise, you will receive an error message or no output.

```
>login: tl1
>Please wait...checking for disk quotas
>(c)Copyright 1983-1994 Hewlett-Packard Co.,  All Rights
Reserved.
>(c)Copyright 1979, 1980, 1983, 1985-1993 The Regents of
the Univ. of
>California
>(c)Copyright 1980, 1984, 1986 Novell, Inc.
>(c)Copyright 1986-1992 Sun Microsystems, Inc.
>(c)Copyright 1985, 1986, 1988 Massachusetts Institute of
Technology
>(c)Copyright 1989-1993  The Open Software Foundation, Inc.
>(c)Copyright 1986 Digital Equipment Corp.
>(c)Copyright 1990 Motorola, Inc.
>(c)Copyright 1990-1992 Cornell University
>(c)Copyright 1989-1991 The University of Maryland
>(c)Copyright 1988 Carnegie Mellon University
>
>                         RESTRICTED RIGHTS LEGEND
>Use, duplication, or disclosure by the U.S. Government is
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>Technical Data and Computer Software clause in DFARS
252.227-7013.
>
>                         Hewlett-Packard Company
>                         3000 Hanover Street
>                         Palo Alto, CA 94304 U.S.A.
>
```

```
>Rights for non-DOD U.S. Government Departments and
Agencies are as set
>forth in FAR 52.227-19(c)(1,2).
>
>Setting up the SNC environments at SNCROOT = /snc....
>)
>Setting SNC environments with /snc/bwx5.1/config_data/
maa/app_setup...
>
>Your SNC environments are:
>        RAPIDROOT=/tools/bwx5.1
>        SNCROOT  =/snc
>        ROAMCNFG =/snc/bwx5.1
>        APPTAG   =SNC
>
>*** You may get prompted for TERM type here - but NOT
ALWAYS !!!! ***
>
>
>act-user:SNC-OC3-K:nma:ctag::nma123;
>
>   SNC-OC3-K 97-08-06 17:16:29
>M  ctag COMPLD
>   "nma"
>   /*    LUCENT TECHNOLOGIES DDM-2000 OC-3 Multiplexer
>         RELEASE 11.0.3
>         User Privilege Level: PRIVILEGED
>             LUCENT TECHNOLOGIES - PROPRIETARY
>        THIS SOFTWARE IS NOT TO BE DISCLOSED OR USED EXCEPT
>          IN ACCORDANCE WITH APPLICABLE AGREEMENTS.
>        UNAUTHORIZED ACCESS OR USE MAY LEAD TO PROSECUTION.
>   */
>;rtrv-sys:SNC-OC3-K::ctag1;
>
>IP ctag1
><
>
>   SNC-OC3-K 97-08-06 17:16:58
>M  ctag1 COMPLD
>   "product=ddm-2000 oc-3 (hw), dormant_release=none,"
>   "tid=SNC-OC3-K, gne=active, agne=yes, dsne=no,
x25ps=256,"
>   "crs=manual, almgrp=255, idle=ais, site=54, ne=2,"
>   "agne_address=SNC-OC3-L, agne_address=SNC-OC12-HH,"
>   "dsne_address=SNC-OC3-J,"
>   "shelf=2, cort=rt, tbaddr=1,"
>   "tblink=noTBOS, tbrem=disabled,"
>;rtrv-eqpt:SNC-OC3-K:all:ctag2;
>;canc-user:SNC-OC3-K;
>
>M   COMPLD
>;
```

Notes on Establishing an SAAI Session:

- The UNIX TL1 login will only support eight instances per host
- The ITM SNC login to be used for logging into the NEs via the TL1 interface can have as many occurrences as there are NEs.

Securing ASCII Alarm Interface (SAAI) Window on Workstations

The SAAI/NMA interface can be piped to a printer similar in function to the LAN printer, except that the user may selectively monitor certain network elements.

The following files located in the user's *$HOME/bin* directory are used to invoke the Alarm window on a workstation:

- *alarms*—opens a new xterm window to display the output.
- *tl1*—activates the SAAI interface on the ITM SNC host.

Checking SAAI Lock Files

For each instance of SAAI, a lock file is created. On occasion, these lock files become out of sync and may need to be manually corrected.

To list the active SAAI processes on an ITM SNC host:

At the UNIX prompt, enter the command: **`ps -ef | grep ntty`**

Output similar to the following is displayed:

```
     tl1 20394 20393  0 11:12:51 ttyp8    0:02 CN_CmdProc
-p 10151 -d CM -s ntty_01 -m CmdProc_01 -t 0 -T 0
     tl1 20393 20362  0 11:12:49 ttyp8    0:00 CN_Tty -t0
-T0 -mCmdProc_01 -p10151 -d CM -s ntty_01
```

The SAAI interface is composed of two processes:

- *CN_Tty* provides the tty interface to the user.
- *CN_CmdProc* is the command processing interface to the ITM SNC application.

These processes can be paired together using the **-p** option.

In the example above, these processes are both using socket 10151 as specified by the option **-p 10151**.

For each set of "paired" *CN_Tty* and *CN_CmdProc* processes, the **s** option indicates the instance number. In the example above, this SAAI is Instance 01 as specified by the option **`-s ntty_01`**.

NOTE:
If two processes cannot be paired, then the instance of SAAI may be hung and must be cleared manually (as described in the following section).

Verifying SAAI Lock Files

To verify the SAAI lock files:

1. At the UNIX prompt, enter the command: **`cd /tmp/CN_ttylocks`**
2. At the UNIX prompt, enter the command: **`ls -l`**

   Output similar to the following is displayed:

```
-rw-rw-r--   1 tl1     snc          0 Apr 14 13:59 tty01.lock
```

   For each set of "paired" *CN_Tty* and *CN_CmdProc* processes, a lock file must exist to prevent contention.

   In the example above, *tty01.lock* indicates SAAI Instance 01 is active.

CAUTION:
If paired processes exist, but there is no lock file, contention will occur if another user wishes to initiate an SAAI Instance.

3. Perform either of the following:

- Manually create the appropriate lock file.

  To manually create an SAAI lock file:

  a. At the UNIX prompt, enter the command: **`cd /tmp/CN_ttylocks`**

  b. At the UNIX prompt, enter the command: **`> ttyxx.lock`**

     where **xx** is the SAAI Instance number 01 to 08.

  c. At the UNIX prompt, enter the command: **`chmod 664 ttyxx.lock`**

  d. At the UNIX prompt, enter the command: **`chown tl1:snc ttyxx.lock`**

- Kill the orphaned SAAI Instance.

  To kill an orphaned SAAI Instance:

  a. Login to the host as *root* or *su* (super-user).

b. At the UNIX prompt, enter the command: **`ps -ef | grep ntty`**

For example, you may see output similar to:

```
tl1 22445 ?  0  Apr 14  ttyp1  3:20 CN_CmdProc -p
10151 -d CM -s ntty_01 -m CmdProc_01 -t 0 -T 0
```

Note the PID of the "orphaned" SAAI process. In this case it is **22445**.

c. At the UNIX prompt, enter the command: **`kill`** ***`SAAA.pid`***

where ***`SAAA.pid`*** is the UNIX PID of the SAAI process retrieved in Step 2., for example**: `kill 22445`**

If the “kill” does not work, try sending the command again.

NOTE:
If SAAI still persists, then use the **-9** option in the **kill** command, for example: **`kill -9 22445`**

The -9 option sends an unconditional kill to the process.

Investigating the ITM SNC Application

APPSTAT

The **appstat** command reports the ITM SNC application status.

At the UNIX prompt, enter the command: **appstat**

If the application is up, you see a message similar to:

```
CURRENT RUN LEVEL IS: Running

DEMONS:


siren:appstat

CURRENT RUN LEVEL IS: Running

DEMONS:


Demon Name      Pid   Process Name     Strt Persist  Respawns
                                            Opt

ccd              27176 ccd -f $CCP_DIR -e / R Yes        0
logdaemon        27178 SNC_LogDaemon        R Yes        0
orbixd           27181 orbixd -u -c $ROAMLO R Yes        0
stackHpov        27183 OsiStack /tmp/stackH R Yes        0
ifr              27260 ifr -L > $ROAMLOG/IF R  No        0
GUI_TrcServer    27276 GUI_TrcServer TRACE_ R  No        0
LM_Logger        27284 LM_Logger -s $LML_SI R  No        0
LM_Browser       27290 LM_Browser -k /tmp/L R  No        0
NEH_Server       27299 NEH_Server -server N R  No        0
CM_Server        26745 CM_Server -l /tmp/CM R  No        0
SDS_Server       21413 SDS_Server -l /tmp/S R  No        0
CS_SbOsi         27621 CS_SbOsi -s CS_SbOsi R  No        0
CS_Southbound    16698 CS_Southbound -s CS_ R  No        0
SB_TL1Mgr         3589 SB_TL1Mgr -server SB R  No        0
CF_NeAgent       15335 CF_NeAgent -server C R  No        0
CF_Network       27652 CF_Network -server C R  No        0
CF_DbServer      27662 CF_DbServer -server  R  No        0
FM_DbServer      27694 FM_DbServer FM_Db /t R  No        0
FM_Server        27704 FM_Server FM_Server  R  No        0
SNC_Mon          27744 SNC_Mon SNC_Mon FM_S R  No        0
BR_bacres        27756 BR_bacres -server BR R  No        0
SM_Security      27766 SM_Security -lockfil R  No        0
GDB_Server       28091 GDB_Server GDB_Serve R  No        0
GDB_ServerFile   28093 GDB_ServerFile GDB_S R  No        0
GDB_ServerNtwk   28094 GDB_ServerNtwk GDB_S R  No        0
OBR_Main         28096 OBR_Main -server OBR R  No        0
```

```
SWM_Gateway      18047 SWM_Gateway -server  R  No        0
TLA_MsgHandler   28205 TLA_MsgHandler -serv R  No        0
TLA_CmdHandler   28209 TLA_CmdHandler -serv R  No        0
CN_Northbound    28232 CN_Northbound -t5 -T R  No        0
OAM_Scheduler    28253 OAM_Scheduler -serve R  No        0
GUI_Server       19484 GUI_Server GUI_Serve R  No        0
GUI_AdminServer  28262 UI_AdminServer GUI_A R  No        0
GUI_JvmLauncher  28263 GUI_JvmLauncher      R  No        0
PM_Dc            28297 PM_Dc -server PM_Dc  R  No        0
OAM_BcServer     28368 OAM_BcServer -server R  No        0
OAM_RpServer     28370 OAM_RpServer -t $RP_ R  No        0
```

The **ITM SNC** 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 ITM SNC application is not up.
- **Administrative**—The ITM SNC application is in transition (coming up or going down).
- **Running**—The ITM SNC 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.

UP

The **up** command starts the ITM SNC 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 ITM SNC application. The usage of this command is as follows:

dn [y] [delay]

where **[y]** activates the automatic GUI kill option. (Default = **n**)

[delay] specifies the delay in seconds before bringing down the application. The default is **0**.

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
```

If a GUI is running when the *dn* script is executed, you see a warning similar to:

```
1 SNC GUIs are still running on snch

     snc  5697  5096  7  Apr 30  ttyp5    0:10 UI_GUI -m
snch -p 3 -i /tools/tmp/snch3/Input_Pipe -t 0

Continue with shutdown (Killing GUIs)? (Y/N) [N]
```

At the prompt, enter **Y** to kill any active GUIs and continue with the shutdown. Otherwise, enter **N** and the shutdown will be aborted.

CM_Tool

The cmtool utility allows you to do a couple of things. First, it allows you to check the communication status of your network elements.

cmtool -h <hostname> -a

siren: cmtool -h siren -a

[27905: New Connection (135.17.13.171,IT_daemon,*,snc,pid=11009,optimised)]

[27905: New IIOP Connection (135.17.13.171:1596)]

Ne tid	NE Active	NE Type	Channel Id	Link Status	Login Status	VC Type	VC Port	VC Info
1 2.5G	Y	TCP	361	Down	Off			
2 400G-Test	Y	TCP	355	Down	Off			
3 FLM150PLUS-C	Y	GNE	559	Down	Off	PVC	m0p5	9

```
 4 FLM150PLUS-D     Y    RT     559    Down   Off
 5 SNC-OC3-J        Y    OSI      4      Up   On
 6 SNC-OC3-K        Y    OSI     10      Up   On
 7 SNC-OC3-M        Y    OSI      7    Down   Off
 8 SNC-OC12-AA      Y    GNE    688      Up   On    SVC  m0p5  4418020
```

As you can see from the preceding list, 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 and deactivate your network elements. To deactivate a network element, type the following:

cmtool -h <hostname> -n <TID> -o d

siren:cmtool -h siren -n SNC-OC12-MM -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 -h <hostname> -n <TID> -o a

siren:cmtool -h siren -n SNC-OC12-MM -o a
[29645: New Connection
(135.17.13.171,IT_daemon,*,snc,pid=11009,optimised)]
[29645: New IIOP Connection (135.17.13.171:1596)]

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**

siren:wgui 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
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
ClientSockId31        0
ClientSockId32        0
ClientSockId34        0
GS>exit
```

Investigating INFORMIX

Overview

The following section verifies the INFORMIX application. The ITM SNC Release 8.0 software uses INFORMIX-SQL Release 6.05 and On-line Release 7.32 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

ISQL Software Version

The INFORMIX-SQL version and serial number loaded on the ITM SNC host can be retrieved.

At a UNIX prompt, enter: **`isql -v`**

You should see messages similar to the following:

```
INFORMIX-SQL Version 6.05.UD1
Software Serial Number AAA#C533980
```

Each system has a unique software serial number for their location.

The INFORMIX-SQL version, however, should be as stated above.

On-Line Software Version

The INFORMIX On-line version and serial number loaded on the ITM SNC host can be retrieved.

At a UNIX prompt, enter: **`$INFORMIXDIR/lib/sqlrm`**

You see messages similar to the following:

```
INFORMIX-OnLine Version 7.23.UC1 Thu Oct 26 15:22:51 CDT
1995
Software Serial Number AAA#C533979
```

Each system has a unique software serial number for its location.

The INFORMIX On-line version, however, should be as stated above.

Database Locks

The locks that the ITM SNC 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 ITM SNC 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-OnLine Version 7.23.UC1   -- On-Line -- 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.

The physical_log partition utilizes as much space in its partition as it can. Therefore, it is acceptable for the free column value for this partition to be very low.

Investigating Data Communication Problems

Overview

The following section provides information on checking the X.25 data communications from the ITM SNC host's point of view. All these utilities can be used independently of the ITM SNC application and should be used to isolate potential communication problems external to the ITM SNC application.

Utilities

Checking Level 2 Status of X.25 Network Connections

To display a status of each X.25 port on the SNC 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 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 ITM SNC 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 right 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 dis-

played (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 ITM SNC 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 ITM SNC 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 SNC 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		

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:

1. 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.
2. 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` (super-user).
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
```

Resetting X.25 System Drivers

If there is loss of communications to all ITM SNC 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.”

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 -h <hostname> -n <TID> -o d`
3. Repeat this step for all GNEs.
4. Respawn the Southbound Process, *CS_Southbound*, to reset the X.25 interface.
5. Reset the X.25 drivers using the command:
   `/etc/x25/x25_config.rc`
6. Reactivate system links using the command:
   `cmtool -h <hostname> -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 ITM SNC application and are used to verify X.25 PSN connectivity before an NE is added to the ITM SNC 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:

```
siren:gneVcinfo

                    Total  CR1       Auto       CR2
TargetId           VCs   VCType   VCType    VCType   X121Address Psn
------------------- -----  --------  --------   -------- -----------
SNC-OC3-J           1    MADM 2                              Osi
SNC-OC3-M           2    MADM 2   MANT 1                     Osi
SNC-OC3-K           2    MADM 2   MANT 1                     Osi
OSI-PUMBAA          1    MANT 1                              Osi
OSI-GIZMO           1    OTHR 5                              Osi
OSI-SIREN           1    MANT 1                              Osi
SNC-RT-D            2    MADM 2   MANT 1                     Osi
SNC-FT-E1           2    PVC  18  PVC  19                    m0p5
SNC-RT-B            2    PVC  6   PVC  7                     m0p5
SNC-OC3-R           2    MADM 2   MANT 1                     Osi
SIM-WBM1            2    PVC  1   PVC  2                     m0p6
SNC-NCC-A           1    64                                  Osi
SNC-NCC-B           1    64                                  Osi
SNC-WBS-E           2    MADM 2   MANT 1                     Osi
SNC-OC12-GG         2    MADM 2   MANT 1                     Osi
SNC-OC12-HH         2    MADM 2   MANT 1                     Osi
SNC-OC12-LL         3    SVC      SVC      SVC     4418010       m0p5
RATBERT             2    PVC  23  PVC  24                    m0p5
NCC                 1    25                                  Osi
SNC-OC3-E           1    MANT 1                              Osi
SNC-FT-G1           2    PVC  15  PVC  16                    m0p5
SNC-RT-C            2    MADM 2   MANT 1                     Osi
SNC-WBS-C           2    MADM 2   MANT 1                     Osi
SNC-WBS-F           2    MADM 2   MANT 1                     Osi
SNC-WBS-G           2    MADM 2   MANT 1                     Osi
```

```
HO-TITAN             1    OTHR 5                                    Osi
OSI-EEL              2    MADM 2    MANT 1                          Osi
SIM-WBM2             2    PVC  3    PVC  4                          m0p6
SNC-WBS-D            1    OTHR 5                                    Osi
TESTTID              1    MANT 1                                    Osi
WBM-1152             1    15                                        Osi
SIM-WBM3             2    PVC  5    PVC  6                          m0p6
FLM150-123456789012A   2    PVC  12   PVC  13
m0p5
SNC-OC3-F            2    MADM 2    MANT 1                          Osi
OSI-TIMON            1    MANT 1                                    Osi
4E4-SQID             1    MANT 1                                    Osi
SNC-OC3-G            1    OTHR 5                                    Osi
siren:
```

PVCTEST

The **pvctest** utility exercises communication via a specified PVC to a network element.

Once an NE has been entered into the ITM SNC 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 **CM_Tool** command. (See the CM_Tool 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 ATT01 DDM-2000

    TID:
```

2. Enter the NE TID.

   For example: **`DSL-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:DSL-123456789012345B:ATT01:700::******;
   ```

   If the command was successful, you see a response similar to:

```
   DSL-123456789012345B 96-02-26 14:08:28
M  700 COMPLD
   "ATT01:02-26 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:

1. Is the NE powered up and operational?
2. Is the NE connected to the X.25 network?
3. Is the TID of the NE set properly?
4. Are the channel maps in the local PSN (on the ITM SNC side) set correctly?
5. 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:DSL-123456789012345B:ATT01:701;
   ```

   If the command was successful, you see the following response displayed:

   ```
   IP 701
   <[P]

      DSL-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 ATT01 DDM-2000

    TID:
```

2. Enter the NE TID.

   For example: **DSL-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:
Timeout 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 timeout is 30 and for subaddress is 1. Even though SNC 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:

1. Do the PVC and SVC definitions on the PSN match the PVC and SVC definitions on the host?
2. Is the SVC Address translation in the PSN mapped correctly?

7. Select Menu Option 1 (ACT-USER).

   The following line is displayed:

   ```
   ACT-USER:DSL-123456789012345B:ATT01:700::******;
   ```

   If the command was successful, you see a response similar to:

   ```
      DSL-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:

1. Is the NE powered up and operational?
2. Is the NE connected to the X.25 network?
3. Is the TID of the NE set properly?
4. Is the SVC Address translation in the PSN mapped correctly?

8. Select Menu Option 2 (CANC-USER).

   The following line is displayed:

   ```
   CANC-USER:DSL-123456789012345B:ATT01:701;
   ```

   If the command was successful, you see the following response displayed:

   ```
   IP 701
   <[9]
   DSL-123456789012345B 96-02-26 14:08:34
   M  701 COMPLD
   ;[62]
   ```

9. Select Menu Option 99 (Exit).

OSIOPU

The osiopu command allows you to monitor the OSI stack on the SNC host. Type osiopu at a UNIX prompt to start. Once the process is running, you can send tarp requests to the network elements you want to communicate to.

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.

tarp getnsap CSNC-OC3-J

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-OC3-J [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 CSNC-OC3-J

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-OC3-J [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.

Testing LAN Connectivity

Utilities

Verifying IP Addresses and Names

Network device IP addresses and names are stored in the file */etc/hosts* on ITM SNC 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 ITM SNC 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.

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 ITM SNC domain.

D

Data
A collection of system parameters and their associated values.

Database Administrator
A user who administers the database of the application.

Data Communications Channel (DCC)
The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

Data Communications Equipment (DCE)
: The equipment that provides signal conversion and coding between the data terminating equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

Data Terminating Equipment (DTE)
: The equipment that originates data for transmission and accepts transmitted data.

DDM-1000
: Lucent Technologies' Dual DS3 Multiplexer — A digital multiplexer that multiplexes DS1, DS1C, or DS2 signals into a DS3 signal or a 90 Mb/s or 180 Mb/s optical signal.

DDM-2000
: Lucent Technologies SONET-ready network multiplexer that can function as a lightwave terminal. It is designed primarily for loop feeder and interoffice applications that work in existing asynchronous as well as the emerging SONET networks. This equipment multiplexes DS1, DS3, or EC-1 inputs into EC-1, OC-1, OC-3, or OC-12 outputs.

Default
: An operation or value that the system or application assumes, unless a user makes an explicit choice.

Default Provisioning
: The parameter values that are preprogrammed as shipped from the factory.

Defect
: A limited interruption of the ability of an item to perform a required function. It may or may not lead to maintenance action depending on the results of additional analysis.

Demultiplexer
: A device that splits a combined signal into individual signals at the receiver end of transmission.

Demultiplexing
: A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

Dense Wavelength Division Multiplexing (DWDM)
: Transmitting two or more signals of different wavelengths simultaneously over a single fiber.

Deprovisioning
: The inverse order of provisioning. To manually remove/delete a parameter that has (or parameters that have) previously been provisioned.

Digital Cross-Connect Panel (DSX)
: A panel designed to interconnect equipment that operates at a designated rate. For example, a DSX-3 interconnects equipment operating at the DS3 rate.

Digital Multiplexer
: Equipment that combines by time-division multiplexing several digital signals into a single composite digital signal.

Digital Signal Levels 0, 1, 3 (DS0, DS1, DS3)
An ANSI-defined signal or service level corresponding to the following: DS0 is 64 Kb/s, DS1 is 1.544 Mb/s (equivalent to T1), and DS3 is 44.736 Mb/s (equivalent to 28 T1 channels or T3).

Directory Service Network Element (DSNE)
A designated network element that is responsible for administering a database that maps network element names (TIDs) to addresses [NSAPs (network service access points)] in an OSI subnetwork. There can be one DSNE per ring. A DSNE can also be a GNE.

Dispersion
Time-broadening of a transmitted light pulse.

Dispersion Shifted Optical Fiber
1330/1550 nm minimum dispersion wavelength.

Divergence
When there is unequal amplification of incoming wavelengths, the result is a power divergence between wavelengths.

Doping
The addition of impurities to a substance in order to attain desired properties.

Downstream
At or towards the destination of the considered transmission stream, for example, looking in the same direction of transmission.

Drop and Continue
A circuit configuration that provides redundant signal appearances at the outputs of two network elements in a ring. Can be used for Dual Ring Interworking (DRI) and for video distribution applications.

Drop-Down Menu
A menu that is displayed from a menu bar.

DS1 Signal
Signal with a data rate of 1.544 Mb/s.

DS3 Format
Specifies the line format of a DS3 interface port, such as M13 or C-bit parity.

DS3 Idle Signal
A signal that can be applied to any output port that is not cross-connected to an input port. This signal lets downstream network elements know that the facility is operating normally even though it is not sending a normal DS3 signal.

DS3 Signal
A logical or electrical B3ZS signal with a data rate of 44.736 Mb/s.

DSX-1, 2, 3
Digital cross-connect used to interconnect equipment, provide patch capability, and provide test access at the DS1, DS2, or DS3 level.

Dual Ring Interworking (DRI)
A topology in which two rings are interconnected at two nodes on each ring and operate so that inter-ring traffic is not lost in the event of a node or link failure at an interconnecting point.

E

Electrical Carrier, Level 1 (EC-1)
An electrical interface signal at the SONET rate of STS-1.

Electromagnetic Compatibility (EMC)
A measure of equipment tolerance to external electromagnetic fields.

Electromagnetic Interference (EMI)
High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

Electronic Industries Association (EIA)
A trade association of the electronic industry that establishes electrical and functional standards.

Electrostatic Discharge (ESD)
Static electrical energy potentially harmful to circuit packs and humans.

Entity
A specific piece of hardware (usually a circuit pack, slot, or module) that has been assigned a name recognized by the system.

Entity Identifier
The name used by the system to refer to a circuit pack, memory device, or communications link.

Equipped (EQ)
Status of a circuit pack or interface module that is in the system database and physically in the frame, but not yet provisioned.

Erbium
A soft rare earth element used in metallurgy and nuclear research.

Erbium Doped Fiber Amplifier (EDFA)
An amplifier that performs by having a light signal pass through a section of erbium-doped fiber and using the laser pump diode to amplify the signal.

Errored Seconds (ES)
A performance monitoring parameter. ES “type A” is a second with exactly one error; ES “type B” is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

Establish
: A user initiated command, at the WaveStar CIT, to create an entity and its associated attributes in the absence of certain hardware.

Event
: A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Event Driven
: A required characteristic of network element software system: NEs are reactive systems, primarily viewed as systems that wait for and then handle events. Events are provided by the external interface packages, the hardware resource packages, and also by the software itself.

Externally Timed
: An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency.

Extra traffic
: Unprotected traffic that is carried over protection channels when their capacity is not used for the protection of working traffic.

F

Facility
: A one- or two-way circuit that carries a transmission signal.

Failures in Time (FIT)
: Circuit pack failure rates per 10^9 hours as calculated using the method described in *Reliability Prediction Procedure for Electronic Equipment*, BellCore Method I, Issue 5, September 1995.

Far End (FE)
: Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

Far-End Block Error (FEBE)
: An indication returned to the transmitting node that an errored block has been detected at the receiving node. A block is a specified grouping of bits.

Far-End Receive Failure (FERF)
: An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI.

Fault
: Term used when a circuit pack has a hard (not temporary) fault and cannot perform its normal function.

Fault Management
Collecting, processing, and forwarding of autonomous messages from network elements.

Fiber Distributed Data Interface (FDDI)
Fiber interface that connects computers and distributes data among them.

Flash EPROM
A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

Folded Rings
Folded (collapsed) rings are rings without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Forced
Term used when a circuit pack (either working or protection) has been locked into a service-providing state by user command.

Frame
The smallest block of digital data being transmitted.

Frame Relay (FR)
A form of packet switching that relies on high-quality phone lines to minimize errors. It is very good at handling high-speed, bursty data over wide area networks. The frames are variable lengths and error checking is done at the end points.

Framework
An assembly of equipment units capable of housing shelves, such as a bay framework.

Free Running
An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

FT-2000 ADR
Lucent Technologies' OC-48 rate Add/Drop Rings lightwave Terminal for 2-fiber BLSRs. It is designed primarily for interoffice applications. It supports adds, drop, and through connections for DS3/EC-1, OC-3, IS-3, and OC-12.

G

Gateway Network Element (GNE)
A network element that passes information between other network elements and management systems through a data communication network.

Gateway Network Element (GNE)
A Network Element that provides a means of communication between an OS and remote Network Elements over the SONET DCC.

In a primary/secondary GNE pair:

The active GNE is the GNE (primary or secondary) that is currently serving as the GNE for the subnetwork.

The primary GNE is the first GNE associated with a subnetwork that initially serves as the GNE for the subnetwork.

The secondary GNE is the second GNE that is associated with the primary GNE for a subnetwork, and can take over communications in the event there is a failure in the communications via the primary GNE.

The standby GNE is the GNE (primary or secondary) that is currently serving as the backup GNE for the subnetwork in the event there is a failure in communications via the active GNE.

H

Hard Failure
An unrecoverable nonsymptomatic (primary) failure that causes signal impairment or interferes with critical network functions, such as DCC operation.

High Level Data Link Control (HDLC)
OSI reference model datalink layer protocol.

Holdover
An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

Host
The host is an HP 9000/800 series platform running HP-UX.

Hot Standby
A circuit pack ready for fast, automatic placement into operation to replace an active circuit pack. It has the same signal as the service going through it, so that choice is all that is required.

Human Machine Language (MML)
A standard language developed by the ITU for describing the interaction between humans and dumb terminals.

I

Idle
An output port not cross-connected to an input port.

Idle Code
A signal transmitted downstream automatically from an idle output port. It can also be transmitted downstream by a manual command from a cross-connected output port.

Insert
To physically insert a circuit pack into a slot, thus causing a system initiated restoral of an entity into service and/or creation of an entity and associated attributes.

In-Service (IS)
A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

Integrated Transport Management Network Module (ITM NM)
Lucent Technologies' integrated network management system that provides a broad end-to-end view of the SONET network.

Integrated Transport Management SubNetwork Controller (ITM SNC)
Lucent Technologies' SONET element management layer system that provides fault, configuration, and security functions through the use of a GUI.

Intelligent Alarm Filtering
The filtering of symptomatic alarms and events that are associated with a reported root-cause or symptomatic condition.

Interconnect Signal-3 (IS-3)
The logical equivalent to an OC-3 signal that uses a proprietary interface that allows short-range operation at a lower cost than an OC-3.

Interface Capacity
The total number of STS-1 equivalents (bidirectional) tributaries in all transmission interfaces with which a given transmission interface shelf can be equipped at one time. The interface capacity varies with equipage.

InterLATA
Circuits that cross outside the LATA and to an interexchange carrier.

IntraLATA
Circuits with both end-points within the LATA.

J

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

L

Lead Time
: The time interval between placement of a product order and receipt of the product.

Lightguide Build-Out (LBO)
: An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

Line
: A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

Line Build Out (LBO)
: An equalizer network that guarantees the proper signal level and shape at the DSX panel.

Line Controller Local Area Network (LCLAN)
: The internal local area network that provides communications between the controlled circuit packs.

Line Protection
: The optical interfaces can be protected by line protection. Line protection switching protects against failures of line facilities, including the interfaces at both ends of a line, the optical fibers, and any equipment between the two ends. Line protection includes protection of equipment failures.

Line Timing
: Refers to a network element that derives its timing from an incoming OC-N signal.

Link
: The mapping between in-ports and out-ports. It specifies how components are connected to one another.

Literal Character
: A letter, digit, or symbol that is entered in a command. The first hyphen in UNIT-{1-64} is a literal character; the braces and the second hyphen are not literal characters.

Local Area Network (LAN)
A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

Location
An identifier for a specific circuit pack, interface module, interface port, or communications link.

Lockout of Protection
The WaveStar CIT command that prevents the system from switching traffic to the protection line from a working line. If the protection line is active when a “Lockout of Protection” is entered – this command causes the working line to be selected. The protection line is then locked from any Automatic, Manual, or Forced protection switches.

Lockout State
The Lockout State shall be defined for each working or protection circuit pack. The two permitted states are: None – meaning no lockout is set for the circuit pack, set meaning the circuit pack has been locked out. The values (None & Set) shall be taken independently for each working or protection circuit pack.

Loopback
Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

Loop Timing
A special case of line timing. It applies to network elements that have only one OC-N/STM-N interface. For example, terminating nodes in a linear network are loop timed.

Loss Budget
Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

Loss of Frame (LOF)
A failure to synchronize to an incoming signal.

Loss of Pointer (LOP)
A failure to extract good data from a signal payload.

Loss of Signal (LOS)
The complete absence of an incoming signal.

M

M23-Format
A standard framing format used for DS3 signals produced by multiplexing 28 DS1s into a DS3 (sometimes referred to as M13 format, without C-bit parity).

Major
Indicates a service-affecting failure, main or unit controller failure, or power supply failure.

Maintenance Condition
An equipment state in which some normal service functions are suspended, either because of a problem or to perform special functions (copy memory) that cannot be performed while normal service is being provided.

Manual Switch State
A protection group shall enter the Manual Switch State upon the initiation and successful completion of the Manual Switch command. The protection group leaves the Manual Switch state by means of the Clear or Forced Switch commands. While in the Manual Switch state the system may switch the active unit automatically if required for protection switching.

Mapping
The logical association of one set of values, such as addresses on one network, with quantities or values of another set, such as devices or addresses on another network.

Mediation Device (MD)
Allows for exchange of management information between Operations System and Network Elements.

Mid-Span Meet
The capability to interface between two lightwave network elements of different vendors. This applies to high-speed optical interfaces.

Minor (MN)
Indicates a non-service-affecting failure of equipment or facility.

Miscellaneous Discrete Interface
Allows an operations system to control and monitor equipment collocated within a set of input and output contact closures.

Multiplexer
A device (circuit pack) that combines two or more transmission signals into a combined signal on a shared medium.

Multiplexing
The process of combining multiple signals into a larger signal at the transmitter by a multiplexer. The large signal is then split into the original smaller signals at the receiver by a demultiplexer.

N

Network Element (NE)
A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

Network Monitoring and Analysis (NMA)
An operations system designed by Bellcore which is used to monitor network facilities.

Network Service Access Point (NSAP) Address
Network Service Access Point Address (used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

Node
A network element in a ring or, more generally, in any type of network. In a network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Preemptible Protection Access (NPPA)
Non-preemptible protection access increases the available span capacity for traffic which does not require protection by a ring, but which cannot be preempted.

Non-Revertive Switching
In non-revertive switching, an active and stand-by line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the stand-by line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Volatile Memory (NVM)
Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

No Request State
This is the routine-operation quiet state in which no external command activities are occurring.

Not Monitored (NMON)
A provisioning state for equipment that is not monitored or alarmed.

O

Open Ring Network
A network formed of a linear chain-shaped configuration of network elements. Each network element connects to two others, one on each side, except for two network elements at the ends which are connected on only one side. A closed ring can be formed by adding a connection between the two end nodes.

Open Systems Interconnection (OSI)
Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

Operations Interface
: Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, WaveStar CIT, office alarms, and all telemetry interfaces.

Operations Interworking (OI)
: The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SONET network or from a centralized operations system.

Operations System (OS)
: A central computer-based system used to provide operations, administration, and maintenance functions.

Operations System for Intelligent Network Elements (OPS/INE)
: A Bellcore configuration management operations system.

Operator
: A user of the system with operator-level user privileges.

Optical Carrier N (OC-N)
: An optical carrier signal at the SONET rate of N, where n equals 1, 3, 12, 48, or 192. The basic rate of an OC-1 signal is 51.84 Mb/s, equivalent to an STS-1, with other values of N direct multiples of this basic rate.

Optical Channel
: A OC-N wavelength within an optical line signal. Multiple channels, differing by 1.5µ 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).

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