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StarKeeper® II NMS Graphics System Guide

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Preface

StarKeeper ® II NMS manages, controls, and diagnoses the complete line of BNS-2000 and BNS-2000 VCS nodes as well as concentrators, servers, bridges, routers, gateways, and other network elements. *StarKeeper* II NMS collects alarm information, billing data, and performance measurements from the network and generates reports on request. Two-way communication between *StarKeeper* II NMS and the network allows one centrally located administrator to manage equipment at many locations.

StarKeeper II NMS architecture consists of one or more Core Systems optionally connected to one or more Graphics Systems running various graphics applications. The Core Systems maintain network connectivity and databases, and perform basic network management functions. The *StarKeeper II NMS SNMP Proxy Agent* is a Core System application which may be optionally installed.

The *StarKeeper* II NMS Graphics System is an 8-user system. It consists of the following software packages:

- *StarKeeper* II NMS Graphics System Platform, including
  - — Bulletin Board
  - — Cut-Through
  - — Workstation Administration
- *StarKeeper* II NMS Network Builder
- *StarKeeper* II NMS Network Monitor
- *StarKeeper* II NMS Performance Reporter

The *Graphics System Platform* provides you with the basic services that are necessary to administer a *StarKeeper* II NMS Graphics System. The platform comprises several applications: The *Bulletin Board* displays alarms from *StarKeeper* II NMS applications and Graphics System software. *Workstation Administration* provides you with the ability to administer the network management-related aspects of your Graphics System, such as establishing connections between your Graphics System and one or more Core Systems.

Finally, *Cut-Through* allows you to establish login sessions on host computers, such as a *StarKeeper* II NMS Core System.

Network Builder provides user-friendly and task-oriented windows for configuration and analysis of your network. It also allows you to configure and analyze a network from one, centralized location — populating supported node databases and *StarKeeper* II NMS Core System databases in one operation. Network Builder provides complete configuration support for the Frame Relay service. Network Builder is required if you want to implement the network's Session Maintenance feature and support for Frame Relay. Network Builder is also required for configuring nodes, SNIs, and the Inter-Carrier Interface (ICI) for Switched Multimegabit Data Service (SMDS) networks. It is also used to establish and maintain optimal network routing. Analysis reports are also available.

Network Monitor provides user-friendly and task oriented windows for alarm monitoring and BNS-2000 VCS and BNS-2000 diagnostics.

Performance Reporter is a user-friendly and task oriented windows interface that provides several features to enhance the basic *StarKeeper* II NMS reporting capabilities. Some reports are available in graphical format via XGRAPH® software.

Netstations can be connected to the Graphics System host machine, allowing multiple users to access the Graphics System software. For small networks, the Graphics System software can reside on the same host machine as the Core System. For large networks, multiple Core Systems can divide the load either geographically or functionally.

Purpose of the Document

This guide presents complete instructions for the administration and use of the Graphics System Platform and the Network Builder, Network Monitor, and Performance Reporter applications.

You need to read this guide if you will be performing any of these tasks:

- administering the Graphics System
- utilizing Network Builder, Network Monitor, or Performance Reporter
- configuring Frame Relay service
- configuring SMDS networks
- analyzing real and proposed network routing
- generating Node Reroute Tables, in support of the Session Maintenance feature

- using the Session Maintenance simulator, in support of the Session Maintenance feature
- creating and generating network maps
- troubleshooting network problems
- scheduling and running performance reports

Refer to the *StarKeeper II NMS Core System Guide* for instructions on software installation and printer configuration.

Organization

This guide is divided into the following chapters.

Chapter 1	provides an overview of the major features of the software packages that are available on a Graphics System, including the Graphics System Platform, Network Builder, Network Monitor and Performance Reporter.
Chapter 2	refers to the *StarKeeper II NMS Core System Guide* for information on installing the Graphics System software and for physically connecting your Graphics System to the network. This chapter also provides instructions related to the utilization of the Graphics System including adding and removing Graphics System users, starting and stopping the Graphics System, and establishing communications between the Graphics System and Core Systems in order to logically connect your Graphics System to the network. It also contains information related to administering your netstation.
Chapter 3	provides information on using the Graphics System including starting Graphics System applications, accessing the OS environment, printing, HyperHelp capabilities and HP VUE features such as the Style Manager.
Chapter 4	provides information on using the Bulletin Board application along with information on checking the EVENTLOG.
Chapter 5	describes the Workstation Administration component of the Graphics System Platform, including configuring and monitoring communications between the Graphics System and Core Systems, synchronizing the Graphics System with the databases on the connected Core Systems, adding host computers that can be accessed by Cut-Through, and managing the disk files used by the Graphics System applications.
Chapter 6	describes the Cut-Through component of the Graphics System Platform, including how to connect to host computers, utilizing the automatic login capability, and customizing the list of host computers that can be accessed by Cut-Through.
Chapter 7	provides instructions related to the utilization of the Network Builder application including tuning Network Builder system parameters.

Chapter 8	describes how to configure physical and logical resources in your network using Network Builder. The chapter contains a discussion on how to use Network Builder as well as information related to configuring network elements including nodes, trunks, groups, service addresses, NMS connections, node reroute tables and the Frame Relay and SMDS data services.
Chapter 9	describes how to perform network analysis using Network Builder. The chapter contains information related to the Connectivity Analysis and Session Maintenance simulation tools, including how to use the tools, constraints and limitations, input and output, examples and troubleshooting.
Chapter 10	provides instructions related to the utilization of the Network Monitor application. The chapter explains the relationship between network maps and alarms, and contains a step-by-step tutorial describing how to plan a map hierarchy and how to create maps using Network Monitor. The chapter also contains instructions for defining user notices, specifying alarm filters, updating maps and distributing maps to other Graphics Systems.
Chapter 11	contains two step-by-step tutorials describing how to monitor a network for faults using Network Monitor. It also describes how to use Network Monitor in an environment where the network monitoring responsibility transfers from one location to another.
Chapter 12	is the Network Monitor user reference section. The chapter describes each of the windows, menus and fields used in the Network Monitor application. Network Addressing and Editor Legend Symbols are also discussed in this chapter.
Chapter 13	provides instructions related to the utilization of the Performance Reporter application including administration of thresholding, updating configuration data and specifying filed report retention intervals.
Chapter 14	describes how to use Performance Reporter to perform Routine Performance Assurance, the daily monitoring of key performance measurements in the network. The chapter shows how Performance Reporter is used to identify and troubleshoot service-affecting conditions in the network, including how to access exception reports and on-demand performance measurements.
Chapter 15	describes how to use Performance Reporter to perform Long-term Traffic Engineering, the task of engineering the network to keep it running optimally. The chapter shows how to use Performance Reporter to aid in this task, including scheduling measurement reports and interpreting the report output.
Chapter 16	provides instructions related to the maintenance of the Performance Reporter application including managing filed reports and report requests, and troubleshooting Performance Reports.
Chapter 17	shows examples of tabular and graphical reports generated by Performance Reporter, and provides descriptions of the fields used in the reports.
Appendix A	provides manual pages for some commands used in this guide.
Appendix B	contains a listing of Graphics System Platform error messages.

Appendix C	contains information related to troubleshooting Network Monitor, including a list of the error messages produced by the Network Monitor application and the recommended course of action. The chapter contains a list of Network Monitor software processes and their related Network Monitor window, if any. The chapter also includes a list of HP-UX error numbers.
Appendix D	contains the error messages from Performance Reporter including a brief explanation and recommended course of action.
Glossary	contains definitions of acronyms and terms used in this guide.
Index	contains a listing of indexed terms that appear in this guide.

Document Conventions

Certain conventions are used in this document to help make it more usable.

- Some screen displays are boxed:

  ```
  This is a screen display
  ```

- Messages that appear on the screen (for example, system responses, alarms, prompts, and so forth) are printed as follows: **`device for printer_name: io_port`**
- User input instructions appear in bold italic font: Type ***/usr/bin.***
- Command names, menu items and field names are shown in bold font: **help**, **View**, **Display Info**.
- Directory and file names are shown in italic font: *$CNMS_DBS/ahp/alarm_log*.
- Variable information, either entered from the keyboard or displayed on the screen, is enclosed in angle brackets: <name>.
- Keys that you press are shown in a box: Enter.

  If two keys are shown, press them together. For example, Ctrl ***q*** means to press (and hold) the Ctrl key and then enter a ***q***; once both keys are depressed, you release them both.
- Procedural steps are marked by consecutive step numbers.
- Buttons that are to be selected on some StarKeeper II NMS screens by using the mouse appear like this: Button

What's New in This Document for Release 10.0

This document is reissued because of changes and additions made since Release 8.0 of *StarKeeper* II NMS. The following list details these changes:

- Support for BNS-2000 Release 5.0
- Support for BNS-2000 VCS R6.0
- Network Monitor Call Trace feature
- Year 2000 Compliance. *StarKeeper* II NMS R10.0 provides *Year 2000 Compliance* through the support of four-digit years in most date fields; two-digit years are also supported in an unambiguous way (refer to **Chapter 1** of this guide for more details).

Screen Displays

This guide shows many screens that appear on your terminal; in some cases only a portion of the screen is shown. However, in every instance, this document shows the portion of the screen necessary to complete the task described.

Recommended Prerequisites

Using Network Builder, Network Monitor, and Performance Reporter requires that users be familiar with administration of their data network. For example, a Network Builder user must know the meaning of the various parameters associated with the components (e.g. node, trunk, address) which are configured by Network Builder. Familiarity with the items listed below is recommended:

- HP-UX® Operating System
- OSF/Motif user environment
- HP VUE
- *StarKeeper* or *StarKeeper* II NMS
- *Datakit* VCS or BNS-2000 VCS
- BNS-2000

Supported Products

This version of the Graphics System supports BNS-2000 Release 5.0 and BNS-2000 VCS R6.0. See the *StarKeeper II NMS Planning Guide* for a complete listing of supported products.

☞ **IMPORTANT:**
Support for a number of systems—including BNS-1000, ISN, and other previously supported nodes—has been discontinued. Prompts for unsupported node equipment might appear on the console screen and in screen captures that appear in this document. They are to be disregarded. If they are used, the results will be undefined. In addition, text references to BNS-2000 VCS refer to Datakit II VCS, unless Datakit II VCS is specifically mentioned in instances of interworking. Screen captures that refer to Datakit II VCS refer to BNS-2000 VCS and/or Datakit II VCS, depending on the product that reflects that particular software release.

In some instances the Graphics System may refer to or query you for input relating to currently unsupported products. Be aware that entry of responses related to these unsupported products should be avoided since they may yield unpredictable results.

Related Documentation

StarKeeper® II NMS Documents

- *StarKeeper II NMS Core System Guide*
- *StarKeeper II NMS Planning Guide*
- *StarKeeper II NMS SNMP Proxy Agent Guide*

Hewlett-Packard Documents

- *HP Visual User Environment 3.0 Quick Start*
- *Using Your HP Workstation*
- *Hewlett-Packard DeskJet 560C Printer User's Guide*
- *Hewlett-Packard LaserJet IIP Printer User's Manual*
- *Hewlett-Packard LaserJet IIIP Printer User's Manual*
- *Hewlett-Packard LaserJet 4 and 4M Printer User's Manual*
- *Hewlett-Packard PaintJet Color Graphics Printer User's Guide*
- *HP ENVIZEX Station User's Guide*
- *HP ENVIZEX Station Installation Guide*
- *HP 700/RX Netstation User's Guide*
- *System Administration Tasks Manual*
- *Upgrading from HP-UX 9.x to 10.0*
- *Installing HP-UX 10.20 and Updating from HP-UX 10.0x to 10.20*

BNS-2000 VCS Documents

Refer to the *Datakit II VCS Publications* brochure for information on BNS-2000 VCS and Data Networking Products documentation.

BNS-2000 Documents

Refer to the *BNS-2000 Publications* brochure for information on BNS-2000 documentation.

Additional Copies

If you need to order additional copies of documentation

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StarKeeper II NMS Graphics System Overview

1

This chapter provides an overview of the components of a Graphics System: the *StarKeeper* II NMS Graphics System Platform, and the *StarKeeper* II NMS Network Builder, *StarKeeper* II NMS Network Monitor, and *StarKeeper* II NMS Performance Reporter applications.

Together, the platform and applications provide:

- simplified administration and operation of your network management system
- simplified configuration and provisioning of network elements
- simplified fault detection and management
- simplified traffic and performance measurement and analysis
- a menu/forms interface based on the Motif Graphical User Interface
- on-line help for the interface
- easy access to non-graphical capabilities

The platform and applications are accessed from the *StarKeeper* II subpanel on the HP VUE Front Panel of your Netstation.

Year 2000 Compliance

StarKeeper II NMS R10.0 supports the use of four-digit years in most user-specified date fields. Two-digit years are also supported, with the following assumptions:

- If a two-digit year, XX, is entered that is between 00 and 70 (inclusive), the four-digit year 20XX will be used
- If a two-digit year, YY, is entered that is greater than 70, the four-digit year 19YY will be used

Some report headings will continue to use two-digit years in the date field. These will represent the appropriate year and should not be ambiguous to the user.

Graphics System Platform

The Graphics System Platform provides you with the basic services that are necessary to administer a *StarKeeper* II NMS Graphics System and monitor its performance. Built on the Motif Graphical User Interface, the Graphics System Platform consists of several components. Each component consists of one or more task-oriented windows, which together provide a simplified interface for administering the Graphics System.

Graphics System Platform Features

The Graphics System Platform consists of the following three components:

- Bulletin Board
- Workstation Administration
- Cut-Through

Each component is described in the following subsections.

Bulletin Board

The Bulletin Board application is used to retrieve and display messages from the Graphics System applications and software. As such, it provides an important tool in monitoring the health of the Graphics System. Messages posted to the Bulletin Board identify exceptions, alerts or informational notices, and are grouped into the following *classes*:

- Graphics System host computer resources
- Graphics System file system resources
- Graphics System to Core System communications
- Graphics System application database access

Often, messages posted to the Bulletin Board will require the intervention of the network administrator. The Bulletin Board application is launched from the *StarKeeper* II subpanel on the HP VUE Front Panel.

Workstation Administration

Workstation Administration provides you with a simplified way of performing administration and maintenance of the Graphics System environment. This application is accessible from the *StarKeeper* II subpanel on the HP VUE Front Panel.

Workstation Administration provides procedures for establishing and removing connections between the Graphics System and one or more *StarKeeper* II NMS Core Systems. This allows for an integrated, end-to-end approach to the management of networks containing more than one *StarKeeper* II NMS system. In addition, Workstation Administration allows you to continually monitor the status of the connections between the Graphics System and the Core Systems connected to it.

Workstation Administration provides procedures for maintaining consistency between the Graphics System and the Core Systems connected to it.

In particular, Workstation Administration is used to configure certain local machine connection parameters necessary for the applications on the Graphics System to have access to data server processes on the Core Systems connected to it.

Workstation Administration is also used when there is a need to synchronize the Graphics System with the databases on the Core Systems connected to it. This is necessary in order for the applications on the Graphics System to have access to latest information available in the databases on the Core Systems.

Workstation Administration also provides procedures for managing the disk files created by the applications on the Graphics System. You can also use Workstation Administration to add, delete or modify the list of host computers that is made available to all Graphics System users who utilize Cut-Through.

Cut-Through

The Cut-Through application provides you with a simplified way of accessing the HP-UX ASCII environment on the Graphics System or on a host computer connected to the Graphics System. This application is accessible from the *StarKeeper* II subpanel on the HP VUE Front Panel.

Cut-Through allows you to access a list of host computers. From this list, you select the name of the computer to which you want to connect. Cut-Through sets up a call to this processor and establishes a connection so that you can begin to execute your commands. For instance, if you need to access the console of a node monitored by a Core System connected to your Graphics System, you would use Cut-Through to log into the Core System, then access the node from there.

Graphics System Platform Window Architecture

This section provides a brief description of the Graphics System Platform's window architecture.

As **Figure 1-1** illustrates, the Graphics System Platform consists of three Control Windows, corresponding to each of the Graphics System Platform applications.

In addition, several other windows are available from the Workstation Administration Control Window. The Graphics System Platform applications are launched from the *StarKeeper* II subpanel on the HP VUE Front Panel.

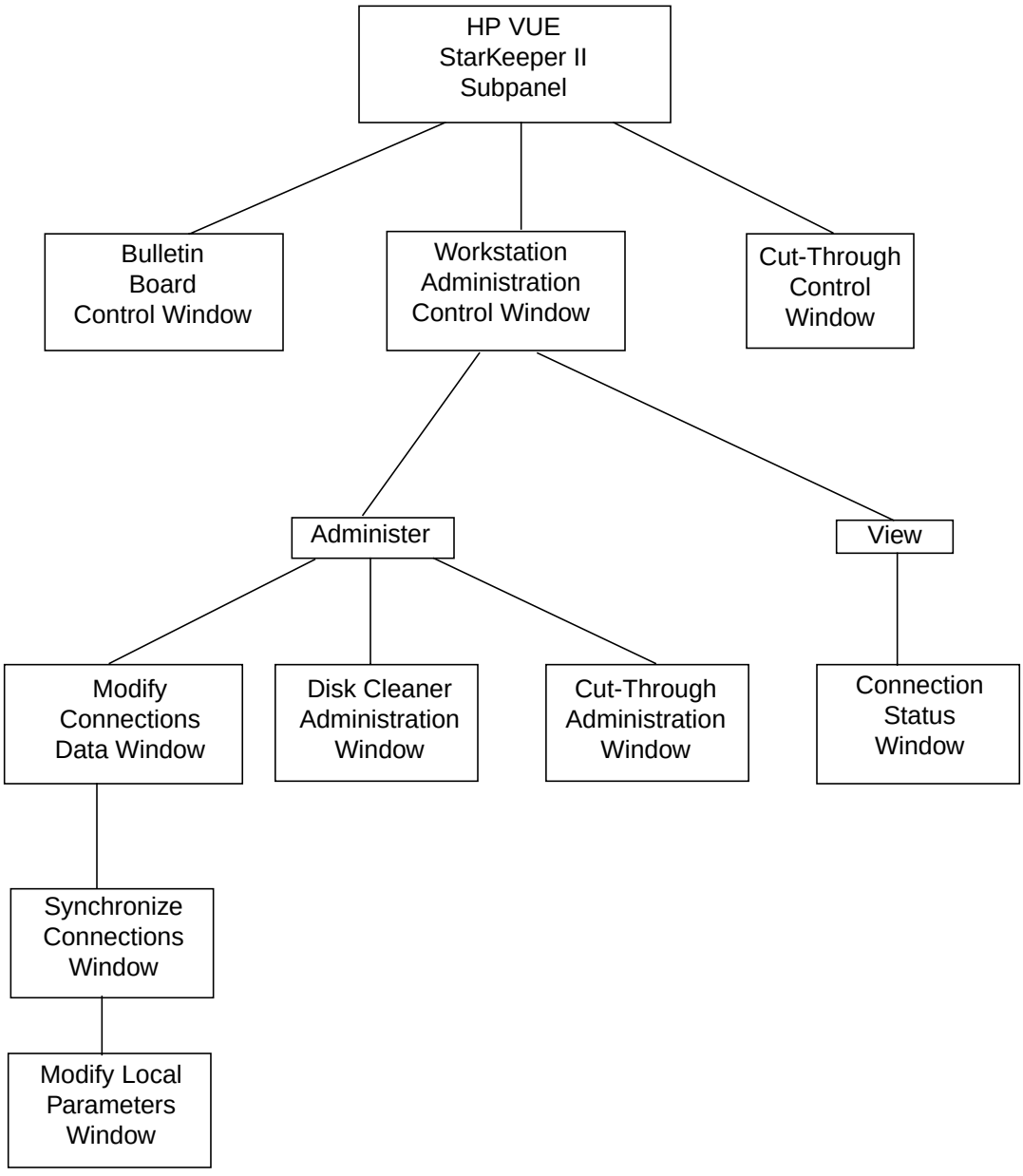


Figure 1-1. Graphics System Platform Window Architecture

The Graphics System Platform window architecture consists of the following windows:

- Bulletin Board Control Window
- Workstation Administration Control Window
  - — Add/Delete/Modify Data Window
  - — Synchronize Connections Window
  - — Modify Local Parameters Window
  - — Disk Cleaner Administration Window
  - — Cut-Through Administration Window
  - — Connection Status Window
- Cut-Through Control Window
  - — Add-On Computers

Bulletin Board Control Window

The Bulletin Board Control Window is used to retrieve and display informational and error messages from the Graphics System applications and software. The window contains the login id of the user and the name of the host computer on which the Graphics System is running. Whenever a message is posted to the Bulletin Board, a *glyph* is displayed for that message in the message bar of the base window. Selection of the glyph will raise another window. This window will display the message associated with the glyph. Occasionally, more than one message will be displayed. There is one glyph for each of the four *classes* of messages, described earlier in this section.

Workstation Administration Control Window

The Workstation Administration Control Window is used to launch several other windows that are used to perform system-wide Graphics System administration related to network management.

Add/Delete/Modify Data Window

This window is available from the **Administer** menu of the Workstation Administration Control Window. You use this window to establish connections between the Graphics System and one or more host computers each containing a Core System. You can add and remove a Core System from the list, specify the system name and listener address of the remote host, and activate or inactivate the connection between the Graphics System and a Core System.

Synchronize Connections Window

This window is available from the **Administer** menu of the Workstation Administration Control Window. Raising this window results in the automatic synchronization of the Graphics System with the databases on the connected Core Systems. Status messages will show the outcome of the synchronization process for each connected Core System. In general, you invoke the Synchronize Connections Window whenever you manually activate or inactivate a connection between the Graphics System and a Core System, whenever you add or remove a node from your network, or whenever you change the Core System that is actively monitoring a node.

Modify Local Parameters Window

This window is available from the **Administer** menu of the Workstation Administration Control Window. You use this window to establish several parameters that apply only to your local host, but that must be made known to each Core System connected to your Graphics System. These parameters consist of an identifier unique to the Graphics System within the network consisting of all interconnected *StarKeeper* II NMS Graphics Systems and Core Systems, and the dial strings of the service address and listener address for the local host on which the Graphics System is running.

Administration of these local parameters is necessary so that processes associated with the Graphics System applications can communicate with processes on remote Core Systems that provide data services to the Graphics System applications such as *StarKeeper* II NMS and node configuration database access, alarm occurrence access and performance measurement data access.

Disk Cleaner Administration Window

This window is available from the **Administer** menu of the Workstation Administration Control Window. This window allows you to control the consumption of the disk resource on your Graphics System. You use this window to specify a list of files and directories whose contents are to be deleted after a specified number of days.

Cut-Through Administration Window

This window is available from the **Administer** menu of the Workstation Administration Control Window. You use this window to administer a list of computers that can be accessed from the Cut-Through Control Window. This list is made available to all users on the Graphics System. Additional computers can be added on a per-user basis by using the Cut-Through Control Window, Add-on Computers.

Connection Status Window

This window is available from the **View** menu of the Workstation Administration Control Window. You can use this window to examine or monitor the status of the connections between the Graphics System and each connected Core System. The status is updated in real-time.

Cut-Through Control Window

The Cut-Through Control Window is used to establish a login session with a host computer connected to the computer on which the Graphics Systems is running. It can also be used to obtain a window on the local host. The Cut-Through Control Window contains a list of computers that have been configured for Cut-Through. This list consists of those computers that have been configured system-wide by using Workstation Administration, plus those computers that have been added on a per-user basis by using the "Add-On Computers" capability available from the **File** menu of the Cut-Through Control Window.

To establish a Cut-Through session, select a computer from the list and then select (Connect). The Control window also contains an **Authorize** menu item for activating the automatic login capability the first time you Cut-Through to a computer.

Add-On Computers Window

The Add-On Computers Window provides the capability to modify a local set of computers for your login. You will not be able to modify any computer administered centrally by the Workstation Administrator. You can add new computers, delete computers, change the dialstrings and login protocols associated with computers, or rearrange the order of the list.

Where Do You Go From Here?

Situation	Reference
Installing the Graphics System Platform	*StarKeeper II NMS Core System Guide*
How to use HP VUE	*Using Your HP Workstation*
How to use the Motif Graphical User Interface	*Using Your HP Workstation*
Adding and removing Graphics System users	Chapter 2
Starting and stopping the Graphics System	Chapter 2
Provisioning Graphics System to Core System communications	Chapter 2
Using the Bulletin Board application	Chapter 4
Using Workstation Administration	Chapter 5
Using the Cut-Through application	Chapter 6

Network Builder

Network Builder is a graphics-based, software application that allows an administrator to configure and analyze a network from one, centralized location — populating supported node databases and *StarKeeper* II NMS Core System databases in one operation. Network Builder is required if you want to implement data services, such as SMDS. Network Builder is also used to establish and maintain optimal network routing via analysis reports.

All of the user's input to perform Network Builder configuration and analysis tasks is entered with a unified menu/forms interface. All commands and choices are readily made using the Graphic User Interface.

Network Builder Features

Built on the Motif Graphical User Interface, Network Builder simplifies the population of configuration databases in supported nodes and in the *StarKeeper* II NMS Core System database. In addition to providing a vehicle for database entries and changes, Network Builder performs analysis and generates analysis reports. Network Builder is required for administering Session Maintenance and SMDS services in your network.

From a central location, Network Builder generates Node Reroute Tables, required by nodes supporting the Session Maintenance feature. This network-wide view of NRTs ensures a consistent implementation of Session Maintenance. Refer to the node's *Session Maintenance Guide* for information on planning and operating Session Maintenance.

Network Builder supports BNS-2000 nodes in an SMDS network by providing SNI and ICI configuration facilities. Refer to the node's *SMDS Guide* for information on planning and operating SMDS networks.

The features of Network Builder fall into these two categories:

- configuration
- analysis

Configuration

Using the configuration facilities of Network Builder you can enter, verify, change, and delete network elements. Some additional features of the configuration facilities of Network Builder are briefly discussed below.

- perform updates immediately, place them on hold, or consider them as proposed data only
- validate input field entries against the *StarKeeper* II NMS Core System database
- provide default values based on previously input data
- confirm node and *StarKeeper* II NMS Core System database changes
- provide log of Network Builder activities
- perform retries for failed activities (for example, communication errors)
- provide on-line help

The network elements configured by Network Builder are briefly discussed below in approximately the order in which you would configure them:

NMS Connections	Provides configuration of *StarKeeper* II NMS connections to nodes.
Node	Provides node configuration.
Group	Provides complete group configuration. Direct access to the group form is also provided from trunk and service address forms.
Service Address	Provides complete service address configuration including mnemonic and X.121 numeric addresses.
Trunk	Provides complete trunk configuration. Complete trunk configuration consists of updating the node databases at *both* end nodes *and* the *StarKeeper* II NMS Core System database(s).

Node Reroute Tables	Generates and supports editing of Node Reroute Tables to facilitate Session Maintenance for the entire network.
SNI	Provides Subscriber Network Interface (SNI) configuration for support of Switched Multimegabit Data Services (SMDS) networks.
ICI Carrier	Provides Inter-Carrier Interface (ICI) carrier configuration.
ICI Prefix	Provides ICI address prefix configuration.
ICI Group Address	Provides ICI group address configuration.
Frame Relay	Provides configuration of Frame Relay modules, ports, PVCs and DLCIs.

Analysis

The analysis features of Network Builder greatly assist users in engineering and planning networks. The analysis features are listed below.

- evaluate network topology
- evaluate existing routing tables
- identify topological deficiencies
- generate error-free routing patterns
- recommend routing solutions
- recommend extended routing feature assignments
- perform "what if" routing scenarios
- analyze network routing paths
- simulate Session Maintenance trunk failures

Using the analysis features of Network Builder you can perform evaluations and analysis of network resources, and run simulations of trunk failures to evaluate the Session Maintenance feature. The four analysis operations are briefly discussed

next; the first three operations are connectivity checks and the last is the simulation. This analysis tool applies only to connection oriented traffic.

Routing Evaluation Evaluates the routing tables, node by node, for all the destination nodes in a network. Checks are made for loops, dead-end paths, minimum number of hops, etc.; reports are generated and "what-if" scenarios can be performed.

Topology Evaluation Evaluates the network topology to determine if the network has adequate connectivity to support alternate routes for all the nodes in a network. Generates error-free utility (any node to any node) network routing tables.

Path Analysis Performs an analysis of specified endpoints in a network in normal and failure scenarios. All paths for any single node failure can be identified. Alternatively, or in addition, all paths for a single trunk group failure or any combination of two trunk group failures can be identified. The user can identify the worst path in terms of the number of hops, the number of failures, the type of failure, etc.

Session Maintenance Simulation Simulates network behavior for single or multiple Session Maintenance trunk failures. The Session Maintenance reroute algorithm is modeled for each node to analyze the effect of a failure. The overall performance of Session Maintenance in a given network topology can then be reported.

Supported Products

Network Builder populates databases for *StarKeeper* II NMS Core Systems and network nodes. It also analyzes trunking schemes for networks comprised of supported nodes.

Network Builder is required for configuring Session Maintenance and SMDS.

Network Builder Window Architecture

This section gives a high-level description of Network Builder window architecture.

The window architecture for Network Builder is shown in **Figure 1-2**. From the Network Builder Control Window you can access all of the features of Network Builder.

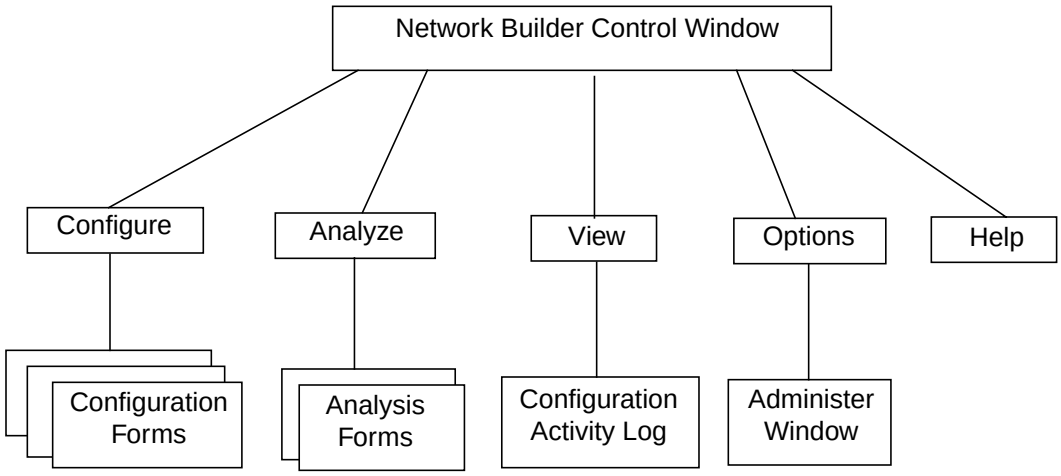


Figure 1-2. Network Builder Window Architecture

The following describes the features that are available from the Network Builder Control Window.

- The **Configure** menu provides access to configuration forms for network elements:
  - Frame Relay
    - FRM
    - FRM-M2
    - PVC
  - Group
  - ICI
    - Carrier
    - Group Address
    - Prefix
  - NMS Connections
  - Node
  - Node Reroute Tables
  - Service Address
  - SNI

— Trunk

Choosing one of the above calls the appropriate configuration form base window (see **Chapter 8** for a complete discussion).

- The **Analyze** menu provides access to analysis forms, which are:
  - — Network Connectivity
  - — Session Maintenance Simulation

  Choosing one of the above calls the appropriate analysis form base window (see **Chapters 8** and **9** for a complete discussion).
- The **View** menu provides access to the Configuration Activity Log containing a listing of outstanding tasks. Direct access to forms associated with a selected task is provided. This window is fully described in **Chapter 8**.
- The **Options** menu provides access to the Administer Window, used to specify certain Network Builder parameter values. This window is fully described in **Chapter 7**.
- The **Help** menu provides access to on-line help.

Where Do You Go From Here?

Your first step in Network Builder operation depends on the availability of the application and your experience. Refer to the following table for your particular situation.

Situation	Reference
Installing Network Builder	*StarKeeper II NMS Core System Guide*
How to use HP VUE	*Using Your HP Workstation*
Adding and removing Network Builder users	Chapter 2
Administer Network Builder (change retry parameters and change file cleanup schedule)	Chapter 7
Configure network elements	Chapter 8
Implement and maintain Session Maintenance	Chapters 8 and 9
Analyze network topology and routing for the network	Chapter 9

Network Monitor

Network Monitor is a sophisticated fault management package that provides user-friendly access to alarm handling and diagnostics capabilities from a central location. Network Monitor is a graphics-oriented application that is used in conjunction with *StarKeeper* II NMS to support nodes, servers and routers in the product line, as well as certain Element Management Systems (EMSs).

Network Monitor Features

The Network Monitor application continuously receives alarm information from one or more *StarKeeper* II NMS systems that may be monitoring your network equipment. Network Monitor is designed to present this information in an easy and usable form. Network Monitor also provides easy access to all the nodes in your network, from which you can initiate fault management commands.

Built on the Motif Graphical User Interface, Network Monitor provides multiple task-oriented windows. These windows provide simultaneous access to network maps that show the status of the network, provide alarm lists with detailed information about outstanding alarms, diagnostics commands and other alarm-related commands, and configuration information.

The features of Network Monitor fall into one of these three categories:

- interactive bit-mapped graphical displays
- interactive lists of alarm information
- fault diagnosing

Interactive Bit-Mapped Graphical Displays

Network Monitor offers bit-mapped graphical displays that provide a customized network view. Various optional backgrounds and an extensive array of symbols are available to create your network maps. These maps are created in varying levels of detail to depict the equipment in your network.

An easy-to-use editor allows you to place objects on maps and link them together to achieve the network representation that best suits your needs. Additionally, Network Monitor lets you request the automatic generation of shelf maps that display a cabinet view of any node or concentrator monitored by a *StarKeeper* II NMS.

Alarms that occur in the network are immediately reflected on your maps, which are color-coded by severity.

Interactive Lists of Alarm Information

Alarms from network equipment can be displayed in textual form in a List Alarms Window. Multiple List Alarms Windows can be used simultaneously. Each List Alarm Window has its own criteria that is used to limit the list to a subset of the total alarms in the network. This allows you to concentrate on a particular network problem. The criteria used to determine alarm types collected include network addresses, alarm severities, module types and message identifiers.

The alarms in a List Alarms Window can be scrolled through — both up and down—and selected. Commands can easily be issued on the selected alarms. Such commands allow you to clear alarms, obtain help on alarms and to display more detail about an alarm. Short-cuts are available to quickly access the corresponding Network Map Window or Diagnostics Window. Various list formats and sorting options are available both dynamically and as an individual user preference when a list is invoked.

Fault Diagnosing

Network Monitor enables you to diagnose most equipment anywhere in your network from a central location. You also have the ability to diagnose multiple pieces of equipment to assist in solving network problems.

Supported Node Commands

Diagnostic commands are provided to identify problems that may occur on any node. The supported diagnostic commands are:

- verify
- remove
- restore
- display conn
- dstat
- dmeas
- diagnose
- display EIA
- display traffic
- nping
- route
- smeas
- tmeas

Commands Pre-formatted and Sent to a Node

Network Monitor provides a user-friendly interface to the node diagnostic commands by supplying the various parameters required to properly format commands for different equipment types. You do not need to know the exact syntax of the node diagnostic commands. You simply determine the equipment you wish to diagnose from a map or an alarm on an alarm list and then choose the appropriate diagnostic task.

Supported Products

Please see the *StarKeeper II NMS Planning Guide* for a list of all nodes, servers, routers, and systems that can be used with Network Monitor. Supported product version numbers are also provided.

Network Monitor Window Architecture

This section provides a brief description of Network Monitor's window architecture.

As the following figure illustrates, Network Monitor uses six basic types of windows, each geared to facilitate performing a particular task. The six windows are:

- Network Monitor Control Window
- Edit Maps Window
- Network Status Window
- Network Map Window
- List Alarms Window
- Diagnostics Window

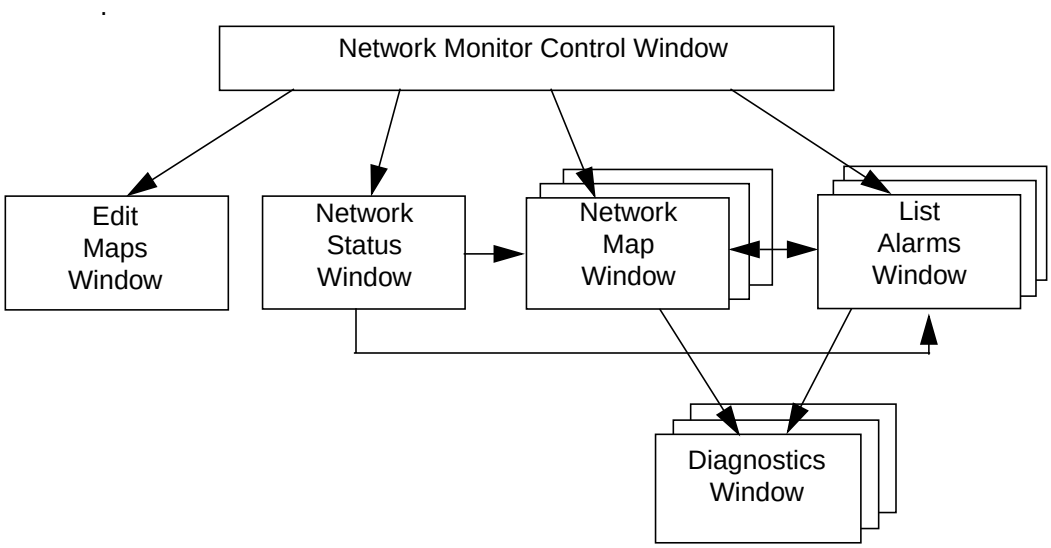


Figure 1-3. Network Monitor Window Architecture

The remainder of this section provides a high-level description of some of the features available in each window.

Network Monitor Control Window

The Network Monitor Control Window has two main functions:

- to provide access for monitoring the network
- to administer the Network Monitor application

Administration tasks include:

- setting alarm list preferences
- defining user notices (see the **Network Status Window** section)
- creating and linking maps via the map editor
- requesting the automatic generation of shelf maps for nodes and concentrators to show the modules that have been configured
- setting the Top Map

See **Chapter 10** and **Chapter 12** for more information on the Network Monitor Control Window.

Edit Maps Window

The main function of the Edit Maps Window is to create bit-mapped graphic maps that represent your network. Characteristics of the map editor are:

- easy placement of symbols on maps using lists of equipment obtained from the *StarKeeper* II NMS database
- an editor legend for placing symbols and manually assigning network addresses
- optional geographical backgrounds to display the location of your equipment (for example, a map of the USA)

The following are characteristics of the maps you can create with the map editor:

- a *top map* can represent your entire network via *aggregate location symbols*, with each representing a group of equipment
- *regional maps* can represent individual portions of your network
- *detailed maps* can represent equipment associated with a particular node (for example, concentrators associated with a BNS-2000 VCS node)

NOTE:
Shelf maps are created independently of the map editor and are considered the lowest level in a map hierarchy.

The various types of maps can be linked together in a *top-down* fashion to form a *map hierarchy*, starting with a very high-level view (that is, the top map) and ending with a *close-up* view of specific network equipment. See **Chapter 10** and **Chapter 12** for more information on the Edit Maps Window.

Network Status Window

The Network Status Window provides a *status-at-a-glance* feature via:

- *alarm severity notices*—these display a count of alarms in the entire network, color-coded by severity.
- *user notices*—these display a count of alarms highlighting user-defined important events (for example, trunk alarms). User notices can be defined to match alarms based on network address and/or module type and/or message identifiers.

Alarm lists associated with each of the alarm severity notices and user notices can be easily obtained by clicking on the Alarm Severity Notice or User Notice.

NOTE:
As **Figure 1-3** indicates, the Network Status Window and the Network Map Window are invoked together from the Control Window. Additional Network Map Windows can be invoked from the Network Status Window, the Network Map Window or the List Alarms Window.

See **Chapter 11** and **Chapter 12** for more information on the Network Status Window.

Network Map Window

The Network Map Window is used to display the bit-mapped graphical maps created with the map editor, as well as the automatically generated shelf maps for nodes and concentrators. Characteristics of the Network Map Window are:

- when the Network Map Window is invoked, the top map is automatically displayed along with the Network Status Window
- a navigation feature allows you to maneuver up and down the map hierarchy
- multiple maps can be simultaneously displayed, allowing you to scrutinize various portions of a network
- map symbols change color to reflect the status of the equipment they represent. In general, the status is *normal, alarmed,* or *unmonitored*. Unmonitored status means the equipment is not monitored by a *StarKeeper* II NMS.

The following table lists the various colors a symbol can have with their associated meaning.

Table 1-1. Alarm Colors

Color	Meaning
red	A critical alarm has occurred
yellow	A major alarm has occurred
blue	A minor alarm has occurred
green	No alarms (normal)
white	The equipment represented by the symbol is unmonitored (for example, a host computer)

See **Chapter 11** and **Chapter 12** for more information on the Network Map Window.

List Alarms Window

The primary function of the List Alarms Window is to display textual alarm information. Characteristics of the List Alarms Window are:

- lists of alarms can be requested by network address and/or alarm severities
- the *display detail* feature can be used to display an extended version of an individual alarm in a list to view the recommended action and other information not shown in the multi-line format
- the *find map* feature can be used to locate and directly access the map where the equipment associated with a particular alarm is represented
- the *clear alarms* feature can be used to clear an alarm or set of alarms
- the *diagnostic* feature can be used to perform diagnostics on the selected alarm
- on-line help is available for any alarm or message identifier
- lists of alarms can be displayed by using one of two formats—a single line per alarm or multiple lines per alarm. The multi-line format includes the alarm message text. The format can be changed dynamically.
- lists of alarms can be sorted by date and time, severity, and network address
- the *freeze* feature can be used to temporarily suppress new alarms from being displayed while a particular alarm is being investigated
- an audible alarm option is provided for newly received alarms in the Network Status Window as well as in other List Alarms windows

NOTE:
As **Figure 1-3** indicates, the List Alarms Window can be invoked from one of three places—the Control Window, the Network Status Window, or the Network Map Window. Multiple List Alarm Windows can be invoked simultaneously.

See **Chapter 11** and **Chapter 12** for more information on the List Alarms Window.

Diagnostics Window

The primary function of the Diagnostics Window is to perform diagnostics on a particular piece of equipment. The following are characteristics of the Diagnostics Window:

- a user-friendly interface to the node diagnostic commands. This eliminates the need for remembering and entering parameters required to format commands for different equipment types; you merely need to select an object on a map or an alarm from a list and choose the desired diagnostics task
- the ability to compare the output of multiple diagnostic commands on a piece of equipment
- the ability to simultaneously access and diagnose different pieces of equipment to assist in fault isolation

NOTE:
As seen in **Figure 1-3**, the Diagnostics Window is invoked from either the Network Map Window or List Alarms Window.

See **Chapter 11** and **Chapter 12** for more information on the Diagnostics Window.

Where Do You Go From Here?

Your first step in Network Monitor operation depends on the availability of the application and your experience. Refer to the following table for your particular situation.

Situation	Reference
Installing Network Monitor	*StarKeeper II NMS Core System Guide*
How to use HP VUE	*Using Your HP Workstation*
Adding and removing Network Monitor users	Chapter 2
You need to plan your map hierarchy	Chapter 10
Create and generate maps	Chapter 10
Define user notices	Chapter 10
Specify alarm filters	Chapter 10
Distribute maps to workstations	Chapter 10
Monitor your network	Chapter 11

Performance Reporter

Performance Reporter is a network measurement package that provides user-friendly, menu-based access to performance reports. These performance reports are used to evaluate the performance of network resources — both physical and logical. Network nodes transmit raw performance data to *StarKeeper* II NMS via a designated performance connection. Only nodes with an active performance connection can be supported by the performance management capabilities of *StarKeeper* II NMS and Performance Reporter.

Performance Reporter is an optional, graphics-oriented application that makes use of the data collection, summarization, and storage capabilities of *StarKeeper* II NMS. While *StarKeeper* II NMS does provide basic reporting capabilities, Performance Reporter adds value in terms of the user interface and features that are specifically geared to two performance management tasks: routine performance assurance and long-term engineering.

Performance Reporter Features

This section provides a high-level discussion of the major features available through Performance Reporter. Performance Reporter is based on the Motif Graphical User Interface.

The features of Performance Reporter fall into one of the following three categories:

- routine performance assurance
- long-term engineering
- administration and maintenance

Routine Performance Assurance

Routine performance assurance is the daily monitoring of performance measurements in the network. The purpose is to identify service-affecting or potentially service-affecting conditions in the network. Since performance problems can be related to network alarms, troubleshooting a performance problem will often require checking alarms or alarm history. While it is not always possible to solve a performance problem as it occurs, it is important that the System Administrator, in the role of pro-actively managing a network, be aware of these conditions as they occur.

The following lists the features that Performance Reporter has available for routine performance assurance.

- Thresholding

  This is a feature that can be manually activated if routine performance assurance is part of the operation. Thresholding helps the System Administrator to identify problem areas. Performance measurements, peak trunk utilization, and node availability, for example, have threshold values associated with them. Factory set default values are provided but can easily be changed. When the threshold value has been crossed during an interval, that interval is flagged as an exception, and will appear on the Daily Exception Report.

- Daily Exception Reports

  This feature is activated as part of the thresholding feature. The Daily Exception Report is automatically generated and filed at the end of each day. Two formats are available: a detailed view of all the exceptions and a summary of exceptions per resource. The report shows the previous day's problem areas. The System Administrator will decide which problems to troubleshoot. The first step in troubleshooting is to check the current day's reports for a recurrence of the problem.

- On-demand reports

  Daily performance reports are available for hourly intervals of the past several days according to the data retention period that was set on the *StarKeeper* II NMS Core System (see **Chapter 13**). Most often, these reports are specified up to the last hour of the current day. The reports are organized by categories: Bandwidth Utilization, Connection Utilization, Port Capacity Utilization, Network Availability and Module Performance. They are accessed via menus and forms. These reports, available in tabular or graphical form, can be displayed to the screen, sent to a printer or saved to a file. Performance measurements are included in the reports so that the System Administrator can see what the values are today and compare them to yesterday's Daily Exception Report. Performance measurements that have crossed threshold settings will be identified on the reports. If a performance problem persists, the System Administrator can follow it up by checking the other lower-level reports, or by checking other applications. For example, you could look for related alarms in Network Monitor or check the configuration data in Network Builder.

Long-term Engineering

Long-term engineering is the ongoing identification of network performance needs and planning involved to meet those needs. There are several sources of network performance needs: chronic service-affecting conditions, trends in usage, weekly and monthly report summaries, and user feedback. Long-term engineering provides a history of performance-related information that can be used to design an optimal network. This information must be used together with growth plans to arrive at an optimal network design.

The following lists the features that Performance Reporter has available for long-term engineering.

- Scheduled report requests

  It is important that the System Administrator be able to set up schedules for running measurement reports, especially when those reports will be run repeatedly. The System Administrator will decide which reports are needed and when they are to be run. The scheduled reports are requested via the same forms interface as the on-demand reports. Scheduled reports can be run on a daily, weekly, or monthly basis. These reports, available in tabular and graphical form can be sent to a printer for viewing at a later date. Performance measurements that have crossed threshold settings will be identified on graphical reports.

- Weekly and monthly measurement reports

  The reports relevant to long-term engineering are the weekly and monthly summary reports. The reports are organized by categories: Bandwidth Utilization, Connection Utilization, Port Capacity Utilization, Network Availability and Module Performance. Some reports are available in both tabular and graphical form. These reports can be saved to a file and be available for printing at a later date. When it is time to review and compare the reports, the System Administrator will look at the performance measurements, noting any changes, specifically changes in relation to threshold values.

- Weekly and monthly exception reports

  The weekly and monthly exception reports will be automatically generated and sent to files. These reports are summary reports that show the frequency of performance problems per resource. The System Administrator has the option to print the report and use that report in identifying chronic performance problems that should be resolved by an engineering change.

Administration and Maintenance

Administration and maintenance is the support of activities that ensure the application is set up appropriately and continues to work properly.

A menu and forms interface accesses the administrative features of Performance Reporter. Those features are:

- activating/deactivating the threshold feature
- entering a threshold value to replace the factory set value
- updating configuration information
- displaying the report request schedule, with the option to change or delete a request
- displaying the list of filed reports, with the option to display, print, or delete a report

Supported Products

Please see the *StarKeeper II NMS Planning Guide* for a list of all nodes that can be used with Performance Reporter. Supported product version numbers are also provided.

Various products transmit performance data to *StarKeeper* II NMS via a designated performance connection. Only products with a configured, active performance connection can be supported by the performance management capabilities of *StarKeeper* II NMS and Performance Reporter.

Performance Reporter Window Architecture

This section gives a high-level description of the Performance Reporter window architecture. The window architecture for Performance Reporter is shown in the following figure. From the Performance Reporter Control Window you can access all of the features of this application.

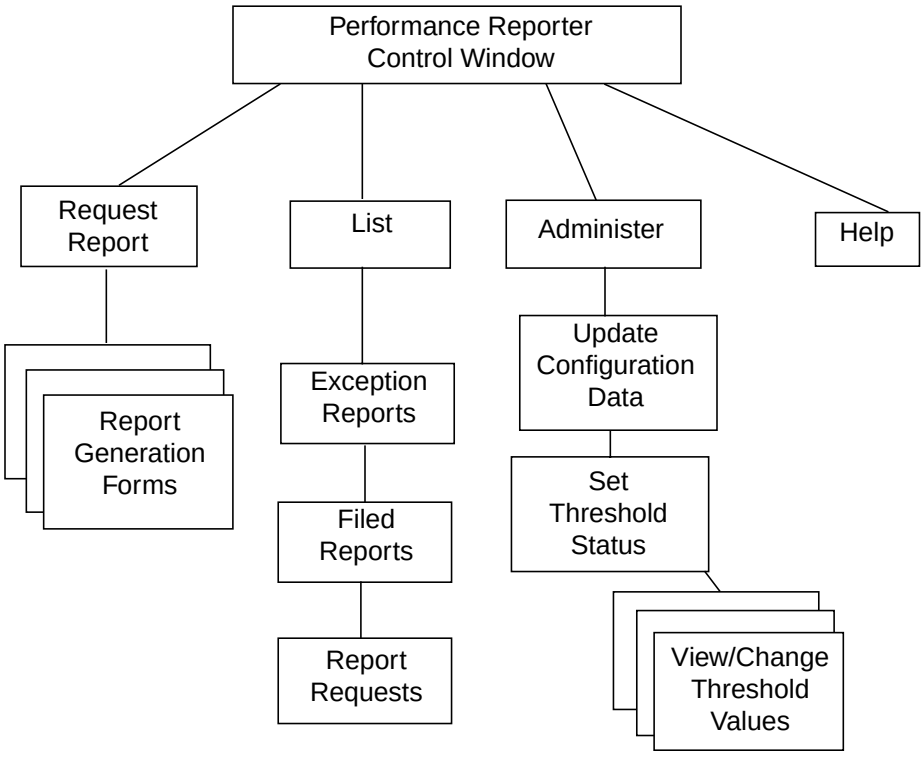


Figure 1-4. Performance Reporter Window Architecture

The following describes the windows that are available from the Performance Reporter Control Window.

- The **Request Report** menu provides access to report generation forms, organized by report categories. Selection of a report category will bring up a form, where you enter your report request. The report request is made up of report selection criteria, such as, resource name, report type (i.e., daily, weekly, monthly), interval, and scheduling information.

  This button is used for both requesting on-demand measurement reports and scheduling measurement reports to be run later. When you request an on-demand report, the report output can be directed to the screen, a

printer, or saved to a file. A scheduled report can be sent to a file or to a printer. The reports can be obtained in either tabular or in some cases graphical format.

- The **List** menu provides access to report information that has been previously entered. You can view a list of measurement reports that have been run and filed, a list of exception reports that have been run and filed, or a list of report requests that have been scheduled. By selecting the list item, you can display the corresponding report or report schedule.
- The **Administer** menu provides access to Performance Reporter functions which are important in administering the application. You can activate the thresholding feature by changing its status. Once thresholding is active, you can view and change the threshold values for each performance measurement. You can also update configuration information.
- The **Help** menu provides access to on-line help.

Report Categories

There are five report categories for both on-demand and scheduled performance reports. This section summarizes each of these categories.

Bandwidth Utilization

Bandwidth Utilization reports represent the utilization of the main physical components in a network. The main physical components in a network are: nodes, trunks, links, and M1 shelves. They are high-level reports that are expected to be run daily, weekly, and monthly. Error counts are not included in this high-level report; they are found in the Module Performance reports.

Bandwidth Utilization reports show how much capacity is being used. Trunk utilization is the usage of facilities between nodes. Link utilization is the usage of facilities between nodes and other products, such as, concentrators, multiplexers, hosts and servers. Node utilization is the usage of the node backplane.

Trunk Utilization Report

These reports identify both ends of the trunk (node name and group), and show utilization data from both ends.

Link Utilization Report

These reports show utilization data for Multipurpose Concentrators, SAMs and CPMML servers.

Node Backplane Utilization Report

These reports show the usage of the node backplane. Usage is defined as the number of packets/segments switched across the backplane expressed as a percentage of the backplane capacity. A summary report and a detail report are provided. The detail report gives module specific information of the traffic contribution to the BNS-2000 node backplane.

This report shows what percentage of the backplane is being used, which indicates how close a node backplane is to its maximum data transfer rate. This measurement is important in deciding whether or not a node can support more concentrators or multiplexers.

M1 Shelf Utilization Report

This report shows the aggregate usage of M1 shelves in the BNS-2000 node by displaying the percentage of the M1 shelf that is being used. Usage is defined as the traffic carried as a percentage of the shelf capacity. The higher the percentage, the closer the shelf is coming to its maximum data transfer rate.

Connection Utilization

Connection Utilization reports represent the percentage of connections of logical components in your network, X.25 channels, and the node. There are two levels of these reports. The summary report shows the channel (trunk groups) or port (receiving groups) utilization, call success rate, and a failed call indication. The detail report shows the breakdown of failed calls listed by cause, such as contention conflict or a security problem.

Logical components are the trunk groups and receiving groups that you have set up to route calls. By looking at the data in these reports, you can determine if the groups can handle the call traffic effectively, or if the groups should be reconfigured.

X.25 reports show the utilization of X.25 channels that are allocated to X.25 ports. By looking at the data in these reports, you can determine if the number of channels can handle the call traffic effectively. The summary report shows the channel utilization and call success rate. If the call success rate is less than 100%, it indicates that there were failed calls.

Node reports show the percentage of backplane connections, which indicates how close a node backplane is to its maximum data transfer rate. This measurement is important in deciding whether or not a node can support more concentrators or multiplexers.

Port Capacity Utilization

Port Capacity Utilization reports show the port utilization for access modules in the backplane. Ports in access modules are connected via facilities to other devices and therefore are similar to other transmission facilities; for example, trunks and links. These reports are usually run on a daily, weekly, and monthly basis.

Network Availability

Network Availability reports show the percent availability of nodes and trunks. Availability is calculated from a centralized network management perspective. Both node and trunk availability are based on alarms coming from the node via the console connection. They are calculated daily by *StarKeeper* II NMS. The percentage is the average daily availability. If the console connection is down for any reason, the percentage in the report will be less than 100%.

Module Performance

Module Performance reports show the traffic loading and error summary information for low level physical components. You can select from module, port, channel, or facility level information, depending on what you need. These reports are available for all types of modules. These reports are used to troubleshoot specific problems (on a module or port) that have been identified in either an exception report, a high level report, or via customer feedback. An example of a high level report is a Bandwidth Utilization report.

Graphical Options

All types of usage and performance reports, described above, are available in tabular form. Some reports are also available in graphical format.

The following reports can be requested in graphical format.

- Bandwidth Utilization: Link: Module address
- Bandwidth Utilization: Trunk: Module address or Trunk name
- Port Capacity Utilization: Module address

When requesting the above graphical format reports, be aware that **all** is not a valid option. Individual node names must be selected for the Port Capacity Utilization: Module address, Bandwidth Utilization Trunk: Module address, and Bandwidth Utilization Link: Module address reports. An individual trunk name must be selected for the Bandwidth Utilization Trunk: Trunk name report.

Where Do You Go From Here?

Your first step in using Performance Reporter depends on the availability of the application and your experience. Refer to the following table for your particular situation.

Situation	Reference
Installing Performance Reporter	*StarKeeper II NMS Core System Guide*
How to use HP VUE	*Using Your HP Workstation*
Adding and removing Performance Reporter users	Chapter 2
Administer Performance Reporter (activate thresholding, change threshold values, update configuration data)	Chapter 14
Check status of performance connections to nodes	*StarKeeper II NMS Core System Guide*
Schedule performance data collection on nodes	*StarKeeper II NMS Core System Guide*
Access exception reports	Chapter 14
Run on-demand performance reports	Chapter 14
Schedule performance reports	Chapter 15
Maintain report files and schedules	Chapter 16

Administering the Graphics System

2

We assume that you have completed the installation of your *StarKeeper* II NMS software. If you have not yet done so, please refer to the *StarKeeper II NMS Core System Guide* for instructions on how to install the software. The procedures in this chapter may be executed only after the software has been installed.

Before beginning administration procedures, you must first have an HP-UX login and have superuser privilege.

Adding HP-UX Logins

Before a user can access the Graphics System, the user must have a valid HP-UX login. To obtain an HP-UX login for a user, run the System Administration Manager (SAM) on your HP host computer. See the **HP System Administration Tasks Manual** for more information.

Adding Graphics System Users

The **adduser** command allows a user to access the Graphics System. When you run **adduser**, you specify which applications a user is authorized to access. You are presented with the following options:

- Graphics System Platform - allows the user to access the Bulletin Board and Cut-Through applications of the Graphics System Platform.
- Workstation Administration - allows the user to access the Workstation Administration application of the Graphics System Platform. Note that as a workstation administrator, a user is granted special privileges, including the following:
  - — the user can start and stop the Graphics System
  - — the user can activate and inactivate connections between the Graphics System and Core Systems
  - — the user can set various administrative parameters for the Graphics System

See **Chapter 5** for a complete discussion of the Workstation Administration application.

- Network Monitor - allows the user to access the Network Monitor application.
- Performance Reporter - allows the user to access the Performance Reporter application.
- Network Builder - allows the user to access the Network Builder application. You specify whether the user has read-only permission, or configure (read-and-write) permission. If the user has read-only permission, they may perform the Network Builder **Load** operation in order to view configuration data, but they cannot **Submit** a loaded task for update, nor can they perform Network Builder **New** or **Delete** operations.

You may specify any combination of the above. If you specify any one of Network Monitor, Performance Reporter or Network Builder, the user is automatically authorized to access the Graphics System Platform (Bulletin Board and Cut-Through).

The **adduser** command will also establish an HP VUE environment for the user and will add an icon and menu mark for the *StarKeeper* II NMS subpanel to the user's HP VUE Front Panel. Each Graphics System application that you authorized for the user when you ran the **adduser** command will be displayed as an icon in the *StarKeeper* II NMS subpanel.

NOTE:
The **adduser** command should not be run for a user when that user is logged onto the system. If the user is logged onto the system, changes made by the **adduser** command may not be properly saved when the user logs off. Make sure the user is not logged onto the system before running **adduser**.

Procedure 2-1. Adding Graphics System Users

To add a Graphics System user, do the following:

1. Log in as **root**.
2. Enter **. /usr/share/lib/pub/AP_ROOT**
3. Enter **$AP_ROOT/bin/adduser**

You will be prompted to enter the login ID for the user you wish to authorize, and you will be asked to select the application(s) for which you would like the user authorized. When you are finished authorizing users, enter **q** to quit the **adduser** command.

Removing Graphics System Users

The **remuser** command allows you to deny a user access to the Graphics System or any of its applications previously granted by the **adduser** command.

NOTE:
The **remuser** command should not be run for a user when that user is logged onto the system. If the user is logged onto the system, changes made by the **remuser** command may not be properly saved when the user logs off. Make sure the user is not logged onto the system before running **remuser**.

Procedure 2-2. Removing Graphics System Users

To remove a Graphics System user, do the following:

1. Log in as **root**

2. Enter **. /usr/share/lib/pub/AP_ROOT**

3. Enter **$AP_ROOT/bin/remuser**

You will be prompted to enter the login ID for the user. You will then be presented with a numbered list of Graphics System applications for which the user was authorized to access by the **adduser** command. Enter the applications to which the user should be denied access.

You may specify any combination of applications assigned to the user. However, if you specify the Graphics System Platform as one of the applications to remove, then all other applications assigned to the user will be removed as well.

Removing Graphics System Applications Software

This section describes the procedure to remove the software for any of the Graphics System applications. Use this procedure when you want to remove software from the system completely.

NOTE:
It is not necessary to remove the software when you are installing a new version of the software. The new software will be installed in place of the old software.

NOTE:
You must stop the Graphics System from running before removing Graphics System software. (See the section **Stopping the Graphics System** later in this chapter).

Procedure 2-3. Removing Graphics System Software

To remove Graphics System applications software, do the following:

1. Log in as **root**
2. Stop the Graphics System. (See the section **Stopping the Graphics System** later in this chapter). Wait for the system to display a message telling you that *StarKeeper* II NMS has been shut down.
3. Enter **. /usr/share/lib/pub/AP_ROOT**
4. Enter **$AP_ROOT/bin/Remove**

You will then be presented with a numbered list of Graphics System applications that have been installed on the system. Enter the applications you wish to remove. You will receive a confirmation message for each application that is removed. When you are finished, you may restart the Graphics System. (See the section **Starting the Graphics System** later in this chapter).

Verifying Graphics System Applications Software

To view the list of Graphics System application software and supporting software currently installed on the system, do the following:

Procedure 2-4. Verifying Graphics System Software

1. Log in as **root**
2. Enter **. /usr/share/lib/pub/AP_ROOT**
3. Enter **$AP_ROOT/bin/Display -i**

In addition to the **-i** option, other options are available for the **Display** command. To view a list of these options and see what they do, run the command using the **-h** option.

Starting the Graphics System

The Graphics System software should be running. However, if you are not sure, enter the command **startws** at the system prompt. The **startws** command starts all Graphics System processes. If the Graphics System is running, the message

```
StarKeeper II NMS Workstation Software is already running.
To terminate, enter "stopws".
```

is output. If you have a need to start the Graphics System, use this command. Before you use this command, you must be authorized as a Workstation Administration user, obtained by using the **adduser** command. Also, the Bulletin Board should be up when you use this command, or you should run the "**Display -g**" command to see if other users are present before shutting down the workstation.

To start a Co-resident system, use the **SKsh** command at the **SK** prompt. The system displays the SKsh main menu. From there, select **SYSADM** to display the SYSADM sub-menu, then select **STARTSK**, and respond **y** to the continue prompt. Refer to the *StarKeeper II NMS Core System Guide* for further information on the **SKsh** command.

Stopping the Graphics System

The **stopws -k** command terminates the Graphics System software as well as all users' graphics applications. Use the **Display -g** command to check for other users before shutting down the software.

The **stopws -k** command is entered at the system prompt. You must be recognized as a Workstation Administration user by using the **adduser** command before you can use **stopws**.

To terminate a Co-resident system, use the **SKsh** command at the **SK** prompt. The system displays the SKsh main menu. From there, select **SYSADM** to display the SYSADM sub-menu, then select **SHUTSK**, and respond **y** to the continue prompt. Refer to the *StarKeeper II NMS Core System Guide* for further information on the **SKsh** command.

Core and Graphics System Communications

Before Core Systems and Graphics Systems can communicate with each other, several administrative tasks must be performed. The following lists the steps you must take.

1. Administer Local Machine Parameters on all Core Systems and Graphics Systems within your *StarKeeper* II NMS network.
2. Administer connections from the Graphics Systems to the Core Systems.
3. Verify all connections are successful.
4. Synchronize the Graphics Systems with the Core System node connection data.

You might encounter problems during some of these steps. This section describes troubleshooting procedures that can be used to isolate problems.

For a more in-depth analysis of some of the concepts discussed in this section, see *Chapter 2*, *Host Interface Installation and Administration*, and *Chapter 4*, *System Administration* in the *StarKeeper II NMS Core System Guide*.

Administer Local Machine Parameters

The following three parameters must be defined on each machine.

- Local Machine ID

  The Local Machine ID is an integer between 1 and 100, inclusive, and must be unique among other *StarKeeper* II NMS machines within the *StarKeeper* II NMS network. Thus, the assignment of the local machine ID must be made with consideration of the machine IDs that are assigned to the other *StarKeeper* II NMS Core Systems and Graphics Systems that comprise the network.

- Local Service Address

  The local service address must be the fully qualified service address for the local machine. This service address must be entered into the node that provides network connectivity for the local machine. A service address may contain up to four levels, with each level containing up to eight characters or digits. This address is the service address used by the *dkserver* process and by convention the right most portion is typically the *uname* of the machine.

- Local Listener Address

  The local listener address is the address that the *listener* process on the local machine responds to when a remote *StarKeeper* II NMS attempts to establish a connection to the local machine. The listener address must be fully qualified and entered as a service address in the node that provides network connectivity for the local machine. A listener address consists of up to four levels, with each level containing up to eight characters or digits. By convention, the lowest level of the listener address is the uname of the

local machine in all capital letters. The *StarKeeper* II NMS installation process will automatically set the listener address for you using this convention.

NOTE:
A *fully qualified* address is the complete path of the service address such as *network/area/exch/localname* or *area/exch/localname*. For example, the Local Service Address for the machine whose *uname* is **bear** might be *usa/nj/town/bear*. The Local Listener Address for the same machine may be *usa/nj/town/BEAR*.

You will administer these parameters when installing your *StarKeeper* II NMS software. You can also modify this information any time after installation on the Graphics System via the **Modify Local Parameters** window, available from **Workstation Administration**.

The following table can be used to keep track of the parameters assigned to your *StarKeeper* II NMS Core Systems and Graphics Systems.

Table 2-1. *StarKeeper* II NMS Machine Parameters

Starkeeper II NMS Machine Parameters			
Machine Uname	**Machine ID**	**Local Service Address**	**Local Listener Address**

Table 2-1. *StarKeeper* II NMS Machine Parameters—*Continued*

Starkeeper II NMS Machine Parameters			
Machine Uname	**Machine ID**	**Local Service Address**	**Local Listener Address**

To guide you, we will be using a sample *StarKeeper* II NMS network that consists of two Core Systems and two Graphics Systems. We will call these machines **skcore1**, **skcore2**, **ws1**, and **ws2**.

The following machine parameters are assigned to these machines.

***Starkeeper* II NMS Machine Parameters**			
Machine Uname	**Machine ID**	**Local Service Address**	**Local Listener Address**
skcore1	1	nj/net/skcore1	nj/net/SKCORE1
skcore2	2	nj/net/skcore2	nj/net/SKCORE2
ws1	3	nj/net/ws1	nj/net/WS1
ws2	4	nj/net/ws2	nj/net/WS2

Administering Connections

After machine parameters are administered, the next step is to administer connections between Graphics Systems and Core Systems. The following diagram shows the logical network view of how we plan to connect the Core Systems and

Graphics Systems in our example network. Physically, these connections will be made through the nodes in the network.

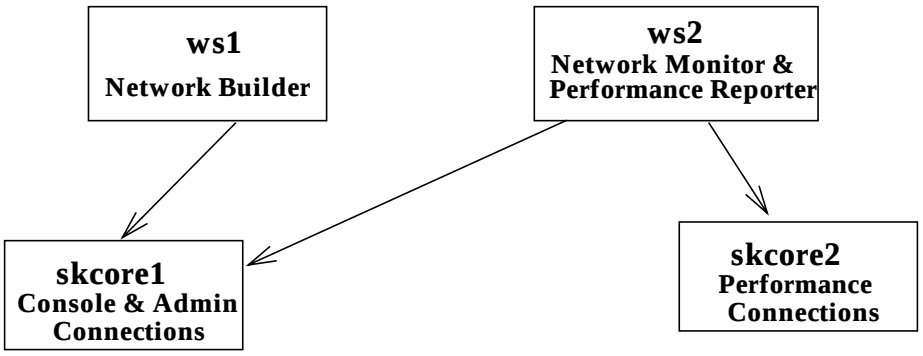


Figure 2-1. Administered Connections in a Network

In the preceding diagram, the Core Systems are administered such that **skcore1** has all the console and administrative connections and is used to collect alarms, and provide passthru access to the nodes. **skcore2** monitors the performance connections for all other node types and stores their performance measurements data. On **ws1** we will install the Network Builder software and on **ws2** we will install Network Monitor and Performance Reporter. Based on the functions of the Core Systems and the applications installed, **ws1** must connect to **skcore1** to access the administrative connections. **ws2** with Performance Reporter and Network Monitor must connect to both *StarKeeper* II NMS Core Systems.

To administer connections from the Graphics Systems to the Core Systems, use the **Add/Delete/Modify Connections** window available from **Workstation Administration**. This must be done on each Graphics System. The fields required are:

- System Name
  The uname of the Core System that you are connecting to.
- Listener Address
  This is the listener address of the Core System you are connecting to.
- Status Flag
  The status of the connection, either active or inactive.

The following shows the information administered for **ws1**, which has one connection administered to **skcore1**.

System Name: skcore1
Listener Address: nj/net/SKCORE1
Status: Active

Verify Connection Status

Once the connection information is entered, the Graphics System will try to establish a connection to all Core Systems where the Status Flag is active. Use **Workstation Administration, View, Connection Status** to see the status of the connections.

If the connection is successful (status is Connected), refer to the section **Synchronizing Connections Data.** If the connection is unsuccessful (status is Disconnected), continue with the following section to troubleshoot the problem.

Troubleshooting Failed Connections

If a connection is unsuccessful, inactivate and activate the connection, and the Graphics System will try again to connect to the Core System. If the second attempt is also unsuccessful, the problem is most likely with the listener address.

Here's how the connection is established. The Graphics System first calls the Core System using the listener address you specified. It also sends the Graphics Systems local listener address (the one you defined for the Graphics System) to the Core System. The Core System then tries to call back the Graphics System using that listener address. The connection may fail because of one of a few reasons:

1. The listener address you specified for the Core System is not defined correctly.
2. The listener address you specified for the Core System is defined correctly, but it may not be administered in all the nodes within the network path from the Graphics System to the Core System, or is not in service.
3. The local listener address for the Graphics System (administered via the **Modify Local Parameters** window), is not defined correctly.
4. The local listener address is not known to all the nodes within the network path from the Core System to the Graphics System.
5. The local listener address is defined at all the nodes, but may not be in service.
6. The *listener* process on the Graphics System is not accepting incoming calls.
7. The *StarKeeper* II NMS software is not running on the Core System.
8. The Core System machine parameters are not administered.

To isolate the problem, here are some steps you can take.

1. Verify that the local listener address is administered correctly for the Graphics System. You can do this by choosing **Modify Local Parameters** and viewing how it is administered.
2. Verify that the Core System listener address is defined properly in the **Add/Delete/Modify Connections** window for the failed connection.
3. Verify that a call can be established from the Graphics System to the Core System. To do this, obtain a Cut-Through window to your Graphics System and execute the following:

   dkcu Core-System-listener-address

   where *Core-System-listener-address* is the address defined via the **Add/Delete/Modify Connections** window for this Core System connection.

   For example, at **ws1** you would type ***dkcu nj/net/SKCORE1***.

   If successful, the following message is displayed:

   ```
   Circuit Open
   ```

   Enter "**~.**" to terminate the call and get back to the UNIX prompt.

   If any error messages appear, you know there is a problem in the administration of this address for the nodes in the path from the Graphics System to the Core System.

   See the section **dkcu Error Messages** later in this chapter for possible error messages and their meanings.
4. Verify that the call can be established from the Core System to the Graphics System. To do this, execute the following from the Core System.

   dkcu Graphics-System-listener-address

   where *Graphics-System-listener-address* is that defined via **Modify Local Parameters** in **Workstation Administration**.

   For example, at **skcore1** type ***dkcu nj/net/WS1***.

   If successful, the following message is displayed:

   ```
   Circuit Open
   ```

   Enter "**~.**" to terminate the call and get back to the UNIX prompt.

   If any error messages appear, you know there is a problem in the administration of this address for the nodes in the path from the Core System to the Graphics System.

   See the section **dkcu Error Messages** later in this chapter for possible error messages and their meanings.
5. Verify that the *listener* process is running, by executing the command:

   nlsadmin -x

on both the Graphics System and Core System. If the output of this command shows INACTIVE, then the *listener* is not running. If the *listener* is not running on either machine, you can restart it by running the following command as user **root**:

nlsadmin -s mx

Once you determine the problem, inactivate and activate the connection on the Graphics System to re-establish the connection. If it is now successful, refer to the next section, **Synchronizing Connections Data**.

If you checked all the above and the problem is still not solved, please contact your support organization.

Synchronizing Connections Data

Once the connection is successful, it is a good idea to invoke the **Synchronize Connections** window via **Workstation Administration**, to make sure the Core System connection information is synchronized on the Graphics System. If the synchronization fails, run the command again. If it continues to fail, then there is most likely a problem with the Graphic System local service address.

Troubleshooting Connection Synchronization Failures

The **Synchronize Connections** window sends a message to each Core System asking it to **push** all its connection information to the Graphics System.

Synchronization may fail for one of the following reasons:

a. You have incorrectly defined the local service address for the Graphics System.

b. The local service address is not known to all the nodes within the network path from the Core System to the Graphics System.

c. The local service address is defined at all the nodes, but may not be in service.

d. The *dkserver* process on the Graphics System is not accepting incoming calls.

A good way to isolate the problem is to execute the following command from the Core System.

dkcu Graphics-System-service-address

where *Graphics-System-service-address* is defined on the Graphics System via the **Modify Local Parameters** window.

If successful, you will see a **`login:`** prompt.

Enter "**~.**" to terminate the call and get back to the UNIX prompt.

If there are any errors see the section **dkcu Error Messages** later in this chapter for possible error messages and their meanings.

Additional Help

If the above information does not solve your problems, additional troubleshooting information can be found in the help file *LD_SCP*. You can view this file by the executing the command **`help LD_SCP`** on a Core System.

dkcu Error Messages

Possible **dkcu** error messages include:

- **`Can't connect to XX/XXX/XXXX: Remote Node not answering`**

  A node within the path of this call is not available and no alternate path is defined.

- **`Can't connect to XX/XXX/XXXX: Server not answering`**

  This indicates the *dkserver* process is not running on the machine you are calling.

- **`Can't connect to XX/XXX/XXXX: Non-assigned number`**

  The address specified is not defined in all the nodes in the network path. Alternately, the address is defined but is not in service.

Netstation Administration

StarKeeper II NMS supports the display of graphics applications on Netstations in addition to the console. Using a Local Area Network (LAN), Netstations provide multiple, simultaneous access to graphics applications. This chapter assumes the LAN is already installed.

There are four supported Netstations for *StarKeeper* II NMS. They are the HP ENVIZEX II, HP 700/RX, HP ENVIZEX ***a*** **Series** and HP ENVIZEX ***p*** **Series** Netstations. Though the addressing concepts described in this chapter are general, the following discussion and directions for the administration of a Netstation are directed toward the use of this particular Netstation. See the appropriate Netstation manual for details.

This section discusses the actions that you must do to use Netstations with your *StarKeeper* II NMS application packages. These action items are

- administer the host server
- administer the Netstation

Because of the presence of a network (the LAN), your Netstation requires that you configure the host and the Netstation so each knows about the presence of the other; this is done by assigning addresses to the Netstations and to the network hosts. Addresses can take several forms according to the type of protocol in use.

To administer your hosts and Netstations, you must:

- add each planned Netstation to the host server (**Procedure 2-5**)
- if necessary, remove unwanted Netstations (**Procedure 2-6**)
- administer the Netstation (**Procedure 2-7**)

Instructions to complete these tasks follow.

The Host Server

When a Netstation is started, it downloads files from a host called a *File Server*. You may choose any host to serve as your Netstation's File Server. You must administer configuration data for the Netstation on the host in order for the host to act as the File Server for the Netstation. A procedure for performing this task is given later. In addition, you may also choose an *Alternate File Server*. Your Netstation will download files from the Alternate File Server if the primary File Server is not available.

If you choose to have an Alternate File Server, then you must also administer configuration data for the Netstation on that host in order for the host to act as the Alternative File Server.

Administering Netstations and Host Servers involves:

- assigning a name for each Netstation
- assigning a *unique* IP (network level) address to each of the hosts and Netstations
- entering the hardware (link level) address of each Netstation

Netstation Name

Each Netstation must have its own name; as an example, we are using the name *john_doe* in **Procedure 2-5**. The name for each Netstation may contain letters or digits up to 64 characters in length, but it must begin with a letter.

Network Level Addressing

The network software can use many different types of protocols. The HP-supported protocol is the TCP/IP protocol. The IP (Internet Protocol) uses an **Internet Address**, which is software configurable, to identify the network hosts and Netstations. This address is often referred to simply as the IP address. The IP address is a 32-bit number that has the form: n.m.p.q, where **n, m, p** and **q** are each decimal integers in the range 0 to 255. 135.22.40.11 is an example of an IP address. To determine the IP address of your host and Netstation, consult your LAN administrator.

Link Level Addressing

The **Link Level** address is the unique address of the Netstation. It is the address of the LAN interface card, which has been set by the factory and cannot be changed. You will have to determine the link level address of each Netstation you expect to have in your network. This link level address will be used later when configuring the Netstation on the host.

There are two ways to determine the unique link level address for your Netstation. The first is to look for the hardware address on a shipping label that accompanied your Netstation. At the bottom of one of these labels is a line that begins with *Ethernet Link Level Address:*, which is followed by a 12-digit hexadecimal number that starts with the sequence 0x080009. Copy down the entire sequence of 12 digits for each Netstation you expect to use. Another way to determine the link level address is to power up your Netstation. As the Netstation boots, a line will be displayed on the screen beginning with *Hardware Address:* followed by a 12-digit hexadecimal number. Record the entire sequence of 12 digits for the Netstation.

Administration on the Host Server

Procedure 2-5. Adding a Netstation to a Host Server

1. On the host server, log in as **root**.
2. Enter ***sam***.

   Choose the **`HP Netstation Administration`** option. Then, a menu labeled HP NETSTATION ADMINISTRATIVE TASKS appears. At this menu, follow the prompts and instructions on the screen until the procedure to add a Netstation is completed. You are asked for specific information. Note that ***john_doe*** and ***135.22.40.11,35.22.40.90, 080009333333*** are sample entries. Supply your own choices for names and addresses.

Please enter Selection (default=1):	**Enter 1**
Continue adding a Netstation [y|n] (y):	**Enter y**
Please enter name of each Netstation to add, [q|?]:	**john_doe**
Please enter the IP address of the Netstation in dot notation, [q|?]:	**135.22.40.11**
Enter LAN hardware address of Netstation [q|?]:	**80009333333**
Enter subnet mask in dot notation [q|?] (none):	**If you have a subnet mask, enter it**
Enter gateway IP address in dot notation [q|?] (135.22.40.90):	**Enter your gateway IP address**
Name:	**john_doe**
IP address:	**135.22.40.11**
LAN hardware address:	**80009333333**
Subnet mask:	**none**
Default gateway IP address:	**135.22.40.90**
Are these correct? [y|n|?] (y):	**Enter y**
NFS is running on this computer. Use <machine name> as NFS server for this netstation? [y|n|?] (y):	**Enter n**
Copy .xsession script to a user home directory? [y|n|?] (y):	**Enter y**
Please enter user login name or q to quit and continue: (q)	**Enter your login name**
Add another Netstation [y|n] (y):	**Enter n**

3. Type ***x*** to exit the program.

NOTE:
Repeat this entire procedure on the primary host for each Netstation to be added to your network. If you have a secondary host, repeat the entire procedure on the secondary host for each Netstation to be added to your network.

Procedure 2-6. Removing a Netstation From a Host Server

1. On the host server for the Netstation to be removed from the LAN, log in as **root**.
2. Enter ***sam***.

   Choose the **`HP Netstation Administration`** option. Then, a menu labeled HP NETSTATION ADMINISTRATIVE TASKS appears. At this menu, follow the prompts and instructions on the screen until the procedure to remove a Netstation has been completed. You are asked for specific information. Note that ***john_doe*** is a sample entry. Supply your own choice of a name. You will be asked for the following:

   ```
   Please enter selection (default=1):2        Enter 2
   Please enter name of Netstation to remove   Enter john_doe
   [q|?]:
   Remove Netstation john_doe? [y|n|?]:        Enter y
   ```

3. Press Return to return to the original menu list.
4. Enter ***x*** to exit the program.

Administration on the Netstation

The following procedure provides a simple set of instructions for administering a Netstation. If you have problems administering a Netstation, see the appropriate HP Netstation manual. This document is included with the shipping box containing your Netstation.

Procedure 2-7. Administering a Netstation

1. Ensure that the LAN interface cable is plugged into your Netstation.
2. Power up your Netstation; the boot screen is displayed. As the station boots, it tries to download information from the network, but since you have not yet configured your Netstation it fails.
3. After the boot fails, press (and hold down) the F12 function key at the top of the keyboard for several seconds.
4. Once the configuration window is displayed, choose the **Network** window.
5. The **Network** window appears. On this window there are two selections: **General** and **Ethernet**. If you click on **General**, you will see the following data fields, some that are required and some that are optional. All the fields are described in the following table, but you only need to complete the required fields.

Field	Description
Network Parms From	A required field. Use your mouse to select the value **Enter Below**. This instructs the Netstation to download the necessary fonts only from the file servers listed in the fields found on this form.
File Server	A required field. This is the host IP address chosen to be your primary file server. At the right of this field use the mouse to select the value **TFTP**.
Alt. File Server	An optional field. This is the host IP address chosen to be your secondary file server. It is used if the primary file server cannot be accessed for any reason. At the right of this field also see that TFTP is displayed. If it is not displayed, use the mouse to choose the NFS button to display TFTP.
Name Server	An optional field. This is the host IP address chosen to be your primary name server. It is usually the same as the File Server but need not be.
Alt. Name Server	An optional field. This is the host IP address chosen to be your secondary name server. It is used if the primary name server cannot be accessed for any reason. It is usually the same as the Alt. File Server but need not be.
Domain Name	A required field if the Name Server field is used; otherwise it is an optional field. Enter the last 3 fields of your Netstation's IP address. For example, 22.40.11.
Alternate NFS and TFTP	Enable box on right lower corner
Gateway	An optional field. This is the default gateway used by the netstation if it is not on the same network as the host machine.

If you click on **Ethernet**, you will see the following data fields:

Field	Description
IP Address	A required field. This is the IP address of the netstation.
Subnet Mask	A required field. This is the subnet mask of the netstation.
Terminal Name	A required field. This is the name of the netstation.

6. Using the mouse, choose the **Terminal** window.
7. The **Terminal** window appears. Complete the field as described in the following table.

Field	Description
File	Enter the name of the Netstation that you are administering. This field requires a **.cfg** suffix to the name.
Remote Config	Enable **Download**.

8. Using the mouse, choose **Server**.

Field	Description
Login	Choose **XDMCP Direct**.
Login Host	Enter the IP address of your Graphics System host.
X Server from	Enable **Network** (***p* Series** only).
X Server file	Leave this field blank (***p* Series** only).
Base Path	Enter **/usr/lib/X11/700X** if it is not already entered in this area (***p* Series** only).

9. Choose OK.

Changing your Startup Host

When you initially configure your Netstation you choose a Startup Host. You may change your Startup Host at any time. To do this, do the following:

Procedure 2-8. Changing Your Startup Host

1. Login to your Startup Host.
2. Press and hold the F12 key until you see the Netstation configuration window.
3. Choose **Startup** from the buttons at the top of the window.
4. Enter the IP address of the new Startup Host in the Startup Host field.
5. Exit HP VUE and when your login prompt is displayed on the screen it will be for your new Startup Host.

Using your 720/730 as a Netstation

To use your 720/730 as a Netstation, do the following:

Procedure 2-9. Using Your 720/730 as a Netstation

1. From the Login screen at the View environment, choose the **No Windows** option.
2. Log in as a user.
3. Run **/usr/bin/X11/X :0 -query "name of host machine"**.
4. Log in as a netstation.

5. To exit, type Control + Shift + Break .

NOTE:
The host machine must be entered in the **/etc/hosts** file of the 720/730 machine.

Using the *StarKeeper* II NMS Graphics System

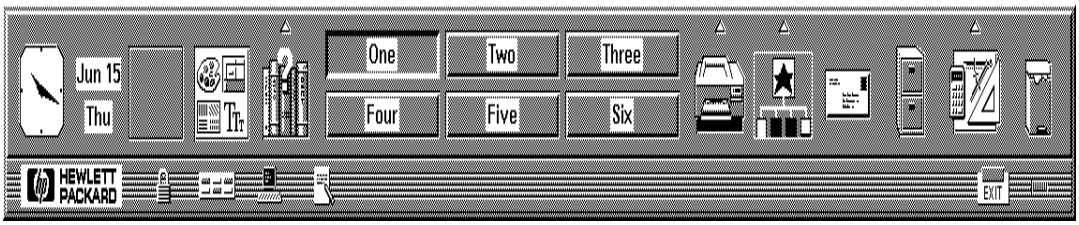
3

The *StarKeeper* II NMS Graphics System applications are accessed via the HP Visual User Environment (HP VUE) Front Panel (see **Screen 3-1**). This chapter will provide a brief description of how you can access these applications and other facilities of HP VUE. Refer to the HP document that came with your system titled *Using Your HP Workstation*, for detailed information regarding use of your Graphics System workstation, including use of the Motif GUI, which is the basis of all Graphics System applications. In addition, extensive on-line help is available in support of HP VUE; choose the **?** icon on the Front Panel to access the HP VUE Help Manager.

The remainder of this guide assumes that you have a basic understanding of HP VUE and Motif.

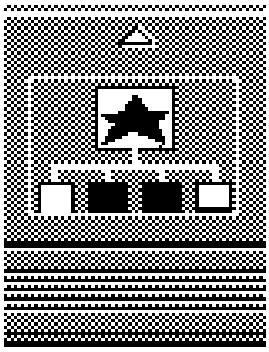
Starting Graphics Applications

After entering your login and password on the HP login screen, the HP VUE Front Panel will be displayed on your screen.



Screen 3-1. HP VUE Front Panel

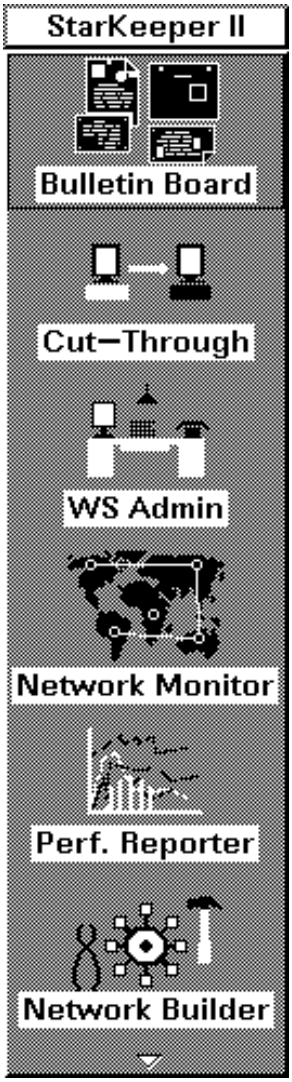
On the right side of the Front Panel is the *StarKeeper* II NMS Graphics System control.



Screen 3-2. *StarKeeper* II NMS Graphics System Control

Click on the arrow above this control to access a subpanel containing controls for each of the Graphics System applications (see **Screen 3-3**).

Clicking on the control icon itself, when a subpanel is available, will invoke the default (top-most) application on the subpanel.



Screen 3-3. *StarKeeper* II NMS Graphics System Subpanel

You can now select the desired application from this subpanel. The subpanel may be lowered by clicking on the arrow at the base of the subpanel, or it may be moved to a convenient location by dragging the subpanel by the title bar. Refer to the appropriate chapters of this guide for details on using individual applications.

Accessing The OS Environment

To gain access to the command line interface to your operating system, or to a Co-Resident Core System on your workstation, one or more HP Term windows can be invoked. Click on the terminal icon on the Front Panel, just below the **Help Manager** control. This will bring up a window labeled **hpterm** which can be used to interact with the operating system (or Core System).

Alternatively, you can use the Cut-Through Application and request a window for the local environment (**Chapter 6**).

Printing

Assuming that you have administered your printers as described in *Appendix D* of the *StarKeeper II NMS Core System Guide*, all printing from Graphics System applications is handled by the application software. Print requests made for any application will be directed to the appropriate printer automatically.

Capturing Images

To capture screen images for later printing use the following procedure:

Procedure 3-1. Using the Capture Screen Utility

1. Open the **General Toolbox** from the **Toolbox** subpanel accessed via the **Toolbox** icon on the HP VUE Front Panel (just to the left of the **Trash Can**).
2. Open the **Utilities** folder (double-click on its icon).
3. Start the **XwdCapture** application (double-click on its icon).
4. Enter the output filename and click OK.

   NOTE:
   The filename you type must end with **.xwd**.
5. If you requested a window capture, click the mouse anywhere within the window you want to capture. The screen will be saved.

Printing XwdCapture Files

To print captured screen images, use the following procedure:

Procedure 3-2. Printing a File

1. Open an **hpterm** window.
2. For the XwdCapture file, issue the **xpr <filename>.xwd | lp** command.

You may determine printing status by clicking on a **Printer** icon. This will bring up the **SharedPrint/UX-Manager**. Refer to your HP VUE documentation for more details regarding printing.

Accessing Your Directory

Click on the File Manager control (the file cabinet icon) on the Front Panel to access a window containing a graphical representation of your home directory. You can use this window to traverse your subdirectories and manipulate files and folders. Files saved by Graphics System applications will usually be found somewhere within your own directory structure.

Logging Off

To log off the system, use the **Exit** control located at the lower right of the Front Panel. You will be asked to confirm your request. Note that any windows or applications left up at log-off time may be retained, depending upon the settings you choose via the **Startup** control on the Style Manager subpanel.

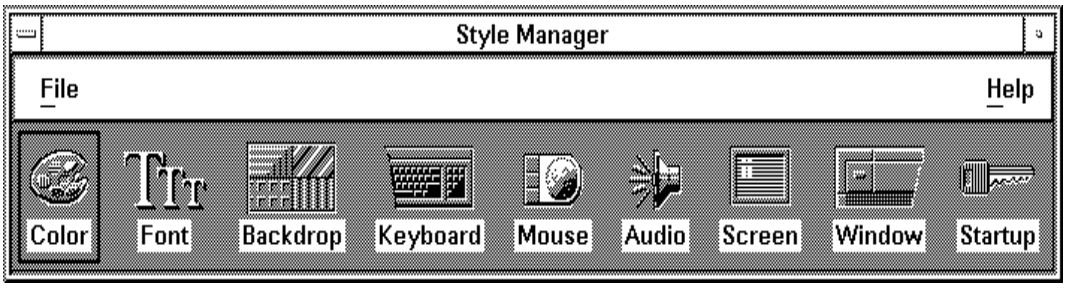
Special HP VUE and Motif Capabilities

Although the intent of this chapter is not to provide a comprehensive presentation of HP VUE and Motif capabilities, some of these will be highlighted below due to their extensive use in this product or because they provide enhanced functionality worthy of special mention.

Style Manager

The Style Manager is a set of utilities that controls the way your system looks and operates. The Style Manager control is located just to the left of the Help Manager icon. Clicking on this icon displays a subpanel providing access to these utilities (see **Screen 3-4**). All settings are maintained on a per-user basis, so you can feel free to customize your workspace as desired.

NOTE:
If you set the font size to greater than 12 points, data in some windows may be truncated.



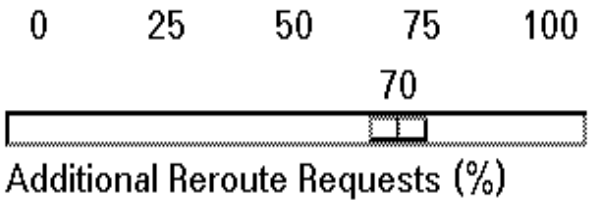
Screen 3-4. Style Manager Control

Workspaces

The array of six buttons in the middle of the Front Panel control which workspace you want to use at any given time. Each workspace can be considered as an independent work area that you may move between at any time without affecting the contents of any of the workspaces. Workspaces may be named using the control located just below the Style Manager icon. Windows can populate one or more workspaces by using the appropriate item on the window menu (accessed via the — window menu icon in the upper left corner of every window).

Using Scales

Scales are used throughout the Graphics Systems applications for selecting numerical values from a range. An example of a scale is shown in **Screen 3-5**. Scales can be manipulated via the mouse, keyboard or a combination of the two. These several methods of setting scale values is especially useful when dealing with large ranges.



Screen 3-5. Scale Example

The following table summarizes the ways you can set scale values (The SELECT button is the left-most button on a right-handed mouse; the ADJUST button is the middle button):

Action	Effect
Click SELECT on the scale	Moves handle in the direction of the cursor in small increments
Click SELECT on the scale with CTRL depressed	Moves handle in the direction of the cursor in large increments
Click ADJUST on scale	Moves handle to the cursor's location
Drag handle using SELECT	Moves handle in the direction of drag
Press left/right arrow key	Moves handle left or right in small increments
Press left/right arrow key with CTRL depressed	Moves handle left or right in large increments

Keyboard Shortcuts

All interaction with Graphics System applications can be accomplished via the keyboard, without use of the mouse. For example, menus and menu items can be accessed by using the mnemonic identified as the underlined character in the menu or item name. Holding ALT while pressing the desired mnemonic displays the associated menu; you can then use the menu item mnemonic (without ALT) to execute the associated command. Also, within forms TAB will traverse the

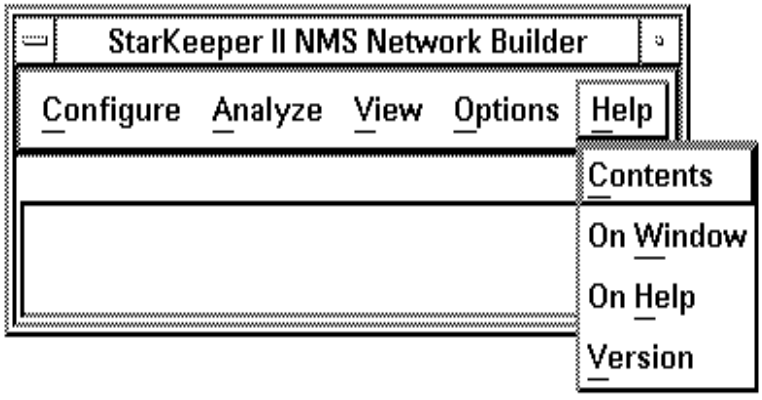
controls on the form; arrow keys will traverse buttons within a control; SPACE will set a button.

Pop-up command windows will have a default action chosen from among the command buttons positioned at the base of the window. The default button is highlighted with a bold outline. You can press RETURN to execute a window's default action.

There are many other keyboard equivalents that you may find useful; refer to your HP documentation for full details.

Graphics System Applications HyperHelp

The *StarKeeper* II NMS Graphics System provides an on-line Help facility in support of the Graphics System applications. Help for base windows is accessed via the Help menu at the top of each of these windows (see **Screen 3-6**). The menu provides Help for the current window (On Window), a table of contents for the current application's Help (Contents), and Help on the Help system itself (On Help). Help "Version" lets you know what version of the application you are running.



Screen 3-6. Help Facility Menu

Help for pop-ups is accessed via Help at the base of each of these windows. This option places you in the Help system at a location corresponding to the pop-up from which the request was made.

For all windows, including those that do not have a Help menu or button, F1 can be used to access the Help system.

For More Information

For further information on how to use the HyperHelp function, select **On Help** from the Graphics System application's **Help** menu. Alternatively, whenever the HyperHelp viewer is displayed, you can select **How to Use Help** from the viewer's **Help** menu.

Using the Bulletin Board Application

4

The Bulletin Board application is used to retrieve and display messages sent by the Graphics System Platform software and the Graphics System applications. Some messages are informational in content, such as those that indicate normal status changes. Other messages indicate system problems of varying severity. Occasionally, messages posted to the Bulletin Board will require the intervention of the network administrator. As such, the Bulletin Board application provides an important tool in monitoring the health of the Graphics System.

This chapter describes how to use the Bulletin Board, including how to read Bulletin Board messages, and how to check the system EVENTLOG to retrieve old Bulletin Board messages and other system messages.

Starting the Bulletin Board Application

There are two ways to start the Bulletin Board application. They are given in the following procedures.

Procedure 4-1. Starting Bulletin Board from the HP VUE Front Panel

1. Click on the *StarKeeper* II NMS icon on the HP VUE Front Panel.

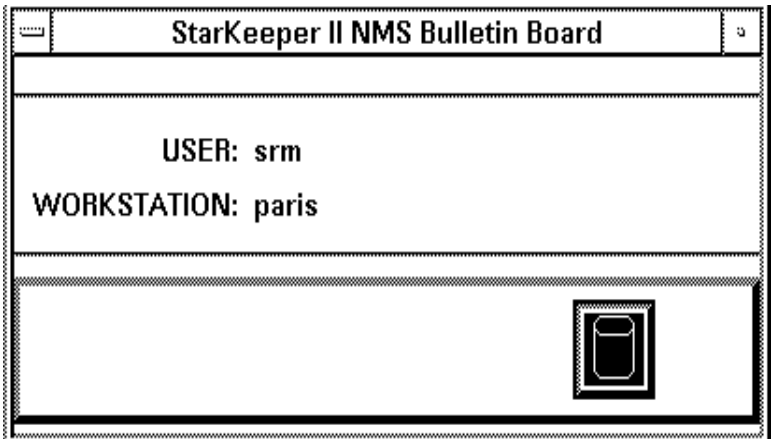
Procedure 4-2. Starting Bulletin Board from the *StarKeeper* II NMS Subpanel

1. Click on the *StarKeeper* II NMS menu mark on the HP VUE Front Panel. This raises the *StarKeeper* II NMS subpanel.
2. Click on the **Bulletin Board** icon in the *StarKeeper* II NMS subpanel.

Upon completion of either procedure, the Bulletin Board Control Window is displayed.

The Bulletin Board Control Window

The following screen shows the Bulletin Board Control Window.



Screen 4-1. The Bulletin Board Control Window

The Bulletin Board Control Window consists of a region that displays the login ID of the user who started the Bulletin Board, and the name of host computer on which the Graphics System is running. It also contains a raised panel. Whenever the Graphics System Platform or a Graphics System application posts a message to the Bulletin Board, a *glyph* (or graphical symbol) is displayed in the raised panel region.

The topic of a Bulletin Board message can be determined from the type of glyph that is displayed. Bulletin Board messages are grouped into four *classes*, each with its own distinctive glyph:

- Graphics System host computer resources
- Graphics System file system resources
- Graphics System to Core System communications
- Graphics System application database access

Multiple glyphs may be displayed simultaneously.

Reading Bulletin Board Messages

When a message is posted to the Bulletin Board, you should read that message as soon as time permits. The following procedures describe how to read and clear Bulletin Board messages.

Procedure 4-3. Reading Bulletin Board Messages

1. To read Bulletin Board messages, click on a glyph in the raised panel of the Bulletin Board Control Window.

   A Message Window appears that contains all of the unread Bulletin Board messages currently associated with the selected glyph.

2. To clear the messages displayed in the Message Window from the Bulletin Board, click OK in the Message Window. This dismisses the window and removes the glyph from the Bulletin Board. If the glyph does not disappear, then new messages for that class have arrived and this procedure should be repeated to retrieve and clear them.

3. If you do not wish to clear the messages displayed in the Message Window from the Bulletin Board, click Cancel in the Message Window. This dismisses the window but does not remove the glyph from the Bulletin Board. The messages are still considered to be "unread". To retrieve the messages once again, or to view possibly new messages for that class that may have arrived, repeat the procedure.

Checking the EVENTLOG

Messages that have been cleared from the Bulletin Board cannot be redisplayed by the Bulletin Board. However, you can examine cleared messages by reading the system EVENTLOG. The EVENTLOG tells you if there is anything malfunctioning within the Graphics System. It contains both cleared and uncleared Bulletin Board messages, as well as other, less critical, messages from the Graphics System Platform and applications.

You can locate the EVENTLOG by using the *$EVENTLOG* environment variable. The *$EVENTLOG* environment variable is defined for all users of the Graphics System. The *$EVENTLOG* variable contains the full pathname of the directory in which EVENTLOG files are stored. A new EVENTLOG file is created each day,

each time the Graphics System is started, and each time the size of the file reaches 200,000 bytes.

The name of an EVENTLOG file consists of the date in which it was created followed by a "." followed by a suffix which represents the file sequence number. The first EVENTLOG file created for a given day has the suffix "1", the second has the suffix "2", and so on.

Procedure 4-4. Checking the EVENTLOG

To check the most recent EVENTLOG file, perform the following procedure:

1. Start the Cut-Through application and open a Cut-Through window to your Graphics System (See **Chapter 6** for information on the Cut-Through Application).
2. Enter ***cd $EVENTLOG***
3. Enter ***ls -lt | pg***.
4. If there is a **:** at the bottom of the window, enter ***q***.
5. The most recent EVENTLOG file is the first file listed in the window. The format of the name of an EVENTLOG file is **<yymmdd>.<suffix>** where:

<yymmdd> is the numeric representation of the year, month and date in which the EVENTLOG file was created.

<suffix> is the suffix, or sequence number, of the EVENTLOG file for that day.

You can use a text editor, such as **vi**, or a pager, such as **pg**, to view the contents of the entire file. If you wish to examine the most recent activity in the EVENTLOG file, you can use the **tail** command to look at the last several lines of the file. For example, to look at the last 24 lines of the file, enter ***tail -24 <EVENTLOG_FILE>*** where ***<EVENTLOG_FILE>*** is the name of the EVENTLOG file.

Using the Workstation Administration Application

5

This chapter teaches you how to operate the Workstation Administration application. The application includes the:

- *StarKeeper* II NMS Connections Administration
- *StarKeeper* II NMS Disk Cleaner Administration
- *StarKeeper* II NMS Cut-Through Administration

This chapter teaches you how to use the interface so that you will feel more comfortable as you complete the procedures in this chapter. See the **Glossary** at the end of this guide for definitions to unfamiliar terms.

Starting Workstation Administration

You are now ready to start the Workstation Administration application. The **WS Admin** icon will appear on the HP VUE Front Panel if the Workstation Administrator has authorized you for Workstation Administration access by using the **adduser** command. This procedure assumes that you have a valid login and Workstation Administration permissions. If you do not have these permissions, return to **Chapter 2** and complete the procedures presented there before you proceed further.

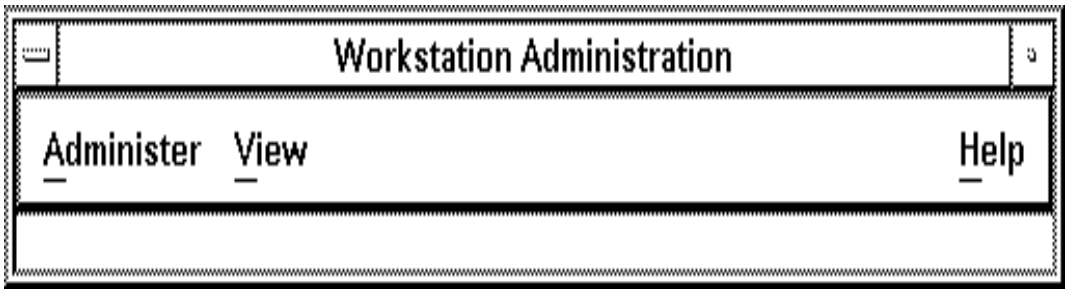
Procedure 5-1. Starting Workstation Administration

1. Click on the *StarKeeper* II NMS menu mark of the HP VUE Front Panel.
2. Click on the **WS Admin** icon.

The Workstation Administration Control Window

This section teaches you how to navigate within and use the Workstation Administration application user interface.

The Workstation Administration Control Window (shown below) consists of several menu options.

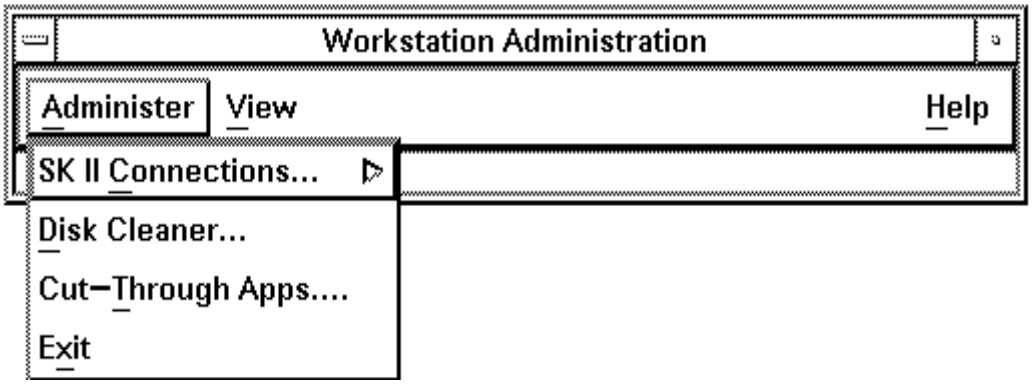


Screen 5-1. Workstation Administration Control Window

The following sections discuss the characteristics of the Workstation Administration Control Window.

The Administer Menu

The **Administer** menu provides access to the administrative processes. This is shown in the following screen.



Screen 5-2. Administer Menu

As shown, the **Administer** menu option provides several choices:

SK II Connections	This button allows the Workstation Administrator to establish connections to remote Core Systems.
Disk Cleaner	This button allows the Workstation Administrator to specify files and directories for automatic cleaning.
Cut-Through Apps	This button allows the Workstation Administrator to have simultaneous access to several different computers in a network from a single Graphics System.
Exit	This button allows users to exit the Workstation Administration application.

SK II Connections Administration

If you plan to install any of the Graphics System applications, you must establish connections with the remote Core Systems from which you expect to collect node configuration, alarm or performance data. Note that these connections are different from Cut-Through connections. Cut-Through connections allow you to open a login session on a remote (or local) host computer.

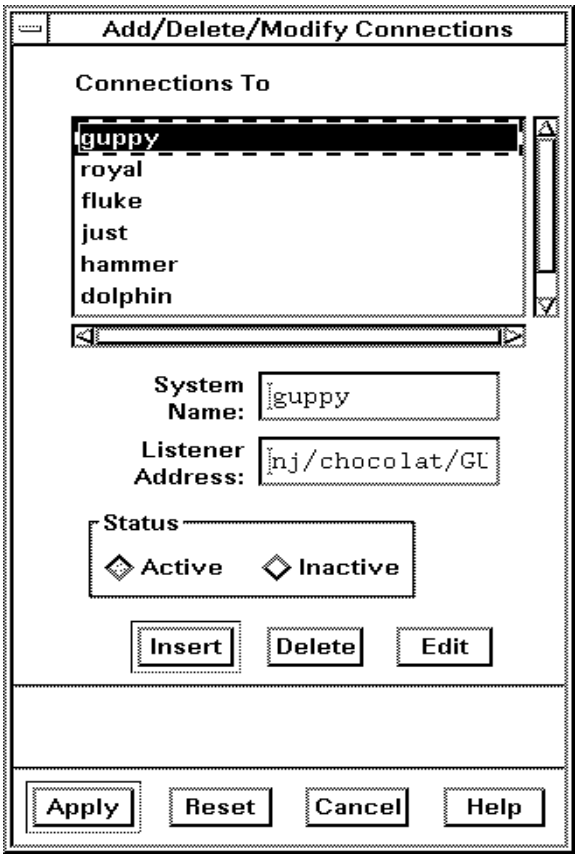
To administer connections to remote systems, choose **SK II Connections** from the **Administer** menu. A sub-menu is displayed with the following options.

Add/Delete/Modify	This button adds, deletes, or modifies connection entries. This button will be used occasionally.
Synchronize	This button updates internal data tables on the Graphics System that store information about node connections. It should be used whenever connection entries are added, deleted, or modified on remote Core Systems (or on the local machine in the case of a Co-resident System).
Modify Local Parameters	This button administers local parameters to support connections to Core Systems. This button will be used rarely.

Adding, Deleting, or Modifying Connections

The **Add/Delete/Modify** option on the **SK II Connections** menu is equivalent to using the Core System **cf** command for adding, deleting or modifying connection entries. The Add/Delete/Modify Connections Data Window is shown in the following screen. Click on **Add/Delete/Modify** from the **SK II Connections** menu to

access the Add/Delete/Modify Connections Data Window. Fields and buttons are described following the screen.



Screen 5-3. Add/Delete/Modify Connections Window

System Name This field contains the unique name (maximum eight characters) of the Core System.

Listener Address This field contains the address recognized by the Core System's listener process. This address must be entered into the database of the node(s) that provides BNS-2000 VCS Host Interface access to the Core System. The address is limited to a maximum of four levels (demarcated by a '/' character), and each level can contain up to eight characters. By convention, the last component of a listener address is the machine's system name in all uppercase letters.

Status This field contains settings that indicate whether the connection is active or inactive.

Insert This button allows you insert a new connection into the list.

Delete	This button allows you to delete a connection from the list.
Edit	This button allows you to edit existing connection data.
Apply	This button incorporates your final changes. Changes go into effect immediately.
Reset	This button resets the window settings to the last values in effect prior to applying any changes you may have made.
Cancel	This button dismisses the window.

The upper part of the window contains a scrolling list (the boxed list) that contains the **System Name** of each remote Core System for which connection data has been entered. This list is identified by the caption **Connections To**.

Associated with each connection in the scrolling list are three fields of information — the **System Name** of the destination machine, the **Listener Address**, and the **Status** setting.

The entries that appear in these three fields are associated with the *current* connection, that is, the Core System that is highlighted on the scrolling list. The current connection is identified by the highlighted **System Name** that appears in the scrolling list. To access data for a different connection (that is, to change the current connection), choose the desired **System Name** from the scrolling list.

Procedure 5-2. Using the Modify Connections Data Window

1. To modify the information for a connection already in the list, click on the entry for that connection in the scrolling list. This brings up the most recent data for that entry in the data fields below the connection name.
2. Click on the field(s) you want to change (or use the Tab key to traverse between fields), and modify the text to reflect the new information. To switch the connection status, click on the setting labeled **Active** or **Inactive**. The current status selection is highlighted.
3. When you are finished with your changes, choose Edit to update the data for the connection to which you have made changes.
4. To delete a connection, click on the **System Name** for that connection in the scrolling list, and then choose Delete. The connection is removed from the scrolling list.
5. To add a new connection into the scrolling list, enter the System Name and Listener Address, click on one of the status settings, and then choose Insert. The connection is added to the scrolling list.

6. Click on Apply to save the changes you made since the last **Apply** operation. It is at this point that new connections are started and that deleted connections are terminated. Connections for which entries were modified are brought down and restarted. See the section **Viewing Connection Status** later in this chapter to obtain snapshots of connection status.
7. Reset resets all connection data entries to their states at the time of the last **Apply** (or the initial settings if no **Apply** operation has been performed).
8. To dismiss the window without executing an **Apply** operation, click on Cancel.

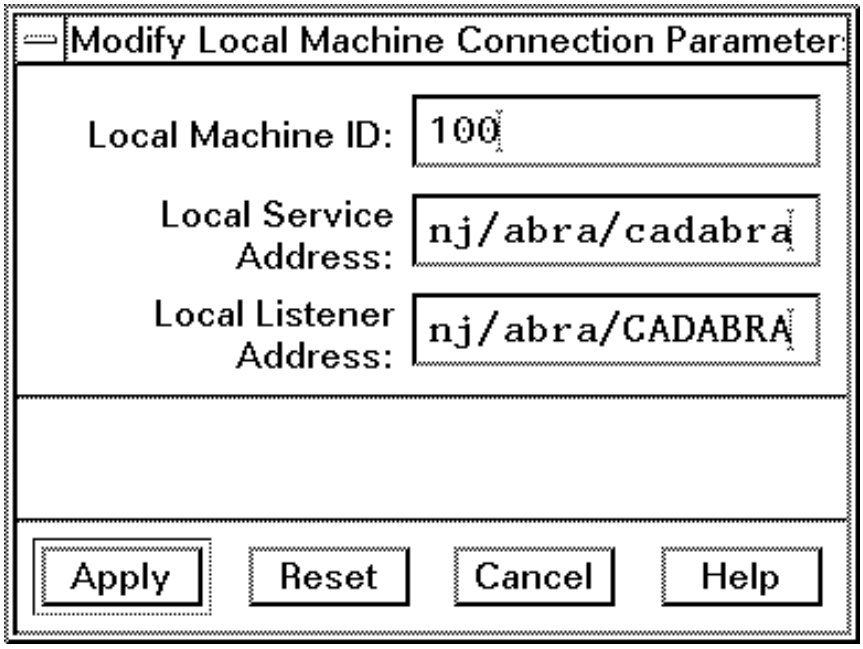
Synchronizing Connection Data

Graphics System applications must know which remote Core Systems are monitoring which nodes. As such, the **Synchronize** option on the **SK II Connections** menu must be used whenever a connection to a node on a remote Core System is added or deleted, or when the ownership of a node is transferred from one Core System to another Core System. (On a Core System, these operations are done using the **cf** commands.) The **Synchronize** option should also be used on a Co-resident system when connections are added or deleted on the local machine. Using the **Synchronize** option ensures that the Graphics System applications have an accurate assessment of the network configuration so they can properly access all available node data from the Core Systems that monitor the nodes. The **Synchronize** option does not need to be executed when the status of a connection from a Core System to a node changes (for example, when the connection status changes from inactive to connected, connected to inactive, or disconnected to connected).

To dismiss the Synchronize Connections Window, click and hold the window menu icon, then select **Close** from the menu.

Modifying Local Connection Parameters

The **Modify Local Parameters** option on the **SK II Connections** menu is used to administer a set of local parameters to support connections to Core Systems, where local refers to your Graphics System. Click on **Modify Local Parameters** from the **SK II Connections** menu to access the Modify Local Parameters Window. The Modify Local Parameters Window is shown in the following screen. Fields and buttons are described following the screen.



Screen 5-4. Modify Local Parameters Window

Local Machine ID — This value must be an integer between 1 and 100, inclusive, and must be unique among other *StarKeeper* II NMS machines within the *StarKeeper* II NMS network.

Local Service Address — This entry must be the fully qualified service address for the local machine (this service address must be entered into the node that provides network connectivity for the local machine). A **Local Service Address** can contain up to four levels, with each level containing up to eight characters or digits.

Local Listener Address — This entry is the address that the listener process on the local machine responds to when a remote *StarKeeper* II NMS attempts to establish a connection to the local machine. The **Local Listener Address** must be fully qualified and entered as a service address in the node that provides network connectivity for the local machine. A **Local Listener Address** can contain up to four levels, with each level containing up to eight characters or digits. By convention, the lowest level of the **Local Listener Address** is the system name of the local machine in all capital letters. You must have root permissions to modify the **Local Listener Address** field.

Apply	This button incorporates your final changes and exits the session.
Reset	This button resets the window settings to the last values in effect prior to any changes you may have made.
Cancel	This button dismisses the window.

In general, these parameters are administered at the time of installation and do not need to be changed thereafter. However, if they must be changed for some reason, the new service address or machine ID parameters will not take effect until the Graphics System software is stopped and restarted. The listener address takes effect immediately.

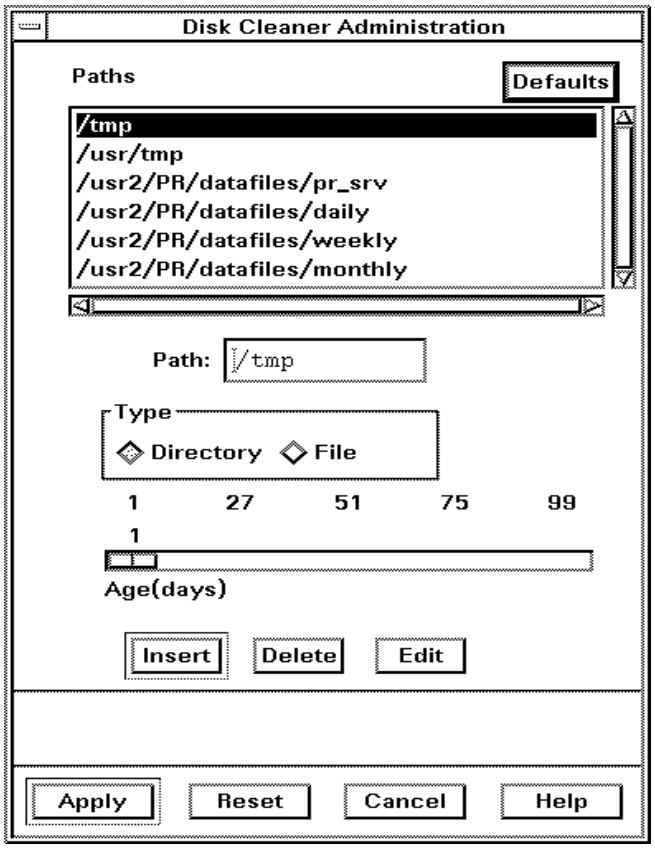
Procedure 5-3. Using the Modify Local Parameters Window

1. Choose the field(s) you want to change (or traverse between them using the Tab key), and modify the text to reflect the new information.
2. Click on **Apply** to store any edits made. Note that the modified parameters will not be used by the system until it is restarted.
3. The Reset button resets all connection data entries to reflect their states at the time of the last **Apply** operation (or the initial settings if no **Apply** operation has been performed).
4. To dismiss the Modify Local Parameters Window without executing an **Apply** operation, simply click on Cancel.

The Disk Cleaner Administration Window

The Disk Cleaner Administration Window allows a Workstation Administrator to specify files or directories to be cleaned automatically. A disk-cleaning crontab process is the method used to accomplish this, where a crontab is a process that runs automatically at specified times. The crontab is started nightly at a specified time to remove files/directories automatically according to prescribed retention intervals.

Click on **Disk Cleaner** from the **Administer** menu option to access the Disk Cleaner Administration Window. The Disk Cleaner Administration Window is shown in the following screen. Fields and buttons are described following the screen.



Screen 5-5. Disk Cleaner Administration Window

Defaults	This button resets the window settings to the factory defaults.
Paths	This field specifies the directory (including full pathname) or a specific file that you want to clean (remove).
Type	This field is used to prevent you from accidentally cleaning up a directory instead of a specific file.
Age	This field specifies the retention period (in days) for the path you specify in the **Path** field. The files in the directory specified by **Path** are deleted if they are older than the specified age.
Insert	This button inserts a new path into the menu.
Delete	This button deletes a path from the menu.

Edit	This button finalizes any changes made to settings associated with the selected path.
Apply	This button incorporates your final changes and exits the session. Changes go into effect immediately.
Reset	This button resets the window settings to the last values in effect at the last **Apply** operation (or the initial setting if no **Apply** operation has been performed).
Cancel	This button dismisses the window.

Procedure 5-4. Using the Disk Cleaner Administration Window

Use the Disk Cleaner Administration Window to customize the pathnames you want to clean.

1. To access a specific path in the **Paths** scrolling list, click on the desired path in the scrolling list. Pathnames are highlighted as they are chosen. This brings up the current data for the **Path** entry you want to edit in the **Path**, **Type**, and **Age** fields.
2. Modify the field value as desired.
3. When you have completed your changes, click on Edit to save your changes. If **Path** contains an environment variable, it will be expanded.
4. To delete a pathname from the **Paths** scrolling list, choose that entry from the list. Click on Delete. The pathname is removed from the scrolling list.
5. To insert a new pathname into the **Paths** scrolling list, enter the new information in the **Path**, **Type** and **Age** fields, then click on Insert to insert the entry into the scrolling list.
6. Click on Apply to save the changes you have made since the last **Apply** operation. Reset resets the Disk Cleaner Administration Window settings to their states at the time of the last Apply (or the initial settings if no **Apply** operation has been performed).

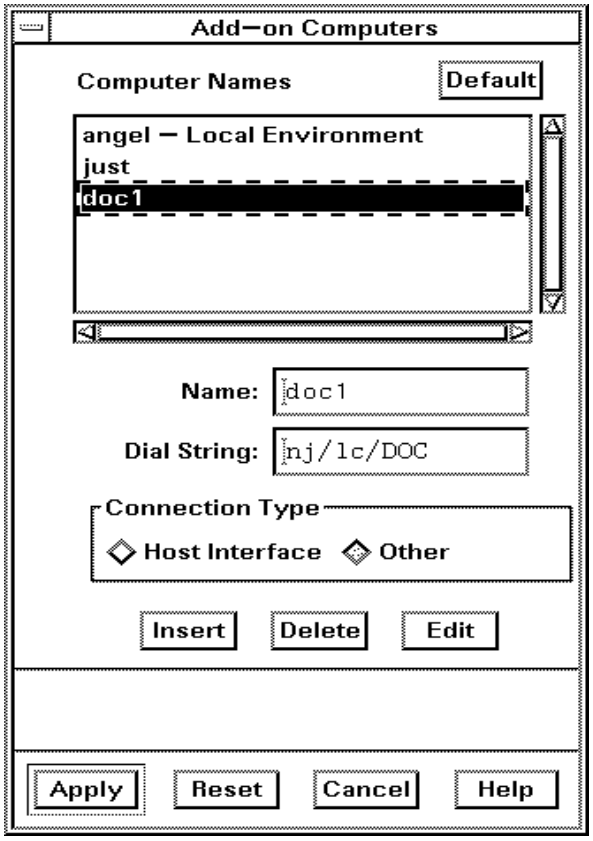
   The Disk Cleaner process is executed each night by the crontab process at 3:00 a.m.

The Cut-Through Administration Window

The Cut-Through Administration Window allows a Workstation Administrator to centrally administer computers that will be available to all HP VUE users on the Graphics System via the Cut-Through application. Only the Workstation Administrator will have the ability to modify information about these machines. The Workstation Administrator may want to centrally administer machine information for each Core System within the network, so that each HP VUE user may have access to that Core System via the Cut-Through capability.

To access this feature, click on **Cut-Through Apps** from the **Administer** menu.

The following window will be displayed.



Screen 5-6. Cut-Through Administration Window

Default	This button resets the window settings to the factory defaults.
Computer Names	This is a scrolling list of machine names that have been administered for the Cut-Through application.
Name	This field specifies how the machine is to be identified on the Cut-Through Control Window.
Dial String	This field is the network address of the machine to which node is expected to connect.
Connection Type	This field tells the node how to connect to the specified address.
Insert	This button inserts a new path into the menu.
Delete	This button deletes a path from the menu.
Edit	This button finalizes any changes made to settings associated with the selected path.
Apply	This button incorporates your final changes and exits the session. Changes go into effect immediately.
Reset	This button resets the window settings to the last values in effect at the last **Apply** operation (or the initial setting if no **Apply** operation has been performed).
Cancel	This button dismisses the window.

Procedure 5-5. Using the Cut-Through Administration Window

1. Click on the computer name you want to modify in the Computer Names list.

   This brings up the current data for that entry in the three fields following the list of computer names.

2. Modify the field values as desired.

   Choose **Host Interface** if the computer to which you want to connect is running the HP-UX operating system and it is connected to the network via the BNS-2000 VCS Host Interface. If these conditions are not applicable, choose **Other**.

   The **Host Interface** connection type uses software that allows automatic login to the designated computer. The **Other** connection type causes Cut-Through to engage the default login protocol for the designated computer.

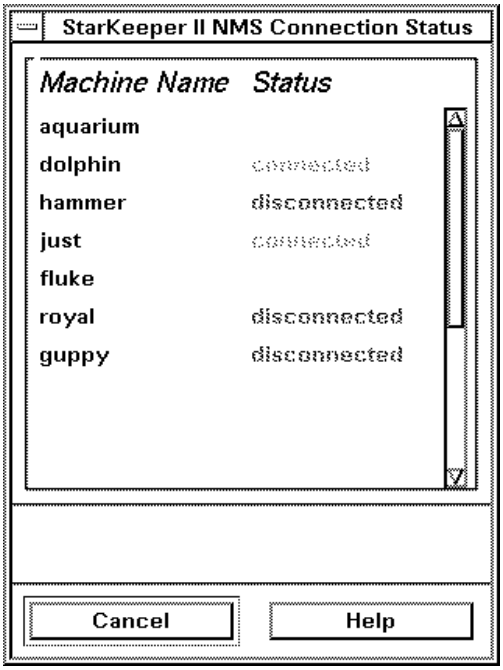
3. When you have completed your changes, click on Edit to update the window settings.

4. To delete a computer name from the list, choose the entry for that computer name from the scrolling list, and then click on Delete. The computer name is removed from the scrolling list.
5. To insert a new computer name into the **Computer Names** scrolling list, enter the new information in the proper fields and click on Insert.
6. Click Apply to save the changes you made since the last **Apply** operation.

Viewing Connection Status

To view connection status, choose **Connections Status** from the **View** menu.

The following window will be displayed.



Screen 5-7. Connection Status Window

The Connection Status Window displays the current status of Graphics System to Core System connections.

Choose Cancel to dismiss the window.

NOTE:
For a Co-resident System, the connection to the local machine will not appear.

Using the Cut-Through Application

6

This chapter teaches you how to operate and optionally customize the Cut-Through application. The Cut-Through application enables you to have simultaneous access to several different computers from a single Graphics System. It allows you to open a login session on a remote (or local) host computer. It provides windows through which you can communicate with the other computers that are accessible through the network. Cut-Through connections are based on the principles of the BNS-2000 VCS Host Interface package **dkcu** command, which requires that you specify the full service address of the desired remote host computer when administering Cut-Through connections. Using the Cut-Through application, you can communicate with a remote computer as though you had logged into it directly.

NOTE:
If you use the Cut-Through connection to connect to a Core System, we recommend that you set the terminal type to **hpterm** when prompted.

Starting the Cut-Through Application

You are now ready to start the Cut-Through application. This procedure assumes that you have a valid login. If you do not have these permissions, return to **Chapter 2** of this guide and complete the procedures presented there before you proceed further.

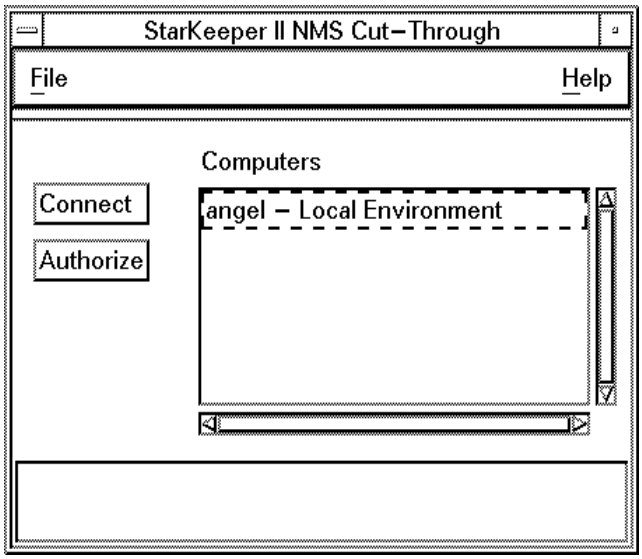
Procedure 6-1. Starting Cut-Through

1. Click on the *StarKeeper* II NMS menu mark of the HP VUE Front Panel.
2. Click on **Cut-Through**.

The Cut-Through Control Window will be displayed.

The Cut-Through Control Window

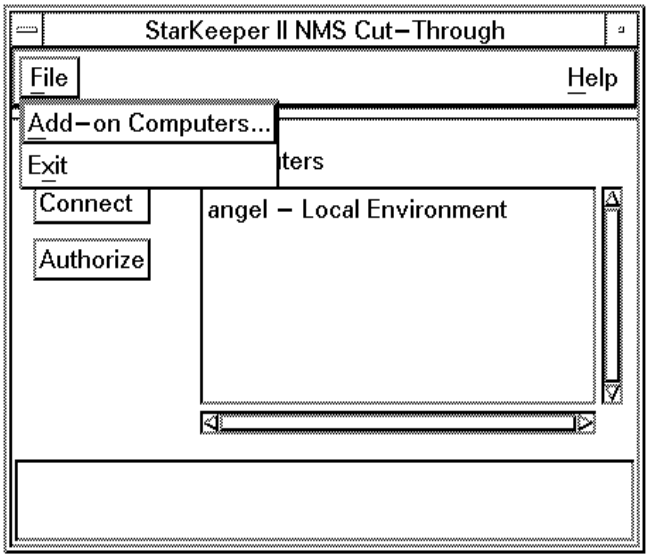
This section teaches you how to navigate within and use the Cut-Through application user interface.



Screen 6-1. Cut-Through Control Window

The File Menu

The **File** menu option is used to customize Cut-Through. The Cut-Through Control Window with the **File** menu is shown in the following screen.



Screen 6-2. Cut-Through Control Window with File Option

The **File** menu provides the following choices:

Add-On Computers	This provides the capability to modify a local set of computers for your login. You will not be able to modify any computer administered centrally by the Workstation Administrator. You can add new computers, delete computers, change the dialstrings and login protocols associated with computers, or rearrange the order of the list.
Exit	This exits the Cut-Through application.

The Connect Button

The Connect button is used to open a Connection Window (a type of interactive text window) to establish a session with a specified computer. The Connection Window is described in the **Using the Connection Window** procedure later in this chapter.

The Authorize Button

The Authorize button is used to open an Authorization Window, (also an interactive text window) and to execute authorization service on a specified computer equipped with the BNS-2000 VCS Host Interface. Before exercising the automatic login capability, you must obtain authorization to do so. Authorization is obtained on an individual computer and individual login basis. Therefore, it is necessary to obtain separate authorization for each computer on the Computers scrolling list for which you want to use this capability. The Authorization Window is described in the **Using the Authorization Window** procedure later in this chapter.

The Computers Scrolling List

This list contains the names of all computers known to the Cut-Through application and identifies the computers with which you can communicate. The list is compiled from two sources:

- a system-wide file that is administered centrally via the Workstation Administration application, and
- a user-defined and administered file for storing the computer names and connection data.

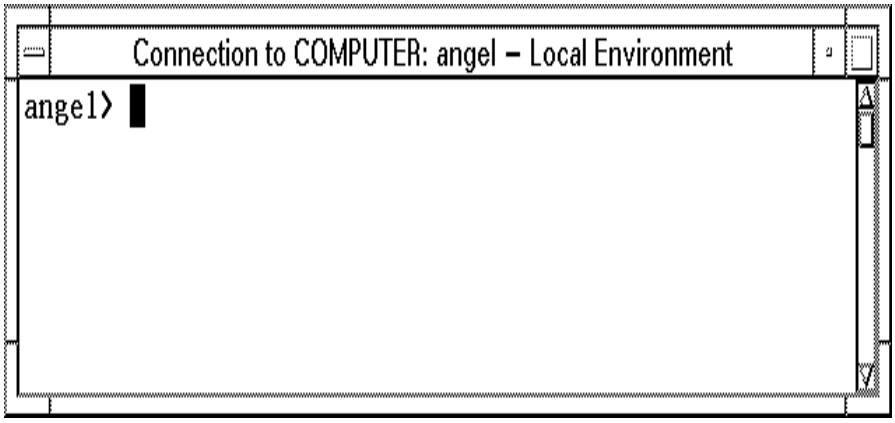
The Cut-Through Application Connection Window

This section teaches you how to work within the Cut-Through application. The following procedures are required to connect a user to a specified computer.

Procedure 6-2. Using the Connection Window

1. Locate the name of the computer to which you want to connect in the **Computers** scrolling list on the Cut-Through Control Window. Use the scrollbar to access names that have scrolled out of view.
2. Move the pointer over the name, and click. This action causes a border to appear around the name.
3. Next, move the pointer over the Connect button and click.

The following window is displayed and you will be connected to the computer you specified.



Screen 6-3. Connection Window

As shown, it consists of a border area and a large text pane. The border area includes a title and a window mark.

The text pane is the region where you interact with the computer named in the Connection Window title. Anything you type into this text pane is sent directly to the computer. Using this text pane, you can communicate with the computer in the same way as you would if you had accessed it via the network.

In some cases you will be logged in to the computer automatically. In other cases, you may be prompted for a login and password. See the next section to learn when the different login methods are applicable.

The Cut-Through Authorization Window and Automatic Login

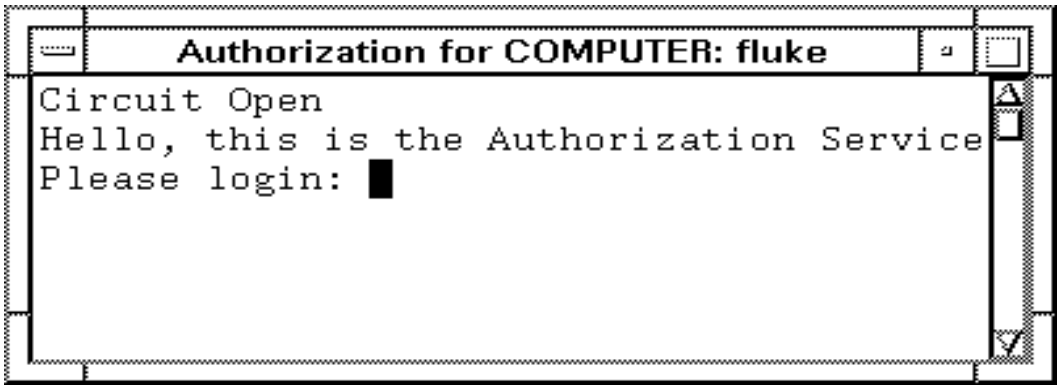
Automatic login means that you are not required to enter login or password information when you connect to a specified computer.

Before exercising the automatic login capability, you must obtain authorization to do so. Authorization is obtained on an individual computer and individual login basis. Therefore, it is necessary to obtain separate authorization for each computer on the **Computers** scrolling list for which you want to use this capability.

The following steps are required to obtain authorization for automatic login.

Procedure 6-3. Automatic Login Procedure

1. Locate the name of the computer for which you are seeking authorization in the **Computers** scrolling list on the Cut-Through Control Window. Authorization can only be obtained for a host-connected machine. Use the scrollbar to access names that have scrolled out of view.
2. Move the pointer over the name and click. This causes a border to appear around the name.
3. Next, move the pointer over the Authorize button.
4. If the Authorize button is *dimmed*, this means that automatic login is not currently supported on the specified machine and you will not be able to use the Authorize feature.
5. If the Authorize button is *sensitive*, then click. The following window appears:



Screen 6-4. Authorization Window

6. The text pane is the region where you interact with the computer authorization service. The authorization service prompts you for your login and password on the target computer.
7. The message `Command complete` is displayed in the lower left portion of the Authorization Window after the sequence is complete. You can dismiss the window at this point. See the next section **Dismissing Connection and Authorization Windows** for details about dismissing windows.
8. After you are authorized on the target computer, click on the Connect button. You should be logged in automatically.

☞ **IMPORTANT:**

Automatic login is possible only if the following conditions are met:

1. You have a valid login and password on the designated computer.
2. The designated computer is equipped with the BNS-2000 VCS Host Interface, and the interface is operational.
3. The BNS-2000 VCS Host Interface on the designated computer has been administered so that its *remote login* service is active and accepting calls from your computer.
4. The computer name has Host Interface listed as its **Connection Type** in the Add-On Computers Window. See **The Add-On Computers Window** later in this chapter for details.

Dismissing Connection and Authorization Windows

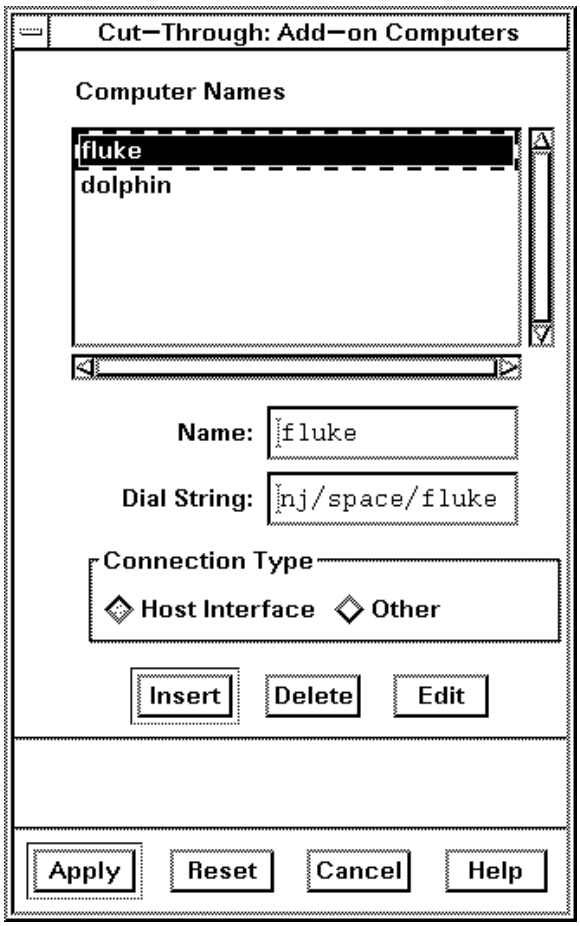
Procedure 6-4. Dismissing Connection and Authorization Windows from a Window

1. Move the pointer to the window menu icon.
2. Press and hold the mouse button.
3. Drag the pointer to **Close** and release the mouse button.

The Add-On Computers Window

The Add-On Computers Window allows you to modify, delete, or add computer names to the **Computers** list on the Cut-Through Control Window. You have the option to add your own machines, however you cannot access all computers available. Machines that have been administered centrally cannot be changed and do not appear on the Add-On Computers Window.

The Add-On Computers Window is shown in the following screen. Fields and buttons are described following the screen.



Screen 6-5. Add-On Computers Window

Computer Names	This is a scrolling list that contains the names of computers available for access.
Name	This field specifies how the machine is to be identified on the Cut-Through Control Window.
Dialstring	This field contains the network address of the machine to which the node is expected to connect.
Connection Type	This field tells the node how to connect to the service address.

Insert	This button allows you to insert a new computer name into the menu.
Delete	This button allows you to delete a computer name from the menu.
Edit	This button updates the window settings.
Apply	This button incorporates your final changes and exits the session. Changes go into effect immediately.
Reset	This button resets the window settings to the last values in effect prior to any changes you may have made.
Cancel	This button dismisses the window.

Procedure 6-5. Using the Add-On Computers Window

1. Click on the name you want to modify.
2. Change field entries as desired.
3. Choose **Host Interface** if the computer to which you want to connect is running the HP-UX operating system and it is connected to the network via the *Datakit* II VCS Host Interface. If these conditions are not applicable, choose **Other**.
4. When you have completed your changes, click on Edit to update the window settings.
5. To delete a computer name from the menu, choose the entry for that computer name from the scrolling list, then click on Delete. The computer name is removed from the scrolling list.
6. To insert a new computer name into the **Computer Names** scrolling list, enter the necessary information in the appropriate fields and click on Insert.
7. Click on Apply to save the changes you made since the last **Apply** operation.

Administering Network Builder

7

This chapter provides instructions for the administration of the Network Builder application.

Before you can use Network Builder to retrieve or send configuration data, communication between the node and the Core System must be established; see the *StarKeeper II NMS Core System Guide* for details. Also, Graphics System to Core System communications must be established; see **Chapter 2**, for more information.

Adding Users

See **Chapter 2** for information on adding Network Builder Users.

Removing Users

See **Chapter 2** for information on removing Network Builder Users.

Network Builder Tuning

Certain user-tunable parameters for configuration tasks are accessed from the Network Builder Administer Window under the Options menu. The parameter values are set at the factory and should suffice; however, you can change them if you want. The user-tunable parameters are: **Task Aging, Maximum Retry Cycles,** and **Retry Interval**.

If database configuration changes and retry cycles are not successful, you will receive an error message. If these are recoverable errors, the system will retry to accomplish the task. Network Builder will retry the task the number of times specified in the **Maximum Retry Cycles** control (see **Screen 7-1**). To solve the problem of possible communication errors, every Retry Cycle produces two

retries: the first is thirty seconds after the initial try and the second occurs after the time specified in the Retry Interval.

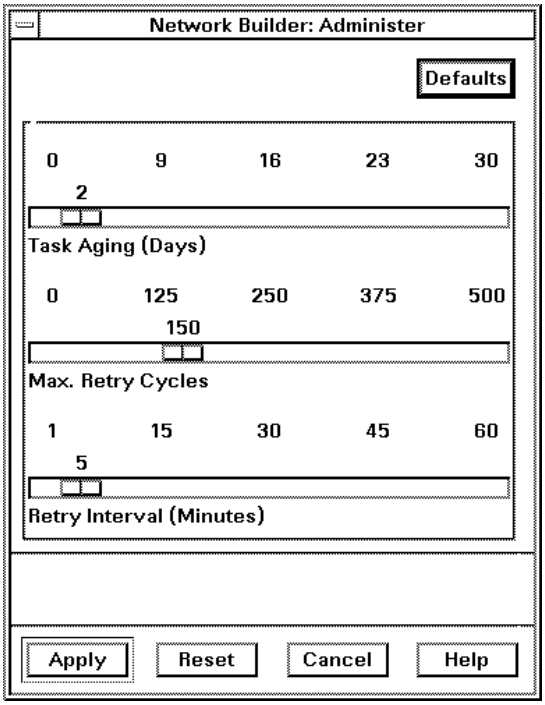
After making the set number of Retry Cycles at the set frequency (interval), if the task is still unsuccessful Network Builder declares the task a failure.

After a task successfully completes, the data associated with the task remains until the Task Aging interval has elapsed or until another task is started, whichever comes first. Task Aging does not apply to a task that fails.

To invoke the Network Builder Administer Window, and tune the parameters, follow the steps in **Procedure 7-1**.

Procedure 7-1. Setting Network Builder Tunable Parameters

1. Select **Options** in the menu bar of the Network Builder Control Window.
2. Select **Administer** in the **Options** menu. This raises the Administer Window.



Screen 7-1. Network Builder Administer Window

3. Adjust the appropriate controls (see the following table).

Parameter	Description
Task Aging	Specify the time (in days) between successful task completion and the time when the task is removed, that is, when all successful log entries associated with the task are deleted. **0** means "no aging". That is, successful tasks will not be deleted by aging; they must be viewed to be deleted. This setting may contribute to excessive disk space utilization. A value of **0** is not recommended, unless you are troubleshooting a problem and do not want the data to disappear. But even in this case, we recommend setting this value to **30**. Default is **2**.
Max. Retry Cycles	Specifies the maximum number of retry cycles that will be attempted before a task is declared "failed". **0** means there will be no retry cycles for task submission. Default is **150**.
Retry Interval	Specifies the time (in minutes) between task retry cycles. Default is **5**.

4. The Apply button incorporates your final changes. The Reset button resets the window settings to the last values in effect prior to any changes you may have made. To reset the window to the factory settings (the defaults), choose Defaults.

Using Network Builder to Configure Your Network

8

Provisioning physical and logical resources within a network monitored by *StarKeeper* II NMS involves manipulating data within one or more node configuration databases and within one or more *StarKeeper* II NMS configuration databases. This provisioning includes adding new equipment (for example, nodes or trunks) and/or new logical entities (for example, groups or services addresses), changing the parameters associated with those resources, deleting resources, and viewing the data corresponding to those resources.

Network Builder assists you in doing these operations from a central location, in a user-friendly and efficient manner.

The major benefit of using Network Builder to do your configuration is that, in a single operation, data is sent to both the node databases and the *StarKeeper* II NMS Core System databases. Not only does this reduce the effort of administering the network, but it ensures that the node and *StarKeeper* II NMS Core System databases retain the same view of the network.

The value of Network Builder is accentuated when you have to provision resources such as: trunks, node reroute tables, Frame Relay and SMDS elements. Each of these activities involves more than one node in your network and the single configuration operation from Network Builder provides data to each of the nodes, as well as to the appropriate *StarKeeper* II NMS Core System machines. This operation will ensure that each node gets a correct, consistent set of data and that the *StarKeeper* II NMS Core Systems reflect that data as well.

Network Builder also provides the tools required to configure SMDS networks. These tools are comprised of the node, trunk, SNI, ICI Carrier, ICI Prefix, and ICI Group Address forms. Specification of supported E.164 address ranges on a node is accomplished via the SMDS pane on the Node form; configuration of T3S and T3I trunks are accomplished via the Trunk form; configuration of SNIs is accomplished using the SNI form; configuration of carriers of interest in an inter-LATA SMDS network (ICI network) is accomplished via the ICI Carrier form; configuration of address prefixes for SMDS individual and group addresses is

accomplished by the ICI Prefix form. Group addresses are configured by the ICI Group Address form and the SNI form.

Network Builder relies on the *StarKeeper* II NMS Core System databases for its view of what is currently configured. Except for ICI configuration data (discussed later), Network Builder configuration tasks operate in three basic steps:

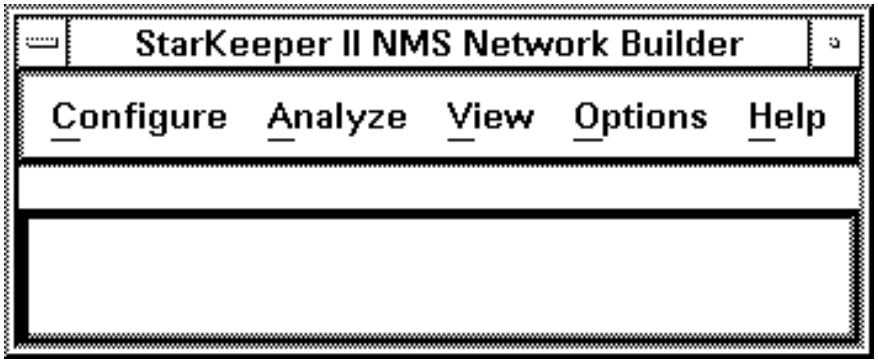
1. extract data from the *StarKeeper* II NMS database
2. permit your adding, changing, deleting, or viewing the data
3. configure the result on one or more node databases and on one or more *StarKeeper* II NMS Core System databases.

This approach to data configuration provides significant benefits to the network administrator, but it also implies that the *StarKeeper* II NMS Core System databases must be kept up-to-date with respect to the nodes' configurations. It is essential that the *StarKeeper* II NMS Core System configuration databases reflects the current set of parameters that have been administered on the nodes. The *StarKeeper* II NMS **skload/cfg_sync** command is used to keep the database at the *StarKeeper* II NMS Core System database synchronized with the data in the node configuration database. It should be run before using Network Builder; we also recommend that you put the **cfg_sync** command in a cron to run nightly during low-usage hours. See the *Database Management* chapter in the *StarKeeper II NMS Core System Guide* for complete instructions.

Using Network Builder for all configuration tasks on the supported network elements will ease your concern about keeping the databases synchronized; however, there is no guarantee that someone hasn't made changes directly at the node, or through the pass-through feature of *StarKeeper* II NMS Core System. Also, the *StarKeeper* II NMS Core System database contains module level information and concentrator level information not supported by Network Builder, which is another reason to run the synchronization commands on a periodic basis.

Starting Network Builder for Configuration

Network Builder is started by choosing **Network Builder** from the *StarKeeper* II NMS menu on the HP VUE Front Panel. After a few seconds the Network Builder Control Window is displayed as in the following screen.

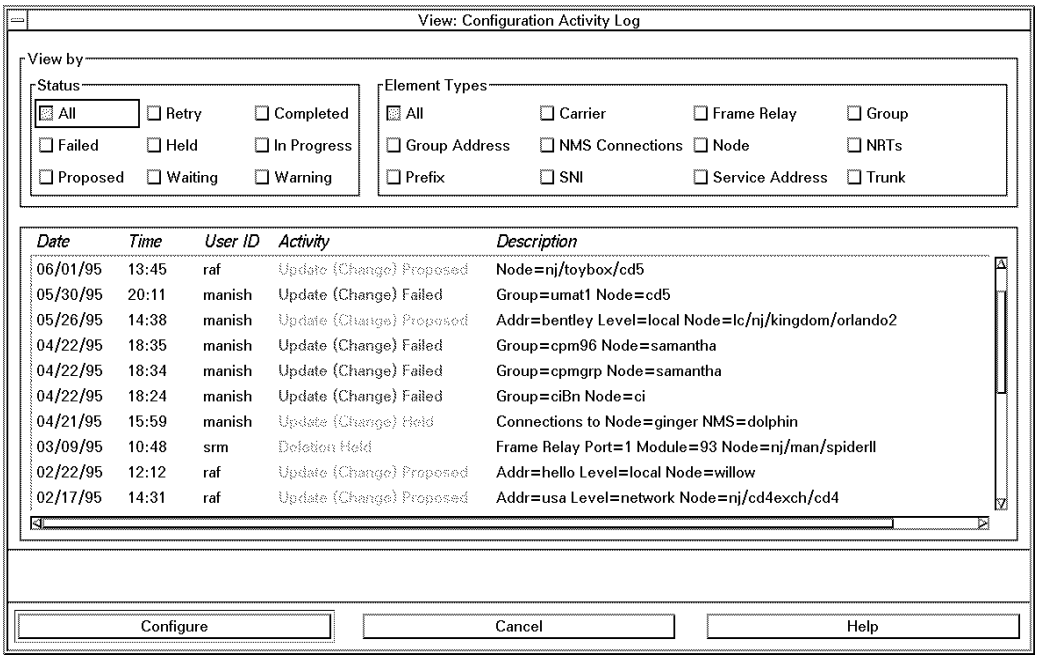


Screen 8-1. Network Builder Control Window

From the Network Builder Control Window, choose the task you wish to complete. This chapter is based primarily on the **Configure** menu, which is accessed by choosing **Configure**. See **Chapter 7** for the administration tasks, which are accessed from the **Options** menu and **Chapter 9** for the analysis tasks, which are accessed from the **Analyze** menu.

Configuration Activity Log

The **View** menu on the Network Builder Control Window provides access to the Configuration Activity Log. See the following screen for a sample of the Configuration Activity Log.



Screen 8-2. An Example Configuration Activity Log

The Configuration Activity Log command window has two control areas with settings to specify the data you want to see in the log display. One setting specifies the **Status** of the log entries to be displayed and the other specifies the **Element Types**. The settings are used together to specify the type of data you want displayed; for example, choose **In Progress** in the **Status** field and choose **Trunk** in the **Element Types** field to display the messages reporting *trunk* tasks that are still *in progress*. Both **Status** and **Element Types** have an **All** choice; setting both to **All** will display all entries.

The display itself provides data in a scrolling list. Entries in the scrolling list correspond to tasks that have been previously submitted and which are still retained on the system. Log entries are preserved for a few days beyond successful completion of the task or until a user views the Task's form, subject to "Task Aging." (This is explained in the **Network Builder Tuning** section of **Chapter 7**.) The default for "Task Aging" is 2 days.

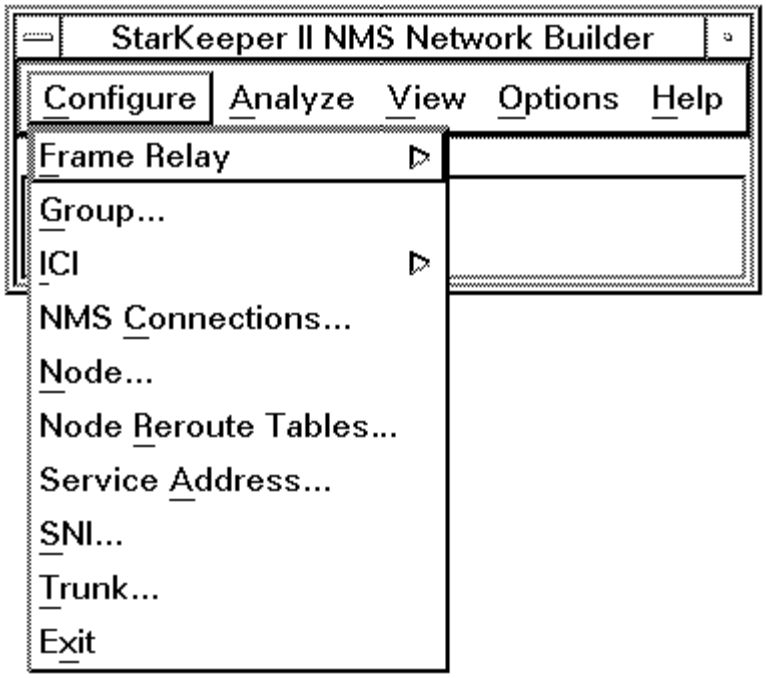
Each Activity Log entry describes a single task, and contains the following information: the time and date of the task submission; the login id of the user who initiated the task; the type and status of the task; key identifying data for the network element involved in the task. Task types are one of the following: Update (New); Update (Change); Deletion. Refer to **Screen 8-2** for some Activity Log entry examples.

From the Configuration Activity Log, you can load a network element record into a configuration form by moving the scrollbar to locate the desired item, choosing the desired item and then choosing **Configure** at the base of the window. Refer to **Operator Tips** further on in this chapter for more information.

Proposed tasks for network elements on unconfigured nodes cannot be loaded from a configuration form. You must load these tasks from the Activity Log.

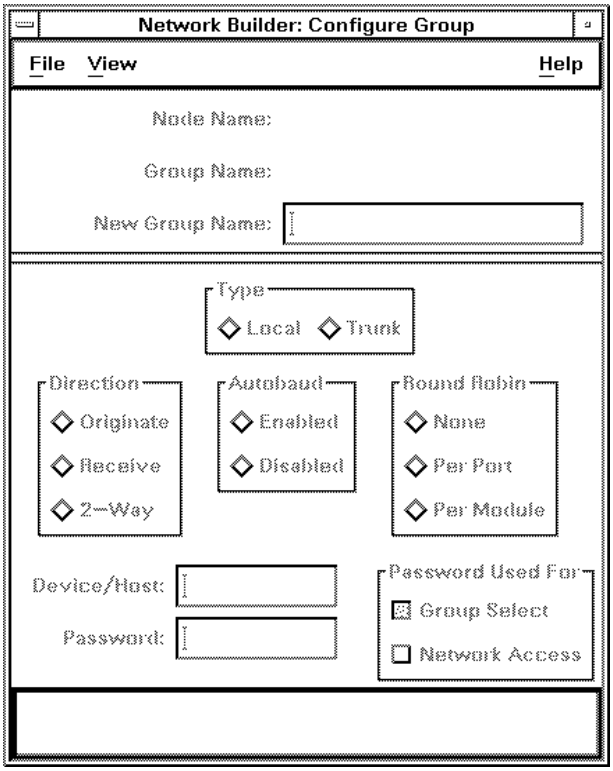
The Configuration Form Base Window

Configuration activities are accessed from a configuration form base window. To invoke the configuration form base window for the network element you wish to configure, choose **Configure**. A menu is displayed (see the following screen). Choose the desired network element.



Screen 8-3. Configure Menu

The desired configuration form base window appears. The Group Configuration Base Window is displayed in the following screen. Each network element has its own Configuration Form Base Window.



Screen 8-4. The Group Configuration Base Window (Initial Appearance)

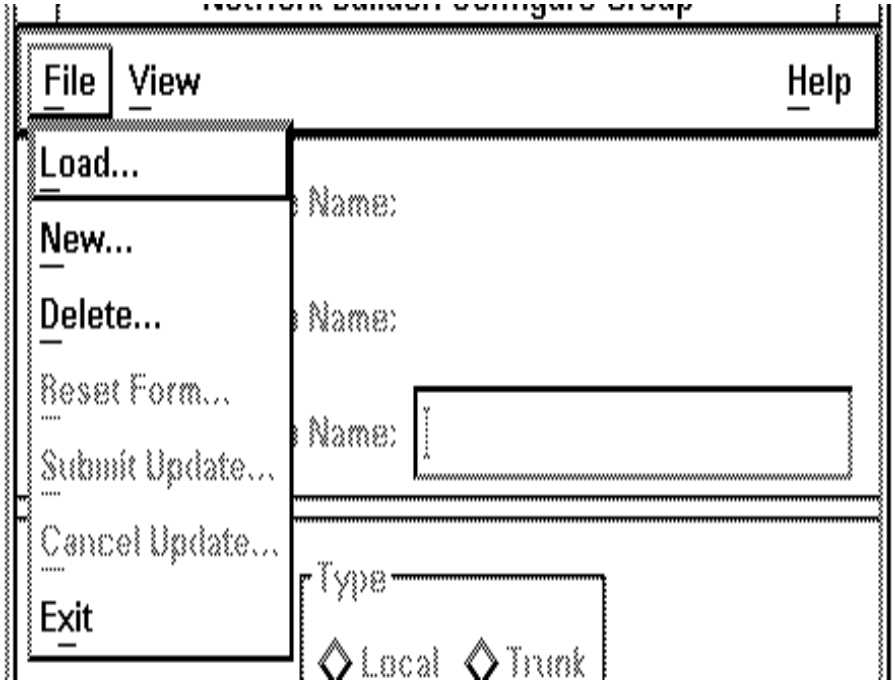
The Configuration Form Base Windows have three standard menus:

- **File** displays a menu of operations to perform.
- **View** displays a menu for viewing the Task Log and other reports.
- **Help** displays help system options.

Control Area Menus and Buttons

Clicking on a menu title in the control area of a Configuration Form Base Window displays the menu.

As an example, the following screen illustrates the menu invoked by clicking on **File**.



Screen 8-5. The File Menu

The File Menu

The **File** menu contains choices for accessing data records and updating or deleting them, submitting and canceling tasks, and manipulating the forms.

Most of the commands on this menu invoke command windows. These windows request information needed before the command can proceed. The command does not execute until you click on the appropriate command button on the command window.

To get to this point, you made a choice of a particular network element type from the **Configure** menu. The **File** button now lets you choose the specific operation you want to do on that network element, as shown below:

Load	displays an existing or pending element record on a form for viewing or changing the data
New	provides a form for entry of data for the creation of a new element record
Delete	removes an element record from the databases
Submit Update	submits the current form (whether created using New or an update of an existing element using Load)

Other supporting operations are to:

- reset the form
- cancel the update or delete request
- exit the form

Refer to the following table for a discussion of the operations you select from the **File** menu. All commands are available to users having *configure* permission. Users with read-only permission may only execute **Load**, **Reset** and **Exit**. See **Chapter 2** for more information**.**

Table 8-1. The File Menu, Operations

Choice	Description
Load...	Displays a Load pop-up command window to specify the key identifying data of a network element. When the data is entered, and the OK button is chosen, the form for the specified element is made available. Load retrieves the record of a specific network element for display on a form. Use this choice to verify or change an existing database record. Two types of records may be retrieved: 1. Current *StarKeeper* II NMS database contents. These records are for existing network elements that do not have an outstanding task associated with them. 2. Previously submitted task specifications. These records are for network elements having an associated task either pending, proposed, or stopped. In this case the record retrieved represents that task, and not what is currently in the database. To bypass the data reflected in the active task, so that the data that is stored in the *StarKeeper* II NMS Core System database is retrieved, the active task must first be canceled.
New...	Displays a New pop-up command window to specify the key identifying data for the to-be-created network element. Use this choice to add a new record to the databases. Options are provided in the window to show whether standard defaults or the currently present form data (if any) should be used to initialize the new form. Choose OK to display a form for the creation of a new database record of the requested network element type. This command is available only to users with *configure* permissions.
Delete...	Displays a Delete pop-up command window to specify the network element record to be deleted. When you choose OK, a confirmation notice window is displayed. If you choose to proceed with the deletion (via an appropriate response to the confirmation notice), the delete task is submitted for execution and the form is loaded with the data record of the specified network element. Note that deleting a database record may have an effect on other database records. These instances will be discussed as they are encountered. This command is available only for users with *configure* permission.

Table 8-1. The File Menu, Operations—*Continued*

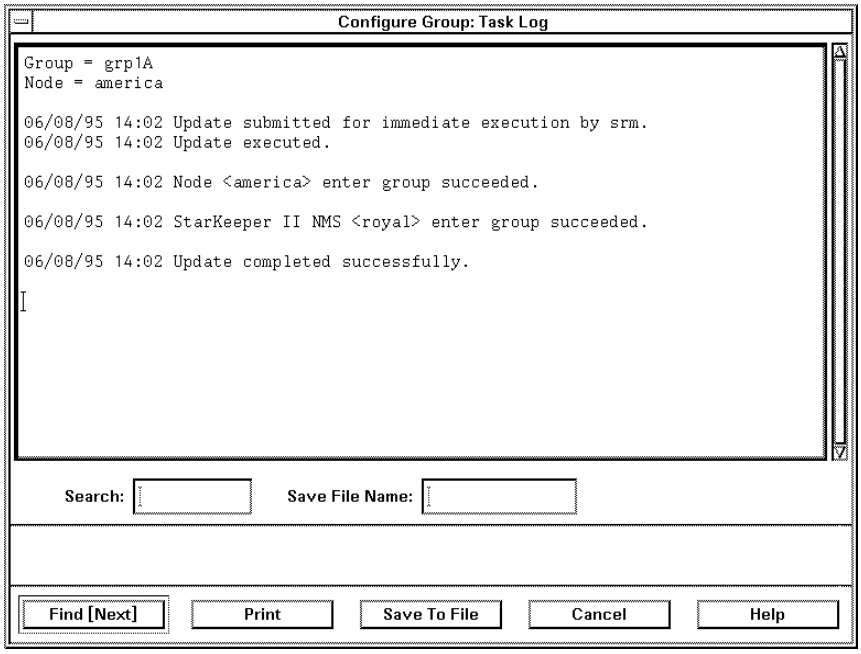
Choice	Description
Reset Form	Resets the data on a form to the state it was in following the last New, Load, Delete or Submit. You are queried for confirmation of this request only if changes have been made on the form since that time.
Submit Update...	Submits a task. It calls a Submit command window to specify execution parameters. This command is active only after a new form is displayed, or a record is loaded for an element without a pending task, and only for users with *configure* permission. If a task is pending, you cannot resubmit it; you first have to cancel the pending task and then you can resubmit it.
Cancel Update or Cancel Delete	Cancels a pending task (whose record is currently loaded). The command object varies depending on the task submitted (Update or Delete); only the single appropriate version will appear. For certain tasks that haven't completed, a confirmation is required. This command is available only for tasks that are pending and only for users with *configure* permission.

The View Menu

This button provides access to the Task Log and other view options for some forms. Choose **Task Log** from the **View** menu to display a Task Log for the current task associated with the loaded form. Task Logs provide a history of the current task associated with the loaded form. Task Log entries are preserved until successful completion of the task. After a task successfully completes, the entries remain until the Task Aging interval has elapsed or until a user views the task's form, whichever comes first. See the section titled **Network Builder Tuning** in **Chapter 7**. The default for Task Aging is 2 days.

The Task Log header will identify the network element being operated upon. Task Log entries indicate success or failure of individual configuration steps. When applicable, these entries are followed by text received from a *StarKeeper* II NMS or a node.

An example of entries in a Task Log is shown in the following screen.



Screen 8-6. Sample Task Log

At the base of this window there are controls for saving and printing a task log, as well as for searching for specific items in the log.

NOTE:
Some **Configuration Reports** accessed via the **View** Menu are updated dynamically, in response to changes made on the associated configuration form. This process will not allow you to configure other elements while one of these reports is displayed. You should dismiss any such reports before attempting to load or create a new network element.

Configuration Forms

Each node has a database that contains information about itself and connected resources. Duplicate copies of many of the records are kept in the database of *StarKeeper* II NMS Core Systems. This data is segregated by Network Builder into sections called *configuration records*. There is a configuration record for the node, and a configuration record for each trunk connected to the node, and a separate configuration record for each network element that the node must “know” about. It is those records that Network Builder retrieves, and displays the data on

the Graphics System screen in a *configuration form*. You can either view the data in the records, or make changes to the data, or delete the entire record. Network Builder also displays forms that you populate and then submit as new additions to the databases of *StarKeeper* II NMS Core Systems and nodes.

The configuration forms are Motif GUI windows that use standard Motif GUI features to display and update data residing in *StarKeeper* II NMS Core System and node databases. Some of the Network Builder features used in configuration tasks are described in the following subsections; they are

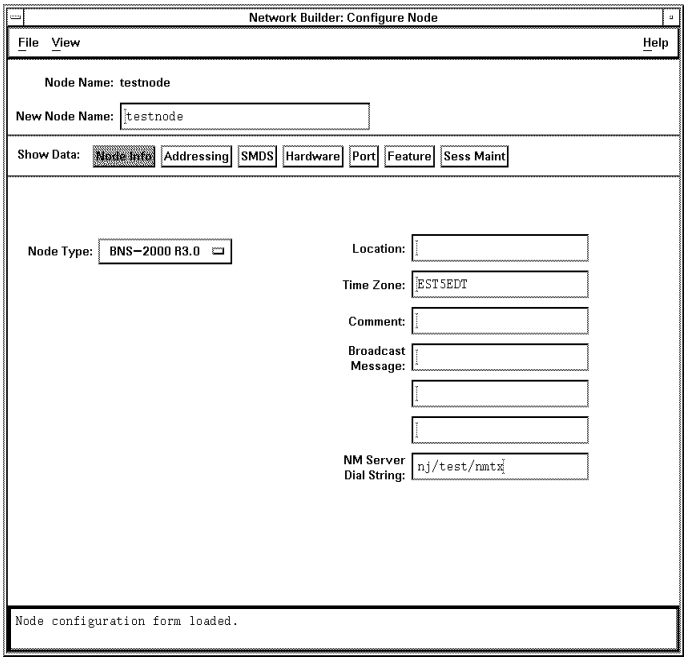
- key and data panes
- message area
- notices

Key and Data Panes

Each configuration form window contains one key pane and one or more data panes. Briefly, the key pane identifies the network element to be configured and the data panes provide detailed parameters for the network element.

For the more complex forms, a **Show Data** setting for displaying desired panes is located just below the key pane. Some configuration form windows have more panes than can fit onto the visible screen. When the window is first invoked, it displays a default pane. The **Show Data** setting controls which pane will be displayed. Displaying and dismissing panes does not affect the data on the form or the database element record.

The panes contain the controls used to specify parameter values for a network element. Details of the key and panes are presented during the configuration discussion for each network element, later in this chapter.



Screen 8-7. Key and Data Panes

Message Area

At the bottom of each base window is a message area. The messages show:

- errors that occur during form generation; for example, validation errors
- messages received from nodes and *StarKeeper* II NMS Core System machines
- status information from the current task

Messages are cleared when they no longer apply.

Error Messages

These messages are used for all immediate errors encountered while validating fields, for all other form validation, and for displaying messages from nodes and Core Systems.

Only one message at a time is displayed. If a message is generated after task submission that represents a serious condition, the task submission is stopped. Shown below are a few, example error messages.

- Group Name 1 contains invalid characters.
- Cannot open file for pending task.
- Cannot submit group task due to a resource problem.
- Node Name does not exist.

Status Messages

These messages are used for showing the mode of operation in effect for a given task, or for the status of the task. Shown below are a few, example status messages:

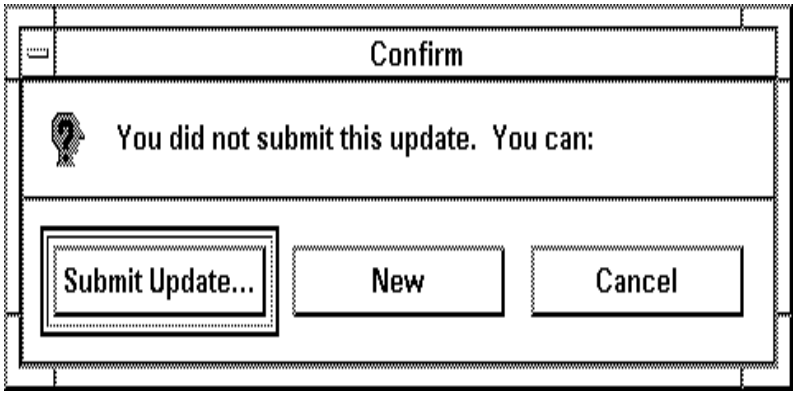
- New trunk configuration form
- Node configuration form loaded
- Update - changed record: Held

The last example shows the status of the task as "Held." There are eight possible states for a task submittal; they are

- **Waiting** - The task was submitted for "Immediate" execution and is waiting to run for the first time.
- **Held** - The task has been identified as "Held" during form submission.
- **Proposed** - The task has been identified as "Proposed" during form submission.
- **In Progress** - The task is in the process of being executed.
- **Completed Successfully** - The task was executed and completed error-free.
- **Canceled** - A previously submitted task has been canceled.
- **Trouble - Awaiting Retry** - The submitted task has encountered a temporary problem and is waiting to execute again. These are usually communication errors between the Graphics System and NMS/node databases.
- **Failed - Task Stopped** - The submitted task has encountered a serious problem.
- **Warning** - If warnings are received from the node **(Warning)** is appended to the state, and the warning messages are displayed in the Task Log.

Notices

Certain command requests require confirmation before proceeding. This confirmation is solicited via notices. A confirmation notice includes a statement asking to confirm a Delete request, Reset Form request, or canceling a task that is in progress or awaiting retry. Also, confirmation is required if changes are made to a configuration form but a Submit Update command was not issued. The notice includes two (or three) command buttons: one to continue the operation, one to cancel the operation, and, sometimes, one to initiate a missing command (**Submit Update** in this case). Press the appropriate command button. The following screen, presents a sample confirmation notice.



Screen 8-8. Sample Confirmation Notice (for an unsubmitted update)

Each notice will appear once and only once per command request, at the time the command execution button on the command window is selected.

Configuration Work Flow

From a Network Builder point of view, there are three operations to support configuration of network elements. You can add new configuration records to support new network elements, you can load data from the *StarKeeper* II NMS Core System database (and then simply view the data or change it) and you can delete entire database records from NMS/node databases. These three operations are supported by the following operation commands. Choosing one of these operations starts a task.

New Used to add network elements to the configuration databases.

Load Used to retrieve configuration databases of existing network elements for verifying, or verifying and changing. You can also choose to delete a record after verifying it.

Delete Used to delete configuration database records for deletion.

NOTE:
The **Load** operation can also be used to retrieve the record for an outstanding task. This allows you to continue with the task after either quitting the task base window or starting a different operation.

An outstanding task can also be loaded by using the Configuration Activity Log (the **View** button on the Network Builder Control Window). For more information, refer to the section titled **Configuration Activity Log** earlier in this chapter.

The *New* Operation, to Add a Network Element

The New operation displays a blank configuration form, for the type of network element specified, and provides the mechanism to populate the form and submit it to be added to the databases.

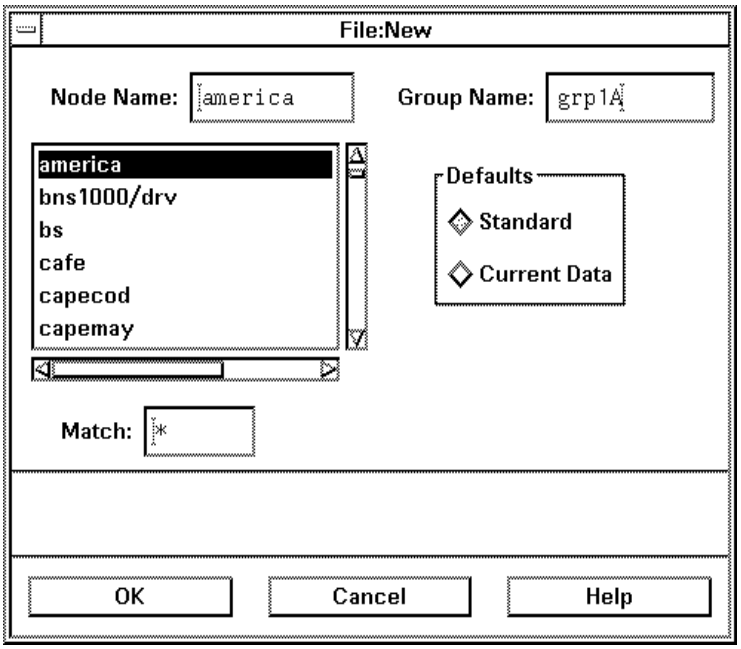
A general outline to add a configuration record to the databases is listed below; refer to the paragraphs that follow for more information. The description here is general, some "Add" procedures are a bit more involved. This additional complexity is fully explained in the applicable sections.

- Accessing the Configuration Form
  - identify the type of configuration record to be added
  - call the New command window
  - identify the specific configuration record to be created
  - specify how the initial form is to be populated (Standard or Current Data)
  - initiate the New operation
- Populating the Configuration Form
  - populate the data panes
- Submitting the Update
  - call the Submit command window
  - specify the execution type
  - submit the task
  - track the progress (status) of the task

When adding network elements, certain interrelationships must be taken into account. Where applicable, they are pointed out in the individual discussions for each network element.

Accessing the Configuration Form

Choose the network element for which you want to add a new configuration record, from the Network Builder **Configure** menu. This calls the applicable network element base window to the screen. Then choose **New** from the **File** menu. A New command window is called to the screen. See the following screen for a sample New command window.



Screen 8-9. New Command Window

The New command window has three major items:

1. a means to identify the network element configuration record that you want to add to the databases
2. a **Defaults** control (to specify Standard or Current Data)
3. a set of command buttons: OK, Cancel and Help

Text entry data fields provide the means to identify the configuration record that you want to add to the databases. The number of fields there are depends on the network element.

The **Defaults** control is an exclusive setting to choose Standard or Current Data. "Current Data" is available only when there is data displayed on the form (from a prior **New**, **Load** or **Delete** operation). Choosing Standard will provide a

configuration form filled out with "Standard" defaults, where applicable. The closer your network element is to this "standard" configuration, the less work you have to do. Just change the data fields that are different from the standard values. If there is data on the form, you can choose Current Data, which leaves the configuration form filled out with the same data. This is especially helpful when adding multiple records for similar network elements or adding an element similar to a loaded record.

Once the configuration record is identified, and the **Defaults** control is set, choose OK to bring the configuration form to the screen.

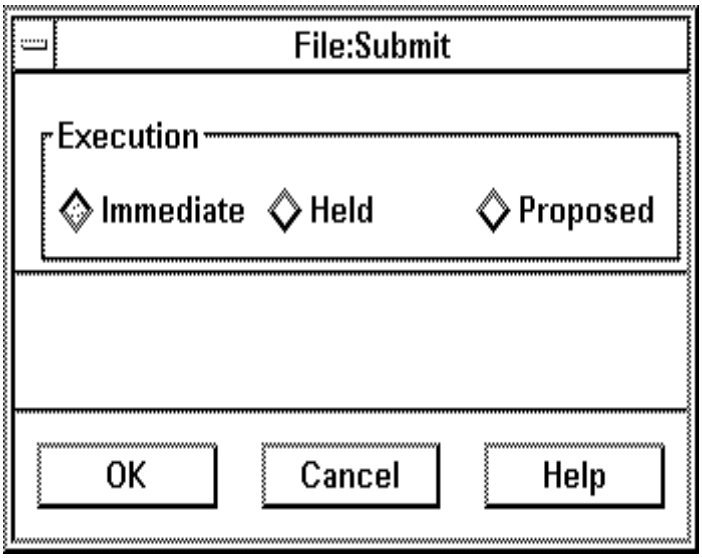
Populating the Form

The form you specified is called to the screen. It has a key pane and one or more data panes. If there are more data panes than can be seen on a screen there is a **Show Data** control to govern which pane will be displayed. Enter or modify field entries as desired.

Initially, the form is partially populated with defaults. Some fields will not be populated and you'll have to supply data in these fields; also, the default data for some fields may not be correct for this entry—change those fields.

Submitting the Update

When you are finished with data entries for the configuration form, choose **Submit Update** from the **File** menu. A Submit command window is called to the screen. See the following screen for a sample Submit command window.



Screen 8-10. Submit Command Window

The Submit command window has an **Execution** control to specify if you want the changed configuration record submitted to the databases immediately, or retained as held or proposed changes. The default will be "Immediate" or the value from a previous submission in the current session, if any.

- Choose **Immediate** to submit the task for immediate execution. Validation of the data on this form is done against previously committed data.
- Choose **Held** to save the data for submission at a later time and for use in other Network Builder tasks. This data is validated against committed and other held data. It is available for use in Network Builder Node Reroute Table Configuration and Session Maintenance Simulation.
- Choose **Proposed** to save the data for future network use. This data is not used in any validations and is not available for use in any other Network Builder tasks.

Choose OK to execute the submittal.

Messages in the base window footer will keep you informed of the progress of the task. You can also track task status by viewing the *Configuration Activity Log*. Messages are also stored in the Task Log to provide a history. To access the *Task Log*, choose **View** from the control area of the configuration form. If messages state the command has failed, identify the cause of the failure (if the Task log doesn't provide enough detail, check the EVENTLOG for possible additional information). To resubmit the task, choose **Cancel Update** from the **File** menu, change the data (see the Load operation, next), and resubmit the record. Forms

for pending tasks (including those that failed) will be protected; changes will not be permitted until the task is canceled. When a task is pending, controls on the associated form will be inactive.

The *Load* Operation, to View or Modify an Existing Database Record

The Load operation retrieves the configuration form for the network element specified, and provides the mechanism just to view the form or view it and do one of the following:

- make changes and return the changed data to the databases
- delete the entire database record

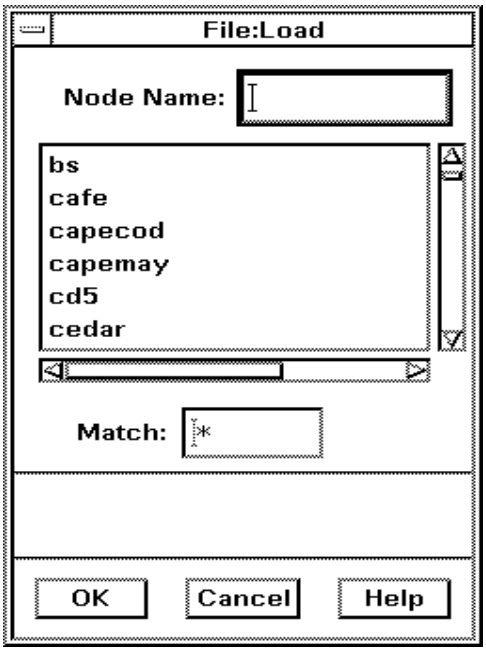
A general outline to change a database configuration record is listed below; refer to the paragraphs that follow for more information. The description here is general; some "Change" procedures are a bit more involved. This additional complexity is explained fully in the applicable section.

- Accessing the Configuration Form
  - identify the type of configuration record to be changed
  - call the Load command window
  - identify the specific configuration record to be verified or changed
  - initiate the Load operation
- Verifying and Changing Data in the Configuration Form
  - quit the window (if you are just verifying data)
  - modify the data panes
- Submitting the Update
  - call the Submit command window
  - specify execution type of update
  - submit the task
  - track the progress (status) of the task

When changing network elements, certain interrelationships must be taken into account. Where applicable, they are pointed out in the individual discussions for each network element.

Accessing the Configuration Form

Choose the network element for which you want to verify or change an existing configuration record, from the Network Builder **Configure** menu. This calls the applicable network element base window to the screen. Then choose **Load** from the **File** menu. A Load command window is called to the screen. See the following screen for a sample Load command window.



Screen 8-11. Load Command Window

The Load command window has two major items:

1. a means to identify the network element configuration record that you want to verify or change
2. a set of command buttons: OK, Cancel, and Help

Once the configuration record is identified, choose OK to bring the specified configuration form to the screen.

Verifying and Changing Data in the Form

The form you specified is called to the screen. It has a key pane and one or more data panes. If there are more data panes than can be seen on a screen, there is a **Show Data** control to govern which pane will be displayed. Enter data in the fields that you want to change.

Ensure that you have the network element configuration form you want. If you are only verifying data and not making any changes, you can quit the window or begin another operation. If you want to change data, continue with the procedure.

Submitting the Update

When you are finished with data entries for the configuration form, choose **Submit Update** from the **File** menu. A Submit command window is called to the screen. See **Screen 8-10** for a sample Submit command window.

The command window has an exclusive control to specify if you want the changed configuration record submitted to the databases immediately, or retained as held or proposed changes. The default will be **Immediate** or the value from a previous submission in the current session, if any. Choose OK to execute the submittal.

Messages in the base window footer will keep you informed of the progress of the task. Messages are also stored in the Task Log to provide a history. To access the Task Log, choose **View** from the control area of the configuration form. If messages state the command has failed, choose **Cancel Update** from the **File** menu, change the data, and resubmit the record or check the EVENTLOG for possible additional information about the failure.

The *Delete* Operation

The Delete operation removes an entire configuration record from the databases. The node is not deleted from the node database.

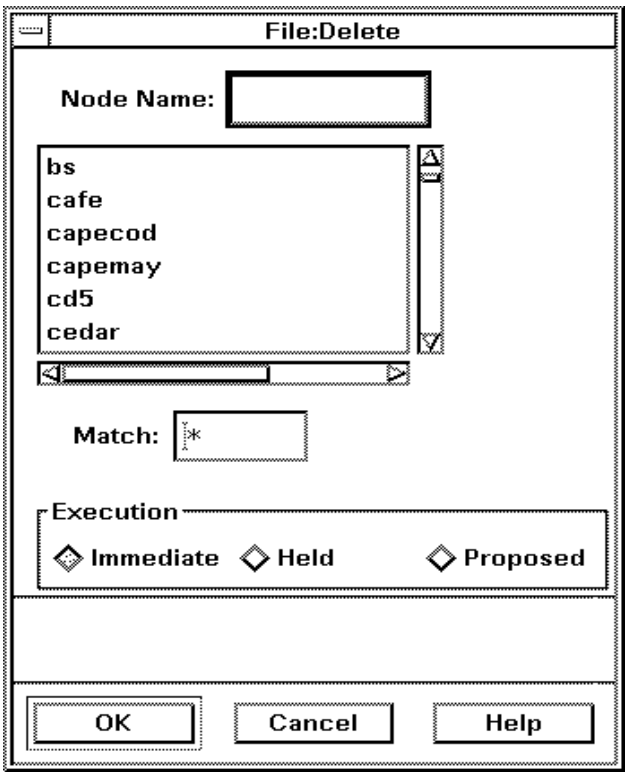
A general outline to delete a configuration record is listed below; refer to the paragraphs that follow for more information.

- Choosing the *Delete* Operation
  - identify the type of configuration record to be deleted
  - call the Delete command window
  - identify the specific configuration record to be deleted
- Executing the Delete Operation
  - specify the execution type
  - initiate the Delete operation
  - track the progress (status) of the task

Choosing the *Delete* Operation

Choose the network element, for the configuration record that you want to delete, from the Network Builder **Configure** menu. This calls the applicable network element base window to the screen. Then choose **Delete** from the **File** menu.

A Delete command window is called to the screen. See the following screen for a sample Delete command window.



Screen 8-12. Delete Command Window

The Delete command window has three major items:

1. a means to identify the configuration record to be deleted
2. an **Execution** control
3. a set of command buttons: OK, Cancel, and Help

Once the configuration record is identified, choose OK to bring the specified configuration form to the screen.

Executing the *Delete* Operation

The **Execution** control is an exclusive setting to choose Immediate, Held, or Proposed execution. The meaning of the labels on the settings was described previously in the sub-section titled **Submitting the Update**.

Once the configuration record is identified, and the **Execution** control is set, choose OK. Choosing OK dismisses the Delete command window and the configuration form is brought to the screen.

Messages in the base window footer will keep you informed of the progress of the task. Messages are also stored in the Task Log to provide a history. To access the Task Log, choose **View** from the control area of the configuration form. If messages state the command has failed, choose **Cancel Update** from the **File** menu, correct the problem and restart the deletion task. Check the EVENTLOG for possible additional information about the failure.

Canceling a Task

Any task can be canceled before it completes. To cancel a task that is held, proposed, awaiting retry, etc., choose **Cancel Update** or **Cancel Delete** (as applicable) from the **File** menu. The Cancel operation is also used to prepare a failed, held, or proposed task for re-submission or to remove it from the system.

⚠ CAUTION:
Canceling a **Waiting***,* **In Progress***, or* **Awaiting Retry** *task may result in a partially applied update.*

Operator Tips

Network Builder is designed to make configuration tasks easier for network administrators. To highlight some of the ways Network Builder can be used to simplify operations, the following subsections present a collection of "operator tips."

Verifying Data before Deleting

The Delete operation, as specified by choosing **Delete** from the **File** menu, assumes you are sure of the record you want to delete. Therefore, the deletion is specified and acted on before displaying a copy of the record.

If you want to see a copy of the record before deleting it, just to make sure you have the right one, choose the **Load** operation from the **File** menu to retrieve and verify a configuration record.

Once you are sure you have the record to be deleted, choose **Delete** from the **File** menu. This action invokes the Delete command window, with the current keys, where you choose OK. Network Builder then deletes the verified configuration record from the databases.

Using Current Data (the Defaults Control)

When you choose **New** from the **File** menu to add configuration records to the databases, you access the New command window, which has a **Defaults** control to choose between Standard and Current Data. (See **Screen 8-9**). If New is the first operation you wish to do on a Network Builder Configuration Base Window, there is no current data, so the only choice is Standard data. Choosing **Standard** will populate the chosen type of configuration form with a specific set of predefined data (considered to be an appropriate set of the particular task). These defaults may or may not approximate your requirements. However, if the new operation follows another operation in the same base window, the current data is available for population of the form. This is particularly helpful when populating forms for similar elements, which is usually the case. For example, when configuring a new network built on similar nodes, you can complete the detailed data for the first New operation and then choose Current Data from the **Defaults** control for each node thereafter, and only have to change the data in the fields that are different from the most recent New operation.

The current data feature is also helpful if you want to change Direction on a local group. The node does not permit you to change Direction; however, you can Delete the group (but the data remains on the form) and then choose the New operation and choose Current Data from the **Defaults** control. The final step would be to change the Direction field and submit the configuration form as a "New" configuration record.

The Copy Feature

Network Builder does not have an explicit *copy* feature; however, copying is easily done by following the steps below.

1. Load the record of the network element that you want to copy.
2. Choose **New** from the **File** menu and identify the target of the copy operation by entering its key data in the fields of the New command window.
3. Choose Current Data on the **Defaults** control, and choose OK at the base of the command window to get a form to create the new entry, using the data from the loaded source record.
4. Make any desired changes and submit the form.

The Move (Trunk) Feature

Network Builder does not have an explicit *move* feature; however, moving trunk data is easily done by following the steps below.

1. Load the desired trunk record.
2. Change the module address field at either (or both) end node. (This can be done along with any other trunk changes you desire.)
3. Make other changes (if desired) and submit the form.

Using this procedure, Network Builder treats the "move" as just another trunk parameter change.

Using the Configuration Activity Log to Access Forms

Network Builder lets you access forms from the Configuration Activity Log. To access a form from the Configuration Log, follow the steps below:

1. choose a log entry in the Configuration Activity Log
2. choose **Configure** at the base of the window.

This simple two-step approach will invoke a configuration base window for the appropriate element type, and loads the data for the specific element chosen from the log.

It is a shortcut way of loading a record and eliminates the need to specify any key data to accomplish the load. It is particularly useful when trying to determine why a particular task failed or is having trouble.
Loading a failed or troubled task's record then gives you access to that element's task log, thus providing more detailed information regarding the task. From this point you can also cancel the task and update and resubmit the form, if desired.

Resubmitting Failed Tasks

When a task fails, you want to accomplish the following:

- find out why it failed
- remedy the problem
- resubmit the task

If a task fails, there are three ways of being informed of the failure.

1. watching the status messages appearing in the footer of the configuration form
2. viewing the Task Log
3. viewing the Configuration Activity Log

In either case, you need to access a configuration form with the loaded record for the failed task. In the first case (above) you are at the configuration form; in the second case you can access the form using any method Network Builder supports, but using the Configuration Activity Log access method (see previous subsection) is the easiest way.

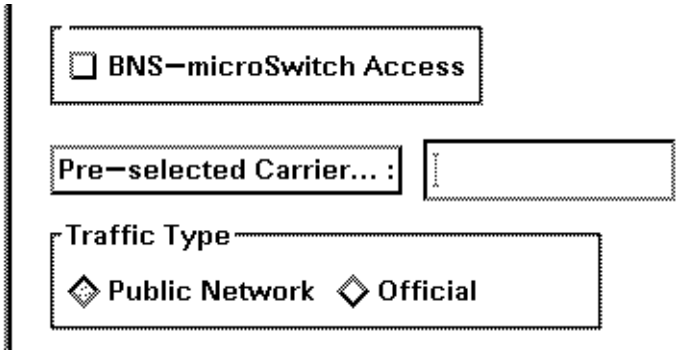
Once you learn of a task failure and have accessed the configuration form, cancel the current task (choose **Cancel Update** from the **File** menu). You can then make any changes on the form, if needed, and resubmit (choose **Submit Update** from the **File** menu). Note that canceling without resubmitting will remove all information regarding this task from both logs; so, cancel only when you are ready to resolve the problem. For deletions, you restart the deletion after canceling.

The point to remember is that the data that was submitted, but failed, is never lost until the task is cancelled. It is made available to you so that you can examine the data entered, and resubmit the corrected data.

Sometimes a re-submittal does not work. This usually happens if a New record must be added to several databases and the first add has succeeded, but the others failed. In this case, run **cfg_sync**. To ensure all databases are updated properly, start the task again by using the **Load** operation for the record.

Choose Command Windows

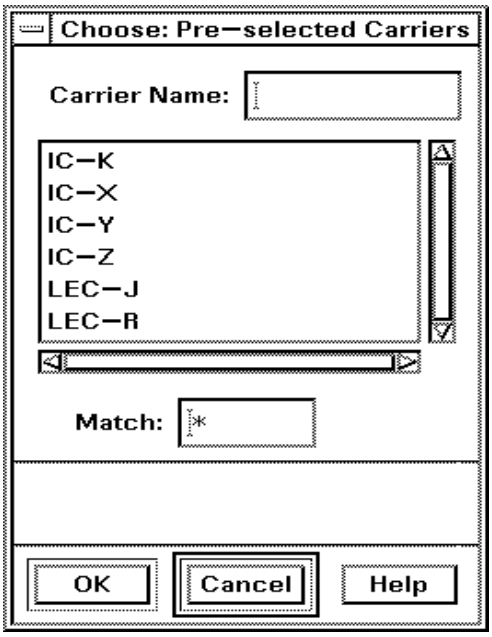
Network Builder introduces a special type of command pop-up window called a *Choose command window.* The Choose command window is used in certain data fields to provide a list of items from which to choose, to complete the entry for the field. This is a very helpful feature when you are not sure of the exact entry to make. You know a Choose command window is available when the field label is followed by an ellipsis (...) and is itself a button. For example, on the SNI form the Pre-selected Carrier field has a choose list associated with it. Press the label to obtain the associated Choose window.



Screen 8-13. Accessing a Choose Command Window

This action calls the Choose command window, which provides a scrolling list of all the available carriers. (See the following screen.) You can use the scrollbar to bring items into view and then click on the item you want, or you can use the **Match** field to limit the number of displayed items on the list. To use the **Match** field, activate the caret and enter a pattern, using wild card techniques; then press the Enter key. All items not matching the pattern are removed from the list. For example, if you enter *n** on the match line, only items beginning with "n" appear on the list. Wild cards **?** and ***** are supported; and so are brackets "[ ]." Enter * on the match line to re-display the entire list.

When you can see the item you want on the scrolling list, select the item. Then press OK. Pressing this button dismisses the window and enters the current item into the appropriate text field.



Screen 8-14. Choose Command Window

NOTE:
If error messages state the list is truncated (because there are more items than can fit on the list), use the pattern match feature to limit the size of the list.

A Choose command window, when applicable, can also provide direct access to a different, but required, configuration task. You can consider this as a back door to a configuration task. If you press Configure the system will respond as though you chose an item from the Configure menu at the Network Builder Control Window. For example, on a Trunk configuration, you can call the Choose

command window for the Group Name field, and then choose Configure to call up a Group Configuration form. The node name and current group name (if chosen) from the Choose command window will be passed to the group form. Once you have configured a new group, and quit that Group Configuration Form Base Window, the Choose command window is dismissed and the name of the new group is entered in the **Group Name** field on the Trunk form.

Cut-Through

Any supported node command can be executed on the Core System using the Cut-Through application. This is particularly helpful to do tasks that must be done at the node. For example, two of the network elements (X.3 and CUG profile) required for addresses must be entered into the node database at the node; you cannot configure them from Network Builder. If you started configuring the service address before entering these fields you can:

1. use Cut-Through to access the applicable node
2. use the node's **enter profile** command to populate the X.3 and CUG profile
3. return to Network Builder, enter the new profile names, and continue configuring the service address

Refer to **Chapter 6** for complete coverage of the Cut-Through application.

NOTE:
Do not use Cut-Through to configure network elements supported by Network Builder. Doing so will disrupt critical data relationships that Network Builder maintains and can result in errors and inconsistencies.

List Editing Controls

The following table describes common controls that are used for editing lists.

Button	Description
Insert	Insert is used to make an addition to a list. Choosing this button will put the data in the **Entry** field into the list.
Delete	Delete is used to delete the current item from a specific list. An item is made current by clicking on the desired item in the list. Choosing Delete will then remove the item from the list.
Edit	Edit is used to modify a list item. Clicking on the list item will place it into the **Entry** field where you can make changes. Choosing Edit will replace that item with the modified entry. Edit is also used to finalize modified associations between two lists (example: SNI Group Addresses), or between a list item and other settings.

Configuring *StarKeeper* II NMS Connections

The procedures for configuring *StarKeeper* II NMS connections are shown first, before node configuration, because *StarKeeper* II NMS first needs to know how to connect to the network.

Prior to configuring *StarKeeper* II NMS connections, perform node administration (at the node) as described in the **Administration Procedures for Host Connections** section in *Chapter 3* of the *StarKeeper II NMS Core System Guide*.

To keep your *StarKeeper* II NMS Core System informed of changes in your network, various synchronization commands are available to update the *StarKeeper* II NMS database with accurate network information. These commands, **skload, cfg_sync** and **conn_sync,** are discussed in detail in *Chapter 2* and *Appendix F* of the *StarKeeper II NMS Core System Guide*.

The NMS Connections configuration form contains several data panes (one for each connection class). A **Show Data** setting chooses which data pane will be displayed.

Background Information

Network Builder supports *StarKeeper* II NMS connections to supported nodes. The available connection classes are listed in the following table. Each connection class is configured using the methods described in this section.

Connections Classes for a *StarKeeper* II NMS Core System

This section lists connection classes for a *StarKeeper* II NMS Core System.

Class	Description
Console	This connection class is used to collect alarms from nodes and provide pass-through to the nodes. It can also be used with the *StarKeeper* II NMS **console** command to provide Cut-Through to the node. To collect alarms, the connection status must be set to active.
Billing	This connection class is used to collect call accounting data from nodes. There is one connection to *StarKeeper* II NMS for each node that reports billing data. This data is stored in the *StarKeeper* II NMS Core System database and is used for the billing reports provided by *StarKeeper* II NMS. The billing address must be entered as **billing.m**. See the **Billing Management** section of the *StarKeeper II NMS Core System Guide* for instructions on entering required billing parameters.

Class	Description
Performance	This connection class is used to collect performance measurement data from nodes. The data is collected, stored, and summarized so that tabular performance reports can be produced. See the **Performance Management** section of the *StarKeeper II NMS Core System Guide* for instructions on entering required data.
Administration	This connection class is used to transfer node configuration data from nodes to the *StarKeeper* II NMS Core System database using the **skload,** and **cfg_sync** commands. It supports the transfer of data from Network Builder to nodes through *StarKeeper* II NMS. This connection must be configured and activated by Network Builder configuration tasks to be operational. It also accommodates the **smverify** and **smstat** commands to support the node's Session Maintenance feature. Each Administration connection must be configured to run from the same *StarKeeper* II NMS Core System having the Console connection set up to that node.
Dial Backup	Supports node connections with modems—as a backup to the standard Console connection. Each database connection must be configured to run on the *StarKeeper* II NMS Core system that has the Console connection set up to the node. Do not run database load and synchronization commands over this connection.
MRCM Maint	Connects to the M port, and to the B port (via the M port), of the MRCM module for use as a backup for the Console connection; it is used for problem situations. Both the Console and MRCM Maint connections cannot both be active at the same time since they both cannot be used to access the same B port. Refer to the section titled **MRCM Connections** in the *StarKeeper II NMS Core System Guide*.

The table above briefly describes the connection classes that are available with your *StarKeeper* II NMS. Use the descriptions in this table and in the following sections to help you determine which connections you need to configure to manage your network.

Connection Classes for Graphics System Applications

Network Builder configuration requires the Administration connection to be active so that data that you wish to be sent to the node can reach the node and take effect. The Administration connection is also required to keep the *StarKeeper* II NMS Core System and node databases in synchronization, using the *StarKeeper* II NMS commands **skload** or **cfg_sync**. The Console connection should also be active to provide pass-through to the node.

In addition to the need for active Administration and Console connections to support Network Builder, the Performance Reporter application requires the Performance connection to be active. Thus, if you use the Performance Reporter application, you will have to configure and activate the Performance connection from the *StarKeeper* II NMS Core System to the node from which you want to extract performance measurement data. The Performance Reporter application uses the data that is stored in the *StarKeeper* II NMS Core System database to generate its tabular reports and graphs.

The Network Monitor application requires the Console connection to be active to collect alarms from nodes and other element management systems.

Task Notes

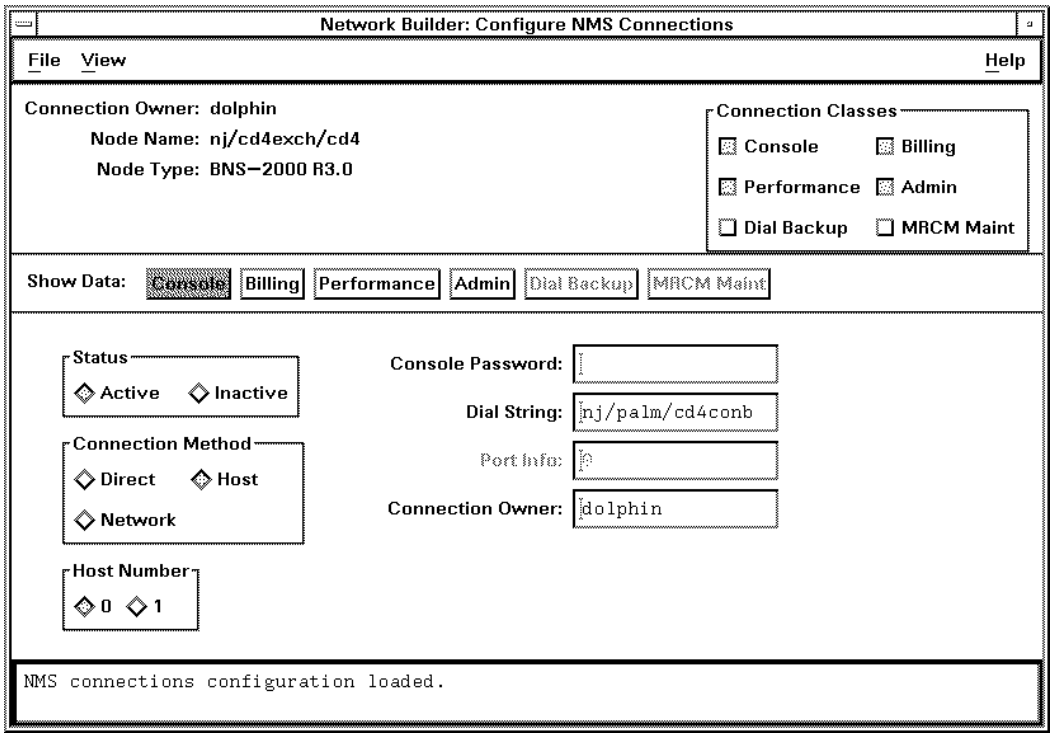
- If you change or add a connection to a node, you must run the *StarKeeper* II NMS **conn_sync** command to synchronize the local connection data with the *StarKeeper* II NMS Core System configuration databases. The **conn_sync** command must be run on the *StarKeeper* II NMS Core System and on the Graphics System.
- When a new node is added to the network via Network Builder, you must add the node in concert with adding the NMS connections. Use the outline below when adding a new node and the appropriate NMS connections.

    1. If not already done, some basic administration must be performed at the node console before proceeding with the following steps. This includes: Entering a name and addressing information for the node; configuring service addresses for internal endpoints; and, possibly, configuring a trunk for *StarKeeper* II NMS connectivity.
    2. Configure new *StarKeeper* II NMS connections using the new node name. Submit the task as immediate. Be sure that at least the Console and the Administrative connection classes were defined as active.
    3. Run the *StarKeeper* II NMS **conn_sync** command at the StarKeeper II NMS Core System machine.
    4. Run **skload** to populate the configuration data for the node.

5. Synchronize connection data by using the **Workstation Administration** application (see **Chapter 5** for details).
6. If additional configuration changes are necessary use the **Load Node** task.

- Connections are configured on a *StarKeeper* II NMS-to-node pair basis; one record for each NMS/node pair. If you want to add a connection class to an existing record, add the record and add the desired connection class.

NMS Connection Parameters



Screen 8-15. NMS Connections Configuration Form

Parameter	Description
Connection Classes	This setting identifies the connection classes to be configured. Choose all the classes that you want to configure for this NMS/ node pair. The appearance of the **Show Data** control is affected by this setting.
Connection Owner	This is the name of the *StarKeeper* II NMS Core System machine owning the connection.
Console Password	This is the console security password as assigned in the node's database for Port B. When you navigate out of this field, the entry is cleared and the field is filled with a string of asterisks.
Network Access Password	This is the network access password. When you navigate out of this field, the entry is cleared and the field is filled with a string of asterisks.
Network Phone Number	This is the telephone number for modem access of the network.
Status	Only one of the following three connection classes can have its status set to Active at any given time: Console, MRCM, and Dial Backup.

Special Considerations

Adding Connection Classes

Adding connection classes establishes the node configuration record. To complete the node configuration record, refer to the **Configuring Nodes** section later in this chapter.

Deleting a Connection

You cannot delete a single NMS connection. When you delete a node, all connections to that node are also deleted. However, you can change a connection status to "inactive."

Configuring Nodes

Use Network Builder to configure node records in the node database and in the *StarKeeper* II NMS database.

Adding your first node to the network is the most difficult entry—there is much data to enter. The remaining nodes are easier to enter because of a **Defaults** control that allows you to choose between Standard data and Current Data. For later new node additions, you can choose Current Data to populate the form with the same data that exists from the last node entry; then you just change the fields that are different.

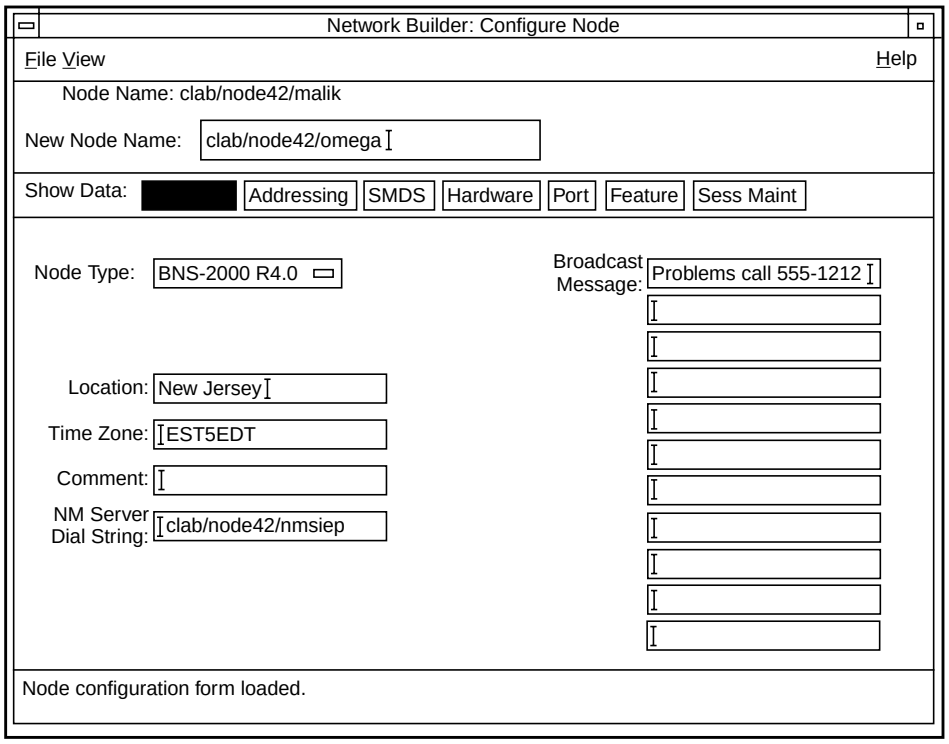
The Node configuration form is partitioned into a key pane and seven data panes: Node Info, Addressing, SMDS, Hardware, Port, Feature, and Sess Maint. A **Show Data** setting chooses which data pane will be displayed.

Background Information

The node is the backbone of the network and the center for call processing. It is the connecting device for all concentrators, interface modules, and peripherals that provide network service.

Entering data on the Node form allows you to specify the characteristics of the node. You can:

- name the node so it can be readily identified on administrative output (reports, alarms, system responses, date stamp). Note that the node name as used by *StarKeeper* II NMS can be different from the name used at the node.
- set up the node address so calls can be routed and directory entries can be made for terminal users.
- specify valid SMDS address ranges for the node, set SMDS billing to enabled or disabled, set the network type, and identify the LATA ID for ICI networks.
- indicate the hardware currently in use: the number of Control Computers and disk drives, and whether a Maintenance and Redundancy Control Module (MRCM) is installed.
- specify functions, such as an automatic disk backup and the removal of babbling ports and/or trunks with errors, that can ease utility operations.
- establish broadcast messages for terminal users.
- enable *console security* by assigning passwords to ports A and/or B to restrict access to the console and/or printer ports.
- tune Session Maintenance node parameters.



Screen 8-16. Node Configuration Form, Node Info Pane

NOTE:
The Node Configuration form does not allow the user to change the node type from BNS-2000 to DKII. (It does allow the user to change the type from DKII to BNS-2000.) If the user has entered BNS-2000 by error for a DKII node, they must delete and then re-enter the node using the Node Configuration form

Task Notes

- If you delete a node, you must run the *StarKeeper* II NMS **conn_sync** command to synchronize the node connection data with the configuration databases.
- Some parameter specifications (such as the node name and port number designations appearing on the date stamp) do not take effect until the next node reboot.

- Initial administration of console security using the Cut-Through facility can be done only if the switch on the SCSI/DKI board is in the DIAG position. The node must then be re-booted with the switch in the ENABLE position.
- The **New** operation can only be submitted as a **Held** or **Proposed** task; **Immediate** submittal does not apply. For a discussion of the relationship between adding a new node and establishing the NMS connections to the node, refer to the section titled **Task Notes** in the **Configuring *StarKeeper* II NMS Connections** section.
- If you change the password, you must also perform the following steps:

  1. Issue the **init controller** command at the node.
  2. Perform the **Load NMS Connections** task.

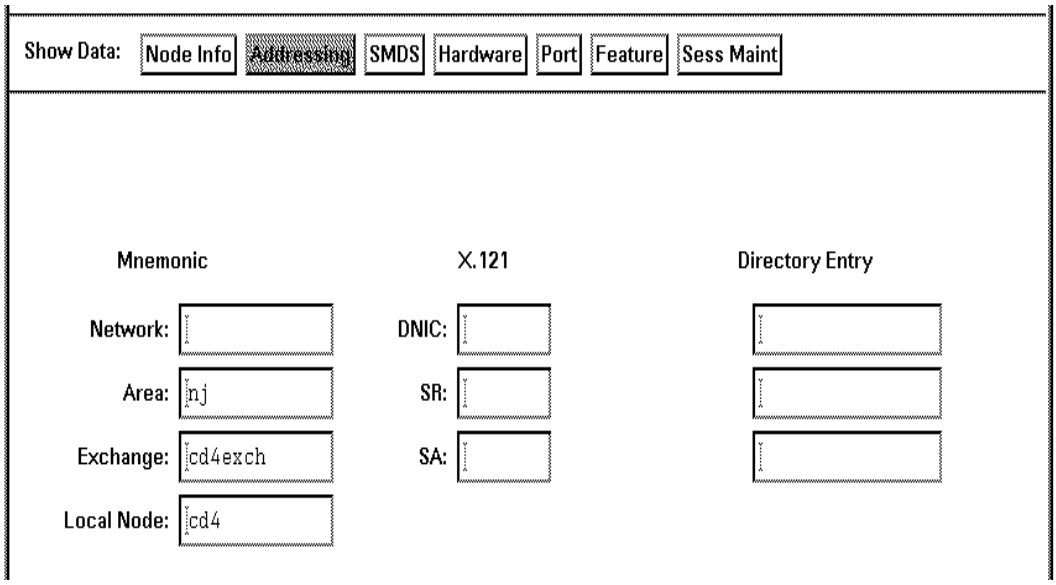
  Be sure to inactivate the console connection to the node, change the password, and reactivate the console connection.
- If an ARU is configured on the node and you want to change or enter node data using the Network Builder Node Form, then if the console connection for that node is monitored on the Core System, it will disconnect and reconnect after changing the data successfully.

Node Parameters

Node Info Pane

Parameter	Description
Broadcast Message	This is an optional message to be broadcast to all users when they connect to the node. Each broadcast message is treated separately when entered, but they are treated as a single unit and displayed to users when they connect to a node.
NM Server Dial String	If the network contains FRM-M2 modules for which performance measurements are to be collected, this dial string - used on the core system to dial the node to download the FRM-M2 performance measurements data - must be entered. It must match the address administered at the node for the *?nmsiep* group. In an ICI network, this is the *service* address used by the ICI download toolkit on the Primary Core to dial the node in order to upload and download the ICI configuration files.
Time Zone	This is the time zone where the node is located. For example; *EST5EDT* means the node is located in the Eastern Standard Time zone, which is 5 hours before Greenwich mean time, and Eastern Daylight Time (optional entry) will be used when appropriate. Central Standard Time is 6 hours before Greenwich mean time. This uses standard HP-UX time zone conventions. Default is the HP-UX time zone of the Graphics System.

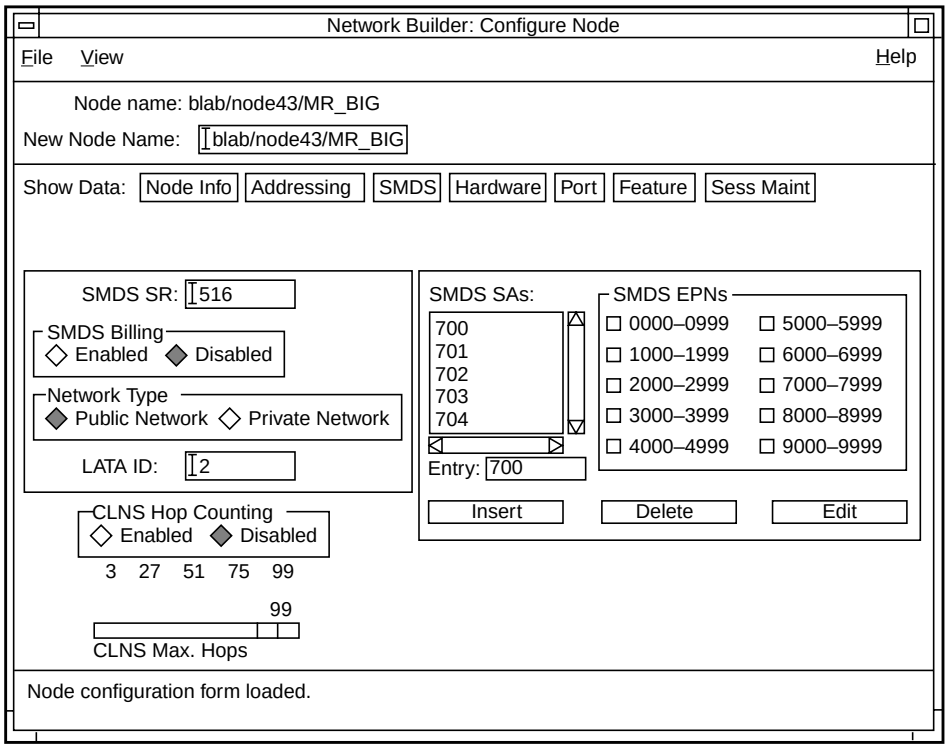
Addressing Pane



Parameter	Description
Area	This is the optional mnemonic for the local area address. Do not use special characters, the word "all", the word "none", or a three-digit number.
Exchange	This is the optional mnemonic for the local exchange address. Do not use special characters, the word "all", the word "none", or a three-digit number.
Local Node	This is the mnemonic for the local node name. Do not use special characters or the word "all". Numbers **are** allowed.
Mnemonic and X.121 Addresses	For a discussion of mnemonic and X.121 Addresses, refer to the **Background Information** for **Configuring Service Addresses**.
Network	This is the optional mnemonic local network address. Do not use special characters, the word "all", the word "none", or a four-digit number.

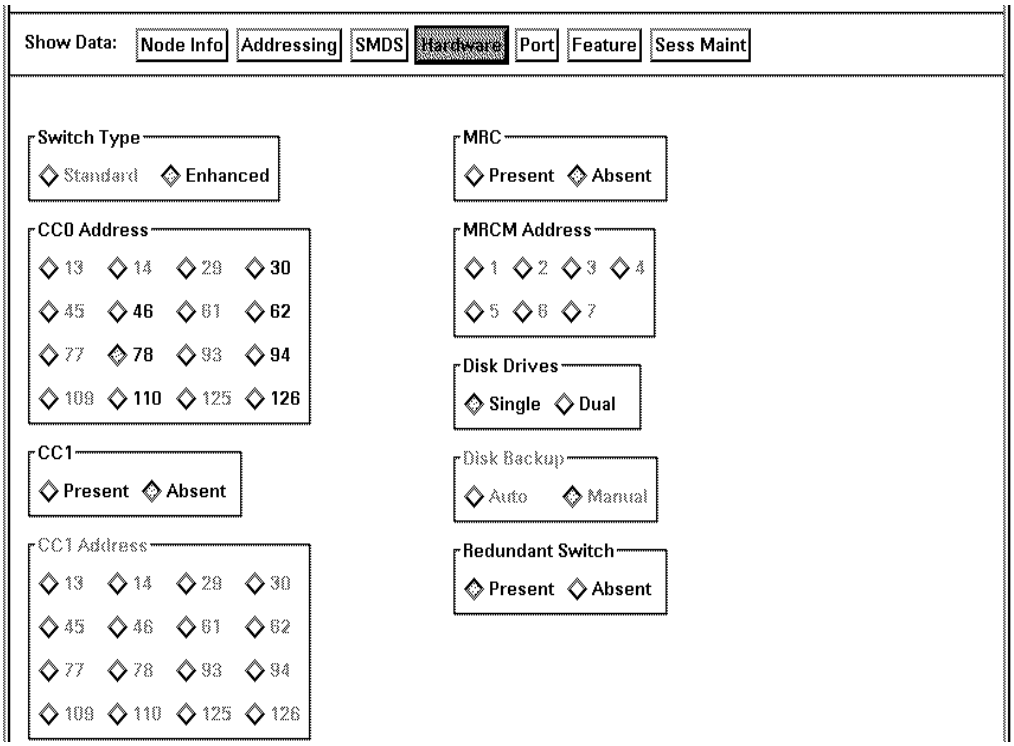
SMDS Pane

This pane is only available for BNS-2000 nodes.



Parameter	Description
CLNS Hop Counting	This indicates whether CLNS hop counting is to be used. The CLNS hop count is the number of trunks traversed by a PDU.
Network Type	Public Network or Private Network. Select Public Network if the node is in an ICI network. For "Network Type" add information indicating that the field is displayed only if the "Node Type" is BNS-2000 and an "SMDS SR" and an "SMDS SA" have been entered.
LATA ID	This field is required for a node in an ICI network for a Local Exchange Carrier. It is displayed only if the "Network Type" setting is "Public Network."

Hardware Pane



The table below shows the CC0 Addresses available for various combinations of Switch Types and availability of CC1.

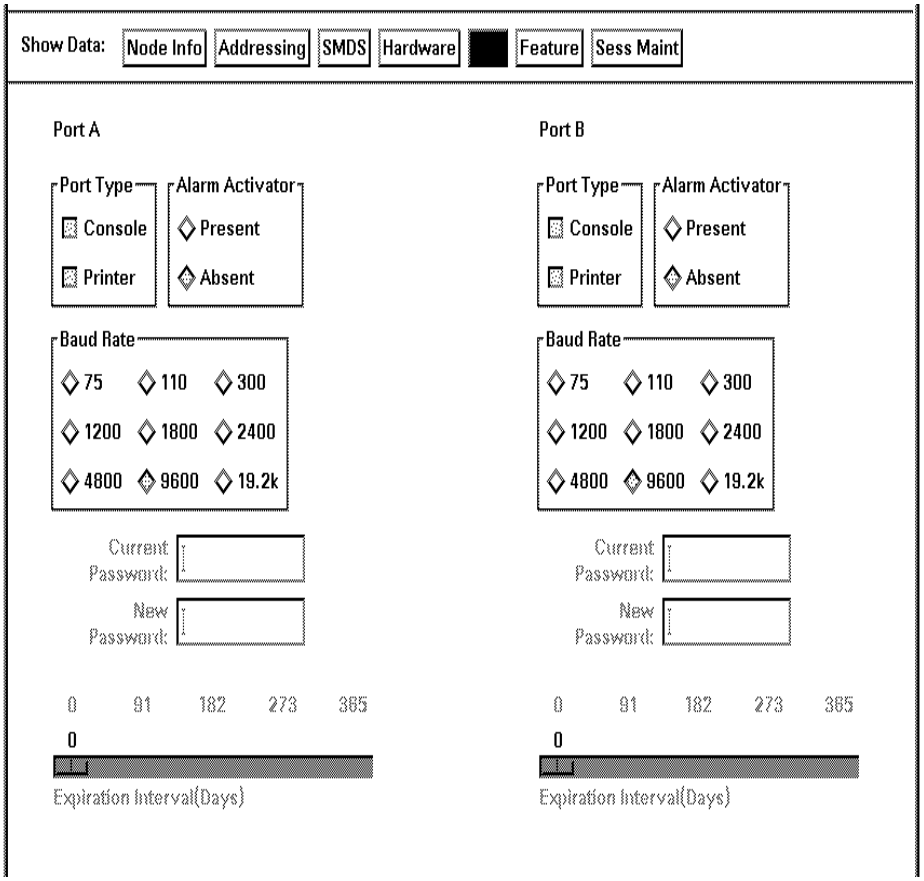
Node Type	Switch Type	CC0 Addr	CC1 Addr
BNS-2000 VCS	Standard	14	30
	Standard	30	Absent
	Enhanced	14, 30, 46, 62, 78, 94, 110	CC0 Addr + 16 (except 94)
	Enhanced	126	Absent
BNS-2000	Enhanced	30, 46, 62, 78, 94, 110, 126	any Addr other than Addr CC0

The following table shows the possible shelf addresses for the MRCM.

CC0 or CC1 Addr	MRCM Addr
30	1
46	2
62	3
78	4
94	5
110	6
126	7

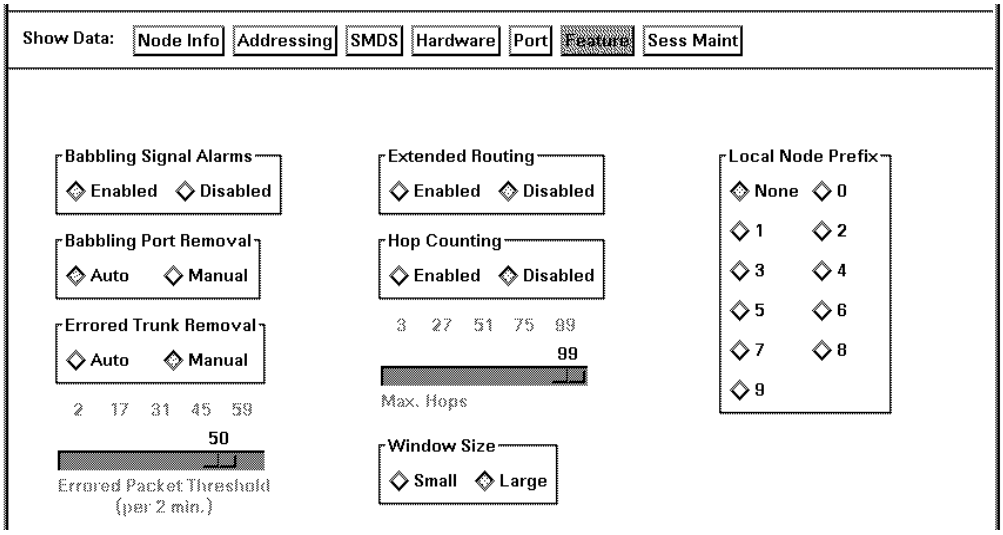
With redundant controllers, the MRCM address may be either of those associated with the CC addresses. The default MRCM address is the one associated with the CC0 address.

Port Pane



Parameter	Description
Current Password	Enter current password if you plan to supply a new password for Port A/B. When you navigate out of this field, the entry is cleared and the field is filled with a string of asterisks. This is to verify that you are eligible to supply a new password.
Expiration Interval	This is the number of days (1-365) the password is to remain before expiring. Enter *0* if you do not want the password to expire.
New Password	Enter the password that will replace the current password.

Feature Pane



Parameter	Description
Babbling Signal Alarms	This specifies if an alarm should be generated for each babbling port. (A babbling port is when there are too many sequential signals.)
Babbling Port Removal	This specifies if babbling ports should automatically be put into the out-of-service fault state.
Errored Trunk Removal	This specifies if trunks that have generated errors exceeding the errored packet threshold should automatically be put into the out-of-service fault state.
Extended Routing	This specifies whether the crankback and route advance features will be used. *NOTE:* This is not related to the Session Maintenance feature.
Hop Counting	This specifies if the hop counting feature is to be used. The hop count is the number of trunks that a call traverses.
Local Node Prefix	This is the number the X.25 interfaces use as a prefix to identify that the subsequent X.121 address begins with a DNIC.
Window Size	Small = 64 envelopes and Large = 256 envelopes. Use Small for nodes in which TY modules are to communicate with the AIMs. However, using Small when not required will seriously degrade node performance.

Node Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, several other reports are provided that will assist you in completing node configuration tasks. These reports provide global views of your network's node data. The reports can be searched, printed or saved to a file.

The reports are listed and described below:

- Configured SMDS Nodes Report
  This report provides a listing of all SMDS nodes in your network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only (a node's owner NMS is the one that monitors the Admin and Console connections of the node). The report may be sorted by SMDS SR/SA/EPN or by node name.
- Audit Prefixes Report
  This report displays the SMDS SR/SAs for which no corresponding address prefix is configured for your company. This will occur if a LATA ID has not been assigned to an SMDS node, or if the ICI Prefix form was used to remove an address prefix assigned to an SMDS SR/SA. If the report is empty (i.e. the view succeeded and zero SMDS SR/SAs are displayed), then you can be confident that all of the SMDS SR/SAs assigned to your company's nodes contain an address prefix configured for your company in the node's LATA. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. The report may be sorted by SMDS SR/SA or by node name. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of each report, entries appear indicating which *StarKeeper* II NMSs were queried, and whether the data retrieval succeeded. Entries will say "View Succeeded:" or "View Failed:", followed by the *StarKeeper* II NMS name. If neither entry appears for an NMS that you know should be connected to the Graphics System, you should check the connection. These entries are followed by a display of the parameters you selected while requesting the report. The body of the report, which appears next, uses some special symbols when presenting the data:

- An ***** in the first column of an entry indicates that the data on that line was provided by the owner *StarKeeper* II NMS. Identical node data may appear in multiple NMS databases if you have a hot spare configuration, or if data has been copied from one NMS to another for any other reason.
- A **?** in the *StarKeeper* II NMS field means that the NMS name could not be determined at the time of data retrieval. This may occur when connections are being established or data is being synchronized. This is a transient condition. Request the report again.

- An **NA** in the LATA ID field means that the node data was retrieved from a pre-R6.0 version of *StarKeeper* II NMS, that is, a version that does not support a LATA ID.

If your company is operating a private network, only the Configured SMDS Node Report is available to you, and the LATA ID field will always be blank in the report if the node data was not retrieved from a pre-R6.0 version of *StarKeeper* II NMS. Otherwise, your company is a public network SMDS provider. Both reports are available to you, and the LATA ID should be displayed in each one. It should be "0" if your company is an Interexchange Carrier, and non-zero if your company is a Local Exchange Carrier.

Special Considerations

Changing Node Names

If you are going to change the name of a node, the node must be connected to a *StarKeeper* II NMS Core System machine and you must make sure all alarms for the existing node name have been cleared before making the change. Also, you must run **conn_sync** at both the *StarKeeper* II NMS Core System and the Graphics System after making the change. This will also affect Network Monitor maps and Performance Reporter configuration data.

Delete Node Precautions

Note the following precautions when performing a delete node procedure:

- When deleting a node, all data associated with the node is removed from the Core System database, such as connection data and NRTs. However, the configuration data is not removed from the node database.
- Whenever a Node which has a Session Maintenance trunk is deleted, new NRTs must be created and successfully submitted. Refer to the section "Generating Node Reroute Tables" later in this chapter, for more information on NRTs.
- When deleting a node, the trunk information is deleted from the database. If the trunk has two end nodes and one end node is deleted, the trunk information for both nodes is deleted from *StarKeeper* II NMS databases. However, the other end node is still connected to StarKeeper II NMS.

  Whenever the node connections (console and administrative connections) are moved from one *StarKeeper* II NMS system to another, concentrator and trunk information must be saved first or it is deleted during the move process.

Configuring Trunks

The trunk configuration form will handle all trunk-related data, including *StarKeeper* II NMS trunk data and node trunk data for the nodes at both ends of a trunk. Without Network Builder this would require several commands. All the functionality present in the node's trunk configuration tasks, including the ability to move and copy trunk modules, is supported (the copy function is done by Network Builder at the form level and does not use the node's **copy** command; the move function does use the node's **move** command and, as such, does not apply to Session Maintenance trunks).

For a Session Maintenance trunk, the node on each end of the trunk must be one which is monitored by a *StarKeeper* II NMS Core System to which this Graphics System has access. If you are upgrading a network of nodes to include the Session Maintenance (SM) feature, you may have to change many non-SM trunks to SM trunks.

The trunk form is a window that is partitioned into a key pane and three data panes: End Node Data, Trunk Data, and Session Maintenance Data.

Background Information

Network nodes support several trunk modules for use in wide area and local area networks. These modules, which serve as connections for trunks ranging from low-speed wire trunks to high-speed fiber optic trunks, can be used to support connections between compatible nodes only. Network Builder facilitates the configuration of trunks between supported nodes and for trunks having only one end terminating on a supported node.

Incoming calls, entering these nodes through a trunk module, can be made secure with *trunk call screening*—a set of security patterns used to check the destination address of calls at strategic points in a network in order to permit, deny, or limit access to a certain host, node, or set of nodes. These security patterns are specified in a call screening profile ID with the node's **profile** commands. Once a call screening profile ID is administered, the same profile ID can be used for one or more trunk modules (the same security patterns will apply).

Some nodes provide the ability to maintain established calls or sessions despite failed trunk facilities through Session Maintenance. With Session Maintenance, all calls on a failed facility are rerouted before the applications using the facility sense the failed state and drop their calls. Refer to the node's *Session Maintenance Guide* for more information.

You can use Network Builder Connectivity Analysis and Session Maintenance simulation as tools to plan your trunk configuration and to evaluate changes to network topology.

Task Notes

- You should enter the monitored end nodes for a trunk before entering the trunk, because Network Builder can then configure both ends of the trunk and the *StarKeeper* II NMS Core System in one set of operations instead of doing only half the job and returning to the trunk form to change it by identifying the second node.
- One of the implications of adding a trunk is that you may have to add Trunk Groups too. To assist in configuring Groups for the added trunks, the application uses a Choose command window to access the Group configuration form.
- If a trunk has been configured on the node and you have not done any administration via *StarKeeper* II NMS, you can load the trunk information via the Network Builder **Configure/Trunk/Load/By Module Address** option. To do this, you will have to enter the module address of the trunk on "End Node 1". Network Builder will bring up the trunk screen and you will be required to enter the trunk name and information about the trunk on "End Node 2". If the trunk on "End Node 2" is an administered node, Network Builder expects that the trunk has also been previously configured on the node. If not, an error message will be displayed.

  You can also change the **Trunk Name** for an existing trunk that has been configured on the node.
- Whenever a Session Maintenance trunk is added, deleted, or if the node name is changed, or if the Session Maintenance feature is removed from a trunk, new Node Reroute Tables (NRTs) need to be created and be successfully submitted. Refer to the section "Generating Node Reroute Tables" later in this chapter, for information on NRTs.
- The t3i trunk type is used to connect your BNS-2000 network to another carrier's network for the purposes of providing inter-LATA SMDS in a public network. As such, the t3i trunk provides the ICI interface between your BNS-2000 network and another carrier's network. For the t3i trunk, you are restricted to only a few node types at each end, as described below. Once you have specified the correct nodes at each end of the trunk, the “t3i” setting in the “Trunk 1 Type” field will become active, and you can select it as the trunk type.
  - — For the “Node 1 Name” you must specify the name of a node that you have already configured to support public network inter-LATA SMDS. That is, you must specify the name of a node for which you

have used the Node Form to specify a “Network Type” of “Public Network” as well as a LATA ID (which you should have set to “0” if your company is an Interexchange Carrier).

— For the “Node 2 Name” you must specify a foreign node (that is, a node not monitored by this *StarKeeper* II NMS network).

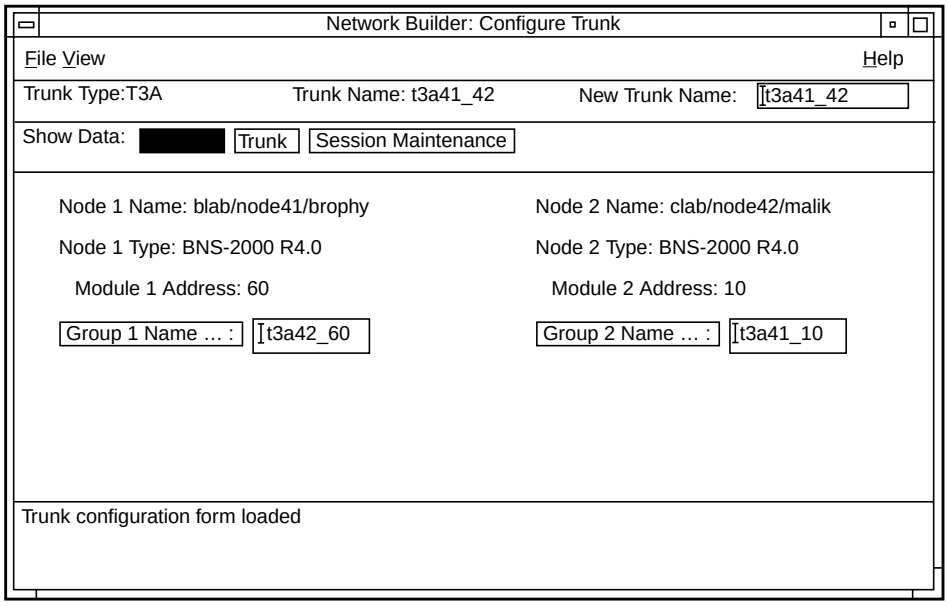
- You should not change the configuration of a trunk that is currently in a rerouted state. Such an action will result in a loss of the rerouted calls. You may Cut-Through to the *StarKeeper* II NMS Core System that is monitoring the node and execute the **smstat** command to find out the state of a particular trunk.
- Handling Conflicting Data

  Trunks are stored as three database records in *StarKeeper* II NMS Core Systems: one for each end and one for the trunk itself. When loading a trunk form, certain error conditions will produce notices that require a corrected entry; these conditions are: mismatched trunk data, and mismatched trunk names. The errors, and the notices generated, are described in the following paragraphs.

  Prior to displaying the Trunk configuration form, Network Builder checks that certain data in the database end records match. For example, if the entry specifies a Line Speed of 56k and the entry at the other end does not match, there will be an error notice. The error notice displays the mismatched data at both of the end nodes, and provides an End Node 1 and an End Node 2 button to specify which end node has the correct data to be used. A Cancel button allows you to cancel the Load operation.

Trunk Parameters

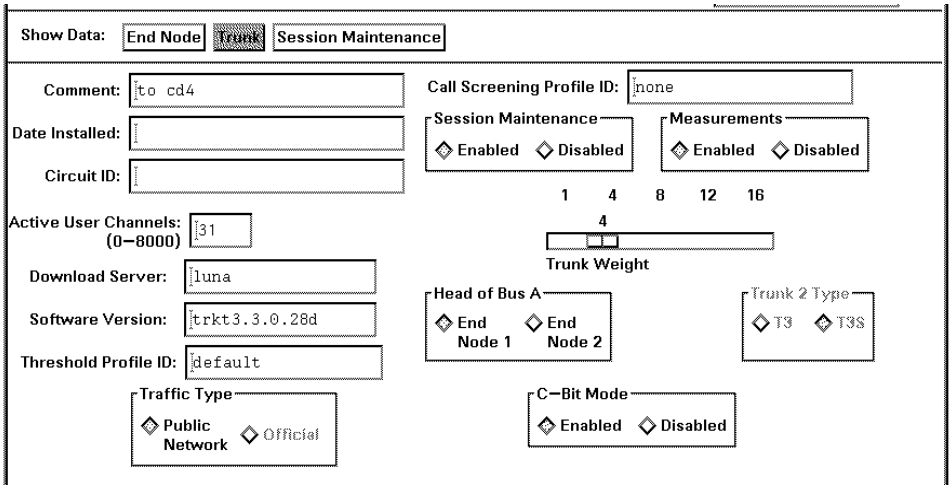
End Node Pane



Screen 8-17. Trunk Configuration Form, End Node Pane

Parameter	Description
Group Name	This is the name of the trunk group. The entry cannot exceed 8 characters, and cannot contain special characters. The field may be left blank for an unadministered end node. Click on the field label to access the choose window. *NOTE:* The Choose pop-up window has a Configure button that allows you to go directly to the Group configuration form.
Module Address	This is the node trunk module address at this end of the trunk. Only a single address entry is allowed. If the trunk module type is dds, which consists of two boards, its address is the slot occupied by the SCSI/DKI interface board. When entering a dds, the next highest numbered slot must be unconfigured to leave room for the second board. Acceptable values are 1 through 127. If the trunk module type is t3i, which consists of two boards, its address is the slot occupied by the egress board. When entering a t3i, the next highest numbered slot must be unconfigured to leave room for the second (ingress) board. Also, a blank value is allowed if the Node Name entry for this end of the trunk was not an "Administered" node.

Trunk Pane



Some of the following parameters only apply to certain trunk types.

Parameter	Description
Call Screening Profile ID	This is the optional profile ID for screening incoming calls. The entry cannot contain special characters. See **Background Information** earlier in this section for more details.
C-Bit Mode	This specifies whether the c-bit parity code violation mode is to be enabled or disabled for this trunk.
Destination	Enter the type of carrier specified in the Carrier control. When used in an ICI Interchange Carrier network, the Interexchange Carrier option is not valid.
Download Server	Enter a valid service address or **controller**. Leaving this field blank will revert to the default **controller**.
Egress Download Server	This is the source of the software to be downloaded to the t3i trunk egress module. This control is only active for trunk type t3i when Download Server is set to *controller* and Software Version is set to *special*.
Egress Software Version	This is the version of the software to be downloaded to the t3i trunk egress module. This control is only active for trunk type t3i when Download Server is set to *controller* and Software Version is set to *special*.
End Node 2 Carrier	This is the name of the Carrier at the far end of the trunk.
End 1 and 2 Transmit Reference Clock	This setting indicates whether the I/O board derives its transmit clocking from the on-board oscillator clock (Local), the Facility, or the Stratum Clock (Stratum).

Parameter	Description
Frame Term Length	This is the maximum frame size combination for the high-priority transmit queue (HPQ) and low-priority transmit queue (LPQ).
Group Name	This is the name of the trunk group. The entry cannot exceed 8 characters, and cannot contain special characters. The field may be left blank for an unadministered end node. Click on the field label to access the choose window. *NOTE:* The Choose pop-up window has a Configure button that allows you to go directly to the Group configuration form.
Header Error Correction	This setting indicates whether the header error correction option is enabled or disabled. When enabled, single-bit errors will be corrected, multi-bit errors will be detected and discarded. When disabled, all detected errors will be discarded.
Head Of Bus A	This indicates which end node is assigned to the head of the trunk's Bus A. Whichever end node is not specified on this control, will be assigned to Head of Bus B. This control will ensure that the two end nodes are assigned to different Bus Heads, as required.
Ingress Download Server	This is the source of the software to be downloaded to the t3i trunk ingress module. This control is only active for trunk type t3i when Download Server is set to *controller* and Software Version is set to *special*.
Ingress Software Version	This is the version of the software to be downloaded to the t3i trunk ingress module. This control is only active for trunk type t3i when Download Server is set to *controller* and Software Version is set to *special*.
LATA ID	This is the LATA ID of the Local Exchange Carrier specified in the Carrier control. This control is only active for trunk type t3i when used in an ICI Interexchange Carrier network.
Max. Aggregate CIR	This is the maximum amount of CIR bandwidth that will be accepted through a pq trunk. This value may be entered as a percentage of the line speed or in bits per second (bps). The bps values are recalculated if there is a change in line speed. When a percentage is entered and the units are switched to bps, the bps are automatically calculated and displayed in the field.
Max. Aggregate Non-CIR	This indicates the service quantum to be shared among all non-CIR calls. This value may be entered as a percentage of the line speed or in bits per second (bps). The bps values are recalculated if there is a change in line speed. When a percentage is entered and the units are switched to bps, the bps are automatically calculated and displayed in the field.
Max. Consec. Test Failures	This the number of consecutive test failures before a module is declared "dead."
MCDU	This is the maximum number of concurrent data units on trunk egress.
Network Interface	This setting specifies the ATM interface type: user-network interface (uni) or Network-node interface (nni). This option must be compatible with that specified for the facility interface type on the ATM line card.

Parameter	Description
Node 1 and 2 Transmit Trail Trace Address	This is an optional 15-digit local module address which will be sent to the far-end equipment by the local module. The Node 1 Transmit Trail Trace Address will be the same as the Node 2 Expected Trail Trace Address, and vice versa.
Node 1 and 2 Expected Trail Trace Address	This is an optional 15-digit far-end module address which is to be received by the local module. The Node 1 Expected Trail Trace Address will be the same as the Node 2 Transmit Trail Trace Address, and vice versa.
Point of Presence ID	This is the point of presence identifier (POP ID) of the Interexchange Carrier specified in the Carrier control. This control is only active for trunk type t3i when used in an ICI Local Exchange Carrier network.
Software Version	Enter a valid software version. If **Download Server** is **controller**, the default is **Standard**. Leaving this field blank will revert to the default **standard**.
Threshold Profile ID	This is an integer between 1 and 16 or the word "default".
Traffic Type	For t3s: In an ICI Local Exchange Carrier network, choose *Official* if the trunk is to carry your company's official or private SMDS traffic. Choose *Public Network* if the trunk is to carry your subscriber's SMDS traffic. For pq trunks: **Traffic Type** specifies the type of traffic (CIR, Non-CIR, or Both) that is permitted on this trunk. CIR traffic consists of Frame Relay connections for which a committed information rate has been administered. Non-CIR traffic consists of connections from any other type of module as well as Frame Relay connections for which committed information rate has not been administered.
Trunk Active Test Interval	This is the period between trunk active ("keep-alive") tests.
Upload Server	Enter the service address of the host that is to receive the module memory dump prior to the Control Computer initiating a download or after a fault. Leaving this field blank will revert to the default *none*.
Virtual Path ID	This is a number from 1 to 31 identifying the virtual path over which all traffic between a pair of nodes is to be carried.

Trunk Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, another report is provided that will assist you in completing trunk configuration tasks. This report provides a global view of your network's trunk data. The report can be searched, printed or saved to a file. It is described below:

- Carrier Report
  This report provides a listing of your network's t3i trunks and their destination carriers. Data may be displayed for all StarKeeper II NMSs in

the network, or for owner StarKeeper II NMSs only (a node's owner NMS is the one that monitors the Admin and Console connections of the node). The report may be sorted by carrier name or by trunk. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of the Carrier Report, entries appear indicating which StarKeeper II NMSs were queried, and whether the data retrieval succeeded. Entries will say "View Succeeded:" or "View Failed:", followed by the StarKeeper II NMS name. If neither entry appears for an NMS that you know should be connected to the Graphics System, you should check the connection. These entries are followed by a display of the parameters you selected while requesting the report. The body of the report, which appears next, uses some special symbols when presenting the data:

An * in the first column of an entry indicates that the data on that line was provided by the owner *StarKeeper* II NMS. Identical node data may appear in multiple NMS databases if you have a hot spare configuration, or if data has been copied from one NMS to another for any other reason.

A **? i**n the StarKeeper II NMS field means that the NMS name could not be determined at the time of data retrieval. This may occur when connections are being established or data is being synchronized. This is a transient condition. Request the report again.

Trunk Trouble Recovery Procedures

Trunk configuration involves a number of individual steps that take place on one or two nodes and one or two *StarKeeper* II NMS Core Systems. There are certain error scenarios where recovery will require some manual intervention. The following are manual procedures required to clean up inconsistencies which might arise when any step fails in the sequence of trunk provisioning actions.

Procedure 8-1. Existing Trunk Configuration Failure

If you load the trunk form from the database and make a change, and the submit of the update fails, use Network Builder to perform the following steps:

1. Autoload the failed transaction from the Configuration Activity Log
2. Cancel Update
3. Submit Update

Since the trunk already existed, there are records in the node and *StarKeeper* Core System databases, so running the update again should achieve the desired result. Note that there is an automatic retry mechanism that will attempt to resubmit the update periodically; however, there are parameters that control the frequency of retry and the maximum number of retries. If the conditions that

forced the failure require more time than the corresponding maximum retry interval, then this procedure would be needed to resubmit.

Procedure 8-2. New Trunk Configuration Failure

If you try to submit a new trunk form, and it fails, the manual procedure will depend on where the failure occurred. The actions that are attempted in provisioning both sides of a trunk are attempted in the following order:

A. Node enter trunk end2

B. *StarKeeper* II NMS enter trunk end2

C. Node enter trunk end1

D. *StarKeeper* II NMS enter trunk end1

E. Node restore trunk end2

F. Node restore trunk end1

The following cases highlight the various failure scenarios and their recommended cleanup procedures.

Case 1: (A) *Node enter trunk end2* Failed

In this case, nothing has been entered in either the node or *StarKeeper* II NMS database. Using Network Builder do the following:

- Autoload this failed transaction from the Activity Log
- Cancel Update
- Submit Update

Case 2: (B) *StarKeeper* II NMS *enter trunk end2* Failed

In this situation, step A has successfully been completed in that end2 data has been entered in a node database. Cut-through to the *StarKeeper II* NMS Core System that is monitoring the node on which end2 of the trunk is found, and do the following:

- **setnode <end2_node_name>**
- end2_node_name> **verify <trunk end2_slot>**

  If appropriate data comes back, proceed. Otherwise the data was not entered on the node, and this is equivalent to Case 1, above.
- end2_node_name> **delete <trunk end2_slot>**
- end2_node_name> **exit**
- **cfg_sync <end2_node_name>**

At this point, the failure has been reduced to that of Case 1, above, so in Network Builder do the following:

- Autoload the failed transaction from the Activity Log
- Cancel Update
- Submit Update

Case 3: (C) *Node enter trunk end1* Failed

This case corresponds to data being entered in one node and the appropriate *StarKeeper* II NMS Core System database. The actions will be the same as case 2.

Case 4: (D) *StarKeeper* II NMS *enter trunk end1* Failed

This case corresponds to data being entered on both nodes and the *StarKeeper* II NMS only knows about one side of the trunk. Cut-Through to the *StarKeeper* II NMS Core System that is monitoring the node on which end2 of the trunk is found, and do the following:

- **setnode <end2_node_name>**
- end2_node_name> **verify trunk <end2_slot>**
- end2_node_name> **delete trunk <end2_slot>**
- end2_node_name> **exit**
- **cfg_sync <end2_node_name>**

If the *StarKeeper* II NMS Core System that monitors end2 is not the same as the *StarKeeper* II NMS Core System that monitors end1, then Cut-Through to the *StarKeeper* II NMS Core System that monitors end1; otherwise, the following steps must be executed on the *StarKeeper* II NMS Core System that was used, above. Do the following:

- **setnode <end1_node_name>**
- end1_node_name> **verify trunk <end1_slot>**
- end1_node_name> **delete trunk <end1_slot>**
- end1_node_name> **exit**
- **cfg_sync <end1_node_name>**

In Network Builder, do the following:

- Autoload the failed transaction from the Activity Log
- Cancel Update
- Submit Update

Case 5: (E) *Node restore trunk end2* or (F) *Node restore trunk end1* Failed

Cut-Through to the *StarKeeper* II NMS Core System that is monitoring the node on which end2 of the trunk is found, and do the following:

- **setnode <end2_node_name>**
- end2_node_name> **verify trunk <end2_slot>**
- end2_node_name> **restore trunk <end2_slot>**
- end2_node_name> **exit**

If the *StarKeeper* II NMS Core System that monitors end2 is not the same as the *StarKeeper* II NMS Core System that monitors end1, then Cut-Through to the *StarKeeper* II NMS Core System that monitors end1; otherwise, the following steps must be executed on the *StarKeeper* II NMS Core System that was used, above. Do the following:

- **setnode <end1_node_name>**
- end1_node_name> **verify trunk <end1_slot>**
- end1_node_name> **restore trunk <end1_slot>**
- end1_node_name> **exit**

Special Considerations

- If you change the name of the trunk, you must first make sure all alarms for the trunk have been cleared. This will also affect Network Monitor maps and Performance Reporter Configuration Data.
- Unknown Carriers

  In an ICI network, you will assign the name of the carrier located at the terminating end of an ICI trunk (type "t3i" trunk). When performing the Load Trunk operation, if a carrier is assigned to a trunk but the form is unable to determine the carrier name, the value *****UNKNOWN***** is displayed in the "End Node 2 Carrier" field.

  The value *****UNKNOWN***** is displayed if Network Builder cannot access the *StarKeeper* II NMS Core System designated as the Primary Core, if the database request fails on the Primary Core, or if the trunk record and the ICI configuration data in the database on the Primary Core are in disagreement.

  In all cases, the form produces a notice indicating the problem. Before submitting changes, re-enter the carrier name. You cannot submit changes using a "End Node 2 Carrier" field value of *****UNKNOWN*****. Choose the carrier name from the list of configured carriers displayed by selecting the abbreviated command button in the "End Node 2 Carrier" field. This list is empty if Network Builder is unable to access the Primary Core.
- No more than five Session Maintenance trunks can be configured on a single node.

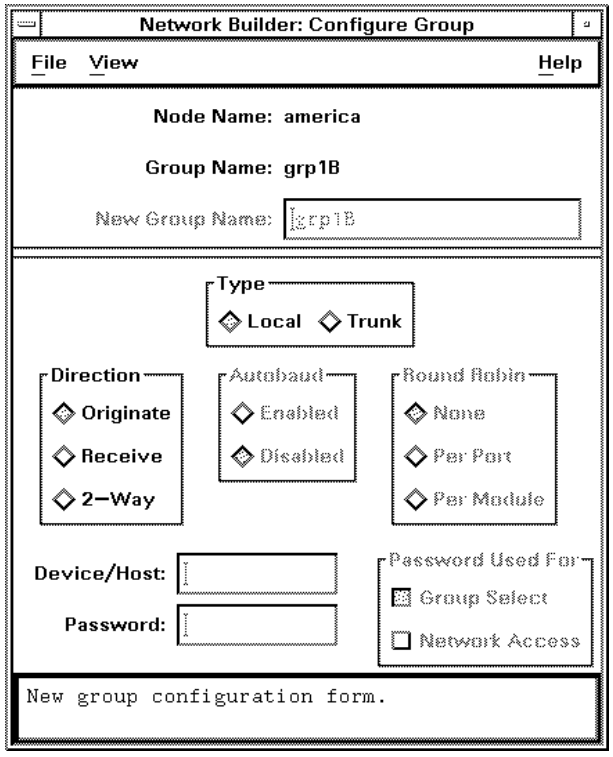
Configuring Groups

Use Network Builder to configure group records on the nodes in your network and in the *StarKeeper* II NMS Core System databases.

Background Information

A group is a logical entity on the node that bundles together groups of ports and channels. A group is designated as either a trunk group or a local group. A trunk group can contain only trunk modules and a local group can contain ports for any module other than a trunk module.

A local group is designated as an *originating*, *receiving*, or *two-way* group. Members of originating groups, such as terminals and modems, can originate calls. Members of receiving groups—like consoles, hosts, and dialers—can only receive calls. Members of a two-way group can originate calls like a terminal and receive calls like a host.



Screen 8-18. Group Configuration Form

Group Parameters

This section lists parameters that are specifically related to configuring a group.

Parameter	Description
Device/Host	Entry cannot contain special (meta) characters.
Password	If you enter a password, when you navigate out of this field, the entry is cleared and the field is filled with a string of asterisks.
Password Used For	At least one of the two values must be specified if an entry exists in the **Password** field to indicate if the password is required as part of Group Security, Network Access, or both.
Type and Direction	When a form update (via the load operation) is requested, the type and direction settings may not be modified.

Special Considerations

Select Group

A special local originating group called *select* can be administered. If *select* is administered in the node configuration database, terminal users can access a different originating group by using the terminal user mode **select** command. The originating group selected for this call must be assigned a network access password. Refer to the node's documentation for more information.

Configuring Service Addresses

Use Network Builder to configure service addresses for each callable destination in the network; you can specify a mnemonic address or an X.121 address, or both. Addresses are required to properly route calls through the network. If you are not familiar with service addresses, or would like a refresher, read **Background Information** before proceeding with your configuration operation.

Background Information

An address identifies one or more destinations on the network. The full address of a destination is composed of up to four levels (Service Addresses). A service address can be a *mnemonic* address (an alphanumeric string), an *X.121* address (a numeric string), or *both* a mnemonic and an X.121 address. Each of these address types can be assigned to a particular level in the addressing component hierarchy.

Equivalence within Address Level Hierarchy

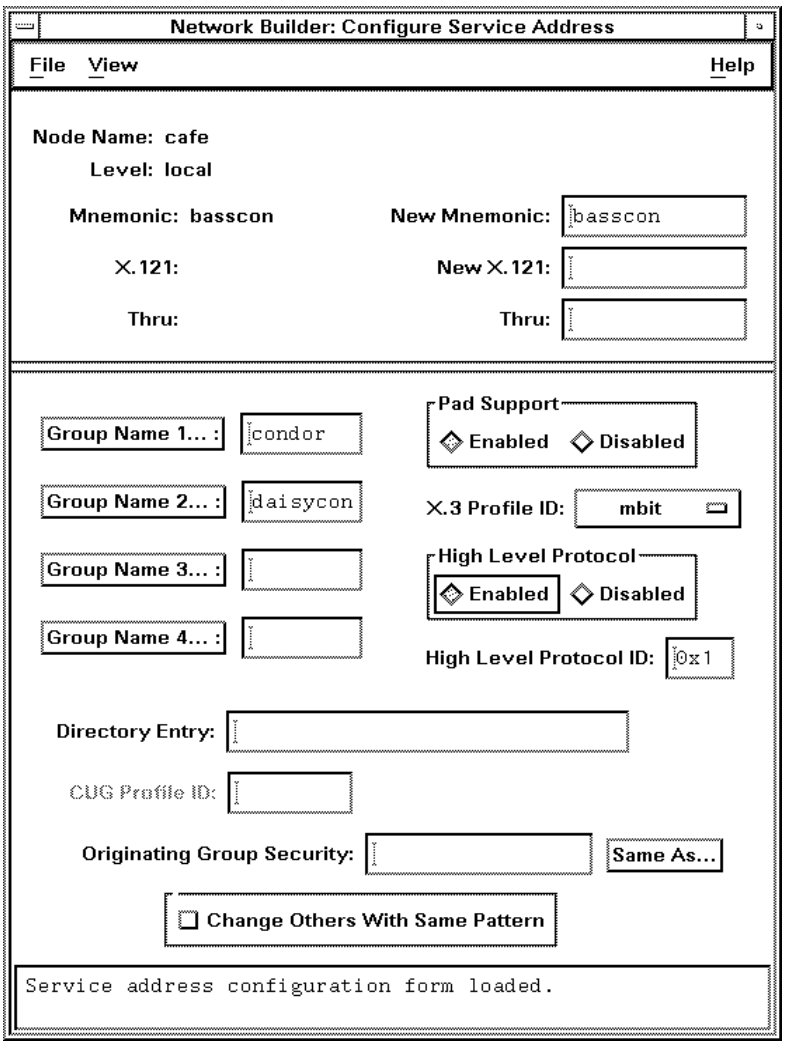
(Highest-to-Lowest)

Level Name	Mnemonic Name	X.121 Name
network	network	Data Network Identification Code (DNIC)
area	area	Service Region (SR)
exchange	exchange	Service Area (SA)
local	local	Endpoint Number or Range (EPN/EPNs)

Local addresses are generally used to route calls over trunks to the destination. Addresses can also identify trunks to remote nodes, the remote nodes themselves, or devices connected to the remote node.

Node endpoints can be addressed directly if an EPN is assigned to the module port with the appropriate hardware module command. Refer to the appropriate node documentation for further information.

Address types and addressing levels, along with other addressing features and particulars, are explained in the following sections.



Screen 8-19. Service Address Configuration Form

Mnemonic Addresses

A mnemonic address is an alphanumeric representation of a destination within the network. Mnemonic addresses can be assigned to any of the following levels: network, area, exchange, or local or as a speedcall or special address.

Mnemonic addresses can be assigned to receiving, two-way or trunk groups.

X.121 Addresses

An X.121 address is a numeric representation of an addressable destination. It can be assigned to one of these levels: a Data Network Identification Code (DNIC), a service region (SR), a service area (SA), as an endpoint number (EPN) or range of EPNs, or as a speedcall address.

X.121 addresses can be assigned to originating, receiving, two-way, or trunk groups.

Speedcall Addresses

Speedcall addresses are a shortened form of an address. By entering an address (at the speedcall level) along with a dial string, you can create an alias for the address.

Special Addresses

Special addresses are used to control the Directory Assistance and Billing features. Specifying *?* as a special address activates Directory Assistance on a node. Specifying *billing* enables billing output on the nodes.

Security Mechanisms

Nodes support two security mechanisms to accomplish successful call setup: *originating group security* and *closed user group* security.

Originating Group Security

Devices that originate calls, such as terminals and modems, belong to *originating groups*. Originating group security determines whether a call from an originating group member can access a particular service address. Access is determined by comparing the originating group name to a pattern of characters specified in configuring the address and then determining whether a match exists.

Closed User Group (CUG) Security

CUG security enables end users to form groups that can restrict incoming/ outgoing call access. CUG security prohibits members of a CUG from accessing destinations that do not belong to the same CUG. End users can belong to more than one CUG and can be associated with the open part of the network (no CUG for the call).

To enable CUG security, CUG profiles must be first configured at the node with the **enter profile** command. Then, the CUG profile can be associated with a particular local X.121 address via the Network Builder service address configuration form. The originators and destinations in groups associated with the address assume the CUG permissions associated with that address.

Task Notes

- If an X.3 and/or CUG profile is to be associated with the service address, they must be entered into the node database first by executing the node's **enter profile** command at the node.
- Any groups, other than special system-created groups, must be entered into the database using the Network Builder group configuration form. Note that you can access the Network Builder Group configuration form directly from the Network Builder Service Address configuration form.
- An address having both a mnemonic and X.121 representation can be associated with originating, two-way, receiving or trunk groups.
- The **Change Others With Same Pattern** control always initially appears as unchecked, even if checked in a previous update for the same address.

Service Address Parameters

Pane for Standard Addresses

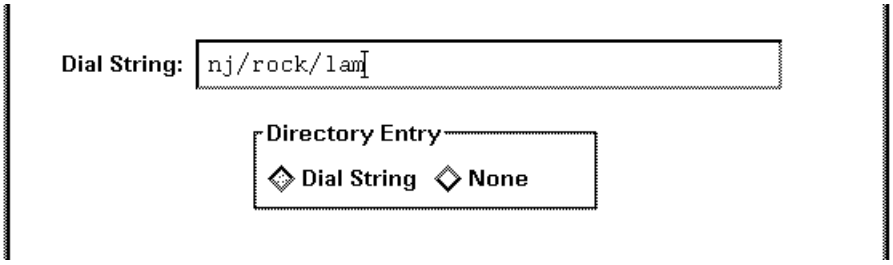
This pane appears when you are configuring a network, area, exchange or local service address (see **Screen 8-19**).

Parameter	Description
Change Others With Same Pattern	This indicates if all addresses **on the same node** with the same security strings should or should not have their security string changed.
CUG Profile ID	This is the Closed User Group profile *identifier* associated with this address. This field is active only if **Level** is Local and an **X.121** address is entered.
Directory Entry	This is the text to be displayed if the user requests directory assistance for the address.
Group Name 1 Group Name 2 Group Name 3 Group Name 4	These are the group names associated with the address being entered. Group Name 1 is accessed first, then Group Name 2, etc.

Parameter	Description
High Level Protocol	This indicates if a high level protocol should be used in the call request packet for X.25 calls associated with the address. This field is active only if **Pad Support** is Enabled.
High Level Protocol ID	This is the two-digit hexadecimal notation to be put in the call user data field of an X.25 call packet. You can prefix the number with the "0x" hexadecimal notation or let Network Builder do it for you. This field is active only if **High Level Protocol** is Enabled.
Originating Group Security	This is the unique pattern that defines the security for the address. If you do not have an entry, you do not have security.
Pad Support	This is the Packet Assembler/Disassembler mode of the addressed X.25 port should be enabled. If enabled, the terminal or host using this address requires X.25 packets to be assembled/disassembled while entering/leaving the network.
X.3 Profile ID	This is the X.3 terminal user profile identifier for all users accessing the X.25 host associated with the address. The associated menu supports the standard three X.3 Profile IDs: simple, transparent, and mbit. This field is active only if **Pad Support** is Enabled.

Pane for Speedcall Addresses

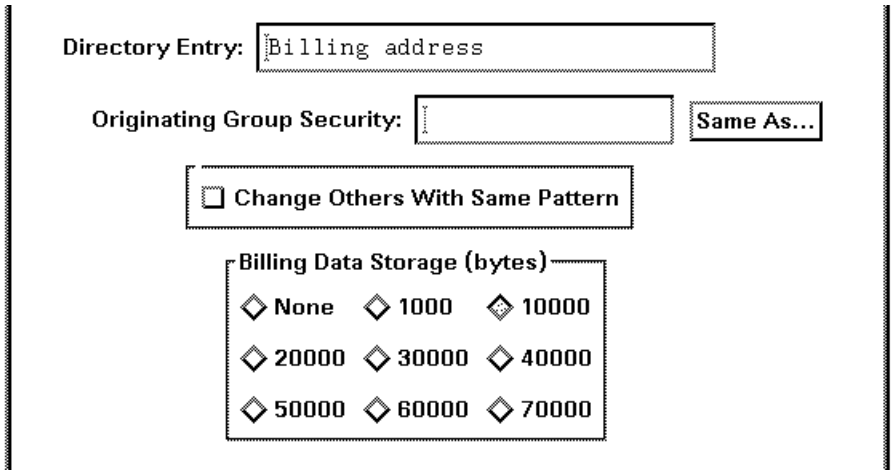
This pane is used when configuring a speed call address.



Parameter	Description
Dial String	Indicates the alphanumeric string that describes the address.
Directory Entry	Indicates whether or not the Dial String will be displayed to users when directory assistance is requested for the address.

Pane for Special Addresses

This pane is used when configuring one of the special addresses, **?** or **billing**.



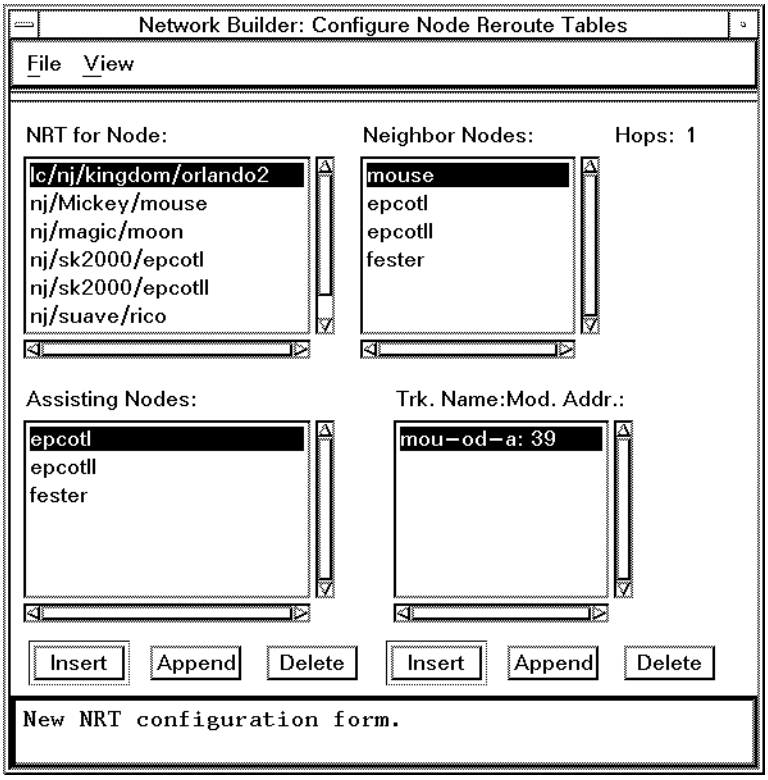
Parameter	Description
Billing Data Storage	Indicates the number of bytes of shared memory to be used on the node to store billing data when the billing connection to the node is down. This field is active only if the address is **billing**, for nodes that support this feature.
Change Others With Same Pattern	Indicates if all addresses **on the same node** with the same security strings should or should not have their security string changed.
Directory Entry	Indicates the text to be displayed if the user requests directory assistance for the address.
Originating Group Security	Indicates the unique pattern that defines the security for the address. If you do not have an entry, you do not have security.

Generating Node Reroute Tables

The Network Builder Node Reroute Tables (NRT) configuration form is used to generate and maintain NRTs. The NRTs generated by Network Builder are downloaded to the applicable nodes, via the *StarKeeper* II NMS Core System. The NRTs are then used by the nodes to support the Session Maintenance feature.

Only Network Builder can generate NRTs. Because of its centralized position within your network, it provides a network view of certain physical and logical concepts and resources. To implement Session Maintenance in your network, Network Builder generates NRTs that are inherently consistent and it can download those tables to each node in your network.

A request to generate (New) or edit (Load) NRTs results in a display of the NRT form to provide access to the entire set of NRTs. You can access a given node's NRT, or a neighbor within that NRT, by selecting the desired node name from a list. If there is a Pending NRT record, it will be loaded automatically when the NRT form is invoked.



Screen 8-20. NRT Configuration Form

Background Information

The Node Reroute Table (NRT) is a node database structure supporting a node's Session Maintenance feature. An NRT is required for each node that participates in this feature; and each NRT contains an entry for each node that is reachable via one or two hops over Session Maintenance trunks. For each such neighbor node, the NRT contains a list of preferred assisting nodes and, for each one-hop neighbor, a list of physical Session Maintenance trunks which connect to the node. The NRT is used to determine optimum reroute paths for sets of channels on a failed trunk.

NRTs are created by Network Builder from trunk configuration data. Network Builder then generates NRTs that list assisting nodes and trunks according to a figure of merit which is based on the number of hops from the node in question. If you disagree with the choices made by the software, you can rearrange the list of preferred neighbor nodes and trunks to try first. You can also add assisting nodes to support reroute paths through unadministered nodes.

Refer to the node's *Session Maintenance Guide* for more information on the Session Maintenance feature, including the usage of NRTs.

Task Notes

- When an NRT task is submitted, only changed data will be delivered to the affected nodes.
- Whenever a Session Maintenance trunk is added, deleted, or if the Session Maintenance feature is removed from a trunk, the NRT for that trunk must be created or modified, and properly submitted.
- NRTs can be generated based on data currently in the database (called Committed data), data submitted by Network Builder as "Held" (called Pending data), or on Committed and Pending data. Use Committed data to generate NRTs for the current network; use Pending data to generate NRTs for network planning; use Committed plus Pending data to generate NRTs for a combination of the two.
- If you are generating NRTs for Session Maintenance simulation using Pending data, then all node and trunk data must be in the Pending state in order for the simulation to be meaningful. That is, all nodes and trunks that are in the Committed state have to be resubmitted as "Held" before you generate the NRTs. The only case in which you must use the Pending data option to generate NRTs is when one or more nodes in your simulation network is Pending.
- Session Maintenance Simulation uses both Committed and Pending data to analyze trunk topology. Therefore, the NRTs used by the simulation should be generated from the Committed node data and Committed and Pending trunk data. See **Chapter 9** for details on Session Maintenance Simulation and analysis.
- You cannot delete the last Assisting Node or Trunk from a list.
- If you have made any changes to the Session Maintenance topology, or if a node name within the network has been changed you must run **skload** or **cfg_sync** to re-synchronize the configuration database and generate new NRTs.

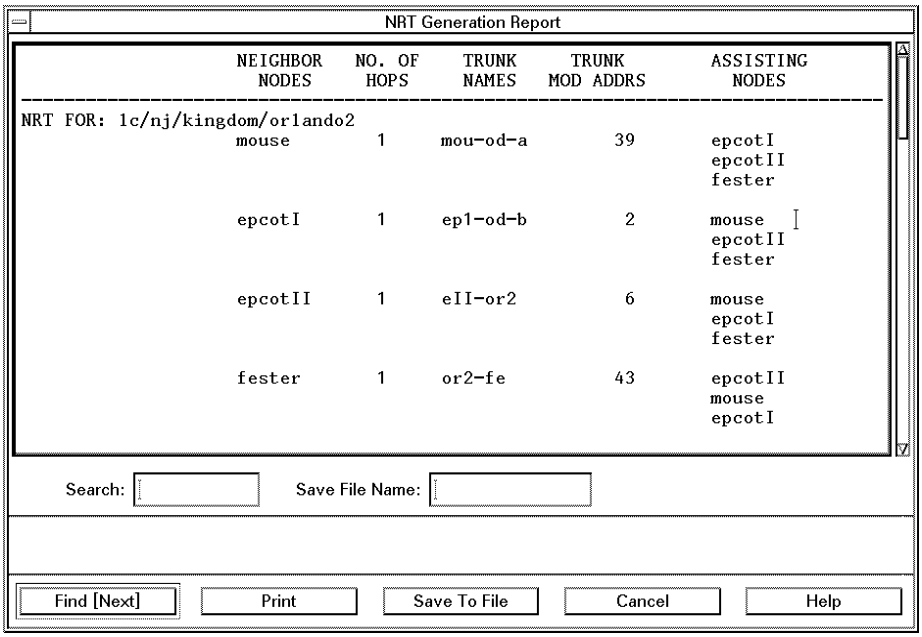
NRT Parameters

Parameter	Description
Assisting Nodes	This is a scrolling list to edit the assisting nodes for the given neighbor node. The list can be edited by using the buttons below the list. The node name displayed is the actual node name of the node.

Parameter	Description
Hops	This shows the number of hops from the selected node to the neighbor node; either 1 or 2.
Neighbor Nodes	This is a scrolling list to choose the neighbor node whose data you want to view. The node name displayed is the actual node name of the node.
NRT for Node	This is a scrolling list to choose the node whose NRT will be displayed. The node name specified is the Node name used by *StarKeeper* II NMS.
Trk Name: Mod Addr.	This is a scrolling list to edit the trunks for the given neighbor nodes. (The list does not appear if the number of hops is 2.) The format is trunk name and the trunk module address separated by a colon. For example: trkab:112. The list can be edited by using the buttons below the list.

NRT Generation Report

To view the data corresponding to the latest Node Reroute Table generation, choose **Generation Report** from the **View** menu. An example NRT Generation Report is shown in the following screen.



Screen 8-21. An Example NRT Generation Report

NRT Trouble Recovery Procedures

NRT configuration is complex. Failures can occur in communicating with any individual node or *StarKeeper* II NMS Core System. The following are procedures

to resolve inconsistencies which may arise when any step fails in the sequence of NRT provisioning actions.

Procedure 8-3. Nodes Failed, or Trunks to the Nodes Failed

Wait until the nodes or trunks are back in a normal state. Then, on the *StarKeeper* II NMS Core System that monitors the node, execute the following command:

cfg_sync <node_name>

In Network Builder perform the following steps:

1. Cancel Update
2. New or (Load)
3. Submit Update

Procedure 8-4. Node Database Update for the NRT Failed

In Network Builder, do the following:

1. Cancel Update
2. New or (Load)
3. Submit Update

Procedure 8-5. *StarKeeper* II NMS Core System Database Update for the NRT Failed

On the *StarKeeper* II NMS Core System do the following:

cfg_sync <node_name>

In Network Builder, do the following:

1. Cancel Update
2. New or (Load)
3. Submit Update

Special Considerations

You can not delete a node's NRT via the NRT form. When you delete a node, its re-route table is also deleted.

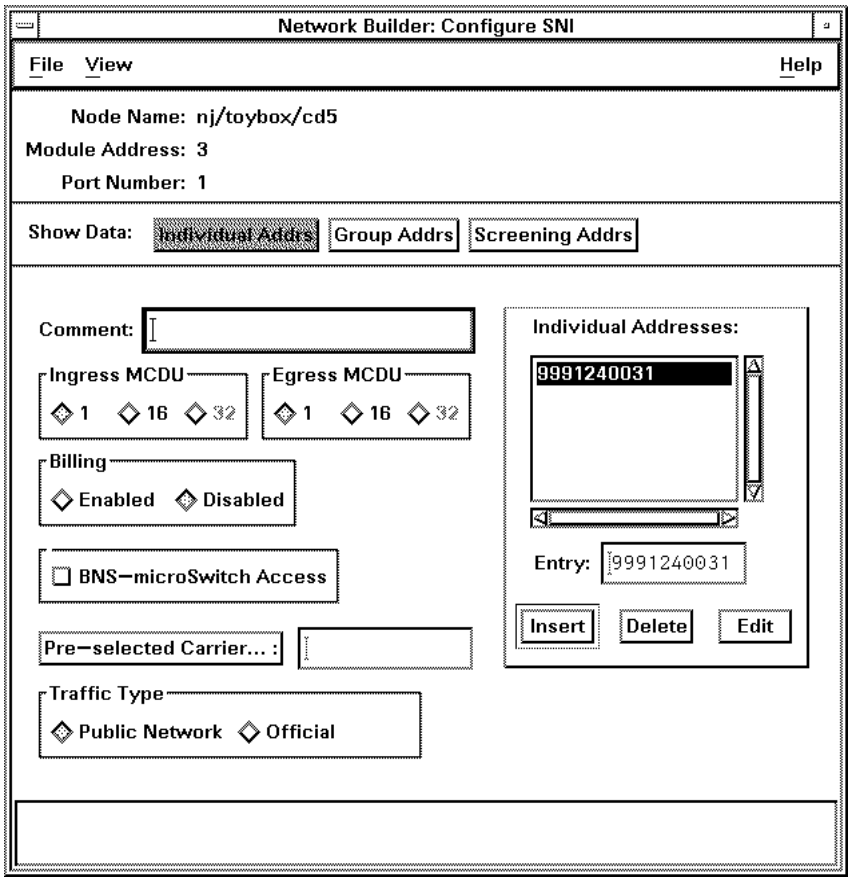
Configuring SNIs

The SNI configuration form will handle configuration of all Subscriber Network Interfaces (SNIs) in your network. Using Network Builder, an SNI is identified by the physical address of the associated Access Interface (AI) module port. Once configured, an SNI record can be loaded either via this physical address or via one of its assigned E.164 individual addresses (the latter may be useful for troubleshooting purposes).

Background Information

Network Builder's support of SNI configuration permits *StarKeeper* II NMS to operate as a Supervisory System for BNS-2000, administering a portion of a multiple vendor and multiple carrier SMDS system (as per Bellcore requirements). As a result, Network Builder provides the basic tools for administering BNS-2000 nodes in an SMDS network, with its functionality oriented towards administering individual SNIs (rather than groupings of SNIs). Refer to the *BNS-2000 SMDS Guide* for a more detailed discussion of the SMDS service and how Network Builder is used to help configure those networks.

To assist in configuring SNIs in your network, a variety of reports are provided by Network Builder. In contrast to the localized manner in which SNI configuration is done, these reports provide a global view of your network's SNI data. These reports will be useful during SNI configuration (for example, to determine unused E.164 addresses) and after SNI configuration is complete (for example, to check that screening tables are properly populated across the network). Refer to the *BNS-2000 SMDS Guide* for specific applications of these reports. The reports themselves are described in more detail later in this section.



Screen 8-22. SNI Configuration Form

Task Notes

- An AI port must be configured before an SNI can be configured for that port (except for proposed submissions).
- Individual addresses assigned to an SNI must be within the range of addresses supported on its node (as entered via the Node form, in the SMDS data pane).
- In an ICI network, each group address assigned to an SNI must contain an address prefix configured for your company (as entered via the ICI Prefix form).

SNI Parameters

The SNI configuration form is partitioned into a key pane and three data panes: **Individual Addrs**, **Group Addrs**, and **Screening Addrs**.

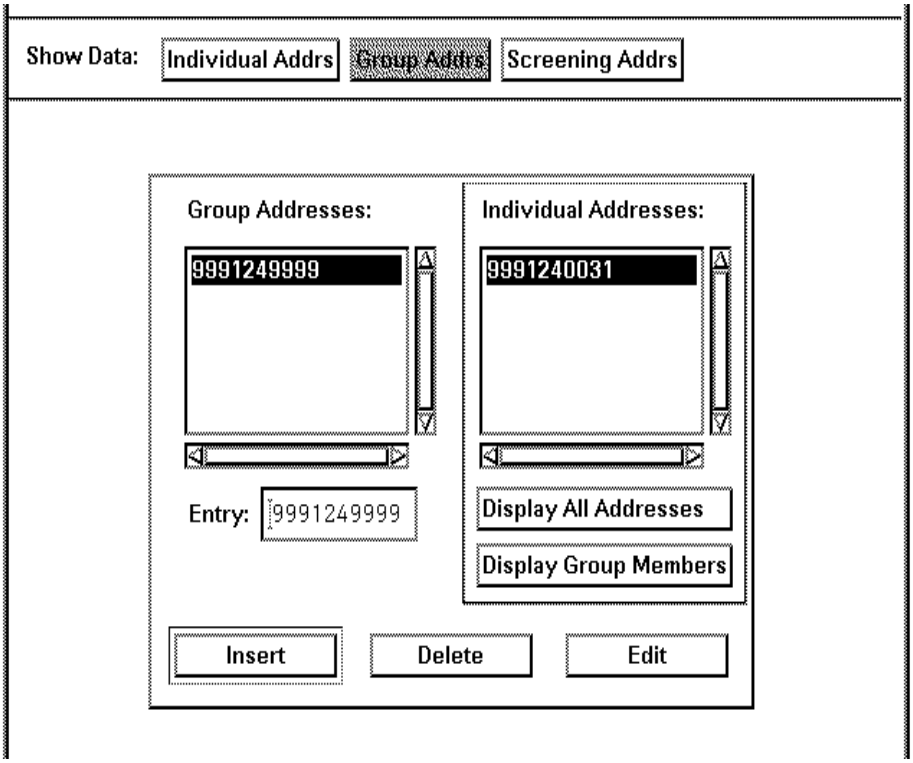
Individual Addrs Pane

Use this pane to assign configuration parameters and individual addresses to an SNI.

Parameter	Description
Billing	Indicates whether SMDS Billing should be enabled or disabled.
AP1 Switch Access	Indicates if the SNI has access to an AP1 Switch.
Egress MCDU	This setting specifies the maximum number of concurrent data units permitted in the egress (to CPE) direction.
Individual Addresses	This list contains the E.164 individual addresses assigned to the SNI. Up to 16 individual addresses can be assigned to an SNI. Up to 32 individual addresses can be assigned if AP1 Switch Access is indicated. All additions, deletions, and modifications of items in this list are reflected in the **Individual Addresses** list in the **Group Addr** pane.
Ingress MCDU	This setting specifies the maximum number of concurrent data units permitted in the ingress (from CPE) direction.
Pre-selected Carrier	Indicates the name of the SNI's pre-selected carrier for inter-LATA SMDS traffic. The carrier must be an Interexchange Carrier. This control is active only for an SNI on a node in an ICI network for a Local Exchange Carrier.
Traffic Type	Indicates if the SNI is to carry your company's official or subscriber's SMDS traffic. This control is active only for an SNI on a node in an ICI network for a Local Exchange Carrier.

Group Addrs Pane

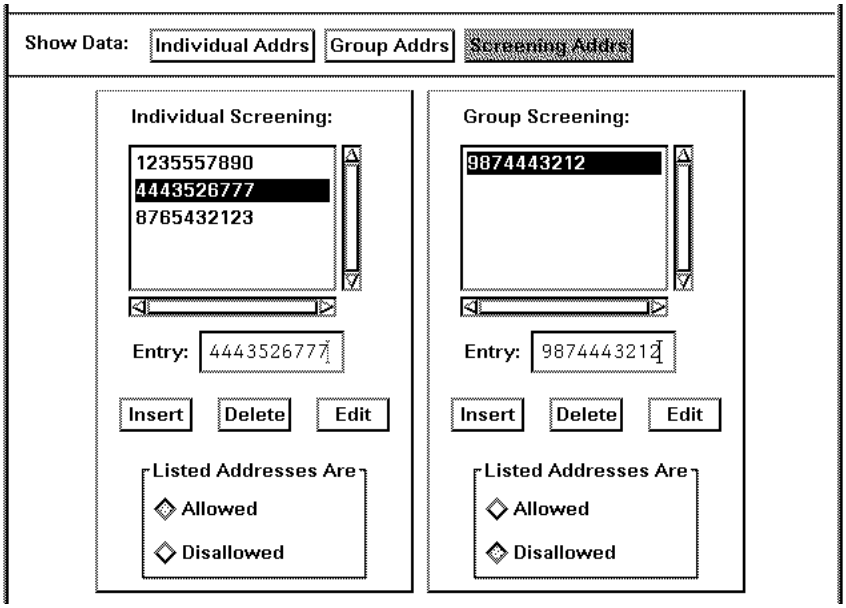
Use this pane to assign an SNI to groups. Each group will contain one or more individual addresses assigned to the SNI as its member(s).



Parameter	Description
Group Addresses	This list contains the E.164 group addresses assigned to the SNI. Up to 48 group addresses can be assigned to an SNI.
Individual Addresses	This list contains either all of the individual addresses assigned to the SNI, or just the members of the current group address in the **Group Addresses** list. In either case, the members of the current group address are highlighted. The list contents are controlled by the pair of command buttons located below the list. The two buttons are: Display All Addresses and Display Group Members. To add a member, select an address so that it is highlighted. To remove a member, select a highlighted address so that it is no longer highlighted. Select the Edit button to apply your change or changes. The members of the current group address will then be displayed.
Display All Addresses	Choosing this button displays all individual addresses assigned to the SNI and highlights the members of the current group address.
Display Group Members	Choosing this button will display only the members of the current group address.

Screening Addrs Pane

Use this pane to create address screening for the SNI.



Parameter	Description
Group Screening	This list contains the E.164 group addresses in the SNI's group address screening table. A total of 128 address can be assigned between Group and Individual Screening tables.
Individual Screening	This list contains the E.164 individual addresses in the SNI's individual address screening table. A total of 128 address can be assigned between Individual and Group Screening tables. For instance, you could have 100 Individual and 28 Group Screening tables assigned, or some other combination that can total up to 128.
Listed Addresses Are	This setting indicates whether the given screening table allows or disallows calls to or from the listed addresses. This control is not active when the screening table is empty; in this case, no addresses are disallowed.

SNI Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, several other reports are provided that will assist you in completing SNI configuration tasks. Except for the "Configuration Report", all others provide global views of your network's SNI data. All of these reports can be searched, printed, or saved to a file. The reports are listed and described below:

- Configuration Report
  This report provides an alternate view of the data from the current SNI record. The "Pre-selected Carrier" and "Traffic Type" are displayed only for an SNI on a node in an ICI network for a Local Exchange Carrier. Screen 8-23 shows an example of a Configuration Report.
- Configured SNIs Report
  This report lists all SNIs in the network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only (an SNI's owner NMS is the one that monitors the Admin and Console connections of the node on which the SNI resides). This report may be sorted by SNI or by the name of the *StarKeeper* II NMS that provided the data.
- Group Address Appearances Report
  This report displays the SNIs to which group addresses are assigned. This report may be obtained for a single group address, or for all group addresses in the network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. This report may be sorted by group address or by SNI.

- Group Members Report
  This report lists the members of a specified group address. All individual address members, and their associated SNIs, are listed. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. This report may be sorted by member SNI or member address. (**Screen 8-24**) shows an example of a Group Members Report.

- Group Prefix Audit Report
  This report displays the SNIs with group addresses for which no corresponding address prefix is configured for your company. This will occur if a LATA ID has not been assigned to the SNI's node, if the SNI was upgraded to BNS-2000 R2.0 but the group address was not updated to use one of your company's address prefixes, or if the ICI Prefix form was used to remove an address prefix assigned to a group address that is assigned to an SNI. If the report is empty (i.e. the view succeeded and zero group addresses are displayed), then you can be confident that all of the group addresses assigned to your company's SNIs contain an address prefix configured for your company in the SNI's LATA. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. The report may be sorted by group address or by SNI. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

- Group Screen Appearances Report
  This report identifies which SNI's group screening tables contain which group addresses. You can request the report for a single specific group address, or for all group addresses in the network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. This report may be sorted by group address or by SNI.

- Individual Addresses Report
  This report lists all individual addresses in the network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. This report may be sorted by individual address or SNI.

- Individual Screen Appearances Report
  This report identifies which SNI's individual screening tables contain which individual addresses. You can request the report for a single specific individual address, or for all individual addresses in the network. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only. This report may be sorted by individual address or by SNI.

- Pre-selected Carriers Report
  This report provides a listing of the SNIs that are assigned a pre-selected carrier. Data may be displayed for all *StarKeeper* II NMSs in the network, or for owner *StarKeeper* II NMSs only.

The report may be sorted by carrier name or by SNI. Your company must be a Local Exchange Carrier able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of each report, entries appear indicating which *StarKeeper* II NMSs were queried, and whether the data retrieval succeeded. Entries will say "View Succeeded:" or "View Failed:", followed by the *StarKeeper* II NMS name, as appropriate. If neither entry appears for an NMS that you know should be connected to this Graphics System, you should confirm the connections. These entries are followed by a display of the parameters you selected while requesting the report. The body of the report, which appears next, uses some special symbols in presenting the data:

An ***** in the first column of an entry indicates that the data on that line was provided by the owner *StarKeeper* II NMS. Identical SNI data may appear in multiple NMS databases if you have a hot spare configuration, or if data has been copied from one NMS to another for any other reason.

A **?** in the *StarKeeper* II NMS field means that the NMS name could not be determined at the time of data retrieval. This may occur when connections are being established or data is being synchronized. This is a transient condition. Request the report again.

An **A** or **D** will appear after each address in a Screen Appearances Report indicating that the address is either allowed or disallowed, respectively, in the specified screen.

The following screen shows an example of a Configuration Report.

```
StarKeeper II NMS Network Builder: SNI Configuration Report
Created: 02/27/98 16:02
Node Name: nj/wreck/pinta
Module Address: 10
Port Number: 1
Comment: Company X - NJ Office
Ingress MCDU: 1       Egress MCDU: 16
AP1 Switch Access: Yes
Pre-selected Carrier: AT&T
Traffic Type: Public Network
Individual Addresses:
       ------------------------------------------------
       9085764290    9085801212    9085804372    9089575342
       ------------------------------------------------
Group Address: 2127659876
       ------------------------------------------------
       9085764290    9085804372
       ------------------------------------------------
Group Address: 3175553428
       ------------------------------------------------
       9085804372
       ------------------------------------------------
Group Address: 8765554321
       ------------------------------------------------
       9085801212    9089575342
       ------------------------------------------------
Individual Address Screening Table:
       ------------------------------------------------
       3126548877    4156345532
       ------------------------------------------------
       Listed Addresses Are Disallowed.
Group Address Screening Table:
       ------------------------------------------------
       9087775429
       ------------------------------------------------
       Listed Addresses Are Allowed.
```

Screen 8-23. Configuration Report

The following screen is an example of Group Members Report.

```
StarKeeper II NMS Network Builder: SNI Group Members Report
Created: 02/04/98 14:47
View Succeeded: groucho
View Succeeded: chico
View Succeeded: harpo
Members of Group Address: 1000000000
Data displayed for All NMSs.
Sorted by Member Address.
Total Members: 20
* = Data obtained from Owner NMS.
=====================================================================
Individual   Node                          Module   Port  StarKeeper II
Address      Name                          Address  Number NMS
---------------------------------------------------------------------
*2096011011  spain/blob/node41/brutus      49       1  groucho
*2096014401  spain/blob/node41/brutus      49       1  groucho
*2096021002  spain/blob/node41/brutus      49       4  groucho
*2096021003  spain/blob/node41/brutus      49       4  groucho
*2096021004  spain/blob/node41/brutus      49       4  groucho
*2096021005  spain/blob/node41/brutus      49       4  groucho
*2096021006  spain/blob/node41/brutus      49       4  groucho
*2096021007  spain/blob/node41/brutus      49       4  groucho
*2096044112  spain/blob/node41/brutus      49       2  groucho
*5167000000  spain/blob/node43/mr_ed       41       1  harpo
5167000000   spain/blob/node43/mr_ed       41       1  chico
*5167002000  spain/blob/node43/mr_ed        4       4  harpo
*5167002001  spain/blob/node43/mr_ed        4       4  harpo
*5167002002  spain/blob/node43/mr_ed        4       4  harpo
*5167002003  spain/blob/node43/mr_ed        4       4  harpo
*5167014303  spain/blob/node43/mr_ed       39       3  harpo
*5167014304  spain/blob/node43/mr_ed       39       3  harpo
*5167014305  spain/blob/node43/mr_ed       39       3  harpo
*5167014315  spain/blob/node43/mr_ed       39       3  harpo
*5167014355  spain/blob/node43/mr_ed       39       3  harpo
=====================================================================
```

Screen 8-24. Group Members Report

SNI Trouble Recovery Procedures

During SNI configuration task processing one of the several node or *StarKeeper* II NMS update steps may fail, resulting in task retries or task stoppage. This section presents recovery procedures to be used if one of these situations arise. View the Task Log to determine at which point in the task a problem occurred, and to determine the reason for the failure.

In all cases, if the task is retrying, allow it to continue with the retry process. If the task has stopped, use one of the following procedures to recover.

Procedure 8-6. SNI Trouble Recovery Scenario 1: Node Update Failure

If the first node update attempt failed, (i.e., only a single node update message appears in the log, and it indicates failure) and the task has stopped:

1. Cancel the task;
2. Fix the problem (based on the information contained in the task log message);
3. Re-submit the task.

⚠ WARNING:
Do not apply the above procedure if any partial node updates have occurred. In the case that partial node updates have occurred, use one of the following procedures, as applicable.

Procedure 8-7. SNI Trouble Recovery Scenario 2: Incomplete Node/NMS Updates

If...

- at least one node update has succeeded, and then a node update attempt fails (also see Procedure 8-8);

  OR

- all node updates succeed, and then a *StarKeeper* II NMS update fails;

and the task has stopped:

1. Save or print a copy of the SNI Configuration Report.
2. Cancel the task;
3. Run **cfg_sync** for the affected node;
4. Re-load the SNI:
   - For *StarKeeper* II NMS failures, check the group address membership against the saved/printed Configuration Report. Make changes if needed.
   - For node failures, re-enter the required data on the form, using the saved/printed Configuration Report as your source;

5. Re-submit the task (for *StarKeeper* II NMS failures, if changes were not required on the re-loaded form to fix any group address membership data problems, do not re-submit).

Procedure 8-8. SNI Trouble Recovery Scenario 3: New SNI Failure

When a New SNI configuration task has stopped before any *StarKeeper* II NMS updates have been attempted, and you want to avoid having to manually re-enter data, you can use the following procedure:

1. Do not Exit the current SNI form;
2. Invoke a second SNI configuration form from the Network Builder control window. On this second form...
   - Delete the SNI which failed to be entered (if any warning notices appear during this procedure, do not be concerned, choose "Continue");
   - Exit.
3. Choose **New** from the **File** menu of the first SNI form, and choose **Current Data** on the **Defaults** control when the **New** command window pops up;
4. Re-submit this form (thereby preserving the data you originally entered).

Procedure 8-9. SNI Trouble Recovery Scenario 4: Unknown Node Data Loss

A Network Builder SNI task has completed successfully but the node's update was lost for some reason. For instance, the node went down or has been re-booted before a periodic update was done.

The next time you use Network Builder to submit a change to the SNI, you may find that the task has stopped while updating the node. The error message displayed will be `Address X already exists` or `Address X does not exist`. If this happens, you can use the following procedure:

1. Invoke an SNI configuration form from the Network Builder control window.
2. Delete the SNI in question.
3. Choose **New** from the **File** menu of the SNI form, and choose **Current Data** on the **Defaults** control when the **New** command window pops up.
4. Re-submit this form (thereby preserving the data you originally entered).

Special Considerations

- Database Management Concerns

The need to move SNI configuration data from one *StarKeeper* II NMS Core System to another may arise for a variety of reasons for example, night fold-down, hardware upgrading or expansion, other backup purposes. Unlike other configuration data, a two-step process is required to completely move SNI data. The first step is to run **skload** on the Core System that is to receive the data; the second step is to run **sni_sync** on that Core System. Refer to the *StarKeeper II NMS Core System Guide* for complete descriptions of these commands and their applications.

- Handling Conflicting Data

  Before an SNI record is loaded into the form, database audits are performed to determine whether SNI data in the *StarKeeper* II NMS database agrees with that in the SNI's node database. Whenever there is conflict in data, a notice will appear displaying the mismatched data, and asking you to select the desired source of data to be loaded (you must choose one of the sources; you can only abort the Load by quitting the Configure SNI window). Note that selecting a specific data source and submitting this record will result in synchronization of the two databases for this SNI; be sure to select the proper data before proceeding. This situation may be a symptom resulting from the transfer of data from one Core System to another.

- Unknown Carriers

  In an ICI network, if the company is a Local Exchange Carrier, you will assign an Interexchange Carrier as the "Pre-selected Carrier" of an SNI. When performing the Load SNI operation, if a carrier is assigned to an SNI and the form is unable to determine the carrier name, *****UNKNOWN***** is displayed in the "Pre-selected Carrier" field.

  The value *****UNKNOWN***** is displayed if Network Builder cannot access the *StarKeeper* II NMS Core System designated as the Primary Core, if the database request fails on the Primary Core, or if the SNI record and the ICI configuration data in the database on the Primary Core are in disagreement.

  In all cases, the form produces a notice indicating the problem. Before submitting any changes, re-enter the carrier name, because you cannot submit changes using a "Pre-selected Carrier" field value of *****UNKNOWN*****. The carrier name is chosen from the list of configured Interexchange Carriers produced by selecting the button in the "Pre-selected Carrier" field. This list is empty if Network Builder is unable to access the Primary Core.

- Billing

  The first member of a group (the lowest numbered individual address assigned to the group) is the billing identifier for the group on the SNI.

Configuring ICI Carriers

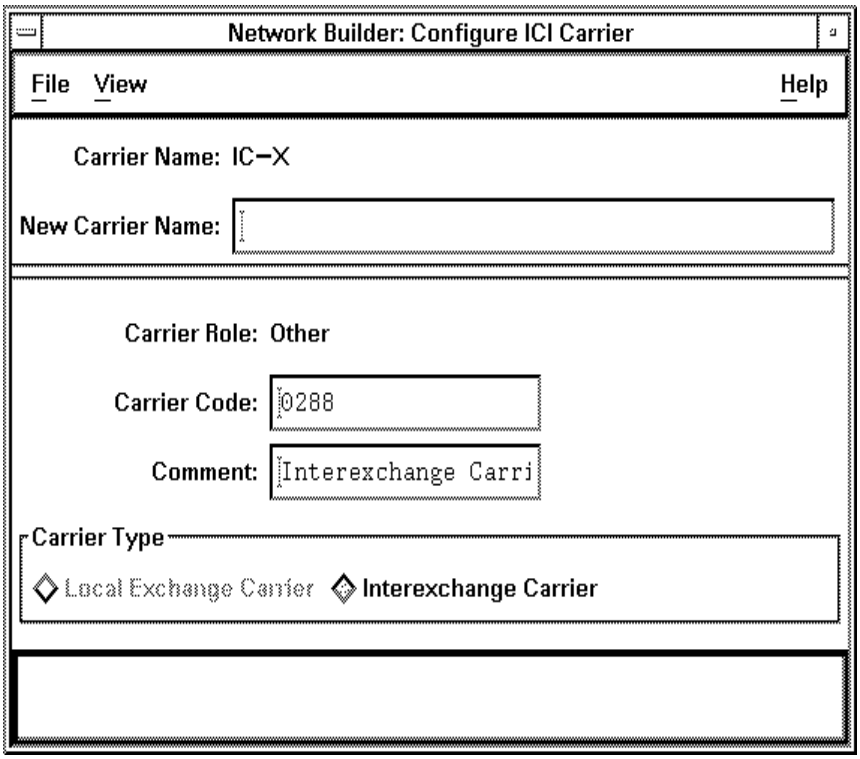
The ICI Carrier form is the first Network Builder form you use to configure an ICI network (public network SMDS). Use the ICI Carrier form to configure general information about all of the carriers in your ICI network. These carriers consist of your company plus all other carriers connected to your company for the purposes of providing SMDS in a public network.

The ICI Carrier form is partitioned into two panes: a key pane and a data pane. The key pane contains controls that specify a carrier name, as well as a new carrier name if the command is a Load.

The data pane contains a control that indicates the carrier role, and controls to specify a carrier type, a carrier code, and a comment. The carrier role shows whether you are configuring information about your company or about another company in your ICI network. The form automatically determines the carrier role based on context (as described later). Use the ICI Carrier form to assign a carrier type to a carrier (a Local Exchange Carrier or an Interexchange Carrier). Then, use the form to assign a carrier code to the carrier. The carrier code is an SMDS CIC if the carrier is an Interexchange Carrier. It is the carrier's NECA CC if the carrier is a Local Exchange Carrier.

The ICI Carrier form (along with the ICI Prefix form and the ICI Group Address form) updates ICI configuration data in a database on the *StarKeeper* II NMS Core System designated as the *Primary Core*. Designate a Core System as the Primary Core by running the **ici_primary** command on that Core. You cannot submit an update using the ICI Carrier form unless Network Builder can access the Primary Core. After using the ICI Carrier form to update the database on the Primary Core, run the **ici_dl** command on the Primary Core in order to download the ICI configuration data to all of the BNS-2000 nodes in your network. This step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).

Refer to the *BNS-2000 SMDS Guide* for a more detailed discussion of the SMDS service and how Network Builder is used to help configure those networks.



Screen 8-25. ICI Carrier Configuration Form

Background Information

If your company is a Local Exchange Carrier, use the ICI Carrier form to administer configuration data about the following carriers:

- your company
- all Local Exchange Carriers connected to your company for the purposes of providing intercompany serving arrangements for intra-LATA SMDS
- all Interexchange Carriers connected to your company where your company provides Exchange Access SMDS

If your company is an Interexchange Carrier, the use the ICI Carrier form to administer configuration data about these carriers:

- your company
- all Local Exchange Carriers connected to your company where your company is providing interexchange SMDS

Always configure your company first. That is, the first carrier added using the ICI Carrier form is your company. The form sets the carrier role of the first carrier to **self**. After using the ICI Carrier form to add your company, all other carriers added have a carrier role of **other** set automatically by the form.

After using the ICI Carrier form to add your company, use the ICI Prefix form to configure your company's address prefixes. Then use the ICI Group Address form to configure the group addresses for which your company acts as the Group Address Agent. These group addresses and their members are based on your company's set of address prefixes. Use the Node form to assign SMDS SR, SA, and EPN values and a LATA id to your ICI nodes based on your company's address prefixes in the LATA. Use the SNI form to assign individual and group addresses to your company's SNIs, based on your company's address prefixes.

After using the ICI Carrier form to add **other** carriers, use the ICI Prefix form to assign the address prefixes belonging to Local Exchange Carriers directly connected to your company. Use the Trunk form to configure the trunks that carry ICI traffic and terminate at the other carriers added using the ICI Carrier form. If your company is a Local Exchange Carrier, use the SNI form to identify which of the other ICI carriers act as the pre-selected carrier for an SNI's inter-LATA SMDS traffic.

Task Notes

- You cannot delete a carrier if there are any address prefixes configured for it. Use the ICI Prefix form to delete those prefixes before deleting the carrier.
- You cannot change the carrier code for an **other** carrier, or delete an **other** carrier if there are any configured or pending trunks or (if your company is a Local Exchange Carrier) SNIs that reference the carrier. Use the Trunk form and the SNI form to delete the carrier from these trunks and SNIs before changing the carrier code. When submitting the carrier code change, the form notifies you which, if any, configured trunk or SNI tasks reference the carrier. To see if any pending trunk or SNI tasks reference the carrier, examine the Configuration Activity Log.

ICI Carrier Parameters

Parameter	Description
Carrier Code	If the carrier is a Local Exchange Carrier, enter its NECA CC. If the carrier is a Interexchange Carrier, enter its SMDS CIC.
Carrier Role	The first carrier added has the carrier role **self**. Each additional carrier you add has the carrier role **other**. (The first carrier you add must be your company.)
Carrier Type	If your company is a Local Exchange Carrier, a maximum of 24 Interexchange Carriers may be added. If your company is an Interexchange Carrier, then your company is the only Interexchange Carrier allowed.

ICI Carrier Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, another report is provided that will assist you in completing ICI Carrier configuration tasks. This report provides a global view of your network's carrier data. The report can be searched, printed or saved to a file. It is listed and described below:

- Configured Carriers Report
  This report provides a listing of all carriers that have been configured using the ICI Carrier form. As such, it provides a listing of all carriers known to your network. The report is sorted by carrier name. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of the Configured Carriers Report, an entry will appear indicating the name of the *StarKeeper* II NMS that was queried. This is the Primary Core. The entry will also indicate whether the data retrieval succeeded. It will say "View Succeeded:" or "View Failed:", followed by the name of the Primary Core. This is followed by a display of the report parameters, followed by the body of the report.

Special Considerations

- Upon submitting an update to add the first carrier, the form displays a notice reminding you that you are about to configure carrier information for your company (the carrier **self**).
- Upon submitting an update, the form displays a notice reminding you to run the **ici_dl** program on the Primary Core, in order to download your ICI configuration data to the BNS-2000 nodes in your ICI network. This step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).

- If you have changed both the carrier name and carrier code, the form displays a notice requesting you to confirm these changes. Changing both the name and code results in the ICI configuration data for the old carrier being assigned to the new carrier, once the **ici_dl** program is run.

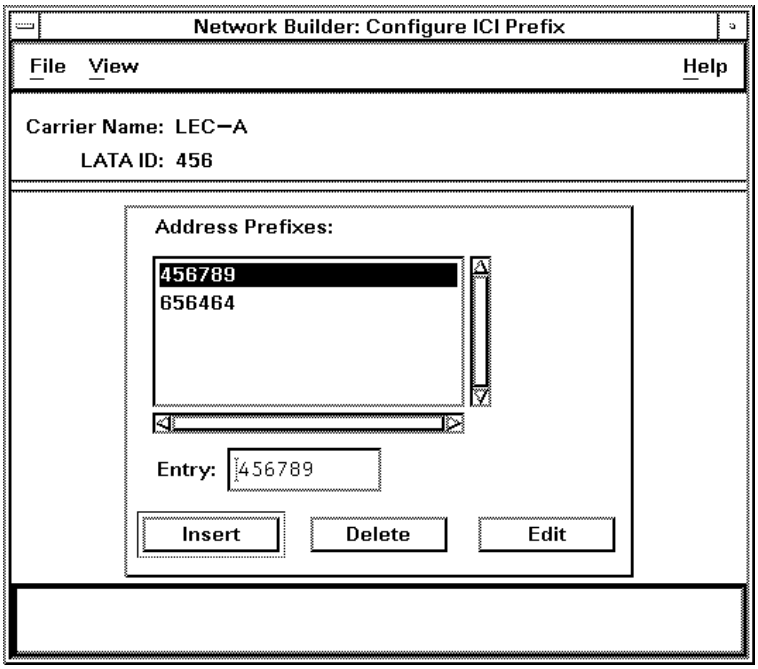
Configuring ICI Prefixes

The ICI Prefix form allows you to configure a list of the first six digits of SMDS addresses that are used in your ICI network (public network SMDS). Use the ICI Prefix form to configure the address prefixes allocated to your company plus the address prefixes allocated to all Local Exchange Carriers of interest in your ICI network. You configure all of the address prefixes that are currently deployed for use in SMDS individual and group addresses, as well as all of the prefixes planned for future deployment. Embodied SACs are not to be included.

The ICI Prefix form is partitioned into two panes: a key pane and a data pane. The key pane contains controls that indicate the name of the carrier and the LATA in which the prefixes are deployed. The data pane contains a list for entering the address prefixes. Up to 64 address prefixes per carrier per LATA are allowed. Within this list, you can specify a maximum of eight unique SRs (the first three digits of the prefix).

The ICI Prefix form (along with the ICI Carrier form and the ICI Group Address form) updates ICI configuration data in a database on the *StarKeeper* II NMS Core System designated as the *Primary Core*. Designate a Core System as the Primary Core by running the **ici_primary** command on that Core. You will not be able to submit an update using the ICI Prefix form unless Network Builder is able to access the Primary Core. Once you have used the ICI Prefix form to update the database on the Primary Core, run the **ici_dl** command on the Primary Core in order to download the ICI configuration data to all of the BNS-2000 nodes in your ICI network. This step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).

Refer to the *BNS-2000 SMDS Guide* for a more detailed discussion of the SMDS service and how Network Builder is used to help configure those networks.



Screen 8-26. ICI Prefixes Configuration Form

Background Information

If your company is a Local Exchange Carrier, then you use the ICI Prefix form to administer address prefixes for the following carriers:

- your company
- all Local Exchange Carriers connected to your company for the purposes of providing intercompany serving arrangements for intra-LATA SMDS

Use the ICI Prefix form to configure prefixes for your company in each LATA in which your company has BNS-2000 nodes monitored by the same Primary Core. Also configure prefixes for each Local Exchange Carrier in each LATA administered by your Primary Core with which your company has an intercompany serving arrangement. Configure all prefixes that are currently in use for SMDS, and those that are reserved for future use.

If your company is an Interexchange Carrier, then use the ICI Prefix form to administer address prefixes for the following carriers:

- your company
- all Local Exchange Carriers connected to your company where your company is providing interexchange SMDS

Use the ICI Prefix form to configure prefixes for your company in LATA "0". Also configure prefixes for each Local Exchange Carrier in each LATA connected to your company. Configure all prefixes that are currently in use for SMDS, and those that are reserved for future use.

The prefixes that you configure for your company in a given LATA are used as the prefixes of the SMDS individual and group addresses allocated to your company in the LATA. After using the ICI Prefix form to configure your company's address prefixes, use the ICI Group Address form to configure the group addresses for which your company acts as the Group Address Agent in a given LATA. These group addresses and their members are based on your company's set of address prefixes in that LATA. Use the Node form to assign to your BNS-2000 nodes a set of SMDS SR, SA, and EPN values and a LATA, based on the address prefixes you assigned to your company in the node's LATA. Then use the SNI form to assign individual addresses to your company's SNI's based on the SMDS SR, SA, and EPN values assigned to the SNI's node. Also use the SNI form to assign group addresses to your company's SNIs based on the address prefixes assigned to your company in the SNI's LATA.

Task Notes

- You must use the ICI Carrier form to configure a carrier before you can use the ICI Prefix form to configure address prefixes for the carrier.
- If your company is a Local Exchange Carrier, then you are not allowed to assign address prefixes to another Local Exchange Carrier in a given LATA unless there are address prefixes already configured for your company in that LATA.
- If your company is a Local Exchange Carrier, then you cannot delete all of your company's address prefixes in a given LATA if there is another Local Exchange Carrier that has address prefixes configured in that LATA. You must first delete all of the address prefixes for the other carrier.
- You are not allowed to delete all of a carrier's address prefixes in a given LATA if a "t3i" trunk is terminating at the carrier in the LATA. Use the Trunk form first to delete the trunk.
- Before using the ICI Group Address form to configure a group for which your company acts as the Group Address Agent, you must use the ICI Prefix form to configure the prefix of the group for your company in the LATA which acts as the resolving network.
- Before using the Node form to assign an SMDS SR and SA to a BNS-2000 node, you must use the ICI Prefix form to configure a corresponding address prefix for your company in the operational LATA of the node.
- Before using the SNI form to assign a group address to an SNI, you must use the ICI Prefix form to configure the prefix of the group address for your company in the operational LATA of the SNI's node.

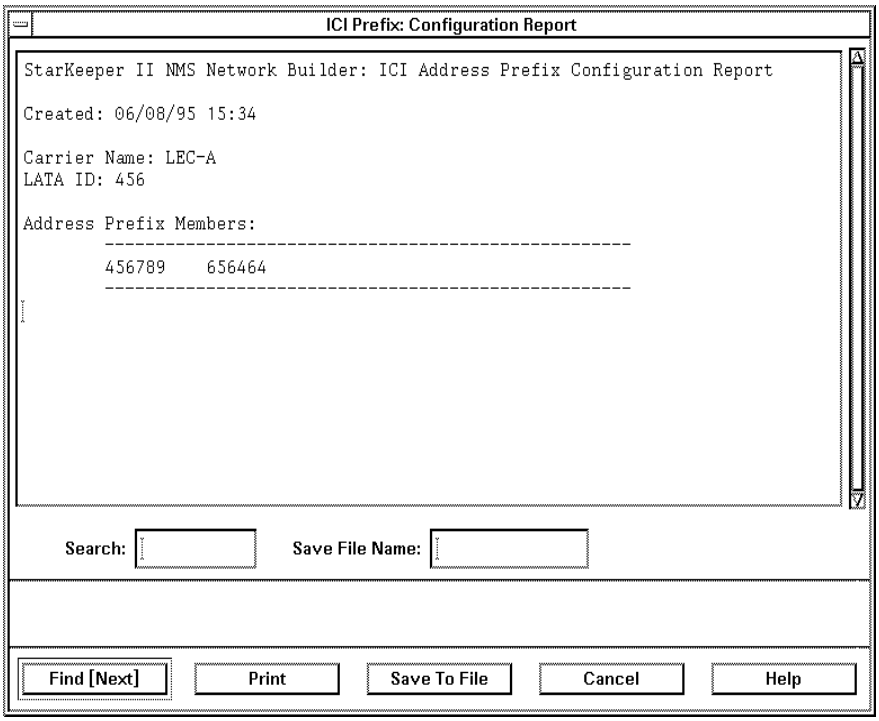
ICI Prefix Parameters

Parameter	Description
Address Prefixes	This list displays the six-digit address prefixes assigned to the carrier in the LATA. Up to 64 prefixes can be assigned to a carrier in a LATA. You can specify a maximum of eight unique SRs (the first three digits of the prefix).

ICI Prefix Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, several other reports are provided that will assist you in completing ICI Prefix configuration tasks. Except for the Configuration Report, all others provide global views of your network's prefix data. The reports can be searched, printed or saved to a file. They are listed and described below:

- Configuration Report
  This report provides an alternative view of the address prefixes on the form. The following screen provides an example of the Configuration Report.



Screen 8-27. ICI Prefix Configuration Report

- Configured Prefixes Report
  This report provides a listing of all address prefixes that have been configured using the ICI Prefix form. As such, it essentially provides a directory listing of all address prefixes known to your network. The report may be sorted by address prefix or by carrier name. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of the Configured Prefixes Report, an entry will appear indicating the name of the *StarKeeper* II NMS that was queried. This is the Primary Core. The entry will also indicate whether the data retrieval succeeded. It will say "View Succeeded:" or "View Failed:", followed by the name of the Primary Core. This is followed by a display of the parameters you selected while requesting the report, followed by the body of the report.

Special Considerations

- Upon submitting an update, the form displays a notice reminding you to run the **ici_dl** program on the Primary Core, in order to download your ICI configuration data to the BNS-2000 nodes in your ICI network. This step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).
- If you are deleting an address prefix that is used in a group address for which your company is the Group Address Agent, the form will display a warning notice. You can either Continue the update or Cancel it. If you continue the update, the address prefix will be deleted but the group address will not be deleted.
- If you are deleting an address prefix that is used as the SMDS SR and SA of one of your company's BNS-2000 nodes, the form will display a warning notice. You can either Continue the update or Cancel it. If you continue the update, the address prefix will be deleted but the SMDS SR and SA will not be deleted. However, messages with a destination address having the deleted prefix will be routed out of your company's network.
- If you are deleting an address prefix that is used in a group address assigned to one of your company's SNIs, the form will display a warning notice. You can either Continue the update or Cancel it. If you continue the update, the address prefix will be deleted but the group address will not be deleted.

Configuring ICI Group Addresses

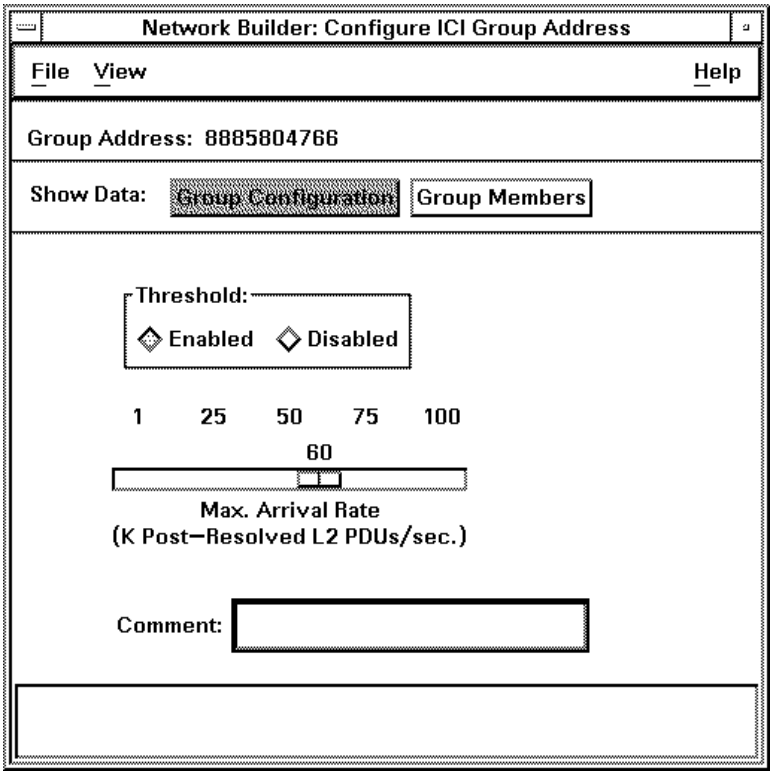
Use the ICI Group Address form to create a group for which your company acts as the Group Address Agent and assign member addresses to it. The member addresses assigned to a group with the ICI Group Address form are those allocated outside of your company`s network. Continue to use the SNI form to assign group membership to addresses allocated to your company's network (that is, individual addresses on your company's SNIs).

The ICI Group Address form is partitioned into three panes: a key pane and two data panes. The key pane contains a control that indicates the E.164 address of the resolving group.

The data panes contain controls that allow you to specify the maximum arrival rate into your network of post-resolved group address messages. You can enter a 60 character comment for the group. The data panes also contain a list for entering the members of the group. You can enter up to 128 members, as any combination of individual addresses and group addresses.

The ICI Group Address form (along with the ICI Carrier form and the ICI Prefix form) updates ICI configuration data in a database on a *StarKeeper* II NMS Core System designated as the *Primary Core*. The Primary Core is designated by running the **ici_primary** command on that Core. You will not be able to submit an update using the ICI Group Address form unless Network Builder is able to access the Primary Core. After using the ICI Group Address form to update the database on the Primary Core, run the **ici_dl** command on the Primary Core to download the ICI configuration data to all of the BNS-2000 nodes in your ICI network. This step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).

Refer to the *BNS-2000 SMDS Guide* for a more detailed discussion of the SMDS service and how Network Builder is used to help configure those networks.



Screen 8-28. ICI Group Addresses Configuration Form

Background Information

Use the ICI Group Address form to administer the individual and group address members of any groups for which your company acts as the Group Address Agent. The members you configure using the ICI Group Address form are those members not allocated to your company within the LATA where your company acts as the Group Address Agent. For example, if your company is a Local Exchange Carrier, use the ICI Group Address form to configure individual and group address members whose six-digit address prefixes are *not configured* in the LATA where the group's six-digit address prefix is configured.

Continue to use the SNI form to assign those individual addresses allocated to your company within a LATA that you wish to be members of a group for which your company acts as the Group Address Agent.

Task Notes

- You must use the ICI Prefix form to assign *all* six-digit address prefixes allocated to your company in a LATA for SMDS individual and group addresses before using the ICI Group Address form to create a group and assign it members.
- The E.164 address of the group must contain a six-digit prefix that is configured for your company in the LATA where your company acts as the Group Address Agent for this group.
- A member address must *not* contain a six-digit prefix configured for your company in the LATA where your company acts as the Group Address Agent for this group.

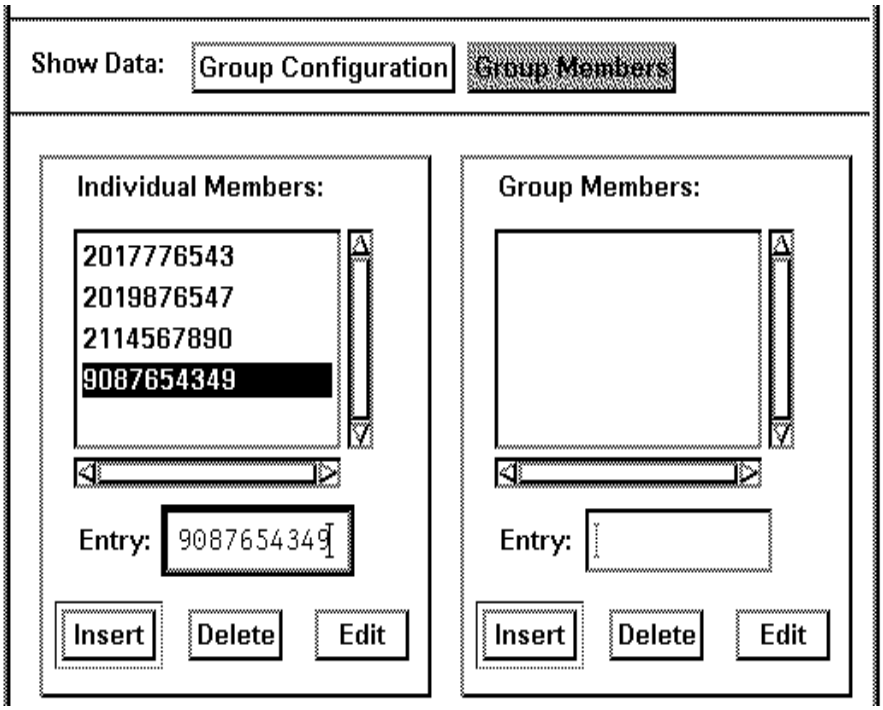
ICI Group Address Parameters

Group Configuration Pane

Parameter	Description
Max. Arrival Rate	Used to limit the number of messages a source sends to this group address (See the *BNS-2000 SMDS Guide*.) Note that the value specified is measured in units of thousands of L2_PDUs per second.
Threshold	This setting activates the Max. Arrival Rate field, limiting the number of messages a source can send to this group address. (See the *BNS-2000 SMDS Guide*.) When Disabled, there is no limit to the number of messages a source sends to this group address.

Group Members Data Pane

Use this data pane to assign members to a group.



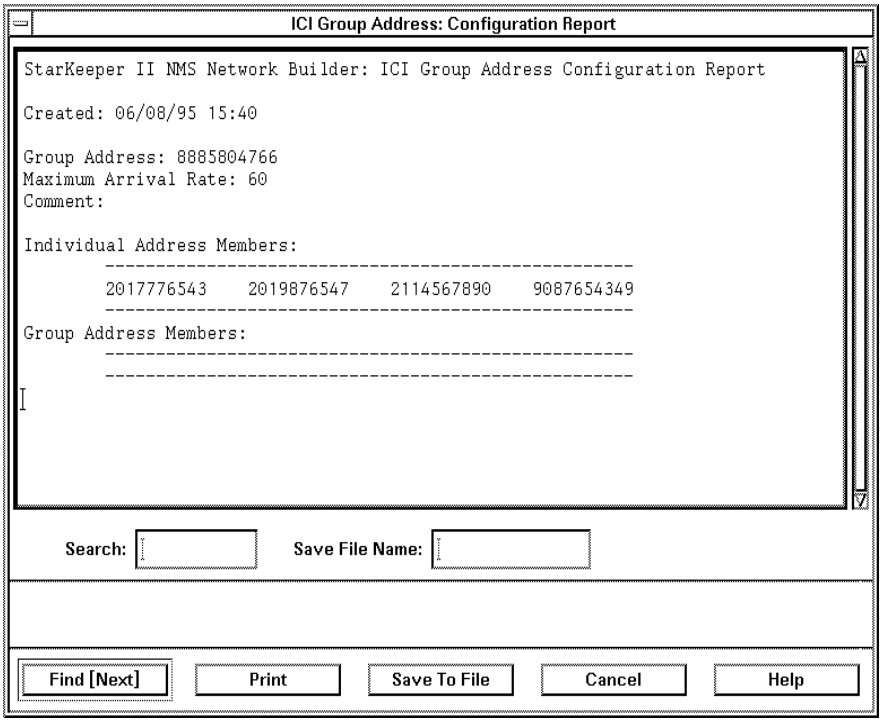
Parameter	Description
Group Members	This list displays the E.164 group addresses assigned as members of the group. There is a maximum of 128 combined entries between this list and the **Individual Members** list.
Individual Members	This list displays the E.164 individual addresses assigned as members of the group. There is a maximum of 128 combined entries between this list and the **Group Members** list.

ICI Group Address Reports

In addition to the standard "Task Log" available on all Network Builder configuration forms, several other reports are provided that will assist you in completing ICI Group Address configuration tasks. Except for the Configuration Report, all others provide global views of your network's group data. The reports can be searched, printed or saved to a file.

The report is described and listed below:

- Configuration Report
  This report provides an alternative view of the data from the current group record. The configuration report is shown in the following screen.



Screen 8-29. ICI Group Address Configuration Report

- Audit Prefixes Report
  This report displays the groups for which no corresponding address prefix is configured for your company. This will occur if the ICI Prefix form was used to remove an address prefix assigned to a group address. If the report is empty (i.e. the view succeeded and zero group addresses are displayed), then you can be confident that all of the groups for which your company acts as the Group Address Agent in a LATA contain an address prefix configured for your company. The report is sorted by group address. You must be a public network SMDS provider able to access the ICI configuration database on the Primary Core in order to run this report.

Following the title and time stamp heading of the Audit Prefixes Report, an entry will appear indicating the name of the *StarKeeper* II NMS that was queried. This is the Primary Core. The entry will also indicate whether the data retrieval succeeded. It will say "View Succeeded:" or "View Failed:", followed by the name of the Primary Core. This is followed by a display of the report parameters, followed by the body of the report.

Special Considerations

- Upon submitting an update, the form displays a notice reminding you to run the **ici_dl** program on the Primary Core, in order to download your ICI configuration data to the BNS-2000 nodes in your ICI network. Note that this step can be deferred until you have configured the foundation of your ICI network (carriers, address prefixes, group addresses, and nodes).

Configuring Frame Relay Service

Network Builder provides complete configuration support for Frame Relay Service via three base windows: one for M1 Frame Relay Service (FRM), one for M2 Frame Relay Service (FRM-M2), and one for configuration of PVCs (regardless of M1 or M2). The **Frame Relay** item on the Network Builder Control Window's **Configure** menu provides access to a sub-menu with the following options: **FRM, FRM-M2, PVC**. Choosing **FRM** or **FRM-M2** yields a base window providing access to a set of forms corresponding to the appropriate Frame Relay components. For FRM: module, port (virtual), and multicast DLCI. For FRM-M2: module, physical port, virtual port, and multicast DLCI. Choosing **PVC** yields a form for configuring PVCs between any type of Frame Relay endpoints (DLCIs).

The **File** menu on the FRM and FRM-M2 Base Windows then give you access to the individual forms required to access the desired Frame Relay component configuration form. The **New, Load** and **Delete** commands on the **File** menu each have sub-menus that provides access to the individual components. Choose the desired action and element on these menus to obtain the required form.

Frame Relay components must be entered hierarchically. That is, module before port, port before virtual port (if applicable), virtual port before DLCI/multicast DLCI, and multicast DLCI (if used) before PVC.

Details regarding configuration of Frame Relay modules, physical and virtual ports, multicast DLCIs and PVCs are covered in the sections that follow. Other information regarding administration of Frame Relay service is covered in the rest of this section.

When deleting a module, Network Builder operates hierarchically, acting as if you requested deletes for all the ports belonging to the module and all the DLCIs associated with the ports. When deleting a port, all multicast DLCIs and all DLCIs associated with that particular port are deleted. When deleting a PVC, all DLCIs associated with that PVC are deleted. A Multicast DLCI cannot be deleted if it is administered in a PVC. A one-sided PVC could result when you delete a port or a module which has only one of the DLCIs in a PVC.

Using Existing Configuration Data

epres is an endpoint resolution process. You need to run **epres** if you have provisioned frame relay PVCs directly on nodes before the availability of the Network Builder frame relay feature. It is run on the *StarKeeper* II NMS Graphics System on which Network Builder for Frame Relay is run. It resolves two-sided as well as one-sided (foreign ended) PVC's, according to strict rules. This resolution is based upon an originating node id, module, slot, port and DLCI data set, in conjunction with a user-defined PVC destination field value. This data is configured initially on the node and passed to the *StarKeeper* II NMS Core

System database, as a result of using the **skload** or **cfg_sync** commands on the Core System.

In order to ensure a consistent and complete view of the data (especially ensuring the one-to-one correspondence of a PVC number to the pair of DLCIs that comprise a particular PVC), you must be careful to execute all frame relay configuration activities from Network Builder. If you begin all of your frame relay configuration activities using the new Network Builder feature, you shouldn't need to execute epres. However, if you do have data that was not provisioned by Network Builder, you need to assign PVC numbers to the pairs of DLCIs, and that requires **epres**. Once all existing DLCIs have been paired, and all additional provisioning is performed using Network Builder, you should not have to run **epres** again. If subsequent to the resolution of end points, you continue to provision directly on nodes, even by using the *pass-through* capability, it will be necessary to run **epres** again.

epres finds and pairs the two DLCIs in your network that belong together and inserts all of the valid pairs into special tables in the database. It assigns a unique PVC number to the pair, and reports all non-resolvable data.

The process is invoked from the command line, and accepts the following options/ parameters:

epres	-p	(Purge mode--removes old PVC's)
	-u	(Update mode--changes database to include resolved PVCs)
	-f <filename>	(Write exception data to a file whose name you provide)

Executing **epres** with no options defaults to Audit mode with exception data appended to a file, called *epres.out*, in the current directory. Since the data is appended, you will have to manage the size of the file to ensure that it doesn't grow too large.

When running **epres** in Update mode, it is recommended that you combine the Purge and Update modes. This will address the situation where a previous execution of **epres** was not able to establish a two-sided PVC and created a one-sided PVC instead, and you made the necessary changes for **epres** to be able to resolve both sides of the PVC in the current execution. You don't need one of the DLCIs to be associated with both a one-sided and a two-sided PVC.

Sample Output

When destinations cannot be resolved by **epres**, information similar to the following will be provided to you for further action:

```
PVC DESTINATION nj/place/fr.27.2.53 does not map to any nodes.
Could not resolve pvc information for
```

```
        NODE=4 (IMPORT)
        NETWORK=() EXCHANGE=(nj) AREA=(area1)
        DLCI=55
        PORT=1
        SLOT=49
        BPLINK=0
        PVC DESTINATION=(nj/place/fr.27.2.53)
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
```

When destinations map to multiple nodes, information similar to the following will be provided to you for further action:

```
PVC DESTINATION fr.27.2.53 maps to the following node ids.
4 (node1) 5 (nj/place/node2)
        NODE=4 (IMPORT)
        NETWORK=() EXCHANGE=(nj) AREA=(area1)
        DLCI=55
        PORT=1
        SLOT=49
        BPLINK=0
        PVC DESTINATION=(nj/place/fr.27.2.53)
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-
```

You are expected to update the PVC destination fields on the nodes with complete information so these end points can be resolved. Then run the **cfg_sync** command on the appropriate *StarKeeper* II NMS Core System, followed by the execution of **epres**. These steps should be repeated until all end points are mapped to PVCs.

Administering Custom IDs

The Custom ID feature allows you to assign comment-like information to frame relay entities during configuration. You may administer the labels used for these Custom ID fields to make the fields more meaningful to you. When configuring a frame relay module, for example, two Custom ID fields will be contained in the "Custom ID" data pane. You can enter values into those two fields, but before doing that, you define the labels for those (and any other) Custom ID fields using the **Administer** window.

The window to define the labels can be invoked from a **Frame Relay** base window by clicking on **Administer**.

The configuration forms for each Frame Relay component allow you to enter information into the Custom ID fields.
The Custom ID labels generated to prompt for this information may be defined in the **Administer** window. If a Custom ID label for a field is left blank, the field will not be displayed or made available for data entry on its associated configuration form.

The first two Custom ID labels are used to prompt for information when configuring an M1 or M2 frame relay module or an M2 physical port. The factory default labels are **Customer** and **Location** for the first two Custom ID fields.

The next three Custom IDs, in addition to the above two Custom IDs, will be used to prompt for data when configuring an M1 frame relay port or an M2 frame relay virtual port. The factory defaults are **Contact**, **Circuit ID** and **Installation Date** for Custom IDs 3, 4, and 5.

All ten Custom IDs, including the above five, will be used to prompt for data when configuring a frame relay PVC. Custom ID labels 6 through 10 are undefined by default. If left undefined, these Custom ID fields will not be displayed in the PVC configuration form or the PVC Configuration Report.

The column labeled **Use To View PVCs** contains ten check boxes. Each check box is associated with the Custom ID field immediately preceding it. When a box is checked and a Custom ID label is defined for the associated field, you will be able to supply search criteria for this field to select PVCs to view in the PVC Configuration Report. The factory default checks the first five boxes (the first two enable the display of data associated with Modules, Ports, and PVCs, the next three are associated with Ports and PVCs.). The remaining five boxes are left unchecked by default, disabling the display of the last five fields in PVC Configuration Reports.

A Custom ID label can be up to 20 characters in length. The value you enter in the Custom ID field when provisioning can be up to 80 characters in length.

In order for your specifications to take effect, you must exit the **Network Builder: Configure Frame Relay** Control Window and re-invoke it.

There is one set of Custom IDs per *StarKeeper* II NMS Core System. The Custom IDs and settings defined and applied in this window are made available to *StarKeeper* II NMS Graphics Systems from the *StarKeeper* II NMS Core System database. This single set of Custom IDs is made available to all copies of Network Builder associated with the same *StarKeeper* II NMS Core System. Therefore changes made at one *StarKeeper* II NMS Graphics System will affect what is displayed at other Graphics Systems the next time the **Network Builder: Configure Frame Relay** window is invoked.

Value Inheritance

When the **Value Inheritance** feature is enabled, it automatically copies your Custom IDs from a previously defined module or M2 physical port (two fields) to the New Port Configuration form, or from a previously defined (virtual) port (five

fields) to the New PVC Configuration form. You may still modify this data when manipulating the corresponding "New" form.

The **Value Inheritance** feature is only available when creating a new Port or a new PVC. "Value Inheritance" is enabled by default.

Example

To illustrate the Custom ID feature, consider an M1 Frame Relay configuration session in which you label all ten Custom IDs as **L1** through **L10**. When configuring a new module, Custom IDs one and two, with labels **L1** and **L2** are available in the **Custom IDs** data pane. In this example, you enter the value ***Value1*** for **L1** and ***Value2*** for **L2**. When you configure a new port that belongs to the module that you configured this way and choose to display the **Custom IDs** data pane for that form, you will see five Custom IDs, with Custom ID one having label **L1** and value ***Value1*** and Custom ID two having label **L2** and value ***Value2***. If you had chosen to disable **Value Inheritance**, the labels **L1** and **L2** would still appear in the new port form **Custom IDs** data pane, but there would be no values associated with either of them. You could enter different values for these Custom IDs than the values that you entered when configuring the module, but the labels would still be **L1** and **L2** for these first two Custom IDs.

With **Value Inheritance** enabled, if you then entered ***Value3*** for the third Custom ID whose label is **L3**, and ***Value4*** for the fourth one whose label is **L4**, but you chose to enter nothing for the fifth Custom ID, whose label is **L5**, you would see all five Custom IDs when you entered a new PVC where one side (DLCI) belonged to the port that was configured this way. You would then be able to enter values for Custom IDs six through ten whose labels are **L6** through **L10**.

If you decide that you want to change a label for a Custom ID, you can invoke the **Administer** window again, make the change, and click Apply. As mentioned before, you would have to quit the frame relay configuration task in Network Builder and invoke it again for the change to take effect. When you change the label of the Custom ID, any values that were previously entered are completely unaffected. So, if you change **L2** to ***Label2*** the value ***Value2*** would still be stored.

If you clear the label field for a Custom ID, the effect is to delete the label. In delete cases, Custom IDs do not get adjusted to reflect the deletion. In other words, if you delete the first Custom ID, the label and value for the second one remain associated with the second one and do not move to the first one.

Reports

Frame Relay Configuration Reports

Depending on what entity has been activated, the **View** button will provide you with choices for getting additional data on frame relay resources as well as seeing the task log. In general, this capability provides reports of information that was loaded into forms in a different format so that you can save the data, or print the data. It also provides reports for those components in the hierarchy that have already been configured.

If the current loaded form is for an M1 port or M2 virtual port on a ChT1 or ChE1 module, a report choice for timeslot assignment will be available showing the timeslots associated with that port or virtual port.

If the current loaded form is for a multicast DLCI, the Multicast DLCI Report will show data for all multicast DLCIs associated with the ports to which this DLCI belongs. Similarly, the Time Slot Assignments Report will show data for these time slots, the Virtual Port Configuration Report will show data for those virtual ports (if applicable), the Port Configuration Report will show data for those ports, and the Module Configuration Report will show data for those modules.

PVC Configuration Report

The PVC Configuration Report sub-menu item is available from the **View** menu on a PVC Configuration form. Clicking on the PVC Configuration Report menu item gives you access to three different types of PVC configuration reports. Clicking on the first two items brings up a popup command window.

The first menu item is **View By Criteria...**. When you click on this item, the **View By Criteria: PVC Configuration Report** command window pops up. It supports specifying criteria to generate a report containing one or more PVC records.

At the top of the window is the criteria data pane. This data pane is split into two panes, labeled **End 1** and **End 2** each containing the Node Name, Module Address, Port Number, Virtual Port Number, DLCI and Custom IDs controls. Any administered Custom IDs which are specified in the Administer window as being used for this purpose will appear. See the section on **Administering Custom IDs**.

All fields have Choose buttons associated with them.

All numeric fields accept single entries or ranges. All text fields accept text entries which may contain the following wildcards in place of other characters in the

string. Both **End 1** and **End 2** criteria sets have an associated **Clear** button.

***** matches zero or more characters

? matches any single character

[...] matches any one of the enclosed characters or character ranges, e.g. [acf] means a, or c or f; [a-f] means a, or b, or c, or d, or e, or f. If a caret (^) is the first character within the brackets, matches occur for characters **not** listed, e.g. [^abc] matches any character that is not a, b, or c.

Clicking on that button for one of the ends will clear all the data in the fields for that end.

Selecting the OK command button at the bottom of the window generates the report. A **Full** or **Brief** report may be selected using the **Report Type** option located above the OK button.

The **Full** report contains all configured data for both DLCIs in each PVC requested. The **Brief** report contains only Node Name, Module Address, Port Number, Virtual Port (if applicable), DLCI, Group, PVC Service Address, and Custom IDs (if administered).

The second menu item is **View By PVC Number...**. When you click on this item, the **View By PVC Number: PVC Configuration Report** command window pops up. It supports the specification of a single PVC number or a range of PVC numbers for generation of a report containing one or more PVC records.

The **PVC Number** field at the top of the window will accept a single PVC number, or a range of PVC numbers, such as "1-10" for PVC numbers 1 to 10. The resulting report will contain PVC records matching the number(s) specified.

Selecting the last menu item, **Full List...**, gives you a list of all PVCs with Node Name, Module, Port, Virtual Port (if applicable), and DLCI for each end of each PVC.

Special Considerations

Database Values

If you use the **isql** command to view field values in the database, please recognize that not all field values will be initialized the same way.

The values for some fields are initialized to "-1" in the database. In most cases, if they are unused, they will retain that value. The values of some fields in the database are changed based on conditions of other fields or other characteristics,

such as module type, and might not retain the initialized value. Other fields are initialized to field-dependent default values.

File Management

Several operations involve the execution of complex database queries that are executed on one or more Core Systems and result in a file that is created in */usr/tmp* on the Graphics System or Co-resident system. The size of the file can be large, depending on the nature of the query and the size of your database. The file is not automatically cleaned up, unless you choose to use the **disk cleaner** capability to purge that directory of old files periodically. See the documentation in the **Using the Workstation Administration Application** chapter for a description of the **disk cleaner** capability.

Simultaneous Provisioning

Simultaneous database provisioning operations from two different Network Builder sessions can yield unpredictable results. If you have multiple Network Builder sessions in operation simultaneously, you will have to coordinate the database operations (additions, changes, and/or deletions) so that one set of operations does not negate or conflict with another. This applies to all Network Builder provisioning capabilities.

One example deals with submitting a transaction and then submitting a second transaction before the first one completes. Consider adding two new ports or PVCs. You submit the first and then want to re-use most of the data to submit the second one with minor differences, such as the port number, etc. Before the first transaction completes successfully, you submit the second one. The data you see in the second window could be different from what would appear if the first submit had completed (e.g. timeslots used by the first transaction would not be grayed out yet). The safest approach is to allow the first transaction to complete successfully before re-using its data.

General Trouble Recovery Procedure

The following steps can be taken to handle cases where one or more of the operations within a submitted task does not complete successfully. If the update (New, Load, Delete) attempt fails:

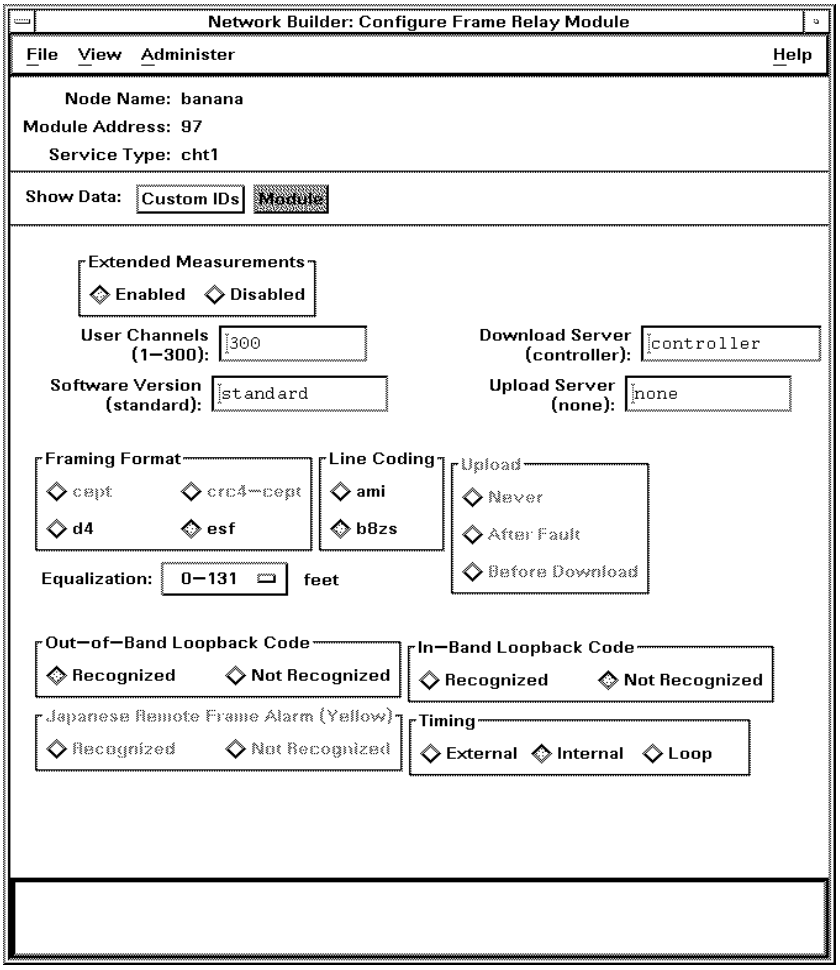
1. Make sure the task has stopped.
2. Cancel the task.
3. Fix the problem (based on the information displayed and contained in the task log message).

This step might involve using pass-through commands to the node controller to delete resources and using ISQL commands on the *StarKeeper* II NMS Core System to clean up partially submitted data.

4. Re-submit the task.

Configuring FRM and FRM-M2 Frame Relay Modules

This section provides details on M1 and M2 Frame Relay module configuration. Frame Relay modules must be configured before associated ports, virtual ports (if applicable), multicast DLCIs and PVCs can be configured. Please refer to the material presented earlier in this section for other information that may affect the Frame Relay module configuration task.



Screen 8-30. M1 Frame Relay Module Configuration Form (cht1)

M1 Frame Relay Module Parameters

Parameter	Description
Download Server	This field specifies the source of the software to be downloaded to the module. It must be a valid service address or the local **controller**.
E-Bits	This control is used to indicate whether E-bits are to be used or not by this module. E-bits are used to indicate a received errored sub-multiframe at the far end (i.e., code violations). E-bits are also referred to as REBE (remote end block error) bits. The E-bits are bit 1 of frames 13 and 15 of the CRC4 multiframe structure. If E-Bits are **enabled**, the E-bits will be used to report far-end code violations. Valid for **che1** only.

Parameter	Description
Equalization	This field specifies the distance, in feet, to the DSX-1 interface. This information is required by the Frame Relay module to ensure that the incoming DS1 signal is properly preserved. Use the option menu to obtain a list of valid entries. Valid for **cht1** only.
Extended Measurements	This setting specifies whether collection of additional DLCI measurements is **Enabled** or **Disabled**. This feature is valid for certain node releases and cannot be enabled if there are more than 300 DLCIs on this module.
Framing Format	This control is used to specify the desired framing format for **che1** and **cht1** service types. When there is a need to provide additional protection for frame alignment, and/or when there is a need for an enhanced error monitoring capability **crc4-cept** should be selected for **che1** module types.
I/O Board	This setting specifies the type of I/O board to be used for **che1** service. Both a 120-ohm symmetrical pair and a 75-ohm coaxial connection are supported.
Japanese Remote Frame Alarm (Yellow)	This setting specifies whether the Frame Relay module will recognize and indicate a yellow alarm defined by the DS1 standard implemented in Japan. Valid for **cht1** only.
Line Coding	This setting specifies the line coding technique - **ami** or **b8zs** (Bipolar Eight Zero Substitution) - to use for the DS1 signal. See **Special Considerations,** below. Valid for **cht1** only.
Out-of-band Loopback Code	This setting specifies whether the Frame Relay module is to recognize and respond to out-of-band loopback codes. When set to **Recognized**, the signal received is transmitted back. If the module is configured with an external CSU that recognizes these codes, this parameter should be set to **Not Recognized**. Valid for **cht1** only.
Si Bit Value	This setting specifies whether the Si bit value is 0 or 1. If the **Framing Format** is **cept,** the first bit of timeslot 0 can be configured to be set to 1 or 0. Setting this bit to 1 indicates the Si bit is disabled, and conversely setting it to 0 indicates the Si bit is enabled. This bit is reserved for international use. Valid for **cht1** only.
Software Version	This field is a string of 1 to 14 characters specifying the software version file name to be downloaded to the module. If **Download Server** is **controller, standard** should be entered as the file name. If **Download Server** is not **controller**, enter the file name of a valid software release.
Timing	This setting specifies the source used to synchronize the signal. The Frame Relay module can be configured to use an external timing source (external), internal timing source (internal), or timing derived from the facility (loop).

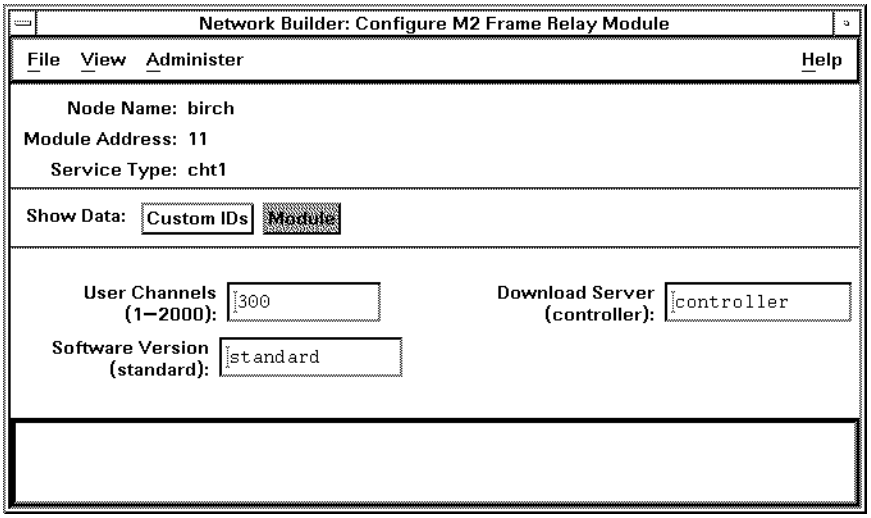
Parameter	Description
Upload	This setting indicates when an upload should occur: never, after a fault, or before a download. This control appears only when an upload server has been specified.
Upload Server	This field specifies the service address of a host that is to receive the module memory dump prior to the Control Computer initiating a download or after a fault.

Special Considerations

Line Coding

The line coding technique dictates how the DS1 equipment electrically encodes the data signal. **b8zs** is a data encoding technique that guarantees the DS1 signal will maintain a pulse density to allow DS1 equipment to synchronize properly on the DS1 signal. Use of **b8zs** requires that all connected DS1 equipment support **b8zs**. **ami** can be used if the equipment does not support **b8zs**. However, **ami**, unlike **b8zs**, does not guarantee that the DS1 signal will maintain the minimum pulse density required by DS1 equipment.

For the **che1** service type, the line coding technique is automatically set to **hdb3** coding. This is a bipolar code with a specific zero suppression scheme where no more than three consecutive zeros are allowed to occur. This data encoding technique guarantees the signal will maintain a pulse density to allow **E1** equipment to properly synchronize.



Screen 8-31. M2 Frame Relay Module Configuration Form (cht1)

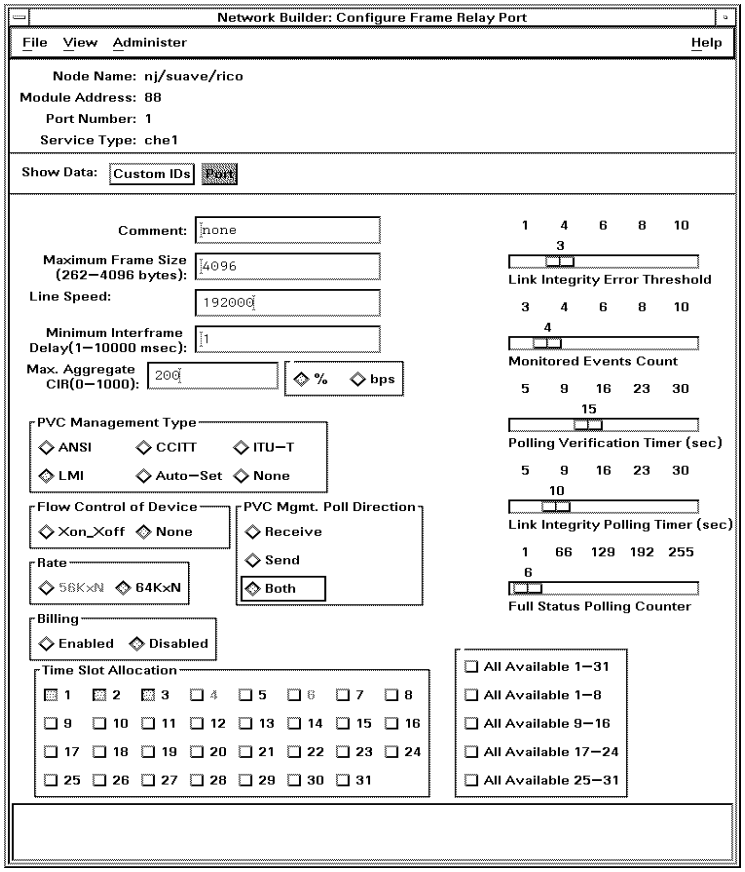
M2 Frame Relay Module Parameters

Parameter	Description
Download Server	This field specifies the source of the software to be downloaded to the module. It must be a valid service address or the local **controller**.
I/O Board	This setting specifies the type of I/O board to be used for **che1** service. Both a 120-ohm symmetrical pair and a 75-ohm coaxial connection are supported.
Software Version	This field is a string of 1 to 14 characters specifying the software version file name to be downloaded to the module. If **Download Server** is **controller, standard** should be entered as the file name. If **Download Server** is not **controller**, enter the file name of a valid software release.

Configuring Frame Relay Ports

This section provides details on Frame Relay port configuration. Frame Relay ports must be configured before associated DLCIs and PVCs can be configured. In addition, M2 physical ports must be configured before associated M2 virtual ports can be configured. The module on which a port resides must be configured prior to configuring the port. Please refer to the material presented earlier in this section for other information that may affect the Frame Relay port configuration task.

There are different types of ports to be configured depending on the type of Frame Relay service you are provisioning. M1 Frame Relay service supports a single port level referred to as *port*. M2 service supports two levels: *physical* and *virtual* ports. For a discussion of the components and their hierarchy refer to the section **Configuring Frame Relay Service**.



Screen 8-32. M1 Frame Relay Port Configuration Form (che1)

M1 Frame Relay Port Parameters

This section describes the M1 Frame Relay port parameters.

Parameter	Description
Flow Control of Device	This setting specifies what type of flow control to use when **PVC Management Type** is set to **LMI**. If set to **Xon_Xoff**, as the frame relay module detects that a PVC is about to enter a congested state, it will issue a status message to request that the local device cease transmitting frames on the PVC. The module will issue another asynchronous status message when it determines that the local device may resume transmitting frames on the PVC.

Parameter	Description
Full Status Polling Counter	This field specifies the frequency of polls requesting full status data. Unlike the **Link Integrity Polling Timer**, which is measured in milliseconds, this value is a number that specifies how frequently a polling cycle will include requests for the full status data. For instance, if the **Full Status Polling Counter** is set to 10, every tenth poll will request the full status data while the remainder of the polls will be limited to requests for the link integrity data.
Link Integrity Error Threshold	This field specifies the number of errored events that can occur before a link problem is declared. An errored event is the non-receipt of a status poll or the receipt of a status poll containing an invalid sequence number. The value chosen for the **Link Integrity Error Threshold** cannot exceed the value chosen for the **Monitored Events Count**.
Link Integrity Polling Timer	This field specifies the frequency, in seconds, of link integrity status polls. The selection of a value for this timer should be coordinated with the value chosen for the connected access device.
Max. Aggregate CIR	This field specifies a threshold for the sum of the Committed Information Rates (CIRs) for calls being established on the port. Valid entries are those listed next to the field label, and are dynamically calculated based on other parameter settings. If a CIR is not being used, the value 0 should be entered, which means that any call attempt where the remote end of the PVC requires a non-zero CIR will be rejected. In general, any call attempt that exceeds the specified threshold will be rejected. The threshold is based on the sum of the CIRs required for data transmitted from remote devices. The aggregate CIR may be up to ten times the port capacity, in bits per second (bps). Allowed values may be input as a percentage of the line speed or as the actual bps. Choose the desired setting to the right of the field to indicate the units you are using.
Maximum Frame Size	This field is a number from 262 to 4096 that specifies the maximum allowable frame size (in bytes) that the port can receive.
Minimum Interframe Delay	This field is a number from 1 to 10000 specifying the minimum delay (in microseconds) between the transmission of frames from the port to the access device. The default value of 1 results in no added delay. This delay, which is produced by transmitting flag characters, is required by access devices that cannot process frames at the maximum line rate.
Monitored Events Count	This field specifies a value that is used with the **Link Integrity Error Threshold** to determine link problems. A link problem will be declared when the number of errors in the count of monitored events exceeds the **Link Integrity Error Threshold**. The default value for **Monitored Events Count** field is the value of **Link Integrity Error Threshold**.

Parameter	Description
Polling Verification Timer	This field specifies the maximum number of seconds the port allows between the receipt of status polls. The expiration of this timer is considered to be an errored event as defined in the **Link Integrity Error Threshold**. The selection of a value for this timer must be coordinated with the value chosen for the connected access device.
PVC Management Poll Direction	This setting specifies the role the port will perform in a bi-directional PVC management scheme. The port, which will use the PVC management procedure selected for the **PVC Management Type** parameter, can be configured to respond to status enquiries (**Receive**), initiate status enquiries (**Send**), or perform both functions (**Both**).
PVC Management Type	This setting specifies the technique used to manage the interface between the access device and the Frame Relay port.
Rate	This setting specifies what rate - **56KxN** or **64KxN**, for clear channel operation - is to be used for the timeslots associated with this virtual port. Each DS1 frame contains 24, 8-bit timeslots. 56K coding forces one bit to be set to high for each timeslot in order to maintain the minimum pulse density requirements of some DS1 equipment. The remaining seven bits are used for user data, which provides 56 Kbps per timeslot. Clear channel operation uses the entire eight bits for user data, which yields 64 Kbps per timeslot.
Time Slot Allocation	This setting allows you to choose the desired timeslots from those remaining on this module. Inactive slots have already been assigned; highlighted slots are assigned to this port. Each Frame Relay port may be associated with one or more of the 24 DS1 timeslots for **cht1** service, or one or more of the 31 **E1** timeslots for **che1** service, depending on the required port speed.

Special Considerations

Flow Control of Device

If Flow Control of Device is set to "Xon_Xoff", as the Frame Relay module detects that a PVC is about to enter a congested state, it will generate an asynchronous status message (the R-bit will be set) to request that the local device cease transmitting frames on the PVC. The module will generate another asynchronous status message (the R-bit will be reset) when it determines that the local device may resume transmitting frames on the PVC.

PVC Management Type

Each port can be independently configured to use either the "ANSI", "CCITT", "LMI," or “ITU-T” PVC management procedures, or they can be configured as "Auto-Set", which causes the port to adopt the technique being used by the access device. The option "None" is provided to disable PVC management procedures on the port.

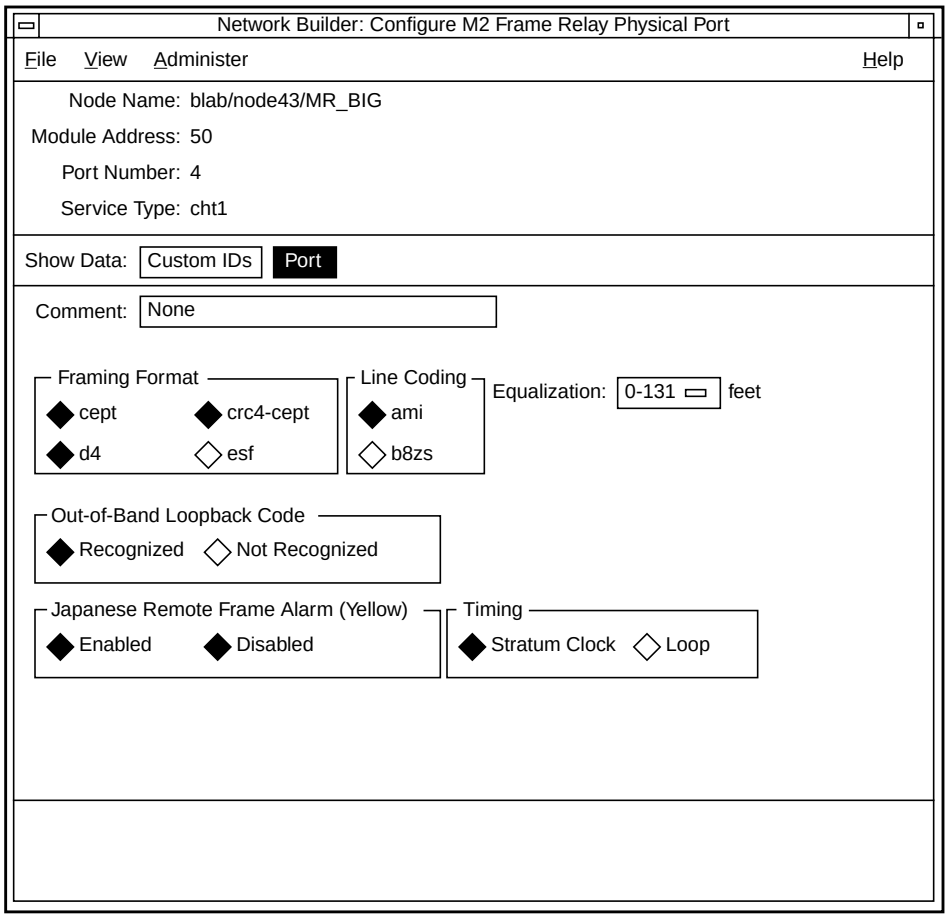
PVC management procedures provide the ability to verify the integrity of the link connecting the access device to the port and report the status of individual PVCs. The module verifies the link integrity by monitoring a series of events and defining the maximum allowable errors that may occur in a consecutive sequence of these events. The events being monitored are the receipt, or nonreceipt, of status enquiries from the access device.

An errored event is the nonreceipt of a "Status Enquiry" message, or invalid contents of the status message, such as an invalid sequence number. This information is obtained via status polling and it may be optionally initiated by the module, which supports bi-directional PVC management.

Related PVC management configuration parameters include defining the number of events to monitor, error threshold, and timers for receiving and generating status polls.

Maximum Frame Size

The maximum allowable frame size includes the information field of a frame, but does not include the bytes the frame relay protocol uses in the frame header. If a port receives a frame from an attached device that is larger than the specified value, it is discarded and an alarm is generated. The alarm is thresholded at one occurrence per five minutes. The maximum frame size that a port can receive should be greater than or equal to the frame size that the attached device transmits.



Screen 8-33. M2 Frame Relay Physical Port Configuration Form (cht1)

M2 Frame Relay Physical Port Parameters

This section describes the M2 Frame Relay physical port parameters.

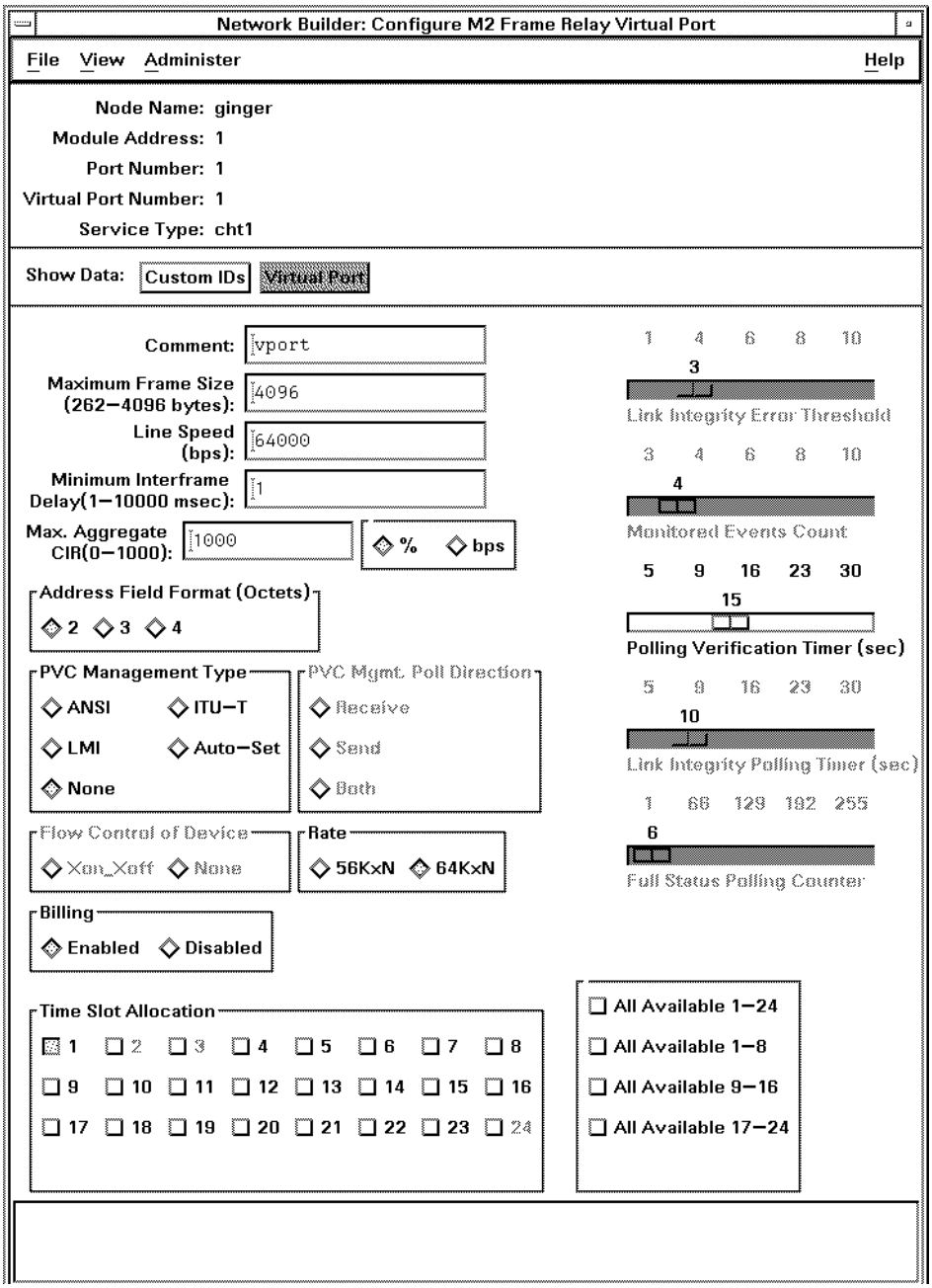
Parameter	Description
E-Bits	This control is used to indicate whether E-bits are to be used or not by this module. E-bits are used to indicate a received errored sub-multiframe at the far end (i.e., code violations). E-bits are also referred to as REBE (remote end block error) bits. The E-bits are bit 1 of frames 13 and 15 of the CRC4 multiframe structure. If E-Bits are **enabled**, the E-bits will be used to report far-end code violations. Valid for che1 only.
Equalization	This field specifies the distance, in feet, to the DSX-1 interface. This information is required by the Frame Relay module to ensure that the incoming DS1 signal is properly preserved. Use the option menu to obtain a list of valid entries. Valid for cht1 only.
Extended Measurements	This setting specifies whether collection of additional DLCI measurements is **Enabled** or **Disabled**. This feature cannot be enabled if there are more than 300 DLCIs on this module.
Framing Format	This control is used to specify the desired framing format for **che1** and **cht1** service types. When there is a need to provide additional protection for frame alignment, and/or when there is a need for an enhanced error monitoring capability **crc4-cept** should be selected for **che1** module types.
Japanese Remote Frame Alarm (Yellow)	This setting specifies whether the Frame Relay module will recognize and indicate a yellow alarm defined by the DS1 standard implemented in Japan. Valid for cht1 only.
Line Coding	This setting specifies the line coding technique - **ami** or **b8zs** (Bipolar Eight Zero Substitution) - to use for the DS1 signal. See **Special Considerations,** below. Valid for cht1 only.
Out-of-band Loopback Code	This setting specifies whether the Frame Relay physical port is to recognize and respond to out-of-band loopback codes. When set to **Recognized**, the signal received is transmitted back. If the module is configured with an external CSU that recognizes these codes, this parameter should be set to **Not Recognized**. Valid for cht1 only.
Si Bit Value	This setting specifies whether the Si bit value is 0 or 1. If the **Framing Format** is **cept,** the first bit of timeslot 0 can be configured to be set to 1 or 0. Setting this bit to 1 indicates the Si bit is disabled, and conversely setting it to 0 indicates the Si bit is enabled. This bit is reserved for international use. Valid for cht1 only.
Timing	This setting specifies the source used to synchronize the signal. The Frame Relay module can be configured to use the Stratum clock (**Stratum Clock**) as the timing source, or timing derived from the facility (**loop**).

Special Considerations

Line Coding

The line coding technique dictates how the DS1 equipment electrically encodes the data signal. **b8zs** is a data encoding technique that guarantees the DS1 signal will maintain a pulse density to allow DS1 equipment to synchronize properly on the DS1 signal. Use of **b8zs** requires that all connected DS1 equipment support **b8zs**. **ami** can be used if the equipment does not support **b8zs**. However, **ami**, unlike **b8zs**, does not guarantee that the DS1 signal will maintain the minimum pulse density required by DS1 equipment.

For the **che1** service type, the line coding technique is automatically set to **hdb3** coding. This is a bipolar code with a specific zero suppression scheme where no more than three consecutive zeros are allowed to occur. This data encoding technique guarantees the signal will maintain a pulse density to allow **E1** equipment to properly synchronize.



Screen 8-34. M2 Frame Relay Virtual Port Configuration Form (cht1)

M2 Frame Relay Virtual Port Parameters

This section describes the FRM-M2 virtual port parameters.

Parameter	Description
Address Field Format	This field specifies the address field (DLCI) format in octet units. The minimum (default) length of the address field is two octets. This can be extended to three or four octets to support a larger DLCI address range at the user-network interface or the network-network interface (based on bilateral agreement). The value set here will affect the range of valid DLCIs that can be assigned to this port.
Flow Control of Device	This setting specifies what type of flow control to use when **PVC Management Type** is set to **LMI**. If set to **Xon_Xoff**, as the frame relay module detects that a PVC is about to enter a congested state, it will issue a status message to request that the local device cease transmitting frames on the PVC. The module will issue another asynchronous status message when it determines that the local device may resume transmitting frames on the PVC.
Full Status Polling Counter	This field specifies the frequency of polls requesting full status data. Unlike the **Link Integrity Polling Timer**, which is measured in milliseconds, this value is a number that specifies how frequently a polling cycle will include requests for the full status data. For instance, if the **Full Status Polling Counter** is set to 10, every tenth poll will request the full status data while the remainder of the polls will be limited to requests for the link integrity data.
Link Integrity Error Threshold	This field specifies the number of errored events that can occur before a link problem is declared. An errored event is the non-receipt of a status poll or the receipt of a status poll containing an invalid sequence number. The value chosen for the **Link Integrity Error Threshold** cannot exceed the value chosen for the **Monitored Events Count**.
Link Integrity Polling Timer	This field specifies the frequency, in seconds, of link integrity status polls. The selection of a value for this timer should be coordinated with the value chosen for the connected access device.
Max. Aggregate CIR	This field specifies a threshold for the sum of the CIRs for calls being established on the port. Valid entries are those listed next to the field label, and are dynamically calculated based on other parameter settings. If a CIR is not being used, the value 0 should be entered, which means that any call attempt where the remote end of the PVC requires a non-zero CIR will be rejected. In general, any call attempt that exceeds the specified threshold will be rejected. The threshold is based on the sum of the CIRs required for data transmitted from remote devices. The aggregate CIR may be up to ten times the port capacity, in bits per second (bps). Allowed values may be input as a percentage of the line speed or as the actual bps. Choose the desired setting to the right of the field to indicate the units you are using.

Parameter	Description
Maximum Frame Size	This field is a number from 262 to 4096 that specifies the maximum allowable frame size (in bytes) that the port can receive.
Minimum Interframe Delay	This field is a number from 1 to 10000 specifying the minimum delay (in microseconds) between the transmission of frames from the port to the access device. The default value of 1 results in no added delay. This delay, which is produced by transmitting flag characters, is required by access devices that cannot process frames at the maximum line rate.
Monitored Events Count	This field specifies a value that is used with the **Link Integrity Error Threshold** to determine link problems. A link problem will be declared when the number of errors in the count of monitored events exceeds the **Link Integrity Error Threshold**. The default value for **Monitored Events Count** field is the value of **Link Integrity Error Threshold**.
PVC Management Poll Direction	This setting specifies the role the port will perform in a bi-directional PVC management scheme. The port, which will use the PVC management procedure selected for the **PVC Management Type** parameter, can be configured to respond to status enquiries (**Receive**), initiate status enquiries (**Send**), or perform both functions (**Both**).
PVC Management Type	This setting specifies the technique used to manage the interface between the access device and the Frame Relay virtual port.
Polling Verification Timer	This field specifies the maximum number of seconds the port allows between the receipt of status polls. The expiration of this timer is considered to be an errored event as defined in the **Link Integrity Error Threshold**. The selection of a value for this timer must be coordinated with the value chosen for the connected access device.
Rate	This setting specifies what rate - **56KxN** or **64KxN**, for clear channel operation - is to be used for the timeslots associated with this virtual port. Each DS1 frame contains 24, 8-bit timeslots. 56K coding forces one bit to be set to high for each timeslot in order to maintain the minimum pulse density requirements of some DS1 equipment. The remaining seven bits are used for user data, which provides 56 Kbps per timeslot. Clear channel operation uses the entire eight bits for user data, which yields 64 Kbps per timeslot.
Time Slot Allocation	This setting allows you to choose the desired timeslots from those remaining on this module. Inactive slots have already been assigned; highlighted slots are assigned to this port. Each Frame Relay port may be associated with one or more of the 24 DS1 timeslots for **cht1** service, or one or more of the 31 **E1** timeslots for **che1** service, depending on the required port speed.

Special Considerations

Flow Control of Device

If Flow Control of Device is set to "Xon_Xoff", as the Frame Relay module detects that a PVC is about to enter a congested state, it will generate an asynchronous status message (the R-bit will be set) to request that the local device cease transmitting frames on the PVC. The module will generate another asynchronous status message (the R-bit will be reset) when it determines that the local device may resume transmitting frames on the PVC.

PVC Management Type

Each virtual port can be independently configured to use either the "ANSI", "ITU-T", or "LMI" PVC management procedures, or they can be configured as "Auto-Set", which causes the virtual port to adopt the technique being used by the access device. The option "None" is provided to disable PVC management procedures on the virtual port.

PVC management procedures provide the ability to verify the integrity of the link connecting the access device to the virtual port and report the status of individual PVCs. The module verifies the link integrity by monitoring a series of events and defining the maximum allowable errors that may occur in a consecutive sequence of these events. The events being monitored are the receipt, or nonreceipt, of status enquiries from the access device.

An errored event is the nonreceipt of a "Status Enquiry" message, or invalid contents of the status message, such as an invalid sequence number. This information is obtained via status polling and it may be optionally initiated by the module, which supports bi-directional PVC management.

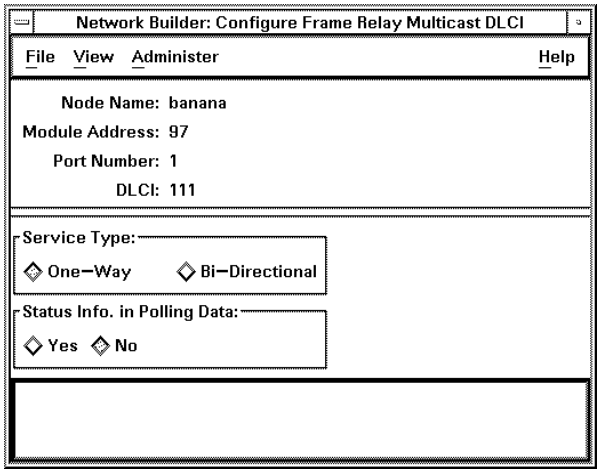
Related PVC management configuration parameters include defining the number of events to monitor, error threshold, and timers for receiving and generating status polls.

Maximum Frame Size

The maximum allowable frame size includes the information field of a frame, but does not include the bytes the frame relay protocol uses in the frame header. If a virtual port receives a frame from an attached device that is larger than the specified value, it is discarded and an alarm is generated. The alarm is thresholded at one occurrence per five minutes. The maximum frame size that a virtual port can receive should be greater than or equal to the frame size that the attached device transmits.

Configuring Frame Relay Multicast DLCIs

A PVC DLCI may be configured (using the PVC configuration form) to belong to a specified multicast DLCI group. When data arrives for a multicast DLCI it will be transmitted over all the DLCIs belonging to that multicast DLCI's group. Use of multicast DLCIs is optional, but they must be configured before they can be assigned to PVC DLCIs. This section applies to both M1 and M2 service.



Screen 8-35. Frame Relay Multicast DLCI Configuration Form

Frame Relay MC DLCI Parameters

Parameter	Description
Service Type	This field specifies whether the DLCI is a one-way or bi-directional multicast DLCI. A one-way multicast DLCI allows the access devices to transmit frames to multiple endpoints; each endpoint receives frames as if they were transmitted over the PVC to that endpoint. A one-way multicast DLCI may be used only for the transmission of frames from the access device to the Frame Relay module; frames are never transmitted by the module on a one-way multicast DLCI. A bi-directional multicast DLCI allows access devices to transmit and receive frames from multiple endpoints. This type of multicast DLCI may be used to support the Frame Relay Forum's two-way and n-way types of service. The fundamental difference between one-way and bi-directional multicast is that frames are transmitted and received over multicast DLCIs in the bi-directional case, while they are transmitted over multicast DLCIs and received through PVC DLCIs in the one-way service.
Status Info. in Polling Data	This field specifies whether the Frame Relay module response to full status requests should include a PVC status message for each multicast DLCI.

Configuring Frame Relay PVCs

This section provides details on Frame Relay PVC configuration. The module and ports and virtual ports (if applicable) on which the two ends of a PVC terminate must be configured prior to configuring the PVC. Also, any multicast DLCIs to be assigned to a PVC must be configured first. Please refer to the material presented earlier in this section for other information that may affect the Frame Relay PVC configuration task.

PVC configuration is supported by a form which accepts data for both DLCIs defining the two ends of the PVC. This form applies only to DLCIs with a service type "PVC" (multicast DLCIs are configured via a separate form).

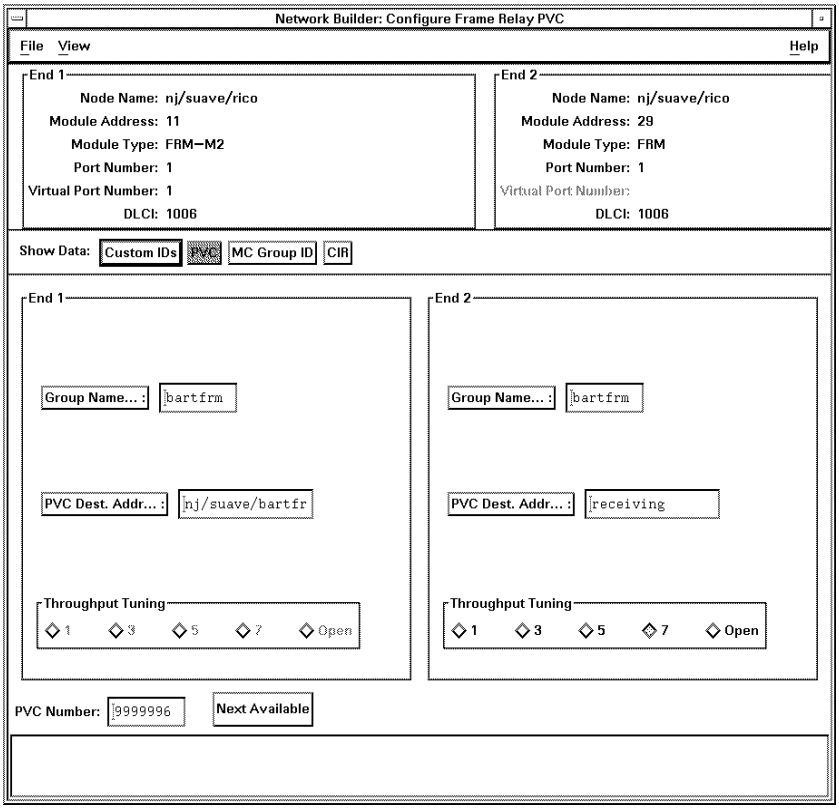
Task Notes

- Loading a PVC
  PVCs can be loaded in either of two ways: *By PVC Number* or *By Address.* Loading *by address* requires complete specification of at least one endpoint of the PVC; loading *by number* requires entry of the PVC Number that was assigned during "New" configuration. The PVC Configuration Report assists in finding desired PVCs and determining their PVC numbers, based on identifiers that you can provide.
- Getting the Next Available PVC Number
  The **PVC Number** field has a button associated with it labeled **Next Available** which will enter the next available PVC number into the field. “Next Available” is defined as the number following the highest number used. As a result, any unused numbers that are lower than the highest in use will not be provided by this button. You may manually enter a number of your choice at any time; follow the entry by the Enter key to get immediate confirmation of the availability of that number. New numbers are validated against committed and pending (but not proposed) transactions.
- Group and Service Address Lists
  The group name choose list will initially show local 2-way groups. A **Configure** button in the group name choose list window is provided for you to do group name configuration.

  A service address choose list with a **Configure** button is provided for you to choose a local service address or configure a new service address. The physical address portion of the other end (module.port.dlci or module.port.virtualport.dlci) is appended for an originating DLCI of a PVC before entry into the field when a service address is chosen or entered. You will have to enter two-level or three-level addresses manually, since only local service addresses are provided in the choose list.
- Multicast DLCI List
  A multicasting group id choose list with both one-way and bi-directional multicast DLCIs is provided. The bi-directional multicast DLCI on the

scrolling list will have " [B] " appended to the DLCI number. Up to four multicast DLCIs may be selected. No more then one bi-directional multicast DLCI may be selected.

- One-sided PVCs
  Configuration of one-sided PVCs (that is, a single PVC DLCI) is supported. This is to accommodate a variety of scenarios:
  - PVCs at the edge of the monitored network
  - one-sided PVCs resulting from erroneous deletion at a console
  - one-sided PVCs resulting from a hierarchical delete of a module or port
  - one-sided PVCs resulting from initial migration of incomplete node data (see **Using Existing Configuration Data** earlier in this section).
- Changing a PVC Number
  The PVC number of existing PVCs can be changed as easily as any other field on the PVC form. Simply load the PVC, change the PVC number, and then resubmit the PVC form.
- Multiple Originating DLCIs
  Network Builder will not allow multiple originating DLCIs to connect to a single receiving DLCI.
- Transforming One-Sided PVCs
  If you have a one-sided PVC and want to make it a two-sided PVC, you have to delete the PVC and re-enter the data.



Screen 8-36. Frame Relay PVC Configuration Form (PVC Pane)

Frame Relay PVC Parameters

Parameter	Description
CIR From Local	This field, if enabled, specifies the CIR for data transmitted on the PVC from the local device through the network via the FRM or FRM-M2. The maximum value for the CIR is limited to the line speed of the port linking the FRM or FRM-M2 to the local device.
CIR From Remote	This field, if enabled, specifies the CIR for data transmitted on the PVC from the remote device through the network (via the FRM or FRM-M2) to the local device. The maximum value for the CIR is limited to the line speed of the port linking the FRM or FRM-M2 to the remote device. This field will be disabled if the Max. Aggregate CIR parameter on the local port is set to zero.
Committed Burst Local	This field, if enabled, specifies the committed burst for data transmitted on the PVC from the local device through the network via the FRM or FRM-M2. The size of the committed burst (Bc) is specified in bits, based on the CIR from the local device. Bc is derived as follows: Bc = T * CIR (where: T is a time value)

Parameter	Description
Committed Burst Local *(continued)*	An option menu with all calculated Bc values may be displayed depending on the release of the node being provisioned.
Committed Burst Remote	This field, if enabled, specifies the committed burst for data transmitted on the PVC from the remote device through the network (via the FRM or FRM-M2) to the local device. The size of the committed burst (Bc) is specified in bits, based on the CIR from the remote device. An option menu with all calculated Bc values may be displayed depending on the release of the node being provisioned. This field will be disabled if the Max. Aggregate CIR parameter on the local port is set to zero.
Excess Burst Local	This field, if enabled, specifies the excess burst for data transmitted on the PVC from the local device through the network via the FRM or FRM-M2. The size of the excess burst (Be) may be specified in bits, or it may be entered as a percentage of the port line speed. However, specification as a percentage is only allowed if the value entered for *CIR From Local* is less than the local port line speed. If a percentage is entered, the system calculates the maximum possible value of Be, Be(max) so that the sum of Bc and Be(max) equals the maximum port line speed. It then applies the specified percentage to Be(max) to obtain Be. The following illustrates how Be is derived from Be(max) for FRM: Be(max) = (LS * T) - Bc Be = Be(max) * P where: P is the specified percentage, LS is the maximum port line speed (in bps). T is the time interval (in seconds) selected when Bc (committed burst) was specified. The following illustrates how Be is derived from Be(max) for FRM-M2: Be(max) = (LS - CIR)* T Bc = T* CIR where: LS is the line speed (in bps) of the local FRM-M2 virtual port. T is the time interval (in seconds) selected when Bc (committed burst) was specified. The field appears if CIR for this DLCI is enabled and CIR from the local device is not equal to the port line speed of this end. When you switch units from "%" to "bits" or vice versa, the value for excess burst from local device is converted and displayed in the field.

Parameter	Description
Excess Burst Remote	This field, if enabled, specifies the excess burst for data transmitted on the PVC from the remote device through the network to the local device via the FRM or FRM-M2. The size of the excess burst (Be) may be specified in bits or it may be entered as a percentage of the port line speed. However, specification as a percentage is only allowed if the value entered for *CIR From Remote* is less than the remote port line speed. If a percentage is entered, the system calculates the maximum possible value of Be, Be(max), so that the sum of Bc and Be(max) equals the maximum port line speed. It then applies the specified percentage to Be(max) to obtain Be. When you switch units from "%" to "bits" or vice versa, the value for excess burst from remote device is converted and displayed in the field.
Group Name	This field is a string of 1 to 8 characters that identifies a bundle of DLCIs as a logical group. DLCIs cannot be mixed in the same group with other module types. Only two-way groups are allowed so the end-point may originate or receive a call. Any number of DLCIs may be associated with one group. The assignment of DLCIs to groups only has significance if the administrator intends to make use of the originating group security feature offered by BNS-2000 VCS and BNS-2000.
Multicast DLCI Group ID	A PVC DLCI can be configured to belong to a specified multicast DLCI group. If data arrives (from the connected equipment) for a multicast DLCI, it will be transmitted over the DLCIs belonging to that multicast DLCI's group.
PVC Destination Address	This field is a string of 1 to 72 characters that specifies the permanent virtual circuit destination, or the service address (module, port, and DLCI) to which the DLCI is to be connected. If entered, the DLCI is assumed to be the originating endpoint for the DLCI connection pair. The string “receiving” is used to designate this end's DLCI as the receiving endpoint for the PVC. The "PVC Dest. Address" has the form: [network/][area/][exchange/]local.physical port address where: network, area, exchange, and local are service addresses defined at the specified level, and the physical port address has the form: [concentrator/]module.port.dlci for M1 module.pport.vport.dlci for M2 Use the abbreviated command button to obtain a choose list with all the local service addresses configured in the node of the other end. If a service address is selected from the choose list, the physical port address portion of the other end (module.port.dlci) will be appended before entry into the field. You can always override any portion of the address entered into this field at any time.

Parameter	Description
PVC Number	The PVC number is a number from one to eight digits (1 to 99999999), unique in the network used as an identifier. This number is used to identify a pair of DLCIs that make up a PVC. Refer to the beginning of this section for more information related to PVC numbering.The Next Available button next to this field will enter the next available PVC number into the field when pressed. See the corresponding Task Note for more information.
Tuning (M1 only)	This field specifies the throughput tuning value of the PVC connection over various trunk types in the network. The tuning value entered indicates the size of the data window that will be transmitted through the network. When set to a lower value, throughput tuning limits the network resources that the DLCI can consume. If the PVC is routed over a trunk with heavy interactive traffic and the traffic begins to experience delays, throughput tuning should be set to a lower value. If the PVC is routed over a trunk that covers a long distance, throughput tuning should be set to a higher value to attain higher throughput.

Trouble Recovery Scenarios

The following contains additional information that will be useful if a problem occurs when you submit a new two-sided PVC. Because this operation involves more steps than entering a new module, port, or virtual port, it can illustrate the kinds of steps that would apply when you encounter problems in configuring those resources as well.

New PVC

When you submit a new PVC, the following activities occur:

a. Data for End 1 is entered on its node.

b. Data for End 1 is entered in the *StarKeeper* II NMS Core System database.

c. Data for End 2 is entered on its node.

d. Data for End 2 is entered in the *StarKeeper* II NMS Core System database.

e. The DLCI for End 1 is put into service on its node.

f. The DLCI for End 2 is put into service on its node.

If an error occurs during any step above, you can perform the corresponding step below to recover:

a. Use Network Builder to cancel the transaction, reconfigure this PVC, and resubmit.

b. Use the pass-through capability to delete the End 1 DLCI,

delete -n nodename frm d modaddr portnum [vportnum] end1_dlci

Use Network Builder to cancel the transaction, reconfigure this PVC, and resubmit.

c. Use Network Builder to cancel the transaction, delete the one-sided PVC, and configure the new PVC again

d. Use the pass-through capability to delete the End 2 DLCI,

delete -n nodename frm d modaddr portnum [vportnum] end2_dlci

Use Network Builder to cancel the transaction, delete the one-sided PVC, and configure the new PVC again.

e. Use the pass-through capability to restore the End 1 and End 2 DLCIs,

restore -n nodename frm d modaddr portnum [vportnum] end1_dlci

restore -n nodename frm d modaddr portnum [vportnum] end2_dlci

f. Use the pass-through capability to restore the End 2 DLCI,

restore -n nodename frm d modaddr portnum [vportnum] end2_dlci

Changed PVC

When you submit a change to a PVC, the following activities occur:

a. The End 1 DLCI is removed from service on its node.

b. Data for End 1 is changed on its node.

c. Data for End 1 is changed in the *StarKeeper* II NMS Core System database.

d. The End 2 DLCI is removed from service on its node.

e. Data for End 2 is changed on its node.

f. Data for End 2 is changed in the *StarKeeper* II NMS Core System database.

g. The DLCI for End 1 is restored to service on its node.

h. The DLCI for End 2 is restored to service on its node.

If an error occurs during any step above, you can perform the corresponding step below to recover:

a. Use Network Builder to cancel the transaction, reconfigure this PVC, and resubmit.

b. Use Network Builder to cancel the transaction, reconfigure this PVC, and resubmit.

c. Run the **skload** or **cfg_sync** command to synchronize the DLCI data. Use Network Builder to cancel the transaction, reconfigure this PVC, and resubmit.

d. Use Network Builder to cancel the transaction, **Load** the PVC, reconfigure End 2 only, since data for End 1 has been applied to both the node and the *StarKeeper* II NMS databases, and resubmit.

e. Use Network Builder to cancel the transaction, **Load** the PVC, reconfigure End 2 only, since data for End 1 has been applied to both the node and the *StarKeeper* II NMS databases, and resubmit.

f. Run the **skload** or **cfg_sync** command to synchronize the DLCI data. Use Network Builder to cancel the transaction, reconfigure End 2 only for this PVC, and resubmit.

g. Use the pass-through capability to restore the End 1 and End 2 DLCIs,

restore -n nodename frm d modaddr portnum [vportnum] end1_dlci

restore -n nodename frm d modaddr portnum [vportnum] end2_dlci

h. Use the pass-through capability to restore the End 2 DLCI,

restore -n nodename frm d modaddr portnum [vportnum] end2_dlci

The recovery procedures for a one-sided PVC are similar to those for a two-sided PVC.

Deleting a PVC

When you submit a request to delete a PVC, the following activities occur:

a. The End 1 DLCI is removed from service on its node.

b. Data for the End 1 DLCI is deleted from its node.

c. Data for the End 1 DLCI is deleted from the *StarKeeper* II NMS Core System database.

d. The End 2 DLCI is removed from service on its node.

e. Data for the End 2 DLCI is deleted from its node.

f. Data for the End 2 DLCI is deleted from the *StarKeeper* II NMS Core System database.

If an error occurs during any step above, you can perform the corresponding step below to recover:

a. Use Network Builder to cancel the transaction and delete again.

b. Use Network Builder to cancel the transaction and delete again.

c. Use the pass-through capability to enter the End 1 DLCI data on the node again. Use Network Builder to cancel the transaction and delete again.

d. Use Network Builder to cancel the transaction, and delete the PVC as a one-sided PVC.

e. Use Network Builder to cancel the transaction, and delete the PVC as a one-sided PVC.

f. Use the pass-through capability to enter the End 2 DLCI on the node again. Use Network Builder to cancel the transaction, and delete the PVC as a one-sided PVC.

Using Network Builder to Analyze Your Network

9

This chapter explains the Connectivity Analysis and Session Maintenance simulation tools of the *StarKeeper* II NMS Network Builder. It contains the following information:

- overall functions of the Connectivity Analysis and Session Maintenance simulation tools
- constraints and limitations
- Connectivity Analysis input and output data
- how to use the Connectivity Analysis tools
  - — analyzing a new network
  - — checking the routing of an existing network
  - — using “What If...” scenarios to optimize network connectivity or analyze changes
- how to use the Session Maintenance simulation tool
- examples of using the analysis tools
- troubleshooting

Overall Functions

This section explains the functions performed by the Connectivity Analysis and Session Maintenance simulation tools. These tools provide connectivity analysis for the trunk groups and routing in a network, and simulation modeling of Session Maintenance performance under failure conditions. The main features of these tools are:

The Connectivity Analysis tools use data loaded from the *StarKeeper* II NMS Core System database, or accept input directly from the user. The Session Maintenance simulation tool loads its data from the *StarKeeper* II NMS Core System database. The next sections provide summaries of these tools.

Connectivity Analysis	The Connectivity Analysis tools examine the network of nodes, trunk connections, and routing that represents your network. They detect a variety of types of errors in the connectivity and routing, and provide recommendations on ways to correct them. They generate reports you can use to optimize the connectivity and routing for a new network, or to modify an existing network. They allow you to change the data model representing the network, and analyze the results of these changes as "What If..." scenarios. After all errors are eliminated from the input data, the Connectivity Analysis tools recommend a set of reliable alternative routing patterns for the network.
Session Maintenance Trunk Failure Simulation	The Session Maintenance simulation tool simulates the performance of Session Maintenance routing under failure conditions. It reports on Session Maintenance trunks, channel sets, active and standby bandwidth, and reroute connectivity. This tool enables you to predict the results of Session Maintenance events. By inspecting these results, you can adjust the Session Maintenance parameters for the network until you obtain satisfactory results.

Connectivity Analysis

Reliable alternative routing implies the absence of dead ends and call-looping in routing administration. As the number of nodes and trunks in a network increases, the problem of designing reliable alternative routing becomes extremely complex. For a network of more than a few nodes, optimizing the trunk group connectivity and routing requires an automated approach. For this purpose, Network Builder provides a set of connectivity analysis tools to assist you. These tools enable you to optimize both connectivity and routing using "What If..." scenarios to analyze the effect of changes. "What If..." scenarios are explained later in this section.

The Network Builder connectivity analysis tools consist of the following tools:

- Topology Evaluation
- Routing Evaluation
- Path Analysis

NOTE:
The Connectivity Analysis tools analyze the topology of networks, based on defined nodes and trunks in the network; the network routing, based on first and second choice routing assignments; and the paths between endpoints for trunk failure or node failure conditions. None of these tools use traffic characteristics, bandwidth requirements, or other considerations in their routing recommendations.

Designs

The connectivity analysis tools work with a model of the network: a collection of data called a *design*. A design contains node address and topology input data, routing input data, and reports generated by the Connectivity Analysis tools. A design must contain data before the tools can run. In general, data can be created for a design in two ways:

- *Committed data* includes node configuration data, trunk configuration data, and routing data loaded from the *StarKeeper* II NMS Core System database. When a design contains only committed data with no changes, it reflects the actual configuration of the network.
- Other data can be entered directly into the model, using input data panes provided by the Connectivity Analysis tools. This type of data may be limited to "What If..." changes to data loaded from the *StarKeeper* II NMS Core System database, or it may be a complete network model entered in the input data panes.

The *current* design contains the network connectivity and routing data that you have loaded or generated, and that you are working on at the moment. A *saved* design is a design that has been saved previously during a Connectivity Analysis session. Each saved design is identified by a name that you assign when saving it. You can display either the current data or the last data saved for a design in the View windows.

If you want to study and compare the effect of several changes to a design, you can simply save each configuration with a different design name. To use one of the alternative designs, you can just load its data. The Connectivity Analysis tools allow you to save up to 40 designs.

The Connectivity Analysis tools analyze one design at a time. While you are working on a design, its data is reserved for exclusive access by the current instance of Connectivity Analysis. If you call up another instance of Connectivity Analysis through the Network Builder control window, you can use it to analyze another design, but not the one that you are already analyzing.

Network Structure

Network nodes can be connected in a variety of ways to form different structures. The key distinction, for connectivity analysis, is between *flat* networks and *hierarchical* networks.

- A *flat* network is organized so that all of the nodes are in one network or area, or are all separate networks. In a flat network, it is not necessary for a call to be routed to a higher addressing level to reach another node. The Connectivity Analysis tools are designed to work correctly with flat networks.
- A *hierarchical* network is organized so that nodes are separated into different areas and exchanges. In a hierarchical network, a call may need to be routed from the originating node to a different exchange, area, or network to reach the destination node. The Connectivity Analysis tools do not handle hierarchical networks. These tools may be useful for analyzing subnetworks within a hierarchical network, such as all the nodes in one exchange or area, but they cannot analyze such a network as a whole.

The Connectivity Analysis tools are particularly useful for analyzing the connectivity and routing within new networks that use flat addressing.

Topology Evaluation

The Topology Evaluation tool analyzes the *topology* of a network—the arrangement of trunk groups connecting the nodes. It determines whether the network has sufficient trunks between nodes to support robust *utility routing*—enabling a call to be routed from any node to any other node in the network—for normal and failure scenarios. It performs this analysis for primary and secondary routes; it does not consider third and fourth choice routes.

In its analysis, the Topology Evaluation tool searches for *dead-end*, *call-looping*, and *call-blocking* conditions.

- A dead-end condition occurs when a call setup request reaches a node with no acceptable outgoing trunk groups, and cannot be routed further. This can be caused by a trunk group or node failure, or it may be due to an error in the initial input data.
- A call-looping condition occurs when the path of a call setup request leads back to one of the nodes it has already passed through. This condition is generally caused by a trunk group or node failure, or it may be caused by an error in the initial input data.
- A call-blocking condition is noted when a call setup request fails due to a node failure, and the network is being evaluated for *node diversity*. Node diversity in a network means that there is at least one path remaining from any source to any destination following any single node failure.

If the network lacks sufficient connectivity, the Topology Evaluation tool generates the best recommended routing patterns, lists connectivity errors, and identifies the location and type of each error. It also recommends corrective actions to eliminate the errors. Using the Connectivity Analysis input data panes to make corrections, you can use “What If...” scenarios to evaluate and improve the corrected network connectivity.

If the network has sufficient connectivity, the Topology Evaluation tool generates error-free routing patterns for every node in the network. Even if routing patterns exist for this network, the Topology Evaluation tool ignores them and generates completely new ones.

Routing Evaluation

The Routing Evaluation tool checks the existing routing for a network. Like the Topology Evaluation tool, it searches for dead-end routes, call looping paths, and call-blocking paths. In addition, the Routing Evaluation tool detects the following:

- primary routes which do not satisfy the *minimum hop criterion*. The minimum hop criterion is based on the number of hops in the shortest route between two nodes. If the primary route contains more hops than the minimum, it does not meet the minimum hop criterion.
- no assignment of either primary route, secondary route, or both

The Routing Evaluation tool tries to find error-free routing with the least amount of change to the existing routing pattern for each destination address. This is important when you modify or analyze an existing network in which the routing is based on available trunk bandwidth, traffic, or other considerations that the Routing Evaluation tool does not include in its analysis. The Routing Evaluation tool generates new routing patterns only if the network has sufficient connectivity. If the design contains errors, the Routing Evaluation tool lists them along with recommendations for corrective actions. Using the Connectivity Analysis input data panes to make corrections, you can use “What If...” scenarios to evaluate and create error-free routing.

Differences Between Topology Evaluation and Routing Evaluation

The Topology Evaluation and Routing Evaluation tools differ as shown in the following table.

Table 9-1. Differences Between Topology Evaluation and Routing Evaluation

Topology Evaluation	Routing Evaluation
Does not require any existing routing.	Evaluates the existing routing for a destination address, and determines whether problems exist. If there is no existing routing, and the network connectivity is good, the tool generates completely new routing.
Generates best recommended routing patterns for an entire network in one run.	Produces the recommended routing pattern for one destination address per run.
Generates best recommended routing every time it completes a run.	Generates recommended routing only if the existing routing has errors and the network has good connectivity; if the existing routing has no errors, no recommendation is output.

Path Analysis

The Path Analysis tool can be run after either the Topology Evaluation tool or Routing Evaluation tool has completed an **error-free** run. It performs an exhaustive analysis of every path leading from a given source address to a specified destination. You can pick whether to analyze paths under node failure or trunk group failure conditions.

- If you pick node failure, the Path Analysis tool analyzes the effect of any single node failure on all possible paths from source to destination.
- If you pick trunk group failure, the Path Analysis tool analyzes all possible paths from source to destination with no trunk group failures, any single trunk group failure, and any two trunk group failures.

Input to the Path Analysis tool can come from either Topology Evaluation or Routing Evaluation. In addition, the data generated by those tools depends on whether the evaluation was done with the node diversity option. Thus, you can specify one of the following input sources:

- Topology Evaluation
- Node-Diverse Topology Evaluation
- Routing Evaluation
- Node-Diverse Routing Evaluation

The output from the Path Analysis tool shows *completed*, *crankback*, *route-advanced*, and *blocked* paths under normal and failure conditions.

- A completed path occurs when a call can be routed successfully from source to destination.
- A crankback path occurs when a call is dropped back to the originating node to try an alternate path due to a trunk group or node failure.
- A route-advanced path occurs when a call cannot be routed normally from a node, and the route advance algorithm is used to find an alternate trunk.
- A blocked path occurs when a call setup request fails due to a trunk group or node failure.

You can use this information to locate possible points of failure in the network, then change the routing to improve its robustness. The Path Analysis reports can be used as a static call trace of each path, to pinpoint the possible source of problems in the network. They show the maximum number of hops between source and destination, so this information can be used to reduce the number of hops.

The Path Analysis tool does not search for problems and make recommendations for changes, as the Topology and Routing Evaluation tools do. It takes the error-free routing generated by the other tools, and analyzes the effect of failures on that routing. What that may mean in terms of network performance is a matter for you to interpret. If you find the need to change the routing based on the Path Analysis reports, you can use “What If...” analysis to develop connectivity and routing that is better for your purposes.

Session Maintenance Simulation Tool

The Session Maintenance simulation tool models the performance of the Session Maintenance feature of your network under trunk failure conditions. For input, it can use two types of data:

- *committed* data—including node configuration data, trunk configuration data, and node reroute tables (NRTs) loaded from the *StarKeeper* II NMS Core System database
- *pending* data—entered using the Network Builder Configuration tools, but not yet downloaded to the *StarKeeper* II NMS Core databases and to the nodes in the network. It includes node data, trunk data, and NRTs created by the Network Builder configuration tasks in this Graphics System only. Note that pending data from other *StarKeeper* II NMS workstations is not available at this Graphics System.

Committed and pending data together make up the entire network configuration as defined by data available at this Graphics System. Before running the Session Maintenance simulation tool, you can choose whether to use only committed data, or to use both committed and pending data. Using this configuration data, the Session Maintenance simulation tool models the effect of various trunk failures, as specified in the **Run: Session Maintenance Simulation** command window. The command window allows you to specify which trunks fail during the simulation, and whether the failures occur concurrently, sequentially, or overlapped. The Session Maintenance simulation tool models the actions of the nodes as they reroute channel sets under the simulated failure conditions. It records the results and generates a set of reports based on the simulation.

Using the Connectivity Analysis Tools

This section explains the basic features of the Connectivity Analysis tools, including their overall constraints and limitations, the user interface, and how to use the input data panes.

Constraints

The Connectivity Analysis tools operate within the following constraints:

- The network (or subnetwork) to be analyzed must have a flat structure, not a hierarchical structure.
- The node address for each node must be unique at the level used for analysis.

If you create a design without using data from the *StarKeeper* II NMS Core System database, you can specify whether to analyze connectivity at the network, area, or exchange level. If you use data from the database, the addresses in the real network data determine what address level is used for analysis. Whatever level is used, the node addresses must all be unique at that level. The reason for this constraint is that the analysis tools must know about every node in the network under analysis, and they cannot operate correctly unless the address of every node is unique.

The input preprocessor recognizes when two nodes have the same address, and automatically generates unique names for all nodes. If this occurs, it is listed in the Database Validation report (explained later in this chapter), and no existing routing data is loaded.

If the addressing level for analysis is at the exchange level, all area and network addresses must be the same. If analysis is done at the area level, all network addresses must be the same.

- Nodes must all have the address type (either mnemonic or X.121) that you select in the New Design window.

  If a node does not have the same address type as you have selected, the input preprocessor reports in the Database Validation report that the design is an "invalid" model, and uses the node address that is available.

- Each trunk group must contain trunks from only one end node to only one other node.

  The analysis tools do not accept trunk groups which contain trunks leading to two or more nodes. As far as the tools are concerned, "trunk" must be synonymous with "trunk group." A trunk group can contain more than one trunk, but all of the trunks in one group must connect to the same nodes at each end.

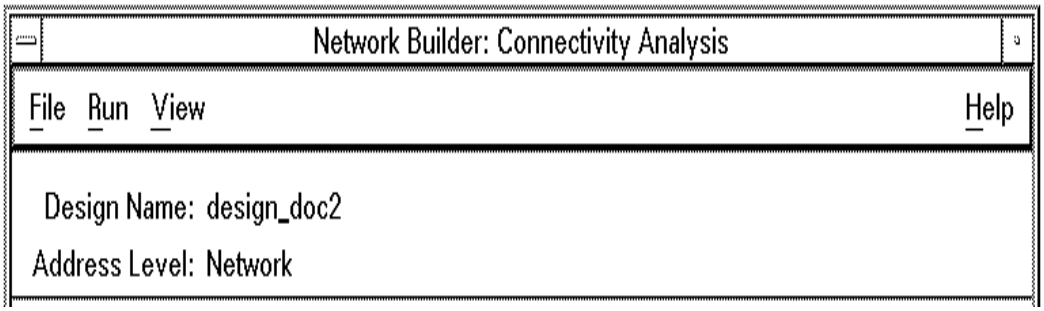
  The input preprocessor recognizes when a trunk group contains trunks to more than one node. It rejects trunks leading to any nodes other than the first node address defined, and notifies you of the error in the Database Validation report.

- The analysis tools only consider the primary and secondary routing choices.

  Although the network allows you to specify up to four choices for each destination, the analysis tools use only the first two choices.

Connectivity Analysis User Interface Controls

You can display the Connectivity Analysis Base Window by choosing **Network Connectivity** from the **Analyze** menu of the Network Builder control window. (For instructions, see **Procedure 9-1, Starting Connectivity Analysis** later in this chapter.) This section explains how to use the controls provided in the Connectivity Analysis Base Window. The following screen shows the Connectivity Analysis Base Window control area.



Screen 9-1. Connectivity Analysis Base Window Controls

This window contains the following control buttons:

File	Provides a menu of commands to load, save, create, and delete network designs
Run	Provides a menu of commands to run the Topology Evaluation, Routing Evaluation, and Path Analysis tools
View	Provides a menu of commands and sub-menus to view input data and the reports generated by the Topology Evaluation, Routing Evaluation, and Path Analysis tools
Help	Provides general help for the connectivity analysis tools

After you load or create a design, the Design Name field, Address Level field, and the Edit controls are displayed below these buttons.

The File Menu

The file commands enable you to load, save, create, and delete designs. Using the **File** menu, you can access the following commands:

Load Design	Loads a design that was created and saved previously
Save Design	Saves a design for future use
New Design	Creates a new design
Delete Design	Removes a design that was saved previously

The Run Menu

The **Run** menu contains commands to run the Topology Evaluation, Routing Evaluation, and Path Analysis tools.

Topology Evaluation Calls up the command window to run Topology Evaluation. This window allows you to specify whether to use the following options:

- evaluate using extended routing
- evaluate for node diversity

These options are explained in detail in **Procedure 9-2**.

Routing Evaluation Calls up the command window to run the Routing Evaluation tool. This window allows you to specify the destination address to be analyzed, and whether to use the following options:

- evaluate using extended routing
- evaluate for node diversity

These options are explained in detail in **Procedure 9-3**.

Path Analysis Calls up the command window to run the Path Analysis tool. This window allows you to specify the failure mode and input source for analysis, and specify the source and destination addresses to be analyzed. See **Procedure 9-2**.

The View Menu

The **View** menu contains commands and sub-menus to enable you to view, save, and print both input data and output reports generated by the Topology Evaluation, Routing Evaluation, and Path Analysis tools.

Node Address & Topology Input — Displays the input data defining node addresses and trunk groups in this design. Also displays the results of connectivity validation.

Routing Input — Displays the input data defining primary and secondary routes through the network.

Database Validation Report — Shows the results of data validation performed by the input preprocessor when a design is created using data loaded from the *StarKeeper* II NMS Core System database.

Topology Evaluation Report — Calls up a sub-menu to display the output from the network topology evaluation. Choices on this menu include:

Destination Routing

Displays the Destination Routing report and errors detected during Topology Evaluation.

Trunk Group Use

Displays the Trunk Group Use report.

Extended Routing Recommendations

Displays the Extended Routing Recommendations report.

Source Routing

Displays the Source Routing report.

Node Address & Topology Input

Displays the input data defining node addresses and trunk groups in this design. Also displays the results of connectivity validation.

Routing Evaluation Report

Calls up a sub-menu to display the output from the network routing evaluation. Choices on this menu include:

Routing Errors

Displays the Routing Errors report.

Destination Routing

Displays the Destination Routing report.

Source Routing

Displays the Source Routing report.

Path Analysis Report

Calls up a sub-menu to display the output from the network path analysis. Choices on this menu include:

Summary

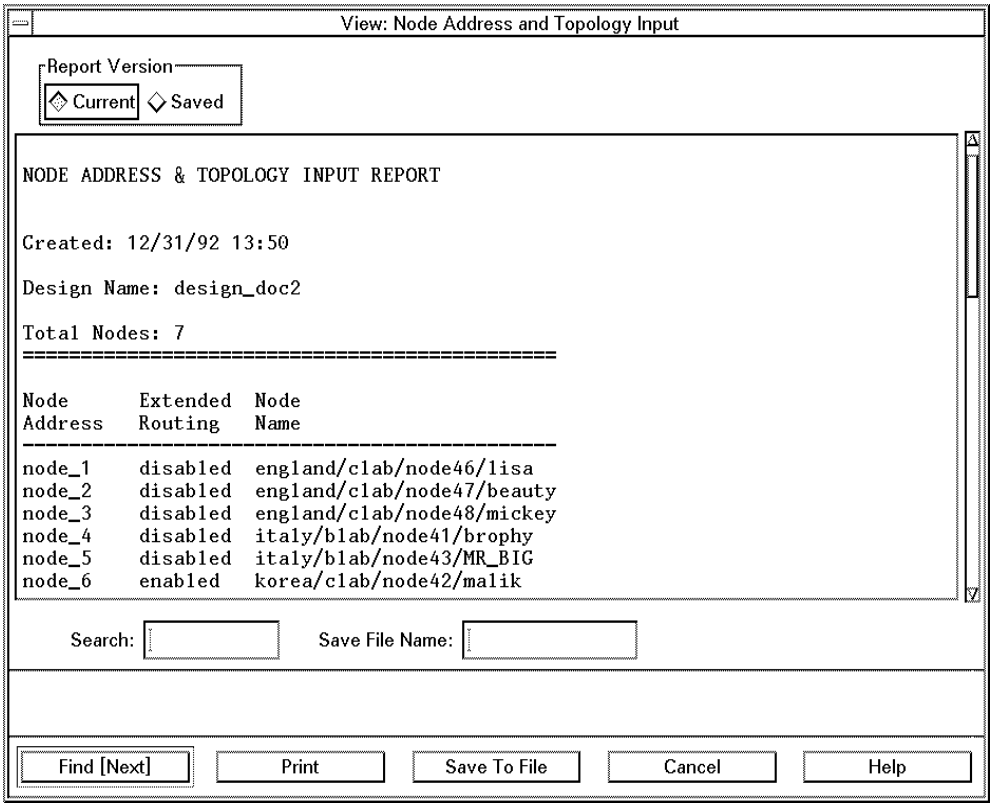
Displays the Summary Path Analysis report

Detailed

Displays the Detailed Path Analysis report

Report Viewing Windows

Each report viewing window contains a data pane, a header control area, and a footer control area. See the following screen for an example.



Screen 9-2. Report Viewing Window

Their functions are as follows:

- **Header Control Area**

  The header control area contains one or more controls (depending on the type of report you are viewing). These controls enable you to specify which data to view. The most common controls include those listed in the next table.

Field Name	Description
Report Version	Exclusive setting. Current or Saved. Use this control to choose whether to display the current version of the report or the saved version. The control is useful for comparing the current design to the saved design after making “What If ...” changes. It does not apply to a report that has been saved to a file using the **View** window Save to File control (explained further on in this section).
Node Diversity	Exclusive setting. Yes or No. Use this control to choose which version of an output report to display: a report from an evaluation with the **Node Diversity** option, or a report from an evaluation without the **Node Diversity** option.
Destination Address	A scrolling list of destination addresses. This field specifies the destination address for which a report is displayed.
Source Address	A scrolling list of source addresses. This field specifies the source address for which a report is displayed.

- **Data Pane**

  The data pane displays the data in the report. Data panes usually contain a vertical scrollbar for scrolling through the report data.

- **Footer Control Area**

  The footer control area contains several buttons to provide additional functions:

Find [Next]	Use this button to search for specific data in the report. This is useful when the report is large, and you want to look at certain parts. Enter a search string into the text field and click Find [Next]. When you choose Find [Next], the application searches in the report text for the specified string. If the search reaches the end of the report without finding the search string, it "wraps around" and continues at the beginning of the report. If the text is found, the text in the data pane scrolls until the line where the match occurred is visible. If you plan to search repeatedly for the same string, use the Find [Next] button again after the first search.
Print	Use this button to send a copy of the report to the default destination of the *lp* command (for information on the *lp* command, refer to the *StarKeeper II NMS Installation Guide*).
Save to File	Use this button if you want to save the report to a file. It creates a text file copy of the report. You can edit the file, view it, or use it as input to other programs, as you see fit. The Save to File command saves only the report you are viewing. It is not the same as the saved version of a report created by choosing the **Save** command from the **File** menu, which saves the entire design.
Cancel	Use this button to dismiss the window.

The Edit Controls

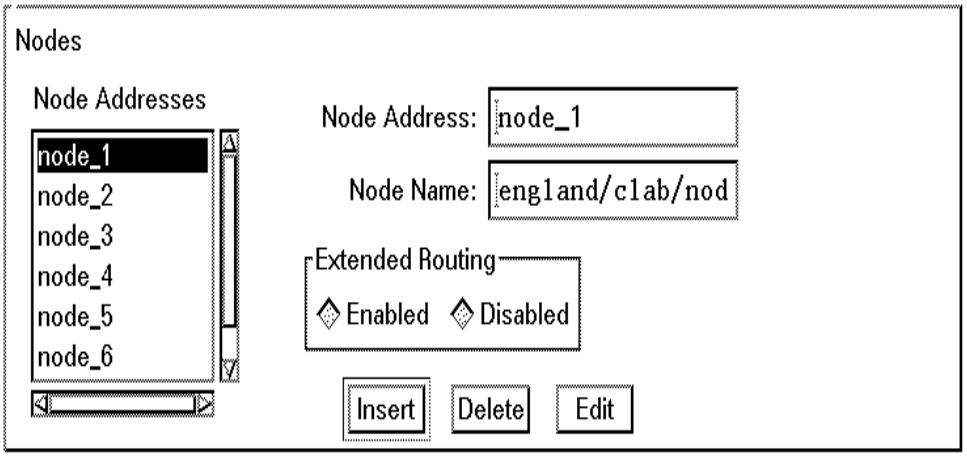
The Connectivity Analysis Base Window contains the following data panes:

- Node Address Input Data Pane
- Topology Input Data Pane
- Routing Input Data Pane

The following sections explain how to use the input data panes to display and change the input data.

Node Address Input Data Pane

The Node Address Input Data Pane has the following format:



Screen 9-3. Node Address Input Data Pane

This pane contains a list of any node addresses that were loaded, and a detailed display for the current node in the list. When you choose a node address from the scrolling list, its data is displayed in the corresponding data fields shown in the above screen. The information is as follows:

Field Name	Description
Node Address	Text field. Shows the address of the current node at the level used for analysis. This is the name the Connectivity Analysis tools use when performing evaluations. You can change the address of a node by editing the contents of this field.
Node Name	Text field. This field is optional, and may be left blank. If you leave it blank, the node address is used as the node name by default. If you load the design from the database, this field contains the *StarKeeper* II NMS node name.
Extended Routing	Exclusive setting. Enabled or Disabled. The default value for an insertion is Disabled. Enabling extended routing enables the route advance, crankback, and hop count features in the node.

If necessary, you can edit the node address data as follows:

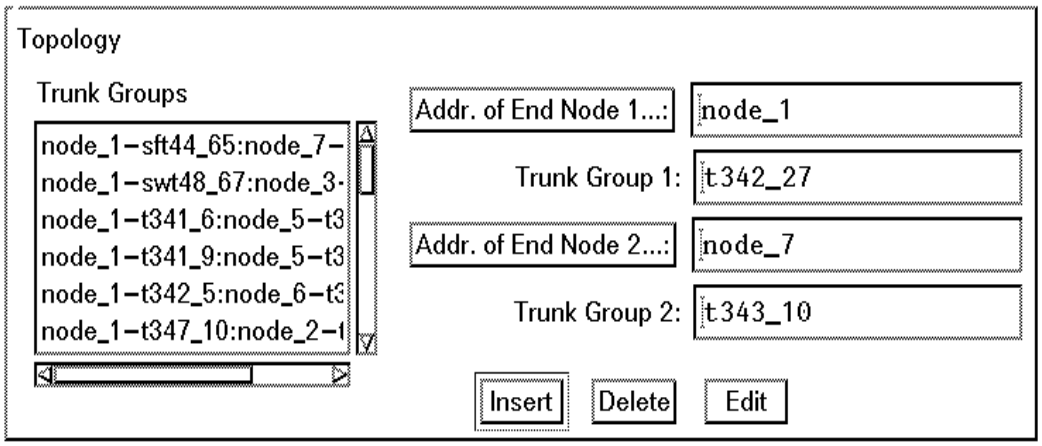
- To add a node, fill in the data fields as needed and click Insert.
- To delete a node, choose the node address from the scrolling list and use Delete.
- To change data for an existing node, including the node address, choose it from the scrolling list and change the contents of the editing fields, then use Edit.

NOTE:
Editing a node in the node address input data pane changes all the data associated with the node data.

- If you delete a node, all trunk groups that have one end connected to that node are deleted automatically. Also, all routing data is deleted that refers to the deleted node.
- If you change the address of a node, the address is changed in all trunk groups that are connected to the node, and in all routing that refers to it.

Whenever you edit the node address input data, connectivity validation is performed automatically. The results appear in the Node Address and Topology Input report, where you can view node address data for the entire network.

Topology Input Data Pane



Screen 9-4. Topology Input Data Pane

This pane contains a list of trunk groups, and a detailed display.

The trunk group list contains one line for each trunk group connecting two nodes. Each line has the following format: ***node–trunk*:*node–trunk***

The line contains a pair of node addresses and trunk group names, separated by a colon. Each node name is followed by a dash, then a trunk group name.

The detailed data fields consist of an editing field for each node address and trunk group name in the chosen line of the trunk group list. When you choose an existing trunk group, the detailed data fields contain the information from that line. The fields are as follows:

Field Name	Description
Address of End Node 1	Text entry, with abbreviated **Choose** command button. The **Choose** command window displays the list of nodes from the node address input data pane. If you type in a node name, it must be on the node address list.
Trunk Group 1	Text entry. The name of this trunk group at the first end node. This field shows the name of the trunk group chosen from the trunk group list or entered in the data field.
Address of End Node 2	Text entry. The node at the other end of the trunk group. Data entry is the same as Address of End Node 1.
Trunk Group 2	Text entry. The name assigned to this trunk group at the second end node. Data entry is the same as Trunk Group 1.

If necessary, you can edit the trunk group data as follows:

- To add a trunk group, fill in the data fields as needed. When you are finished entering data for the new trunk group, use Insert. The new trunk group is inserted into the list in alphabetical order, and the list is scrolled to display it.
- To delete a trunk group, choose the trunk group from the scrolling list and use Delete.
- To change data for an existing trunk group, including the trunk group names, choose it from the scrolling list and change the contents of the editing fields, then use Edit.

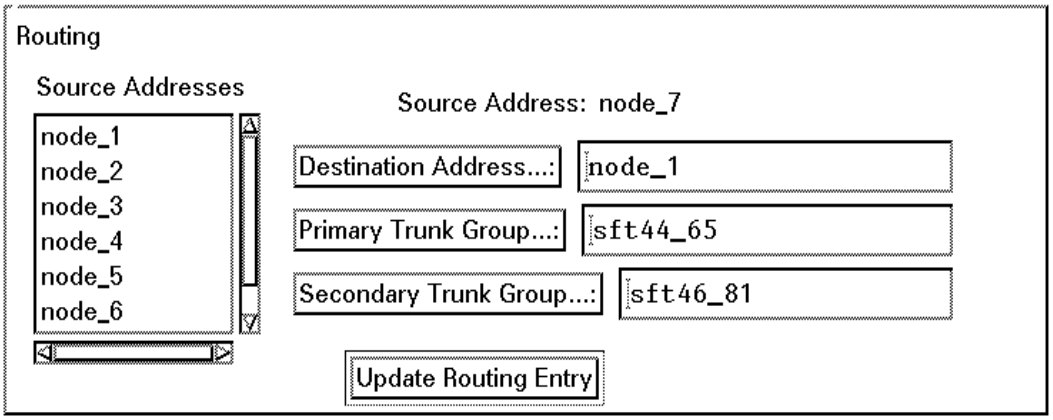
NOTE:
Editing a trunk group in the topology input data pane changes all the data associated with the trunk group data.

- If you delete a trunk group, it is automatically deleted from the routing data.
- If you change the name of a trunk group, the name is automatically changed wherever it appears in the routing data.

Whenever you edit the topology input data, connectivity validation is performed automatically. The results appear in the Node Address and Topology Input report, where you can view topology data for the entire network.

Routing Input Data Pane

The routing input data pane is organized by destination address. For each destination address, it displays a list of source addresses. The data field display shows the primary and secondary trunk groups assigned for each source address.



Screen 9-5. Routing Input Data Pane

The data fields in this window are:

Field Name	Description
Destination Address	Text entry, with abbreviated **Choose** command button. The **Choose** command window displays the list of nodes entered in the node address list data pane. This field specifies the destination address for the routing shown for each source address. If you enter a node address, it must be on the node address list.
Source Addresses	Scrolling list. The list contains all node addresses. You can choose any address except the destination address.

Field Name	Description
Source Address	Text display field. This shows the name of the source node chosen from the source address list.
Primary Trunk Group	Text entry, with abbreviated **Choose** command button. The **Choose** command window displays the list of trunk groups connected to the source node, as listed in the topology input data pane. This field specifies the primary trunk group from the source address to this destination. If you type in the trunk group name, it must be on the trunk group list.
Secondary Trunk Group	Text entry, with abbreviated **Choose** command button. This field specifies the secondary trunk group from the source address to this destination. Data entry is the same as Primary Trunk Group.

If you do not provide routing (either from the database or entered through the input data pane), the Routing Evaluation tool reports this as an error. The Routing Evaluation tool attempts to generate new routing for any node where routing is omitted. If necessary, you can edit the routing for a source address as follows:

a. Choose the destination address.

b. Choose one of the source addresses from the source node list.

c. Edit the following data fields:

- If any additions or changes are needed, choose a primary trunk group, secondary trunk group, or both for the source address.
- To delete the routing for a node, clear the Primary and Secondary Trunk Group fields.
- If you want to assign only primary routing for a node, leave the Secondary Trunk Group field blank.

d. After you finish entering data in all fields, use Update Routing Entry.

e. Repeat the above steps as needed for every source address and every destination address.

To view the routing for the entire network, see the Routing Input report.

Connectivity Analysis Procedures

This section explains the following basic tasks:

- starting Network Builder for Connectivity Analysis
- analyzing a new network
- analyzing an existing network
- analyzing “What If...” scenarios

If you are:	See:
Starting the Network Builder for Connectivity Analysis	Procedure 9-1
Analyzing a new network	Procedure 9-2
Checking the routing of an existing network	Procedure 9-3
Changing the topology, routing, or both in an existing network	Procedure 9-4

These procedures provide instructions for beginning to use the network connectivity analysis tools. Once you become familiar with using the tools, you probably will not need to refer to these procedures very often.

Starting Network Builder for Connectivity Analysis

This procedure explains how to:

- start Network Builder
- choose Connectivity Analysis

Procedure 9-1. Starting Network Builder for Connectivity Analysis

1. To start Network Builder, click on the **Network Builder** icon of the *StarKeeper* II NMS subpanel.

   A banner window comes up to remind you to run **cfg_sync** before using Network Builder. After a few seconds the banner window disappears and the Network Builder Control Window appears.

2. From the Network Builder Control Window, choose **Network Connectivity** from the **Analyze** menu. The Connectivity Analysis Base Window appears. You can use the controls in this window to invoke the Connectivity Analysis tools.

3. To quit the Connectivity Analysis application at any time, choose **Quit** from the Base Window menu button.

Analyze a New Network

This procedure explains how to:

- Create a design.
- Review the Database Validation report.
- Edit the input data.
- Run Topology Evaluation to check the network connectivity and generate error-free routing.
- Run Path Analysis to check the call routing from point to point in the network.
- Interpret the results.
- Save the results.
- Evaluate designs in parallel.
- Implement the recommendations of the analysis tools.

Before you begin this procedure, you must first start Network Builder and invoke the Connectivity Analysis tools, as instructed in **Procedure 9-1**.

Procedure 9-2. Analyze a New Network

A. Create New Design

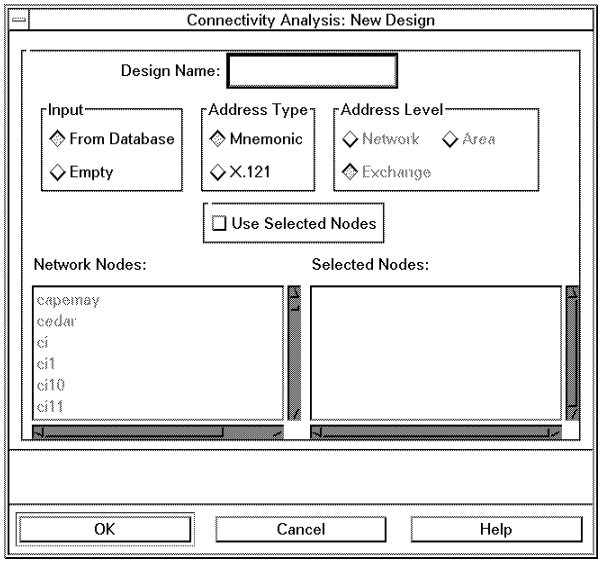
NOTE:
When you create a new design, there are two ways to enter data into it:

- Load the data from the *StarKeeper* II NMS Core System database.

  To load from the database, you must first enter the network configuration as instructed in **Chapter 8**.

- Use the input data panes to enter the data directly.

1. Choose **New Design** from the **File** menu.
2. The **New Design** command window appears. It has the following format:



Screen 9-6. New Design Command Window

Specify the following information:

Field Name	Description
Design Name	The name of the new design, maximum 14 characters. If you do not enter a name, the system generates "design_N where "N" is an integer starting at "1". Example: "design_1".
Input	If you specify "From Database", the system will use the configuration from the *StarKeeper* II NMS Core System database. If you specify "Empty", you must specify the address level and enter configuration data in the Connectivity Analysis input data panes.
Address Level	This control appears in the window if you specify **Empty** as the input source (if you specify **From Database**, the tool sets the address level based on the addresses used in the network). It specifies what part of each node address is used for analysis. Each node in the design must have a unique address at the chosen level.
Address Type Preference	This control is active only if you specify **From Database** as the input source. It specifies whether to use mnemonic or X.121 addresses if a node has both types.
Use Selected Nodes	This control allows you to choose a subset of the nodes in the network for connectivity analysis.

The scrolling list on the left contains all the nodes loaded from the database. When first displayed, the scrolling list on the right is empty.

3. Select nodes from the left hand list.
   - When you choose a node from the list of existing nodes, its name is highlighted, and it appears in the list of selected nodes.
   - As you choose nodes from the list of existing nodes, they appear in alphabetical order in the list of selected nodes.
   - If you click on a highlighted node name in the list of existing nodes, its name is deleted from the list of selected nodes.
4. After all the information is complete, choose **New Design**.

   The window remains busy while the tool loads from the database.
5. Once the new design is created, the Connectivity Analysis Base Window shows the design name, address level of the new design, and input editing controls.

B. Review Database Validation Report

Data validation occurs when data is loaded into a design from the StarKeeper II NMS Core System database; the result of this processing is the Database Validation report. Review this report to see whether it lists any errors that need to be corrected before you run Topology Evaluation or Routing Evaluation. Errors listed in the report include:

- rejected nodes
- nodes assigned new addresses
- duplicate node addresses
- trunk groups connected to more than two nodes
- rejected trunk groups

Pay close attention to this report. It lists errors in the input, and actions taken during input processing. **Table 9-2** lists the possible errors, and actions you may need to take in response to each type of error.

Table 9-2. Error Conditions Listed in Database Validation Report

Error Message	Explanation and Response
Node "xxx" not included in design. Could not retrieve data - Possible unsupported node type.	Make sure that the *StarKeeper* II NMS Core System database is synchronized before you load data into the design.
Node "xxx" not included in design. Could not retrieve data - Communication problem.	Determine the cause of the communication problem and correct it. Check that the connection to the *StarKeeper* II NMS host is up and synchronized. When ready, try to load the data for this design again.
Routing data for node "xxx" not included in design. Could not retrieve data - Communication problem.	Determine the cause of the communication problem and correct it. Check that the connection to the *StarKeeper* II NMS host is up and synchronized. When ready, try to load the data for this design again.
Connectivity data for node "xxx" may be incomplete - unsupported node type.	If the node is a pre-Release 3.0 BNS-2000 VCS node, you must enter the routing data manually.

Table 9-2. Error Conditions Listed in Database Validation Report —*Continued*

Error Message	Explanation and Response
Trunk "xxx" not included in design. <reason> End Node 1 = xxx Grp Name 1 = yyy Mod Addr 1 = nnn End Node 2 = xxx Grp Name 2 = yyy Mod Addr 2 = nnn	The response to this message depends on the reason listed in the message: *No group name found.* This message may occur if the Core System database contains some invalid data. Check the database. *End node(s) previously rejected.* This message appears for each trunk attached to a node that was rejected for either of the two reasons listed above. If you enter the node data manually, you must manually enter the trunks also. *Could not retrieve data.* A communication problem is preventing retrieval from the Core System database. Determine the cause and correct it, then try to load the data for this design again. *Mismatched far end node names or far end group names.* This message may occur if the Core System database contains some invalid data. Check the database. *Retrieved data is inadequate. No Group Name found or unknown end node name*. This message appears if a trunk group name has not been assigned to the trunk group at both ends. *End node(s) not found.* This message appears if one or both nodes attached to this trunk group have been rejected.
Trunk "ttt": Group Name at end node = "xxx" is blank. Connectivity Analysis tool assigns unique Trunk Group Name to permit evaluation to continue without losing connectivity. End Node 1 = xxx Grp Name 1 = tgrp_n ** Assigned unique name Mod Addr 1 = nnn End Node 2 = xxx Grp Name 2 = yyy Mod Addr 2 = nnn	One of the nodes does not have a trunk group name assigned for the indicated trunk group. The program has assigned a name so that processing can continue. You may need to enter the trunk group name manually.

Table 9-2. Error Conditions Listed in Database Validation Report —*Continued*

Error Message	Explanation and Response
Invalid Network Model at "xxx" level. Connectivity Analysis tool assigns unique addresses to nodes to permit the evaluation to continue. "xxx" level addresses in the design are reported below: Node Name Existing Address Design Address <name> <old address> <new address>	At the level selected for use in the design, the network contains duplicate addresses. New addresses have been generated for Connectivity Analysis. Each node is listed by name, with the old address and the new address shown. Check the topology and routing; you may need to enter this information manually.
NOTE One or more trunks have been rerouted by Session Maintenance. Topology and routing may need to be edited to rectify entries for trunk groups named "!routed!" in this design.	Use the input edit data panes to correct the trunk groups and routing data.
Using default routing for destination = "xxx" **Source = "xxx" Primary = "xxx" Secondary = "xxx"**	Appears when no routing exists for a destination, but default routing can be used. Check that the default routing assignment is correct.

C. Edit Input Data

Use the **View** menus to review the input data that was loaded from the database.

1. The end of the Node Address and Topology Input report contains a network connectivity validation section. Verify that the network is connected before running the Topology Evaluation tool.
2. If the Node Address and Topology Input report states that the network is disconnected, examine the subnetwork listings in the report to determine where trunks are missing. Check the Database Validation report to see whether data was lost or rejected during the load, and take corrective action as needed; or add the missing trunks using the Topology input data pane.
3. A distinction can be made in a design between nodes that are connected to two or more nodes, and nodes that are connected to only one other node called *leaf* nodes. In some cases, it may be worthwhile to exclude the leaf nodes from the analysis. This can simplify the network topology, reduce the size of the input and output reports, and eliminate trivial data.

- If you are using data from the *StarKeeper* II NMS Core System database, you can use the **Choose Nodes** option to limit the analysis (see **Procedure 9-2**). Just choose non-leaf nodes from the node address list; the leaf nodes and their associated trunks will not be loaded into the design.
- If you are entering the design rather than loading it from the database (using the **From Empty** choice), enter all the nodes and trunk groups *except* the leaf nodes.

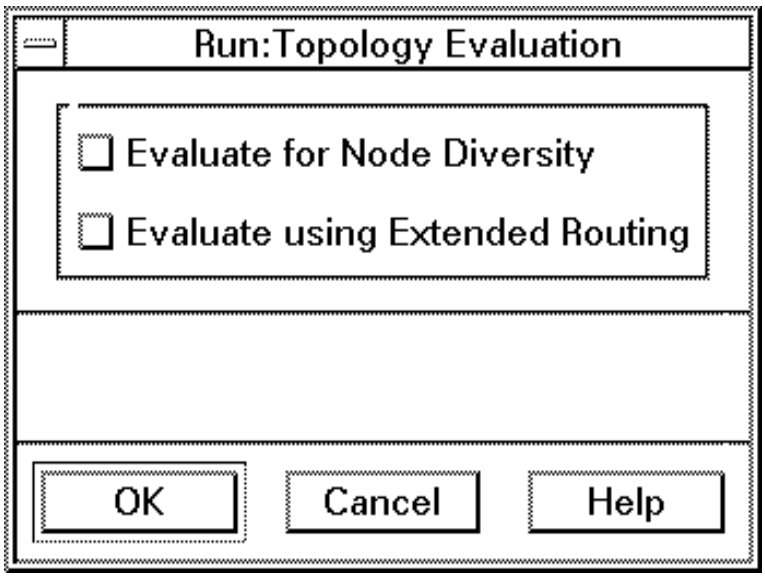
When you are satisfied that the input data is complete, you are ready to run Topology Evaluation.

D. Run Topology Evaluation

Run the Topology Evaluation tool to evaluate the network topology for dead-end paths, call-looping paths, and call-blocking paths (if desired). This tool enables you to create a set of routing patterns that are free of those errors for the entire network.

1. Choose **Topology Evaluation** from the **Run** menu.

   The Run: Topology Evaluation command window appears.



Screen 9-7. Run Topology Evaluation Command Window

2. Decide whether to set either, both, or neither of the two options for this command:

   - Evaluate for Node Diversity

     If you use this option, the analysis will check paths for node diversity. This can yield routing that is robust in spite of any single node failure.

   - Evaluate Using Extended Routing

     If you use this option, the analysis will consider whether each node should use the extended routing algorithms. Extended routing includes two components: crankback and route advance. Crankback occurs when a call is dropped back to the originating node to try an alternate path due to a trunk group or node failure. Route advance occurs when a call cannot be routed normally from a node, and the route advance algorithm is used to find an alternate trunk. If you do not use this option, the analysis does not use extended routing, and the Extended Routing Recommendations report recommends disabling extended routing at all nodes.

3. Choose OK.
4. If the design contains any unconnected nodes, the tool will display the following error message in the base window footer:

   Disconnected Network - View Node Address and Topology Input Report

5. If no errors occur, the Connectivity Analysis tool displays a completion message in the left footer area of the base window. Then use the **Topology Evaluation Report** item on the **View** menu to call up the sub-menu of output reports.
6. Review the topology evaluation output reports to perform an initial analysis of the network configuration.

   - If the Destination Routing report indicates that errors were found in the routing, you will need to perform “What If...” analysis to work out error-free routing. For instructions, see **Procedure 9-4**.
   - If the Destination Routing report states that error-free routing is available for this network, you can run Path Analysis.

E. Run Path Analysis

Once the Topology Evaluation tool produces error-free routing, you can run the Path Analysis tool to analyze paths from source to destination addresses in normal and failure scenarios. The Path Analysis tool performs its analysis on all possible paths between a source address and a destination address that you specify.

The information from the Path Analysis reports can help in optimizing the network configuration, and in finding areas of the network that are vulnerable to failures.

It is not necessary to run the Path Analysis tool for all source and destination addresses. Generally, you would want to run it for one of the following reasons:

- troubleshooting

  In case of a problem in an operating network, you can load the network configuration from the *StarKeeper* II NMS Core System database into a design. If there are any topology or routing errors, they must be corrected before the Path Analysis tool will run. It may be productive to see whether those errors played any part in the trouble you are investigating.

  Once error-free routing patterns are generated, run the Path Analysis tool for the nodes where trouble is occurring. By examining the Detailed Path Analysis reports, you may be able to isolate possible problem sources in the alternate paths used under failure conditions.

- important applications

  In many cases, you know in advance that certain traffic is subject to stringent requirements (such as protocol timeouts) that require it to be carried only on specific trunk types, or limited to a certain number of hops. You can use the Detailed Path Analysis reports to examine which trunk groups may be used, and how many hops may be needed; if necessary, you can change the routing to make certain that this traffic is routed to trunk groups with the proper trunk types.

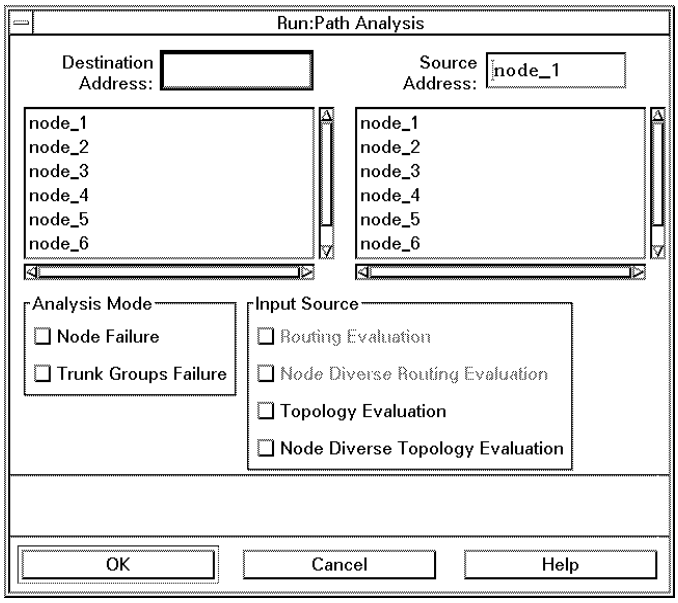
Constraints

- The Path Analysis tool can run only if the topology evaluation is error-free. To confirm this, examine the Destination Routing report, and make sure that the Source Routing report was produced.
- You must specify the correct input source for the routing data. After running topology evaluation, be sure to specify whether to use Topology Evaluation or Node-Diverse Topology Evaluation.

Use the following steps:

1. Choose **Path Analysis** from the **Run** menu.

The Run: Path Analysis command window is displayed.



Screen 9-8. Run Path Analysis Command Window

2. Choose the settings and data values for this run:

Field Name	Description
Analysis Mode	Exclusive setting. Node Failure, Trunk Group Failure. Choose the setting for the type of path analysis you want performed.
Input Source	Exclusive Setting. Routing Evaluation, Node-Diverse Routing Evaluation, Topology Evaluation, Node-Diverse Topology Evaluation. If you ran the topology evaluation with the node diversity option, use Node-Diverse Topology Evaluation; otherwise, use Topology Evaluation. (Topology Evaluation is the default.)
Destination Address	Select the proper entry from the scrolling list.
Source Address	Select the proper entry from the scrolling list.

NOTE:
If you plan to run Path Analysis for several source and destination addresses, you can speed up data entry for this command by pinning the command window.

3. Choose OK. The button displays a busy pattern until the analysis completes.
4. Choose **Path Analysis Report** from the **View** menu to call up the **Path Analysis** sub-menu.

   Use the Path Analysis reports to study the effect of node or trunk group failure on the routing paths to the chosen destination address. For information about the report layouts and contents, see **Output Reports** in **Connectivity Analysis Input and Output Data**.

The menu offers two choices:

Summary	The Summary Path Analysis report shows overall information that applies to all of the paths. The same information also appears in the header of the detailed report.
Detailed	The Detailed Path Analysis report shows how each path works under node failure and trunk group failure conditions.

5. Choose which report you want to display. The report appears on the Graphics System display screen.

NOTE:
The Path Analysis reports apply to just one source address and one destination address. A separate path analysis run is required for each pair of nodes you want to analyze.

F. Interpret the Results

Review the Path Analysis output reports to complete your initial analysis of the network configuration.

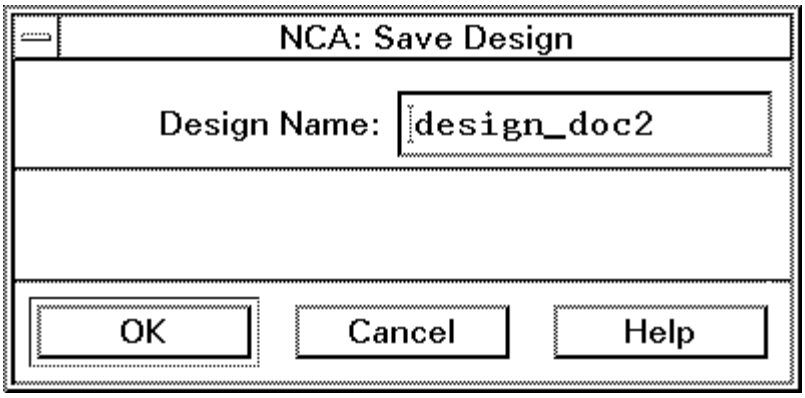
- If your review of the reports indicates the need to change the network, you can perform “What If...” analysis to examine the effect of various changes. For instructions, see **Procedure 9-4**.
- If the Path Analysis report indicates acceptable performance for this network, the connectivity analysis is finished.

G. Save the Results

You can save the current design at any time. To save a design, do the following:

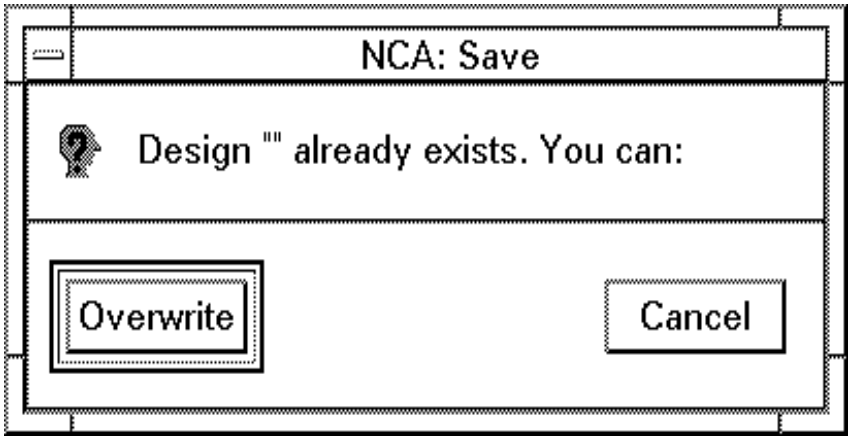
1. Choose the **Save Design** command from the **File** menu.

   The File: Save Design command window appears.



Screen 9-9. File: Save Design Command Window

2. You can use the design name you originally assigned to this design, or change it in the Design Name field.
3. Choose OK.
4. If you try to save a design with the same name as an existing saved design, a notice is displayed:



Screen 9-10. Save Design Notice

- To save the design in the existing files, choose Overwrite.
- To preserve the existing files (and not save the current design), choose Cancel.

  You can retry the **Save Design** command using a different name.

H. Evaluating Designs in Parallel

If you want to compare the effect of making different changes concurrently to the same design:

1. Save the current design using a different name than the current one (if you have assigned a name to it).
2. Run Connectivity Analysis by invoking it from the Network Builder Control Window.
3. From the new Connectivity Analysis Base Window, load the saved design using its new name.

This allows you to compare reports side-by-side on the screen, for example, and more quickly judge the effect of changes.

I. Implement the Recommendations

Topology Evaluation produces the recommended routing patterns in the Source Routing reports, and extended routing recommendations in the Destination Routing and Extended Routing Recommendation reports. To implement the recommended routing patterns and extended routing, they must be entered separately for each node in the network. This can be done through Network Builder configuration tasks. See **Chapter 8** for instructions.

Analyze an Existing Network

This procedure shows how to perform the following tasks:

- Create a design from an existing network or load an existing design.
- Run Routing Evaluation to check the existing routing.
- Run Path Analysis to check call routing from point to point in the network.
- Interpret the results of the analysis.
- Save the results.
- Implement the recommendations.

NOTE:
If you are analyzing an existing network, but you want to ignore the existing routing patterns, use **Procedure 9-2**.

Before you begin this procedure, you must first start Network Builder and invoke the Connectivity Analysis tools, as instructed in **Procedure 9-1**.

Procedure 9-3. Analyze an Existing Network

A. Create or Load Design

1. If you are analyzing the configuration of an existing network that has not been analyzed before, and the *StarKeeper* II NMS Core System database contains the configuration for this network, perform step **A. Create a New Design** in **Procedure 9-2**. Be sure to specify "From Database" for the Input Source.

   After creating the new design, continue this procedure at step **B. Run Routing Evaluation**.

2. If the existing network has been analyzed previously, and a design already exists, choose **Load Design** from the **File** menu.
3. Enter the design name, or use the abbreviated **Choose** button and choose the design name from the list.
4. Use the Load Design button to load the data for the design.

B. Run Routing Evaluation

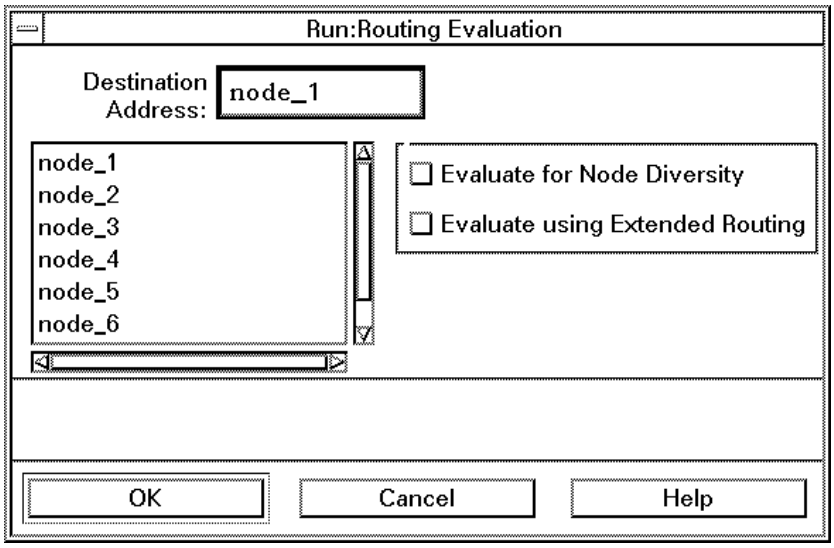
If you want to evaluate the existing routing patterns in the network, use the Routing Evaluation tool as explained here.

Constraints

If any node addresses are non-unique at the level used for analysis, routing data is not loaded into the design, and the Routing Evaluation tool generates new routing. You can find out if this error occurred in the Database Validation report.

1. Choose **Routing Evaluation** from the **Run** menu.

The Run: Routing Evaluation command window is displayed.



Screen 9-11. Run Routing Evaluation Command Window

2. Decide whether to set either, both, or neither of the two options for this command:

   - Evaluate for Node Diversity

     If you use this option, the analysis will check paths for node diversity. This can yield routing that is robust in spite of any single node failure.

   - Evaluate Using Extended Routing

     If you use this option, the analysis will consider whether each node should use the extended routing algorithms. Extended routing includes two components: crankback and route advance. Crankback occurs when a call is dropped back to the originating node to try an alternate path due to a trunk group or node failure. Route advance occurs when a call cannot be routed normally from a node, and the route advance algorithm is used to find an alternate trunk. If you do not use this option, the analysis does not use extended routing, and the routing recommendations recommend disabling extended routing at all nodes.

3. Fill in the Destination Address field.

Field Name	Description
Destination Address	Select the proper entry from the scrolling list.

4. Choose the OK button.
5. After the routing evaluation is complete, call up the menu of reports by choosing **Routing Evaluation Report** from the **View** menu.
6. The Routing Evaluation reports show the results of analyzing the routing for the specified destination address. Use this information to eliminate routing errors or to reduce the vulnerability of the routing to failures. For information about the report layouts and contents, see **Output Reports** in **Connectivity Analysis Input and Output Data**.
   - If the Routing Evaluation reports indicate routing errors, and no routing recommendation can be made, you will need to perform "What If..." analysis to work out error-free routing. For instructions, see **Procedure 9-4**.
   - If the reports indicate that the Routing Evaluation tool generated error-free routing, you can run the Path Analysis tool.
   - If the Routing Evaluation tool found no routing errors in the existing routing, you can run the Path Analysis tool.

C. Run Path Analysis

Once the Routing Evaluation tool produces an error-free routing, you can run the Path Analysis tool. If you want to run Path Analysis, follow the instructions for step **E. Run Path Analysis** in **Procedure 9-2**, but specify Routing Evaluation (or Node-Diverse Routing Evaluation) as the input source.

D. Interpret the Results

When the Path Analysis tool completes its processing, you can view the Path Analysis reports. Review these reports to complete your initial analysis of the network configuration.

- If your review of the reports indicates the need to change the network, you can perform "What If..." analysis to examine the effect of various changes. For instructions, see **Procedure 9-4**.
- If the Path Analysis reports indicate acceptable performance for this network, the connectivity analysis is finished.

E. Save the Results

To save the results of analysis, follow the instructions for step **G. Save the Results** in **Procedure 9-2**.

F. Implement the Recommendations

Routing Evaluation produces extended routing recommendations in the Destination Routing reports, and recommended routing patterns in the Source Routing reports. To implement the recommended routing patterns and extended routing, they must be entered separately for each node in the network. This can be done through Network Builder configuration tasks. See **Chapter 8** for instructions.

Perform "What If..." Analysis

This procedure explains how to analyze changes to a network after conducting an initial analysis. It covers changes to add or delete nodes, add or delete trunks, and change routing. The procedure includes the following steps:

- Load the design to be analyzed.
- Determine whether to modify the design.
- Re-run an analysis with extended routing.
- Add a trunk to the design.
- Run Path Analysis.
- Interpret Path Analysis reports.
- Save the results.
- Implement the recommendations.

Assumptions

This procedure is based on the following assumptions:

- You are familiar with **Procedures 9-2** and **9-3**.
- The network being changed has been analyzed with the Topology Evaluation or Routing Evaluation tools, using **Procedure 9-2** or **9-3**.

Before you begin this procedure, you must first start Network Builder and invoke the Connectivity Analysis tools, as instructed in **Procedure 9-1**.

Procedure 9-4. Perform "What If..." Analysis

A. Load the Design to be Analyzed

If you are analyzing the current design, this step is not needed; go to step **B: Determine Whether to Modify Design**.

If you are not analyzing the current design, you must either load a saved design containing the configuration to be changed, or create a new design from data from the *StarKeeper* II NMS Core System database.

- If the design you want to analyze has been saved from an earlier run, use **Load** from the **File** menu to load it, then use it as the current design.
- If the existing network configuration corresponds to the design you want to analyze, you can create a new design and load data from the *StarKeeper* II NMS Core System database.
- If you wish, you can create a new design **From Empty**.

B. Determine Whether to Modify Design

Once you have a current design loaded, decide whether to make modifications, and what to modify, based on the situation.

— If you ran the Topology Evaluation tool with the **Evaluate Using Extended Routing** option **off**, you will find recommendations for correcting errors in the Destination Routing report.

— If you ran the Routing Evaluation tool with the **Evaluate Using Extended Routing** option **off**, this information is in the Routing Errors report.

In both cases, the possible recommendations include:

— Re-run the tool, with the **Evaluate Using Extended Routing** option **on**.

— Add one or more trunk groups to the configuration.

You can follow either recommendation.

- If you decide to re-run the Topology Evaluation or Routing Evaluation tool with the **Evaluate Using Extended Routing** option **on**, proceed to Step C.
- If you decide to add a trunk group, proceed to Step D.
- If you ran the Routing Evaluation or Routing Evaluation tool with the **Evaluate Using Extended Routing** option **on**, the only method recommended for correcting connectivity errors is to add trunks. Proceed to Step D.

C. Re-Run with Extended Routing

If you decide to re-run the Topology Evaluation or Routing Evaluation tool with the **Evaluate Using Extended Routing** option on, do so; then repeat this procedure, starting at Step B, until error-free routing is generated.

D. Add a Trunk

If you decide to add a trunk and re-run the Topology Evaluation or Routing Evaluation tool, use the following method:

1. Review the output reports and choose the most important destination in the network, such as a main data center site, and look at the recommendations for that destination.

   If the network does not have a preferred destination, choose the recommendation that occurs most frequently.

2. Add one trunk group to the design as instructed for the destination you have chosen.
3. Re-run the tool.

When the re-run is completed, examine the output report to see if any errors were found:

- After re-running the Topology Evaluation tool, review the Destination Routing report.
- After re-running the Routing Evaluation tool, review the Routing Errors report.

If the report indicates further errors, repeat this procedure, starting at Step B, until error-free routing is generated.

E. Run Path Analysis

Once the Topology Evaluation or Routing Evaluation tool produces error-free routing, you can run the Path Analysis tool. If you want to run Path Analysis, follow the instructions for step **E. Run Path Analysis** in **Procedure 9-2**. Be sure to specify the correct input source for the Path Analysis tool:

- Topology Evaluation
- Node-Diverse Topology Evaluation
- Routing Evaluation
- Node-Diverse Routing Evaluation

F. Interpret Path Analysis Reports

If the Path Analysis reports indicate potential problems with the routing patterns, such as blocked paths or paths with too many hops, you may need to redesign the network. Once you have planned the changes you want to make, proceed as follows:

1. Change the network topology or routing for specific destinations, and re-run the Topology Evaluation or Routing Evaluation tool. Then review the output reports for errors.

   If the tool finds routing errors, correct them according to the methods explained in Step B of this procedure.

2. Once error-free routing is generated by either the Topology Evaluation or Routing Evaluation tool, re-run the Path Analysis tool to see the effect of the change. Continue this process until the Path Analysis reports are satisfactory.

G. Save the results

To save the results of analysis, follow the instructions for step **G. Save the Results** in **Procedure 9-2**.

H. Implement the recommendations

To implement the recommended routing patterns and extended routing from the Topology Evaluation or Routing Evaluation reports, they must be entered separately for each node in the network. This can be done through Network Builder configuration tasks.

Connectivity Analysis Input and Output Data

The *StarKeeper* II NMS Network Builder enables you to view the input to the analysis tools, and the output that they generate, by using capabilities of the **View** menu. This section explains the layout and contents of the viewable input and output reports.

The analysis tools use directories in the *StarKeeper* II NMS Graphics System file system to store this data. They are organized into a set of files for each design, with current and saved versions stored separately. Each input or output report is contained in a separate file.

Input Reports

The connectivity analysis input reports present the input data for viewing, printing, and saving to files. They are accessed through the **View** menu. The reports are as follows:

- Node Address and Topology Input
- Routing Input
- Database Validation

Node Address and Topology Input Report

The Node Address and Topology Input report presents the same information as the Node Address input and Topology input data panes. The header control area of the report viewing window contains a Report Version field. The report format is as follows:

```
NODE ADDRESS & TOPOLOGY INPUT REPORT
Created: 02/09/98 14:42
Design Name: design_10
Total Nodes: 4
============================================
Node      Extended  Node
Address   Routing   Name
--------------------------------------------
beans2    enabled   us/gold/beans2/node_F
beans3    enabled   us/gold/beans3/node_G
beans4    enabled   us/gold/beans4/hubnode
beans5    enabled   us/gold/beans5/new_node
============================================
Total Trunk Groups: 5
============================================
End Node 1              End Node 2
Address  Trunk Group    Trunk group  Address
--------------------------------------------
  beans2  g1007                g1006  beans3
  beans2  g1009                g1006  beans4
  beans2  g1010                g1006  beans5
  beans3  g1009                g1007  beans4
  beans4  g1010                g1009  beans5
============================================
NETWORK CONNECTIVITY VALIDATION
The network is connected.
============================================
```

Screen 9-12. Node Address and Topology Input Report

Routing Input Report

The Routing Input report contains the same information that is presented in the Edit Routing data pane. The header control area of the report viewing window contains two fields: the Report Version field and a Destination Address field. The report format is as follows:

```
ROUTING INPUT REPORT
Created: 02/09/98 10:46
Design Name: net_2000
Destination Address: aus
Destination Node Name: us/test/aus/austin
Total Nodes: 10
Total Trunk Groups: 14
=======================================
Source Node    Primary        Secondary
Address        Trunk Group    Trunk Group
---------------------------------------
atl            atl_ny         atl_mia
cin            cin_ok         (none)
den            den_aus        den_min
mia            mia_atl        mia_ny
min            min_ok         min_den
ny             ny_min         ny_cin
ok             ok_aus         ok_por
por            por_ok         por_min
sac            sac_den        sac_por
=======================================
```

Screen 9-13. Routing Input Report

Database Validation Report

This report is produced when you create a new design from the database. It indicates whether the network model is valid. It lists trunk groups that were connected to more than one node at each end, nodes for which data could not be

retrieved from the database, and any other data validation errors. The report format is as follows:

```
DATABASE VALIDATION REPORT
Created: 02/09/98 14:38
Design Name: design_10
Address Type Preference: Mnemonic
=====================================================================
Valid Network Model at "Exchange" level
Trunk t5 not included in design.
Retrieved data is inadequate. No Group Name found.
End Node 1 = us/gold/east3/node_D
Grp Name 1 =
Mod Addr 1 = 58
End Node 2 = us/gold/beans3/node_G
Grp Name 2 = !routed!
Mod Addr 2 = 59

Trunk  not included in design
Retrieved data is inadequate. No Group Name found or unknown end node name
End Node 1 = us/gold/east3/node_D
Grp Name 1 =
Mod Addr 1 = 57
End Node 2 = us/gold/east2/node_C
Grp Name 2 =
Mod Addr 2 = 56

Trunk t6 not included in design
Mismatched far end node names or far end group names.
End Node 1 = us/gold/beans2/node_F
Grp Name 1 = !routed!
Mod Addr 1 = 61
End Node 2 = us/gold/beans3/node_G
Grp Name 2 = g1006
Mod Addr 2 = 60

Using default routing for destination = beans5
Source = east3      Primary = g1007Secondary = g1003

Using default routing for destination = beans5
Source = beans2             Primary = g1003Secondary = g1007
```

Screen 9-14. Database Validation Report

Output Reports

Each tool produces a set of analysis reports. The Topology Evaluation tool generates the following reports:

- Destination Routing
- Trunk Group Use
- Extended Routing Recommendations
- Source Routing

The Routing Evaluation tool generates the following reports:

- Routing Errors
- Destination Routing
- Source Routing

The Path Analysis tool generates the following reports:

- Summary
- Detailed

Topology Evaluation Reports

The Topology Evaluation reports are produced by the Topology Evaluation tool.

Destination Routing Report

This report shows the recommended routing patterns for all destination addresses, from each source address. It contains a section for every destination address in the network. The report also includes an extended routing recommendation for each source address.

NOTE:
If you run Topology Evaluation without checking off the **Evaluate Using Extended Routing** option, the extended routing recommendation field in this report always states: "disabled."

The Destination Routing report indicates whether the network contains dead-end paths, call-looping paths, or call-blocking paths. If any of these problems exist, the report lists them, and recommends corrective actions.

If errors are found, and you ran Topology Evaluation without setting the **Evaluate Using Extended Routing** option, the tool recommends that you re-run Topology

Evaluation with the option. In addition, it may recommend adding trunk groups. The report indicates where a trunk group may be needed.

The header control area of the report viewing window contains two fields: Node Diversity and Report Version. This information also appears in the report. The report is formatted as shown in the following example.

```
TOPOLOGY EVALUATION REPORT: DESTINATION ROUTING
Created: 02/02/98 10:50
Design Name: net_2000
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: No
Total Nodes: 10
Total Trunk Groups: 14
================================================================
Routing Table For Destination Address: atl
Destination Node Name: us/test/atl/atlanta
----------------------------------------------------------------
Source Node    Primary      Secondary    Extended
Address      Trunk Group   Trunk Group   Routing
----------------------------------------------------------------
mia            mia_atl      mia_ny       disable
ny             ny_atl       ny_mia       disable
sac            sac_den      sac_por      disable
                        .
                        .
----------------------------------------------------------------
Dead Ends: 1
----------------------------------------------------------------
  Failed
Trunk Group                          Final Hop In Dead End Path
----------------------------------------------------------------
Recommendations:
Run "Topology Evaluation" again, using Extended Routing
```

Screen 9-15. Topology Evaluation Report: Destination Routing

Trunk Group Use Report

This report lists trunk groups that are not used in any of the routing recommendations that the Topology Evaluation tool made. The header control area of the report viewing window contains two fields: Node Diversity and Report Version. This information also appears in the report. The report is formatted as shown in the following example.

```
TOPOLOGY EVALUATION REPORT: TRUNK GROUP USE
Created: 02/02/98 14:38
Design Name: tg.unused
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 3
Total Trunk Groups: 8
The following Trunk Groups are unused
================================================
End Node 1              End Node 2
Address   Trunk Group    Trunk group  Address
------------------------------------------------
  a1b2c3  gab3                 ga13  abcdef
  abcdef  g12b                 gab2  123456
  abcdef  g12c                 gab3  123456
------------------------------------------------
Number of Unused Trunk Groups = 3
================================================
```

Screen 9-16. Topology Evaluation Report: Trunk Group Use

Extended Routing Recommendations Report

This report indicates whether to enable extended routing at each node to support the recommended utility network routing. Unlike the Destination Routing report, which gives extended routing recommendations for each destination independently of other destinations, this report gives a coherent set of extended routing recommendations for the entire network. If you are interested in the routing for a subset of the nodes in the network, (rather than a utility network), use the Destination Routing report rather than this one. To implement the extended routing recommendations, extended routing must be enabled for each node separately. You can use the Network Builder configuration tasks to do that.

NOTE:
If you run Topology Evaluation without checking off the **Evaluate Using Extended Routing** option, the extended routing recommendation field in this report always states: "disabled."

The report is formatted as shown in the following example.

```
TOPOLOGY EVALUATION REPORT: EXTENDED ROUTING RECOMMENDATION
Created: 02/02/98 11:45
Design Name: net_2000
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 10
Total Trunk Groups: 14
============================================================
Source Node      Extended
Address          Routing
------------------------------------------------------------
atl              enable
aus              enable
cin              disable
den              enable
mia              enable
min              enable
ny               enable
ok               enable
por              enable
sac              disable
============================================================
```

Screen 9-17. Topology Evaluation Report: Extended Routing Recommendations

Source Routing Report

This report is available only if the topology evaluation produced an error-free set of routing patterns. It contains a set of routing patterns, one for each source address. The information in these tables is arranged so that it may be used to update the routing patterns manually at each node. The header control area of the report viewing window contains two fields: Node Diversity and Report Version.

This information also appears in the report. The report is formatted as shown in the following example.

```
TOPOLOGY EVALUATION REPORT: SOURCE ROUTING
Created: 02/03/98 13:13
Design Name: design_1
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: No
Total Nodes: 6
Total Trunk Groups: 10
================================================
Routing For Source Node Address: us
  Node Name: us/beans/ci
  ------------------------------------------------
  Destination     Primary     Secondary
  Node Address  Trunk Group  Trunk Group
  ------------------------------------------------
  node_1          trkusn1      trkusn2
  node_2          trkusn2      trkusn1
  node_3          trkusn3      trkusn4
  node_4          trkusn4      trkusn2
  node_5          trkusn5      trkusn1
  ------------------------------------------------
================================================
```

Screen 9-18. Topology Evaluation Report: Source Routing

Routing Evaluation Reports

The Routing Evaluation reports are produced by the Routing Evaluation tool.

Routing Errors Report

This report shows the errors in the routing for the specified destination address. It lists dead-end paths, call-looping paths, and call-blocking paths. It also indicates if a node does not have primary or secondary routing assigned, or if the primary route does not meet the minimum hop criterion. This occurs when the route is longer than the shortest possible path between the two nodes.

The Routing Errors report provides recommendations for correcting any errors found during the evaluation. If errors are found, and you ran Routing Evaluation without setting the **Evaluate Using Extended Routing** option, the tool recommends that you re-run Routing Evaluation with the option. In addition, it may recommend adding trunk groups. The report indicates where a trunk group may be needed.

The header control area of the report viewing window contains three fields: Node Diversity, Report Version, and Destination Address. This information also appears in the report. The report is formatted as shown in the following example.

```
TOPOLOGY EVALUATION REPORT: SOURCE ROUTING
Created: 02/03/98 14:42
Design Name: design_10
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 4
Total Trunk Groups: 5
================================================================
Routing For Source Node Address: beans2
  Source Node Name: us/gold/beans2/node_F
  -------------------------------------
  Destination     Primary     Secondary
  Node Address  Trunk Group  Trunk Group
  -------------------------------------
  beans3         g1007        g1009
  beans4         g1009        g1007
  beans5         g1010        g1009
  -------------------------------------
Routing For Source Node Address: beans3
  Source Node Name: us/gold/beans3/node_G
  -------------------------------------
  Destination     Primary     Secondary
  Node Address  Trunk Group  Trunk Group
  -------------------------------------
  beans2         g1006        g1009
  beans4         g1009        g1006
  beans5         g1006        g1009
  -------------------------------------
Routing For Source Node Address: beans4
  Source Node Name: us/gold/beans4/hubnode
  -------------------------------------
  Destination     Primary     Secondary
  Node Address  Trunk Group  Trunk Group
```

Screen 9-19. Routing Evaluation Report: Routing Errors

If the report contains dead-end paths, it lists the total number of dead-end paths first, then identifies each one. Each dead-end path is listed on a line containing the failed trunk group that caused the dead end, and the final hop in the path leading to the dead end. The Final Hop In Dead End Path field contains the node address where the final hop started, and an arrow leading to the node where the path dead-ended.

The arrow is marked with the trunk group name that was used, as in this example:

```
      Final Hop In Dead End Path
    -------------------------------
```

If the final hop in a dead-end path goes to a leaf node, the trunk group name appears as "(none)" in the report.

Destination Routing Report

This report shows recommended routing patterns for a specific destination address, from each source address.

NOTE:
If you run Routing Evaluation without checking off the **Evaluate Using Extended Routing** option, the extended routing recommendation field in this report always states: "disabled."

The header control area of the report viewing window contains three fields: Node Diversity, Report Version, and Destination Address. This information also appears in the report. The report is formatted as shown in the following example.

```
ROUTING EVALUATION REPORT: DESTINATION ROUTING
Created: 02/02/98 13:38
Design Name: net_2000
Destination Address: aus
Destination Node Name: us/test/aus/austin
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 10
Total Trunk Groups: 14
=====================================================
Routing Table For Destination Address: aus
-----------------------------------------------------
Source Node    Primary      Secondary    Extended
Address      Trunk Group   Trunk Group   Routing
-----------------------------------------------------
den            den_aus      den_min      disable
ok             ok_aus       ok_min       disable
min            min_den      min_ok       enable
sac            sac_den      sac_por      disable
cin            cin_ok       cin_ny       disable
por            por_ok       por_min      disable
ny             ny_min       ny_cin       enable
atl            atl_ny       atl_mia      enable
mia            mia_ny       mia_atl      enable
-----------------------------------------------------
=====================================================
```

Screen 9-20. Routing Evaluation Report: Destination Routing

Source Routing Report

This report contains routing recommendations for the specified source address, ordered by destination address. The contents of this report depend on the extent and type of errors found in the existing routing:

- If the Routing Evaluation tool finds errors and cannot generate error-free routing, it does not produce this report. The base window message indicates that errors were detected and no routing is recommended. In that case, refer to the Routing Errors report.
- If the Routing Evaluation tool finds errors, but it can generate error-free routing, this report contains recommendations for making changes to the existing routing to correct the errors that were found. Those parts of the existing routing that are already free of errors are not listed in this report.
- If the Routing Evaluation tool determines that the existing routing is already error-free, this report contains no recommendations for making changes. The report detail area contains a statement that the routing input has no errors.

The Source Routing report is formatted as shown in the following example.

```
ROUTING EVALUATION REPORT: SOURCE ROUTING
Created: 02/03/98 14:42
Design Name: design_10
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 4
Total Trunk Groups: 5
========================================================================
Routing For Source Node Address: magic4
  Source Node Name: us/beans/magician/hubnode
  ------------------------------------------------------------------
  Destination     Primary     Secondary     Remarks
  Node Address  Trunk Group  Trunk Group
  ------------------------------------------------------------------
  magic2          g1006        g1007
  magic3         (none)      (none)      ** Routing evaluation not run
  magic5         (none)      (none)      ** Routing evaluation not run
========================================================================
Note: "(none)" indicates that no Trunk Group is recommended.
      See remarks for explanation.
```

Screen 9-21. Routing Evaluation Report: Source Routing

Path Analysis Reports

The Path Analysis reports are produced by the Path Analysis tool.

Summary Report

This report contains a summary of the information from the path analysis. The header control area of the report viewing window contains the Report Version field. This information also appears in the report. The report is formatted as shown in the following example.

```
PATH ANALYSIS REPORT: SUMMARY ANALYSIS
Created: 02/03/98 13:44
Design Name: design_2
Destination Address: mj1
Destination Node Name: us/duster/mj1/usnode01
Source Address: mj3
Source Node Name: us/duster/mj1/usnode03
Analysis Mode: Trunk Groups Failure
Input Source: Topology Evaluation
Total Nodes: 3
Total Trunk Groups: 3
=====================================================================
Maximum Hops: 1 (Normal Operation)
Maximum Hops: 2 (Failure Mode)
Completed Paths: 3
Blocked Paths: 1
Crank-Back Paths: 0
=====================================================================
```

Screen 9-22. Path Analysis Summary Report

Detailed Report

This report includes the same information as the Summary Report, plus detailed routing paths. The header control area of the report viewing window contains the Report Version field. The report is formatted as shown in the following example.

```
PATH ANALYSIS REPORT: DETAILED ANALYSIS
Created: 02/02/98 12:00
Design Name: net_2000
Destination Address: atl
Destination Node Name: us/test/atl/atlanta
Source Address: aus
Source Node Name: us/test/aus/austin
Analysis Mode: Node Failure
Input Source: Node Diverse Topology Evaluation
Total Nodes: 10
Total Trunk Groups: 15
==================================================
Maximum Hops: 4 (Failure Mode)
Node Diversity: 100%
Completed Paths: 8
Blocked Paths: 0
Crank-Back Paths: 0
--------------------------------------------------
Network Routing Paths:
FAILED      HOP   PATH
NODE ADDR  COUNT  STATUS  PATH
--------------------------------------------------
sac        2       c     aus       ok        atl
--------------------------------------------------
den        2       c     aus       ok        atl
--------------------------------------------------
cin        2       c     aus       ok        atl
--------------------------------------------------
mia        2       c     aus       ok        atl
--------------------------------------------------
```

Screen 9-23. Path Analysis Detailed Report

The detailed part of this report shows the paths taken from the specified source to the specified destination under failure conditions. The left-hand column of the report lists each failure, while the rightmost column lists the path. The path is denoted by the node addresses that it passes through. The center columns of the report show the hop count for each path, and its status: completed (c), blocked (b), or cranked-back (cb). If a path is route-advanced, this is indicated where it occurs in the list of nodes in the path.

Input and Output Report Data Fields

The Connectivity Analysis reports contain many of the same data fields. For each data field in **Table 9-3**, the "Field Name" column contains the name that appears on the reports, either as a field label or a column heading. The "Reports" column indicates which reports contain this information for each data field.

Both the Topology Evaluation tool and Routing Evaluation tool generate reports titled "Destination Routing" and "Source Routing." If the same data field appears in both versions of one of these reports, the table lists the report name, but not the tool name. If a data field appears in only one version of one of the reports, the table indicates whether it is generated by the Routing Evaluation (RE) or Topology Evaluation (TE) tool.

Data fields that appear in the Summary Path Analysis report also appear in the Detailed Path Analysis report. They are indicated by "Path Analysis" in the table. Data fields listed as "Detailed Path Analysis" appear only in the Detailed Path Analysis report.

Table 9-3. Input and Output Report Data Fields

Field Name	Reports	Description
Analysis Mode	Path Analysis	This field indicates which failure mode was chosen: trunk group failure or node failure.
Blocked Paths	Path Analysis	This field shows the number of blocked paths in this path analysis.
Call Blocking Paths	Destination Routing (TE), Routing Errors	This field lists the paths where call blocking occurred in node diversity analysis.
Call Looping Paths	Destination Routing (TE), Routing Errors	This column shows the list of nodes and trunks in a loop, starting from the source address and ending where the loop is closed.
Completed Paths	Path Analysis	This field shows the number of completed paths from source to destination in this path analysis.
Crank-Back Paths	Path Analysis	This field shows the number of paths where crank-back was needed to complete the call.

Table 9-3. Input and Output Report Data Fields —*Continued*

Field Name	Reports	Description
Created	All	This field contains the date and time when this data was created or last modified.
Dead Ends	Destination Routing (TE), Routing Errors	This field shows the number of dead-end paths found.
Design Name	All	This field shows the name assigned to this design.
Destination Node Address	Source Routing	This field shows the node address that is the destination of the routing information displayed.
End Node 1 Address	Topology Input, Trunk Group Use	This column lists the first node address for each trunk group.
End Node 1 Trunk Group	Topology Input, Trunk Group Use	This column lists the name of this trunk group in the first node.
End Node 2 Address	Topology Input, Trunk Group Use	This column lists the second node address for each trunk group.
End Node 2 Trunk Group	Topology Input, Trunk Group Use	This column lists the name of this trunk group in the second node.
Evaluated For Node Diversity	All output, except Path Analysis	This field indicates whether the report is based on node diversity analysis.
Evaluated Using Extended Routing	All output, except Path Analysis	This field indicates whether the extended routing algorithm was used in this analysis.
Extended Routing	Node Address & Topology Input, Destination Routing, Extended Routing Recommendations	In input, this column of the destination routing pattern indicates whether extended routing is enabled or disabled for each source address. In output reports, it contains the recommendation for extended routing.
Failed Node Address	Destination Routing (TE), Routing Errors	This field shows the address of the failed node which caused call-blocking paths in a node diversity analysis.
Failed Node Address	Detailed Path Analysis	This column lists the address of the failed node in the path analysis report generated by a node failure analysis.
Failed Trunk Group	Destination Routing (TE), Routing Errors	This column lists the failed trunk group causing call-looping paths or dead ends.
Failed Trunk Groups	Detailed Path Analysis	This column lists the failed trunk groups (if any) that were used for path analysis in trunk group failure mode.

Table 9-3. Input and Output Report Data Fields —*Continued*

Field Name	Reports	Description
Final Hop in Dead End Path	Destination Routing (TE), Routing Errors	This column shows the last hop in a dead-end path found during topology or routing evaluation.
Hop Count	Detailed Path Analysis	This column shows the number of hops for each path.
Input Source	Path Analysis	This field shows whether the data used for path analysis came from topology or routing evaluation.
Maximum Hops	Path Analysis	This field shows the number of hops in the longest path found in path analysis.
Node Address	Source Routing	This column lists the node addresses in alphabetical order.
Node Diversity	Path Analysis	This field shows the percentage of paths that were completed (in other words, that reached their destinations in spite of a single node failure).
Node Name	Node Address & Topology Input, Source Routing	This column lists the node name for each node address.
Number of Call Blocking Paths	Destination Routing (TE), Routing Errors	This field shows the number of call-blocking paths found during a node diversity analysis. It is followed by a list of these paths.
Number of Call Loops	Destination Routing (TE), Routing Errors	This field shows the number of call-looping paths found in the analysis.
Path	Detailed Path Analysis	This column lists the details of each path that was found during analysis.
Path Status	Detailed Path Analysis	This column lists the status of each path shown in path analysis. It shows whether the call is completed (c), blocked (b), or cranked back (cb).
Primary Trunk Group	Routing Input, Destination Routing, Source Routing	This column lists the primary trunk group for each routing assignment from a source address to a destination address.
Routing For Source Address	Source Routing	This field shows the address of the node for which this source routing pattern has been generated.
Routing Table For Destination Address	Destination Routing	This field shows the address of the node for which this destination routing pattern has been generated.
Secondary Trunk Group	Routing Input, Destination Routing, Source Routing	This column lists the secondary trunk group for each routing assignment from a source address to a destination address.
Source Node Address	Destination Routing	This column lists the source address for which routing assignments have been generated in this routing pattern.

Table 9-3. Input and Output Report Data Fields —*Continued*

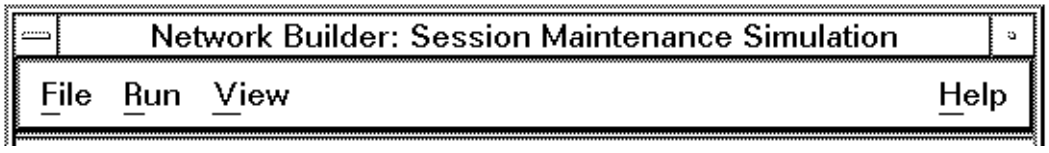
Field Name	Reports	Description
Subnetwork	Node Address and Topology Input	This column lists the subnetwork number assigned to each subnetwork in a disconnected network.
Total Nodes	All	This field shows the total number of nodes in the design.
Total Trunk Groups	All	This field shows the total number of trunk groups in the design.
Unused Trunk Groups	Trunk Group Use	This column lists the trunk groups that were not used in any of the paths in this topology evaluation.

Using the Session Maintenance Simulation Tool

This section explains how to use the Session Maintenance simulation tool to analyze Node Reroute Tables (NRTs) created with the Network Builder Configuration tools. The simulation tool makes use of windows that serve as input screens that allow you to specify parameters for the simulation and then view the results.

Session Maintenance Simulation User Interface Controls

The Session Maintenance simulation tool Base Window control area has the following layout:



Screen 9-24. Session Maintenance Simulation Tool: Control Area

The control area of the base window contains four buttons. Their functions are as follows:

File	Displays a menu for choosing the type of data to use for simulations.
Run	Performs a simulation using the data chosen with the **File** menu.
View	Displays a menu of output reports to view the output of a simulation run.
Help	Displays help text on the screen.

The File Menu

The **File** menu presents a sub-menu for you to choose the input data source. It has two options:

Load This option gives you the following choices for loading data for the simulation tool:

Use Committed Data Only	Use committed data loaded from the StarKeeper II NMS Core databases
Use Committed and Pending Data	Committed and pending data together make up the entire network configuration as defined by data available at this Graphics System. Note that pending data from other *StarKeeper* II NMS workstations is not available at this Graphics System.
Use Pending Data Only	Use pending data that has been created by Network Builder configuration Tasks

Reset The **Reset** option resets the Session Maintenance Simulation base window controls. If you have not run a simulation from this base window, it sets the controls to the default values. If you have run a simulation from this base window, it sets the controls to the values used for the last simulation.

The Run Simulation Menu

The **Run Simulation** menu presents a sub-menu with a **Simulation** menu item used to start simulation, using the parameters specified.

The View Menu

The **View** menu contains three choices of output reports to view:

Summary Report	Displays the Summary Report from a simulation run. This report contains overall summary information for network simulation as a whole.
Detailed Report	Displays the Detailed report from a simulation run. This report contains the same information as the Summary Report, plus descriptions of every path followed and results for each request generated.
Engineering Data	Contains calculations that are useful for understanding why reroute path selections followed the paths shown in the Detailed Report

For information on how to use the contents of these reports in configuring Session Maintenance, refer to the node's *Session Maintenance Guide*.

Quitting the Session Maintenance Simulation Tool

To quit using the Session Maintenance simulation tool, choose **Exit** from the **File** menu.

Session Maintenance Simulation Procedure

This procedure explains how to perform the following tasks:

- Start the Session Maintenance simulation tool.
- Load simulation data.
- Choose a data source for the simulation.
- Specify Run command parameters.
- Specify node tuning data override values.
- Start a simulation run.
- View the output reports.

Assumptions

The procedure assumes:

- You are familiar with Session Maintenance concepts and terminology from the node's *Session Maintenance Guide*.
- The Network Builder application has been started as explained in **Procedure 9-1**.

Procedure 9-5. Run Session Maintenance Simulation

A. Start Session Maintenance Simulation

Choose **Session Maintenance Simulation** from the **Analyze** menu of the Network Builder Control Window. The Session Maintenance Simulation Base Window appears. You can use the controls in this window to invoke Session Maintenance simulation tool functions.

To quit the Session Maintenance simulation tool at any time, choose **Exit** from the **File** menu.

B. Load Simulation Data

Choose the Load item from the **File** menu on the Session Maintenance simulation Base Window. The tool displays a sub-menu with the following options:

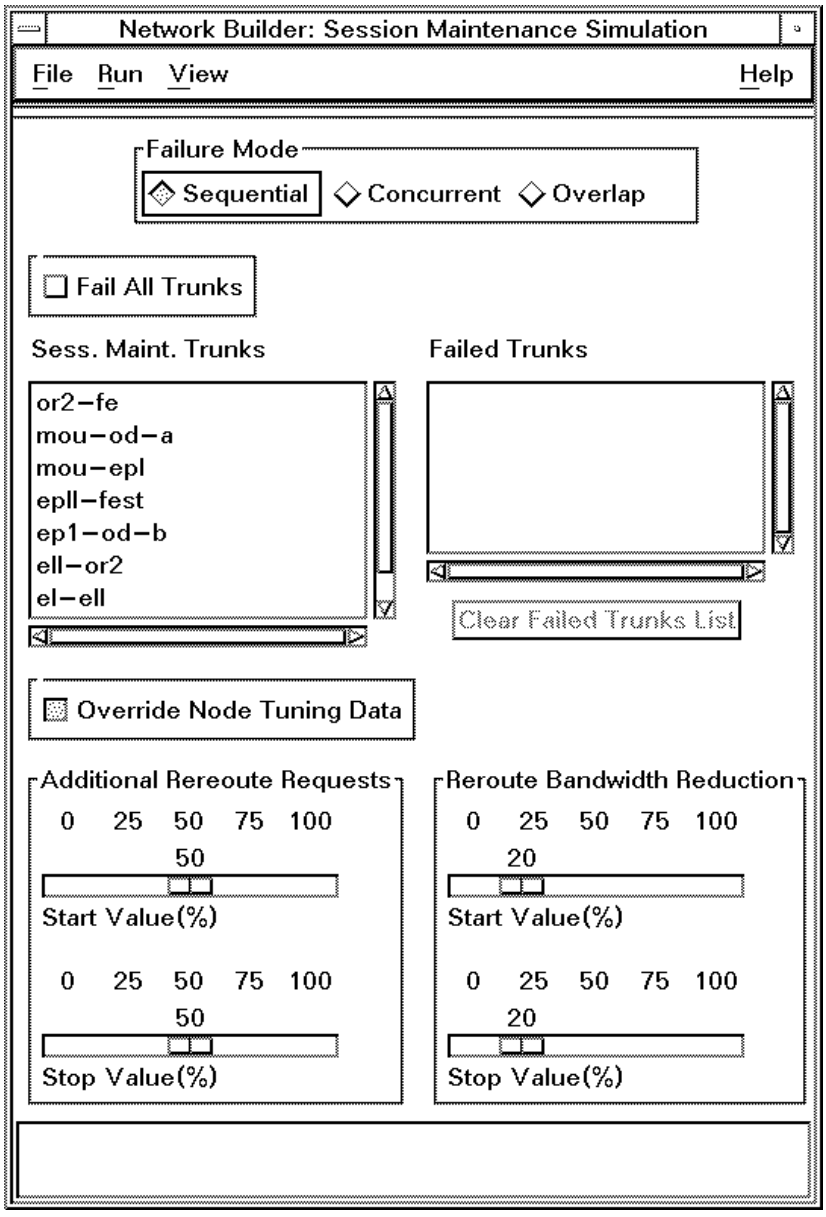
- Use Committed Data Only
- Use Pending Data Only
- Use Committed and Pending Data

C. Choose Data Source

Choose the source to use for the simulation:

Field Name	Description
Use Committed Data Only	Committed data includes node configuration data, trunk configuration data, and node reroute tables (NRTs) loaded from the *StarKeeper* II NMS Core System database. It represents the actual network configuration.
Use Pending Data Only	Use pending data only requires that all data for the simulation be in the pending state. Pending data includes node data, trunk data, and NRTs created by the Network Builder configuration tasks **in this Graphics System only**. It has been entered using the Network Builder Configuration tools, but not downloaded to the *StarKeeper* II NMS Core System databases and to the nodes in the network. You can use this choice to test a configuration before putting Session Maintenance into service. All nodes and trunks in a virtual subnetwork being operated on must be pending in order for the simulation to be successful. Note that if there are any committed nodes between pending trunks, those nodes must be resubmitted as held before proceeding.
Use Committed and Pending Data	This choice allows you to use both committed and pending data.

Choose one of the items on this sub-menu. This initiates data collection from the data sources you chose from the menu. Once the data is loaded, the Session Maintenance Simulation Base Window activates the **Simulation** menu item.



Screen 9-25. Session Maintenance Base Window after Load

D. Specify Run Command Parameters

Specify the following information:

Field Name	Description
Failure Mode	Exclusive setting. Sequential, Concurrent, Overlap. A sequential mode simulation fails the chosen trunks one at a time, in sequence. The simulation tool restores the network to its initial routing before failing the next trunk in sequence. A concurrent mode simulation fails all of the chosen trunks at the same time, with the trunk failures detected in the order listed. Use the concurrent mode to model simultaneous trunk failures. An overlap mode simulation fails the chosen trunks in the order listed, allowing enough time between failures for the effects of the previous failure to be completed, but without restoring the network between failures.
Fail All Trunks	Checkbox. This control appears only for sequential failure mode. If checked, the simulation fails all trunks in the network in sequence.
Session Maintenance Trunks	This scrolling list appears if you have not checked the **Fail All Trunks** checkbox. It lists the names of all the network trunks. Up to ten trunks can be chosen from the list. If you choose a trunk already in the Failed Trunks list, it is removed from that list.
Clear Failed Trunk List	This button clears all trunks from the Failed Trunks list.
Failed Trunks	This list appears if you have not checked the **Fail All Trunks** checkbox. It contains the list of trunks you chose from the list of Session Maintenance trunks. Trunks appear on the list in the order chosen, not in alphabetical order. The simulation tool will fail them in the order listed.
Override Node Tuning Data	This control provides access to other controls that allow you to override node tuning parameters (but only for the current simulation). If you check off this box, the window expands to add more controls. Two parameters are affected by these controls: • Additional Reroute Requests • Reroute Bandwidth Reduction

E. Specify Node Tuning Data Override Values

Specify the values for these controls as follows:

Field Name	Description
Additional Reroute Requests	Use these controls to specify the range of additional reroute requests made by the primary node. If you specify a larger value for the stop value than for the start value, the simulation uses a series of values instead of a single one. Beginning at the start value, it increases the percentage of additional reroute requests by ten percent each time, until it reaches the stop value.
Reroute Bandwidth Reduction	Use these controls to specify the range of reroute bandwidth reduction values the primary node will accept. If you specify a larger value for the stop value than for the start value, the simulation uses a series of values instead of a single one. Beginning at the start value, it increases the reroute bandwidth reduction value by ten percent each time, until it reaches the stop value.

F. Start Simulation

Select **Simulation** from the **Run** menu to start the simulation.

G. View Output Reports

Use the **View** menu in the Session Maintenance Simulation Base Window to choose output reports for viewing.

Session Maintenance Simulation Output Reports

The Session Maintenance simulation tool provides three reports based on the results of running the Session Maintenance simulation tool.

- Summary Report
- Detailed Report
- Engineering Data

Use the **View** menu in the Session Maintenance Simulation Base Window to choose these reports for viewing.

Summary Report

Screens 9-27 through **9-31** show four Summary reports. Each report represents the output from a different type of simulation run:

- sequential failure mode for all trunks
- sequential failure mode for up to ten trunks
- concurrent failure mode for up to ten trunks
- overlap failure mode for up to ten trunks

In each report, the first column, "FAIL MODE," shows the chosen failure mode. The second column, "FAILED TRUNKS," contains a list of the trunks that were chosen to fail, or "ALL" if you chose sequential failure mode for all trunks. See **Table 9-4** for descriptions of the other data fields in each report.

Sequential Failure Mode, All Trunks Failed

When the simulation run uses node administered tuning parameters, the report produces one row of information. The following screen is an example of output from a sequential mode failure using "ALL".

```
SESSION MAINTENANCE SIMULATION: SUMMARY REPORT
Created: 02/03/98 07:35
FAIL   FAILED          ADD'L  BW    CS    CS   REQS  REQS  REQS  SUCC  AVG
MODE   TRUNKS         REQS  REDUC  NEED  SUCC  SENT  REJ   DEAD   %    HOPS
-------------------------------------------------------------------------
seq    ALL                          48    48    65    13     4   100%  1.96
```

Screen 9-26. Summary Report (Sequential, ALL)

Since the simulation used node administered tuning parameters, there is one row of information for all the remaining columns that represents a compilation of the outcome of routes for "ALL" the failed trunks.

Sequential Failure Mode, Selected Trunks Failed

The following screen is an example of a sequential mode failure using a list of five trunks. This output is also based on a simulation that used node administered tuning parameters. The five trunks are listed in column two.

The single row of additional information for all the remaining columns represents a compilation for all routes, given the five trunk failures.

```
SESSION MAINTENANCE SIMULATION: SUMMARY REPORT
Created: 02/03/98 09:27
FAIL   FAILED          ADD'L  BW    CS    CS   REQS  REQS  REQS  SUCC  AVG
MODE   TRUNKS         REQS  REDUC  NEED  SUCC  SENT  REJ   DEAD   %    HOPS
-------------------------------------------------------------------------
seq    samtra1                    24    24    33    6     3    100%  1.96
       lacsam
       samtra2
       chotra
       chosam
```

Screen 9-27. Summary Report (Sequential, List)

Concurrent Failure Mode

The following screen is an example of a concurrent mode failure using a list of two trunks. For this simulation, the "Override Node Tuning Data" control was chosen, and the following values were chosen for the override:

- Additional Reroute Requests, 0 to 30%
- Reroute Bandwidth Reduction, 0 to 20%

The following screen includes twelve rows of output. This represents one row of output per combination of tuning parameters. For example, for the two trunks failed (lacsam and chotra) in the simulation shown in this screen, the first row represents 0% Additional Reroute Requests and 0% Reroute Bandwidth Reduction. Each additional row represents another combination of the parameters that were overridden in the simulation.

```
SESSION MAINTENANCE SIMULATION: SUMMARY REPORT
Created: 02/03/98 09:30
FAIL   FAILED          ADD'L  BW    CS    CS   REQS  REQS  REQS  SUCC  AVG
MODE   TRUNKS         REQS  REDUC  NEED  SUCC  SENT  REJ   DEAD   %    HOPS
-------------------------------------------------------------------------
conc   lacsam            0%   0%    10     8    10     0     2    80%  2.38
       chotra            0%  10%    10     8    10     0     2    80%  2.38
                         0%  20%    10     8    10     0     2    80%  2.38
                        10%   0%    10     4    12     1     7    40%  2.00
                        10%  10%    10     4    12     1     7    40%  2.00
                        10%  20%    10     4    12     1     7    40%  2.00
                        20%   0%    10     4    13     1     8    40%  2.00
                        20%  10%    10     4    13     1     8    40%  2.00
                        20%  20%    10     4    13     1     8    40%  2.00
                        30%   0%    10     4    13     1     8    40%  2.00
                        30%  10%    10     4    13     1     8    40%  2.00
                        30%  20%    10     4    13     1     8    40%  2.00
```

Screen 9-28. Summary Report (Concurrent)

Overlap Failure Mode

The following screen shows the Summary Report for a simulation using overlap failure mode.

```
SESSION MAINTENANCE SIMULATION: SUMMARY REPORT
Created: 02/03/98 09:27
FAIL   FAILED          ADD'L  BW    CS    CS   REQS  REQS  REQS  SUCC  AVG
MODE   TRUNKS         REQS  REDUC  NEED  SUCC  SENT  REJ   DEAD   %    HOPS
-------------------------------------------------------------------------
ovrlp  samtra1                      24    24    33    6     3    90%   1.96
       lacsam
       samtra2
```

Screen 9-29. Summary Report (Overlap)

Session Maintenance Simulation Summary Report Data Fields

Table 9-4 lists the data fields that appear in Summary reports, and explains the contents of each field.

Table 9-4. Session Maintenance Simulation Summary Report Fields

Field Name	Description
FAIL MODE	The failure mode field shows which failure mode was used, sequential (Seq) or concurrent (Con), or overlap (Ovrlp).
FAILED TRUNKS	This field shows the list of trunks failed. If all the trunks were failed, this field will say "ALL".
ADD'L REQTS	The additional requests field shows the percent of additional channel sets requested. If "Override Node Tuning Data" was not chosen, this field is left blank.
BW REDUC	The bandwidth reduction field shows the percent of reduced bandwidth. If "Override Node Tuning Data" was not chosen, this field is left blank.
CS NEED	The channel sets needed field shows the number of channel sets needed. If this is for a single trunk failure it represents the number of active channel sets on that trunk. Otherwise, it represents the sum of all the active channel sets on all the chosen trunks.
CS SUCC	The channel sets successful field shows the number of channel sets that were successfully rerouted.

Table 9-4. Session Maintenance Simulation Summary Report Fields —

Field Name	Description
REQS SENT	The requests sent field shows the number of reroute requests sent by the primary node(s). This is a function of the number of channel sets needed and the additional reroute request value.
REQS REJ	The requests rejected field shows the number of requests rejected at the secondary node as being superfluous. These requests followed a valid reroute path but other requests made it to the secondary node first.
REQS DEAD	The requests dead field shows the requests that followed a path that did not end up at the secondary node. A look at the detailed report illustrates the reason.
SUCC %	The success percentage field shows the reroute success as a percentage of the combination of the Additional Reroute Requests and Reroute Bandwidth Reduction parameters for the specified trunks. If any value in this column is less than 100%, it is preceded by a pound sign (#). You can use this feature to quickly locate these values using Find in the **View** window.
AVG HOPS	The average hops field shows the average number of hops.

Detailed Report

The following screen shows an example of Detailed report output.

```
FAILED  PRIMARY  SECONDARY  ADD'L  BW    CS    CS   REQS  REQS REQS  SUCC  AVG
TRUNK   NODE     NODE       REQS   REDUC NEED  SUCC  SENT  REJ  DEAD    %   HOPS
-------------------------------------------------------------------------------
lacsam   lacylane samabala   10%   10%     6     0     7    0    7   # 0%  0.00
REQUEST    RESULT       NODE    MODADDR     TRUNK     MODADDR    NODE
-------------------------------------------------------------------------------
   1     no CS        lacylane     29     cholac         20    chong
3     no CS        lacylane     29     cholac         20    chong
5     no CS        lacylane     29     cholac         20    chong
6     insuf. BW    lacylane     27     lacgud2         9    gudapati
7     no CS        lacylane     29     cholac         20    chong
2     insuf. BW    lacylane     27     lacgud2         9    gudapati
                      gudapati      8     gudtra          5    tranlee
4     insuf. BW    lacylane     27     lacgud2 anlee
```

Screen 9-30. View: Detailed Report

The detailed report consists of two parts for each trunk. In the upper part of the report for each trunk, the first three columns give the trunk name, primary node, and the secondary node. The remaining columns contain the same data fields as

the Summary Report for a single trunk. The lower part of the Detailed report for each trunk gives a description of the paths followed and the result for each request generated. **Table 9-5** contains summaries of the report fields contained only in the Detailed report. For explanations of the report fields that also appear in the Summary Report, see **Table 9-4**.

Session Maintenance Simulation Detailed Report Fields

Table 9-5 lists the data fields that appear in the Detailed report and explains the contents of each field.

Table 9-5. Session Maintenance Simulation Detailed Report Fields

Field Name	Description
FAILED TRUNK	This field shows the trunk name of the failed trunk.
PRIMARY NODE	This field shows the name of the primary node.
SECONDARY NODE	This field shows the name of the secondary node.
Common fields	See **Table 9-4** for the ADD'L REQS, BW REDUC, CS NEED, CS SUCC, REQS SENT, REQS REJ, REQS DEAD, SUCC %, and AVG HOPS fields.
REQUEST	The request field identifies the request number. There is a maximum of 32, so a report may contain up to 32 request numbers. The typical number of requests is about ten.
RESULT	The result field contains the status of the request. The values are as follows: acc = Accepted rej = Rejected insuf. BW = Insufficient Bandwidth no CS = No Channel Sets hop limit = Hop Limit drop = Drop
NODE	This column shows the node name at one end of one trunk in the path.
MODADDR	The module address column shows the module address of the trunk in the first node.
TRUNK	This column shows the trunk group name.
MODADDR	The second module address column shows the module address of the trunk in the second node.
NODE	This column shows the node name at the other end of the trunk.

The last five fields in this table represent reroute paths. Each row represents a hop. The reroute can include up to four hops, so each reroute path can include up to four rows.

Engineering Data Report

The Engineering Data report is shown in the following screen. T**able 9-6** contains brief explanations of the data fields in the report. For more information about applying the report data, refer to the node's *Session Maintenance Guide*.

```
SESSION MAINTENANCE ENGINEERING DATA
Created: 02/03/98 09:04
TRUNK       EXP. BW/    ACTIVE CHNLS/     TOTAL       REROUTE NODE
NAME        ACTIVE CS   ACTIVE CS       STANDBY BW    CONNECTIVITY
-------------------------------------------------------------------
samtra2     855k        83              1674k         P=S
samtra1     466k        100             1908k         P=S
lacgud2     628k        121             3600k         P<S
chotra      530k        125             2120k         P<S
chosam      733k        100             3600k         P<S
cholac      728k        120             4360k         P<S
lacgud1     634k        92              3560k         P<S
lacsam      673k        83              3960k         P=S
gudtra      466k        110             1908k         P<S
-------------------------------------------------------------------
```

Screen 9-31. View: Engineering Data Report

Table 9-6. Session Maintenance Simulation Engineering Data Report Fields

Field Name	Description
TRUNK NAME	This column shows the name of each Session Maintenance trunk in the network.
EXP. BW / ACTIVE CS	The Expected Bandwidth / Active Channel Sets column contains the ratio of expected bandwidth to active channel sets for each trunk.
ACTIVE CHNLS / ACTIVE CS	The Active Channels / Active Channel Sets column contains the ratio of active channels to active channel sets for each trunk.
TOTAL STANDBY BW	The total standby bandwidth column shows the total standby bandwidth for each trunk.
REROUTE NODE CONNECTIVITY	This column indicates whether the primary node for this trunk has greater or lesser connectivity than the secondary node (it normally should have lesser connectivity). If the primary node has more, the difference is shown in parentheses at the end of the row.

Connectivity Analysis Example

This section contains an example of using the Connectivity Analysis tools to analyze a network and improve the routing.

The net_2000 Network

The network for this example consists of ten nodes in cities across the United States. The network layout is illustrated in the following figure.

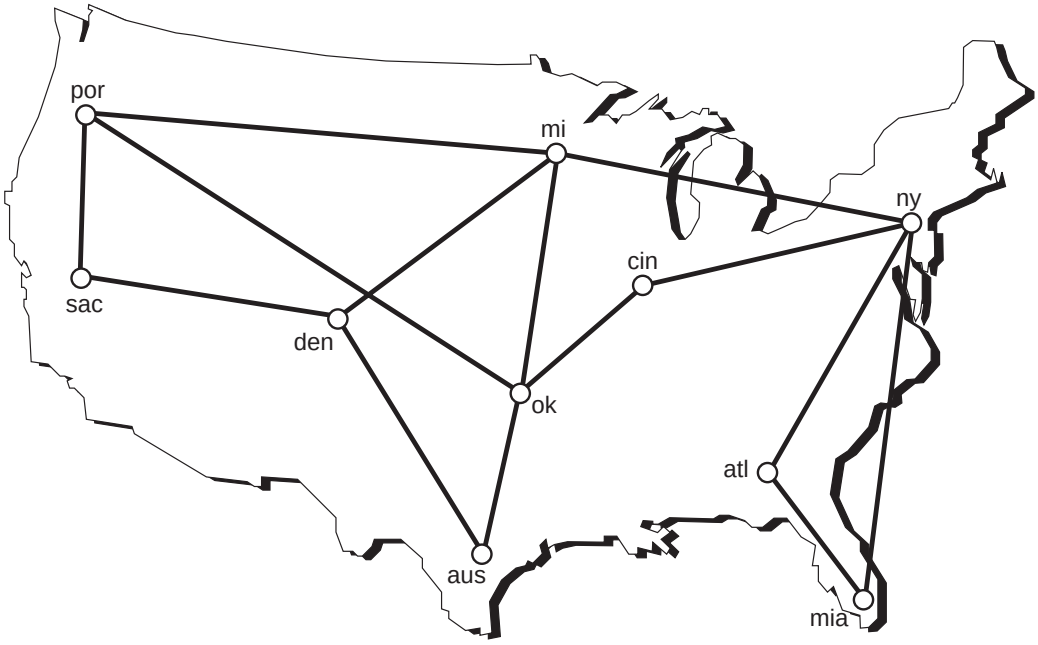


Figure 9-1. Example Network Layout

The Network Topology

The Node Address & Topology Input report shows the list of node names and trunks.

```
NODE ADDRESS & TOPOLOGY INPUT REPORT
Created: 02/02/98 10:46
Design Name: net_2000
Total Nodes: 10
================================================
Node      Extended  Node
Address   Routing   Name
------------------------------------------------
atl       enabled   us/test/atl/atlanta
aus       disabled  us/test/aus/austin
cin       disabled  us/test/cin/cincinnati
den       disabled  us/test/den/denver
mia       enabled   us/test/mia/miami
min       disabled  us/test/min/minneapolis
ny        disabled  us/test/ny/newyork
ok        disabled  us/test/ok/oklahoma
por       enabled   us/test/por/portland
sac       disabled  us/test/sac/sacramento
================================================
Total Trunk Groups: 14
================================================
End Node 1              End Node 2
 Address  Trunk Group    Trunk group  Address
------------------------------------------------
     atl  atl_mia            mia_atl  mia
     cin  cin_ny              ny_cin  ny
     den  den_aus            aus_den  aus
     den  den_min            min_den  min
     min  min_ny              ny_min  ny
     min  min_ok              ok_min  ok
      ny  ny_atl              atl_ny  atl
```

Screen 9-32. Node Address & Topology Input Report

Initial Routing

The initial routing, based on the topology given in the following screen, is listed in the Routing Input report.

```
ROUTING INPUT REPORT
Created: 02/02/98 10:46
Design Name: net_2000
Destination Address: aus
Total Nodes: 10
Total Trunk Groups: 14
================================================
Source Node    Primary        Secondary
Address        Trunk Group    Trunk Group
------------------------------------------------
atl            atl_ny         atl_mia
cin            cin_ok         (none)
den            den_aus        den_min
mia            mia_atl        mia_ny
min            min_ok         min_den
ny             ny_min         ny_cin
ok             ok_aus         ok_por
por            por_ok         por_min
sac            sac_den        sac_por
================================================
```

Screen 9-33. Initial Routing Input Report

Initial Topology Evaluation

The initial Topology Evaluation finds several dead-end paths, as the following screen shows (the last part of this report listing is omitted)

```
TOPOLOGY EVALUATION REPORT: DESTINATION ROUTING
Created: 02/02/98 10:50
Design Name: net_2000
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: No
Total Nodes: 10
Total Trunk Groups: 14
=====================================================================
Routing Table For Destination Address: atl
---------------------------------------------------------------------
Source Node    Primary      Secondary    Extended
Address      Trunk Group   Trunk Group   Routing
---------------------------------------------------------------------
mia            mia_atl      mia_ny       disable
ny             ny_atl       ny_mia       disable
cin            cin_ny       cin_ok       disable
min            min_ny       (none)       disable
den            den_min      den_aus      disable
ok             ok_min       ok_cin       disable
por            por_min      por_ok       disable
aus            aus_ok       aus_den      disable
sac            sac_den      sac_por      disable
---------------------------------------------------------------------
Dead Ends: 1
------------------------------------------------- Failed
Trunk Group                          Final Hop In Dead End Path
---------------------------------------------------------------------
min-min_ny:ny-ny_min                 den -------den_min--> min
---------------------------------------------------------------------
Recommendations:
Run "Topology Evaluation" again, using Extended Routing
                        OR
Add a new trunk group between "min" & "cin"
```

Screen 9-34. Destination Routing Report Shows Errors

The analysis is re-run using the **Evaluate Using Extended Routing** option. This results in generating error-free routing. The Source Routing report shows the results.

```
TOPOLOGY EVALUATION REPORT: SOURCE ROUTING
Created: 02/02/98 11:44
Design Name: net_2000
Evaluated For Node Diversity: No
Evaluated Using Extended Routing: Yes
Total Nodes: 10
Total Trunk Groups: 14
========================================
Routing For Source Node Address: atl
  Node Name: us/test/atl/atlanta
  ------------------------------------
  Destination     Primary     Secondary
  Node Address  Trunk Group  Trunk Group
  ------------------------------------
  aus            atl_ny       atl_mia
  cin            atl_ny       atl_mia
  den            atl_ny       atl_mia
  mia            atl_mia      atl_ny
  min            atl_ny       atl_mia
  ny             atl_ny       atl_mia
  ok             atl_ny       atl_mia
  por            atl_ny       atl_mia
  sac            atl_ny       atl_mia
  ------------------------------------
```

Screen 9-35. Source Routing Report Gives Error-Free Routing

Following the successful Topology Evaluation run, the user runs Path Analysis to study the routing in the network. This analysis shows some blocked paths.

```
PATH ANALYSIS REPORT: DETAILED ANALYSIS
Created: 02/02/98 11:39
Design Name: net_2000
Destination Address: atl
Source Address: aus
Analysis Mode: Trunk Groups Failure
Input Source: Topology Evaluation
Total Nodes: 10
Total Trunk Groups: 14
=========================================================================
Maximum Hops: 4 (Normal Operation)
Maximum Hops: 7 (Failure Mode)
Completed Paths: 32
Blocked Paths: 4
Crank-Back Paths:
-------------------------------------------------------------------------
Network Routing Paths:
   FAILED          HOP    PATH
TRUNK GROUPS       COUNT  STATUS PATH
-------------------------------------------------------------------------
                   4       c     aus    ok    min    ny    atl
-------------------------------------------------------------------------
atl-atl_mia        4       b    (cb)    aus   den    min   ny
ny-ny_atl                        mia
-------------------------------------------------------------------------
```

Screen 9-36. Path Analysis Report Shows Blocked Paths

Next, the user re-runs Topology Analysis with the **Evaluate for Node Diversity** option. This analysis shows the need to add a trunk, perhaps between the Atlanta node and the rest of the network.

```
TOPOLOGY EVALUATION REPORT: DESTINATION ROUTING
Created: 02/02/98 11:47
Design Name: net_2000
Evaluated For Node Diversity: Yes
Evaluated Using Extended Routing: Yes
Total Nodes: 10
Total Trunk Groups: 14
================================================
Routing Table For Destination Address: atl
------------------------------------------------
Source Node    Primary      Secondary    Extended
Address      Trunk Group   Trunk Group   Routing
------------------------------------------------
mia            mia_atl      mia_ny       disable
ny             ny_atl       ny_mia       disable
cin            cin_ny       cin_ok       disable
                    .
------------------------------------------------
Node Diversity Failure
----------------------
Number of Blocked Paths: 1
Blocked Path #1:
Failed Node Address: ny
-----------------------
sac -------sac_den-->
den -------den_min-->
min -------min_ok--->
ok --------ok_cin--->
cin
-----------------------------
Recommendations:
Add a new trunk group between "cin" & "mia"
================================================
Routing Table For Destination Address: aus
------------------------------------------------
```

Screen 9-37. Destination Routing Report with Node Diversity

To decide what changes are needed, the user begins a “What If ...” analysis.

Performing "What If ..." Analysis

The user adds a trunk between Atlanta and Oklahoma City. The Topology Evaluation re-run generates error-free routing.

```
TOPOLOGY EVALUATION REPORT: DESTINATION ROUTING
Created: 02/02/98 11:57
Design Name: net_2000
Evaluated For Node Diversity: Yes
Evaluated Using Extended Routing: Yes
Total Nodes: 10
Total Trunk Groups: 15
============================================================
Error-Free Node_diverse routing  tables
are available for this network
View: Topology Evaluation: Source Routing
============================================================
Routing Table For Destination Address: atl
------------------------------------------------------------
Source Node    Primary      Secondary    Extended
Address      Trunk Group   Trunk Group   Routing
------------------------------------------------------------
mia            mia_atl      mia_ny       disable
ok             ok_atl       ok_cin       disable
ny             ny_atl       ny_mia       disable
min            min_ok       min_ny       disable
aus            aus_ok       aus_den      disable
por            por_ok       por_min      disable
cin            cin_ny       cin_ok       disable
den            den_min      den_aus      disable
sac            sac_por      sac_den      disable
------------------------------------------------------------
```

Screen 9-38. Destination Routing Report with Error-Free Routing

As the Path Analysis Detailed report shows, this routing is also node-diverse, and satisfies the user's concerns.

```
PATH ANALYSIS REPORT: DETAILED ANALYSIS
Created: 02/02/98 12:00
Design Name: net_2000
Destination Address: atl
Source Address: aus
Analysis Mode: Node Failure
Input Source: Node Diverse Topology Evaluation
Total Nodes: 10
Total Trunk Groups: 15
=====================================================
Maximum Hops: 4 (Failure Mode)
Node Diversity: 100%
Completed Paths: 8
Blocked Paths: 0
Crank-Back Paths: 0
-------------------------------------------------------------
Network Routing Paths:
FAILED      HOP   PATH
NODE ADDR  COUNT  STATUS  PATH
-----------------------------------------------------sac     2    c
aus       ok        atl
-----------------------------------------------------den     2    c
aus       ok        atl
-----------------------------------------------------cin     2    c
aus       ok        atl
-----------------------------------------------------por     2    c
aus       ok        atl
"Path Status" Legend: c=completed; b=blocked; cb=cranked-back.
"Path" Legend: (cb)=crank-back path; (ra)=route advance point.
```

Screen 9-39. Path Analysis Report with Node-Diverse Routing

Administering Network Monitor

10

This chapter explains the administrative tasks that you must perform before you begin monitoring your network with Network Monitor. It explains the relationship between maps and alarms; understanding this relationship is fundamental to planning and building a map hierarchy.

The tutorial in this chapter illustrates the steps involved in building a map hierarchy. The first phase of the tutorial describes how to plan a map hierarchy and the second phase describes how to create network maps with Network Monitor. The chapter concludes with instructions for defining user notices, specifying which alarm filters to use, updating network maps, and distributing maps to other Graphics Systems.

Figure 10-1 presents the window architecture for Network Monitor. The two windows that are highlighted are the primary subjects in this chapter and include:

- the Control Window
- the Edit Maps Window

Adding Users

See **Chapter 2** for information on adding users.

Removing Users

See **Chapter 2** for information on removing users.

The remaining Network Monitor windows may also be briefly mentioned within this chapter.

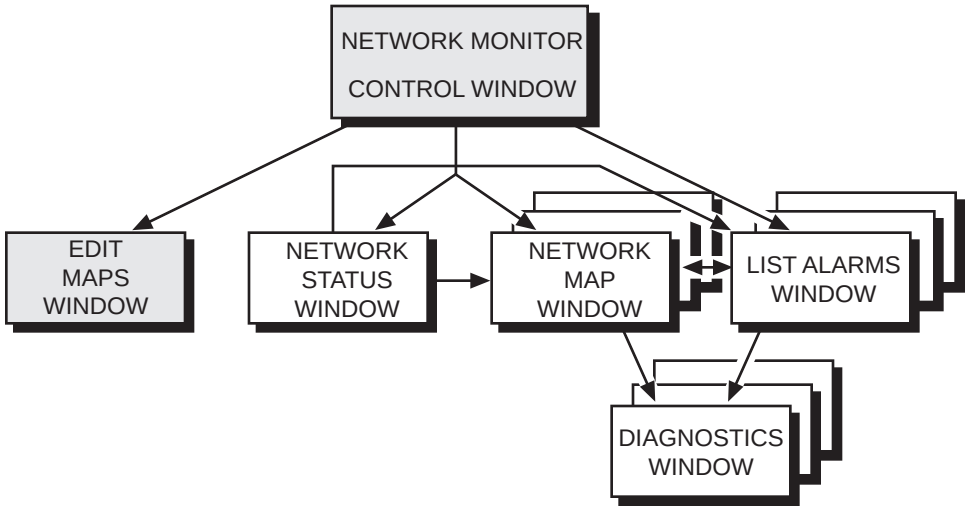


Figure 10-1. Window Architecture

Tutorial on Map Hierarchy

After Network Monitor has been properly installed on your Graphics System, you are ready to begin planning and creating a map hierarchy. The tutorial that follows guides you step-by-step to illustrate the two-phase process for planning a map hierarchy (Phase I) and building a map hierarchy with Network Monitor (Phase II) using a sample network.

The intent of this tutorial is to get you up and running as quickly as possible; it does not describe every command in detail—see **Chapter 12** for more detailed information on each command.

NOTE:
This is a paper-only tutorial and is NOT interactive. You can try to follow the tutorial on your Graphics System, but your network, as well as the configuration data in your Core System database(s), will differ from what is presented here. Therefore, you will not be able to build the sample map hierarchy on your own Graphics System.

If you are planning or creating a map hierarchy for the first time, you will want to read this tutorial in depth. If you are familiar with the topics, you can skip certain sections and immediately access the section you need or go directly to **Chapter 12**.

Map Hierarchy Principles

When planning and creating your map hierarchy, it is very important that you understand a few key principles. These principles enable you to design and implement a map hierarchy optimally suited to your needs.

This section covers the following four principles:

- how a top map and map pointers define a map hierarchy
- how map symbols are updated based on a hierarchical network addressing scheme
- how map symbols are updated based on the trickle-up of alarms and clear messages from the bottom of a map hierarchy to the top of the hierarchy
- how map symbols reflect the highest severity alarms on the represented objects

NOTE:
Network address and trickle-up can operate together to determine how an individual map symbol is updated.

Map Hierarchy Definition

A map hierarchy is defined by designating one map as the top map. Without a top map, you will not be able to display either the Network Map Window or the Network Status Window, as described in **Chapter 1** and **Chapter 12** in this guide.

When the Network Map Window and the Network Status Window are invoked (this is done with the **View Network Status** option in the Control Window), the top map is the first map to be loaded into memory. Symbols on the top map can also be defined to point down to other maps. These pointers further define the map hierarchy. The maps pointed to by symbols on the top map are loaded next. These maps may also have symbols defined to point to other maps that are subsequently loaded, and so on, stopping when a map does not have any symbol pointing to another map.

NOTE:
Although with Network Monitor you can navigate up and down a map hierarchy, you only need to define pointers for symbols that point **down** to other maps. **Up** is automatically defined during the map loading process, as described above.

Hierarchical Addressing

The hierarchical addressing scheme, used by *StarKeeper* II NMS for networks, enables Network Monitor to dynamically color a map symbol representing a piece of network equipment. The color reflects alarms or clear messages on any component of the represented equipment. For more information on the hierarchical addressing scheme, see the *StarKeeper II NMS Core System Guide*.

For example, a map symbol representing a node, named AREA1/EXCH1/node1, will dynamically change color to reflect alarms on any module, port or channel in the node AREA1/EXCH1/node1. Since a concentrator is linked to the node via a module in the node, concentrator alarms are also included.

Another way of describing this principle is that a symbol with a particular address (for example, AREA1/EXCH1/node1) will dynamically change color to reflect any alarm or clear message with that address or any address hierarchically under the one specified (for example, AREA1/EXCH1/node1 or AREA1/EXCH1/node1:3.2/1.2.4).

Trickle-Up

The second principle determining how a map symbol is updated to reflect alarms and clear messages is referred to as trickle-up. This is best illustrated with some simple drawings. The following diagram shows symbols on a map that are specified to point to other maps; for example symbol A on MAP 1 points to MAP 2 and symbol B on MAP 1 points to MAP 3.

.

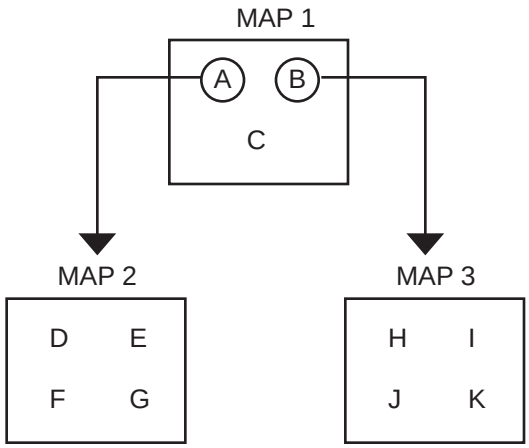


Figure 10-2. Symbols Point Down to Lower-Level Maps

Symbol A on MAP 1 will dynamically change color to reflect any alarms on symbols D, E, F and G found on MAP 2. Symbol B on MAP 1 will dynamically change color to reflect any alarms on symbols H, I, J and K found on MAP 3. In other words, alarms on lower level maps, in effect, trickle-up to the pointing symbol on the higher level map as illustrated in the following diagram:

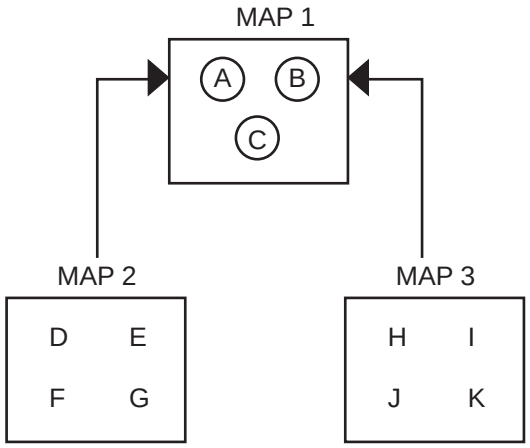


Figure 10-3. Alarms Trickle up to Symbols on Higher-Level Maps

You must keep in mind how trickle-up works when planning your map hierarchy, so that your displays will behave in the intended fashion.

The tutorial in this chapter provides examples to show how trickle-up can influence your decisions in planning and creating your maps to prevent confusion in interpreting map displays.

Highest Severity Alarm(s)

Regardless of whether a map symbol is updated due to the network address or to trickle-up, or both, the color of a symbol will always reflect the highest outstanding alarm(s) on the network equipment represented by a symbol.

For example, suppose a node, (node1), is represented by a map symbol, (S1), and that S1 is green reflecting no alarms on any component of node1. If a major alarm occurs on module 3 of node1, the S1 symbol will become yellow. If a minor alarm on module 12 of node1 occurs, when the S1 symbol is updated, its color will not be changed because S1 is already colored to reflect an alarm of a higher severity (that is, S1 will remain yellow). However, if a critical alarm is received on any component of node1, when S1 is updated, its color will change from yellow to red. Similarly, if the critical and only the critical alarm is cleared, when S1 is updated, its color will change from red to yellow, still reflecting the highest severity alarm that is still outstanding on that node.

Phase I: Planning a Map Hierarchy on Paper

Before you begin creating network maps with Network Monitor, it is recommended that you thoroughly plan your map hierarchy on paper. This ensures that the map hierarchy that you eventually create is useful, and that all the maps work well together. Refer to the following table and follow the next few sections to understand the suggested planning sequence.

Table 10-1. Phase I: Planning a Map Hierarchy on Paper

Step #	Task
1	Identify Network Equipment
2	Place all Equipment on a Paper Map
3	Decide on Equipment Grouping
4	Plan for Scratch Pad Information
5	Decide on Detailed Maps
6	Decide on Shelf Maps
7	Sketch the Map Hierarchy

Step 1: Identify Network Equipment

Equipment in your network may include *StarKeeper* II NMS, BNS-2000 VCS, BNS-2000, LCS50 *Datakit* II VCS Network Interface, *Datakit* II VCS Network Access Controller (NAC), AT&T Paradyne® COMSPHERE® 6800 Series Network Management System, and other products. To determine the number of maps needed to represent your network, you must first identify **all** your network equipment, its location, and network addresses.

The following tables identify all equipment in a sample network. For tutorial purposes, pretend that this is your network and that you are going to plan and create network maps for this network.

Table 10-2 lists nodes and systems in the sample network by location, node/ system type, and address.

Table 10-2. Nodes and Systems in Sample Network

Physical Location of Equipment	Node/System Type	Network Address
New York	BNS-2000 VCS	USA/NY/Albany/ny1
	BNS-2000 VCS	USA/NY/NYC/ny2
	BNS-2000	USA/NY/Bingham/ny3
	StarKeeper II NMS	eastSK
Total= 4(2 BNS-2000 VCS nodes, 1 BNS-2000 node, 1 *StarKeeper* II NMS.)		
Illinois	BNS-2000 VCS	USA/IL/Chicago/il1
	BNS-2000 VCS	USA/IL/Chicago/il2
	BNS-2000 VCS	USA/IL/Blooming/il3
	BNS-2000	USA/IL/Peoria/il4
Total= 4(3 BNS-2000 VCS nodes, 1 BNS-2000 node.)		
Texas	BNS-2000 VCS	USA/TX/Dallas/tx1
	BNS-2000 VCS	USA/TX/Houston/tx2
	BNS-2000	USA/TX/Austin/tx3
	LCS50 *Datakit* II VCS Network Interface	TXnik1
	COMSPHERE 6800 Series NMS	TXcom1
Total= 5(2 BNS-2000 VCS nodes, 1 BNS-2000 node, 1 LCS50, 1 COMSPHERE 6800 Series NMS.)		
California	BNS-2000 VCS	USA/CA/Oakland/ca1
	BNS-2000 VCS	USA/CA/Irvine/ca2
	BNS-2000 VCS	USA/CA/SF/ca3
	BNS-2000 VCS	USA/CA/LA/ca4
	Network Access Controller	CAnac1
	StarGROUP Network Manager	CAsg1
	StarKeeper II NMS	westSK
Total= 7 (4 BNS-2000 VCS nodes, 1 NAC, 1 StarGROUP Network Manager, 1 *StarKeeper* II NMS.)		
TOTAL for network= 11 BNS-2000 VCS nodes, 3 BNS-2000 nodes, 1 LCS50,		
1 COMSPHERE 6800 Series NMS, 1 NAC, 1 StarGROUP Network Manager, 2 *StarKeeper* II NMS.		

Table 10-3 lists all the trunks connecting the equipment in the sample network. For each trunk, the trunk location and name is listed, as well as the names of the two nodes connected by the trunk and the interface boards supporting the connection at each end.

Table 10-3. Trunks in Sample Network

Location	Trunk Name	Node 1 Endpoint	Node 2 Endpoint
New York	NYtrk1	USA/NY/Albany/ny1:3	USA/NY/NYC/ny2:5
	NYtrk2	USA/NY/Albany/ny1:5	USA/NY/Bingham/ny3:17
	NYtrk3	USA/NY/Albany/ny1:17	USA/NY/Bingham/ny3:19
	NYtrk4	USA/NY/NYC/ny2:3	USA/NY/Bingham/ny3:21
	NYTXtrk1	USA/NY/Bingham/ny3:3	USA/TX/Dallas/tx1:5
	NYTXtrk2	USA/NY/Bingham/ny3:5	USA/TX/Dallas/tx1:17
	NYILtrk1	USA/NY/Bingham/ny3:23	USA/IL/Chicago/il1:25
Total= 7 (4 reside in NY, 2 go to TX, 1 goes to IL.)			
Illinois	ILCAtrk1	USA/IL/Chicago/il1:3	USA/CA/Oakland/ca1:5
	ILtrk1	USA/IL/Chicago/il1:5	USA/IL/Chicago/il2:4
	ILtrk2	USA/IL/Chicago/il2:6	USA/IL/Blooming/il3:4
	ILtrk3	USA/IL/Chicago/il2:18	USA/IL/Peoria/il4:3
Total= 4 (1 goes to CA, 3 reside in IL.)			
Texas	TXtrk1	USA/TX/Dallas/tx1:3	USA/TX/Houston/tx2:4
	TXtrk2	USA/TX/Houston/tx2:3	USA/TX/Austin/tx3:4
	TXtrk3	USA/TX/Austin/tx3:5	USA/TX/Dallas/tx1:19
	TXCAtrk1	USA/TX/Austin/tx3:3	USA/CA/Irvine/ca2:3
Total= 4 (3 reside in TX, 1 goes to CA.)			
California	CAtrk1	USA/CA/Oakland/ca1:3	USA/CA/Irvine/ca2:4
	CAtrk2	USA/CA/Irvine/ca2:5	USA/CA/SF/ca3:18
	CAtrk3	USA/CA/SF/ca3:19	USA/CA/LA/ca4:5
	CAtrk4	USA/CA/LA/ca4:3	USA/CA/Oakland/ca1:4
Total= 4 (all reside in CA.)			
TOTAL for network= 19 trunks.			

Table 10-4 shows all the concentrators and Synchronous/Asynchronous Multiplexers (SAMs) in the sample network. For each concentrator or SAM, its physical location, type, network address, and name (if applicable) are shown:

Table 10-4. Concentrators/SAMs in Sample Network

Physical Location	Type	Network Address	Name
New York	SAM504	USA/NY/NYC/ny2:17	
Illinois	SAM64	USA/IL/Chicago/il1:4	
	SAM64	USA/IL/Chicago/il1:2	
Texas	SAM8	USA/TX/Houston/tx2:6	
	RRS	USA/TX/Austin/tx3:25	TXconc1
	FRS	USA/TX/Austin/tx3:26	TXconc2
	SAM64	USA/TX/Austin/tx3:27	
California	SAM8	USA/CA/LA/ca4:8	

Table 10-5 presents information about other systems in the sample network. The location, system name, and the node to which the system is connected, including the slot number of the Computer Port Module (CPM) board supporting the connection, is shown:

Table 10-5. Connections to Other Systems in Sample Network

Location	System Name	Node and CPM Address
Texas	TXnik1	USA/TX/Austin/tx3:19
	TXcom1	USA/TX/Houston/tx2:17
California	CAnac1	USA/CA/LA/ca4:7
	CAsg1	USA/CA/Oakland/ca1:35

Step 2: Place All Equipment on A Paper Map

After you have identified all your equipment and locations, you need to decide whether to represent the equipment geographically, organizationally, or in another fashion. If you decide to represent your network on geographic maps, this is a good time to think about which geographic maps, if any, you would like to use. Backgrounds available with Network Monitor include the world, the U.S.A., and the individual states.

For the sample network, assume you choose a geographical representation. Since the location of the equipment in the sample network spans from coast to coast, choose a map of the continental United States as the background for the top map.

A geographic background allows you to better represent the physical layout of a network. The background provides a topological view of the network so that you can discern distances between equipment.

NOTE:
A map background is purely optional.

Figure 10-4. Planning Background of Top Map

You can now begin to lay out the network topology on paper on the background chosen for the sample network. In this case, it is a map of the USA.

Using **Tables 10-2** through **10-5**, place all the equipment in the sample network on the USA background. Throughout the remainder of this tutorial, you may need to refer to these tables again.

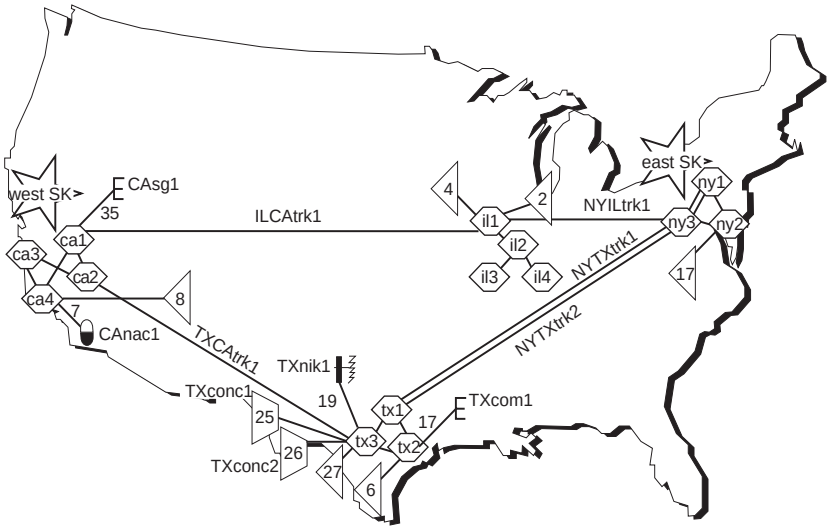


Figure 10-5. Planning the Top Map

The symbols on the above figure correspond to those used in the Network Monitor application. In addition, every symbol has a label. You should incorporate your labels at this point to ensure the maps you build later on are correctly interpreted. Most labels (for example, node/system names and trunk names) are automatically associated with a symbol when you place the symbol on a map. These labels are only automatically assigned to objects that are monitored by a Core System to which a Graphics System is logically connected. Other labels (for example, aggregate symbols) must be manually associated with the symbol.

Notice that **Figure 10-5** displays the node, system, and trunk labels that are automatically assigned by Network Monitor. Concentrators and SAMs are automatically labeled by the local node and address (for example, tx3:27). In **Figure 10-5**, only the slot number is shown to save space.

As you can see, the top map in **Figure 10-5** is rather busy. This might be cumbersome to use in an on-line display, so continue on to the next step, which discusses grouping the equipment into manageable chunks. In general, each group should contain no more than five to ten symbols per group.

Step 3: Decide on Equipment Grouping

Observe that from the cluttered sketch in **Figure 10-5**, four distinct regions stand out. You could group these components into logical clusters; pretend that you decide to do this for the sample network. Network Monitor provides you with an aggregate location symbol that can represent the components contained in a particular cluster. It is recommended that each aggregate location symbol represent anywhere from three to 15 nodes.

NOTE:
Aggregate location symbols do not have a network address of their own; they serve only as pointers to other maps.

To unclutter the preceding busy top map, you can create a top map depicting four aggregate location symbols— one for each state with network equipment. This map can also include two *StarKeeper* II NMSs, since in general, you may want to place *StarKeeper* II NMS symbols on the top map or on a map with multiple aggregate locations.

You also need to represent all the trunks in your network on your top map. The principle of grouping equipment together can be extended to trunks. Network Monitor provides a trunk aggregate symbol to represent two or more trunks. Assume that for the sample network you place the three individual inter-state trunks (NYILtrk1, ILCAtrk1, and TXCAtrk1) on the top map, plus an aggregate trunk symbol (see **Figure 10-6**) to represent the two trunks between New York and Texas (NYTXtrk1, and NYTXtrk2).

The top map now looks something like the following figure:

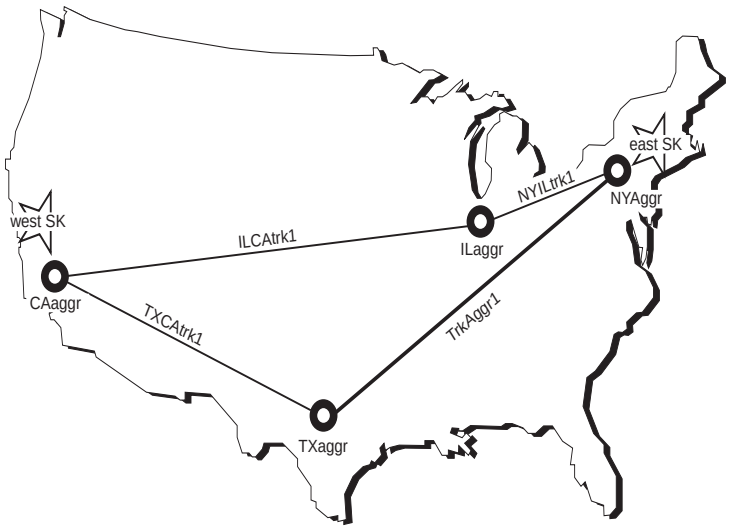


Figure 10-6. Planned Top Map

Each aggregate location symbol on this map represents the network components that are located in an area. Since there are four chunks of equipment in this sample network —one in New York, one in Illinois, one in Texas, and one in California—plan to have four regional maps, each using the appropriate state's geographical background.

To accomplish this, place the equipment represented by each aggregate location symbol and the associated trunks on a separate map. Refer to **Figure 10-6** to see what aggregate location symbol corresponds to which equipment (you may also want to refer to **Table 10-2** through **Table 10-5**). When placing the Texas equipment on the Texas regional map, it will be a bit crowded if you put all the concentrators in this area onto the map; besides, as discussed later on in **Step 5, Decide on Detailed Maps**, you would like to show some of the Front End Processors (FEPs) and hosts associated with tx3, so decide to leave the concentrators associated with tx3 off the Texas regional map, and make a note to get back to them later.

Finally, recall that you want each aggregate location symbol on the top map to point to the corresponding regional map. As a result of all the decisions made up to this point, the top map and the four regional maps representing the sample network now look like the following figure:

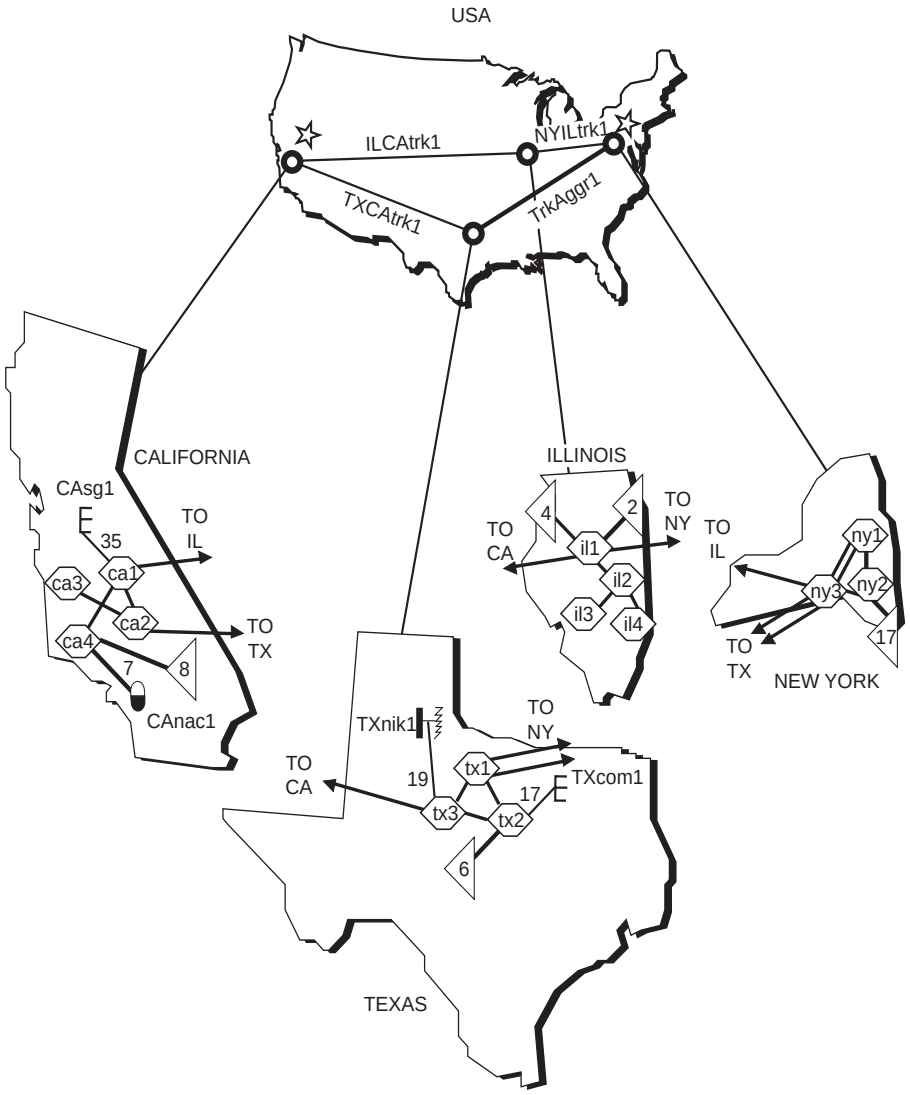


Figure 10-7. Planned Regional Maps

At this point, it is also a good idea to plan for map titles for each map as well as file names for each map. Devising a naming scheme will assist you in locating the map(s) when you want them. Plan on using the names of the states and the United States as the file names for the regional maps and top map, respectively.

Step 4: Plan for Scratch Pad Information

Network Monitor provides a Scratch Pad feature so you can associate important notes with a map symbol. For example, you may want to enter notes that aid in solving certain network problems. Now is a good time to plan for such notes, so on the paper map, write your notes near the equipment that you think would benefit from these notes the most. For the sample network, plan on entering Scratch Pad notes on the number of the carrier company for the heavily loaded trunk between Texas and California (that is, TXCAtrk1). It may also be helpful to enter the name of the technician who has previously repaired the trunk, if applicable.

NOTE:
Scratch Pad information is stored on an appropriate Core System and is available to any Graphics System that is logically connected to the Core System.

Step 5: Decide on Detailed Maps

Detailed maps depict more detail of network equipment. The sections that follow describe detailed maps for a node and a trunk aggregate symbol.

Detailed Map of a Node

Recall that you decided to leave some equipment associated with tx3 off the Texas regional map where tx3 is represented. However, you want to represent this equipment somewhere. You can plan to do this on a detailed map dedicated to the tx3 BNS-2000 VCS node.

What you would like to show on this map is the tx3 node itself, the two concentrators and one SAM associated with it, some CPM-connected hosts, FEPs, and two Automated Teller Machines (ATMs). *StarKeeper* II NMS does not monitor the hosts, FEPs, and ATMs, so when these symbols are placed on the map, they appear white and will never turn colors in response to alarms. However, the presence of these unmonitored objects is useful in showing network topology. Additionally, you can include the connections to these objects (for example, the CPM connection to Host C) on your map so you will be alerted to any problems with the connections.

Assume that you would like to include on the detailed map of tx3 the LCS50 *Datakit* II VCS Network Interface (that is, TXnik1) and the connection between TXnik1 and tx3. TXnik1 already has been placed on the Texas regional map. But, it is important to keep TXnik1 unmonitored (white) on the detailed map of tx3; you can do this by placing a NIK symbol without a network address. Otherwise, due to trickle-up, the tx3 symbol on the Texas regional map will not only reflect alarms on tx3, but also will reflect alarms on TXnik1. This would result in confusion and should be avoided.

NOTE:
See **Trickle-Up** of the **Map Hierarchy Principles** section in the beginning of this chapter.

On the other hand, the CPM connection between tx3 and TXnik1 does not present a problem with trickle-up, since the CPM module is actually part of the tx3 node. For every CPM or other type of connection, you must know the exact address and make a note of it when building maps with Network Monitor. If you have many connections, you may want to make a table similar to **Table 10-5**.

Continuing on, the detailed map for the tx3 node now looks something like this:

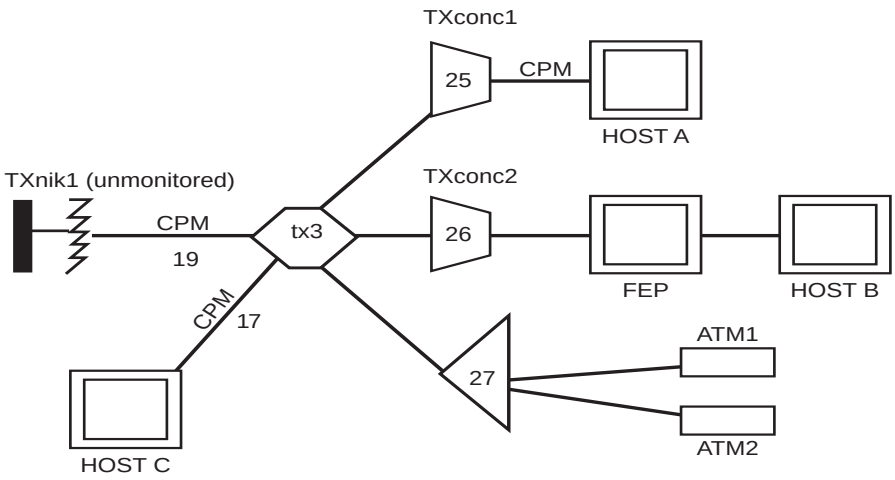


Figure 10-8. Planned Detailed Map for Node tx3

Later, when you simulate translating this map into an on-line map on Network Monitor (in Phase II of this tutorial), you will need to specify that the tx3 node on the Texas regional map should point to this detailed map for tx3. One possible naming convention for detailed maps of nodes is to specify the local node/system name, followed by 'node' or 'system'—in this case, *tx3node*.

Detailed Map of a Trunk Aggregate Symbol

Another type of detailed map you might need is a detailed map of trunks. If you choose to use a trunk aggregate symbol on one map, create an associated detailed map of trunks which shows the individual trunks represented by the

aggregate trunk symbol; otherwise, the aggregate trunk symbol will not reflect the alarms from the intended trunks. This case will be obvious to you because the trunk aggregate symbol will be white to indicate an unmonitored object.

It is a good idea to plan your detailed maps of trunks ahead of time, along with your other maps. This gives you the option to show collections of trunks on some maps, and specific trunks on regional maps and/or on detailed maps for trunks.

Recall that for the sample network, you placed a trunk aggregate symbol on the top map between the New York and the Texas aggregate location symbols (see **Figure 10-6**). The detailed map corresponding to the trunk aggregate symbol should represent the two trunks between New York and Texas, and will look like this:

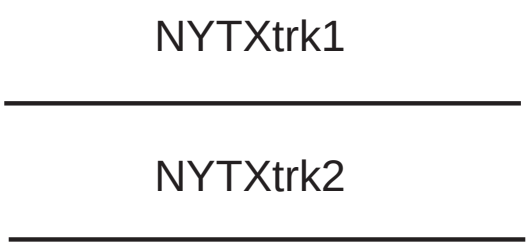


Figure 10-9. Planned Detailed Map for Trunk Aggregate Symbol

Later, when you simulate creating this map in Network Monitor (in Phase II of this tutorial), you will need to specify that the trunk aggregate symbol on the top map points to this corresponding detailed map. One possible naming convention for detailed maps of trunks is to specify the name of the trunk aggregate symbol - in this case, *TrkAggr1*.

Step 6: Decide on Shelf Maps

At this point in your planning, your should decide whether you would like any shelf maps for your nodes and concentrators, and if so, select the nodes of interest. With Network Monitor, you can automatically generate shelf maps for all nodes and concentrators that are monitored by the Core System to which your Graphics System is logically connected.

For the purposes of this tutorial, pretend that this is what you decide for the sample network. Later in this tutorial, you will simulate requesting that shelf maps,

displaying the shelves and modules for all the nodes and concentrators in your sample network, be automatically generated.

Step 7: Sketch the Map Hierarchy

Now you can combine the results of the previous steps to determine how the map hierarchy representing the sample network will look. Linking together the top map, the four regional maps, the detailed map for the tx3 node, the detailed map for the trunk aggregate, and the shelf maps for each node and associated concentrators produces the following map hierarchy:

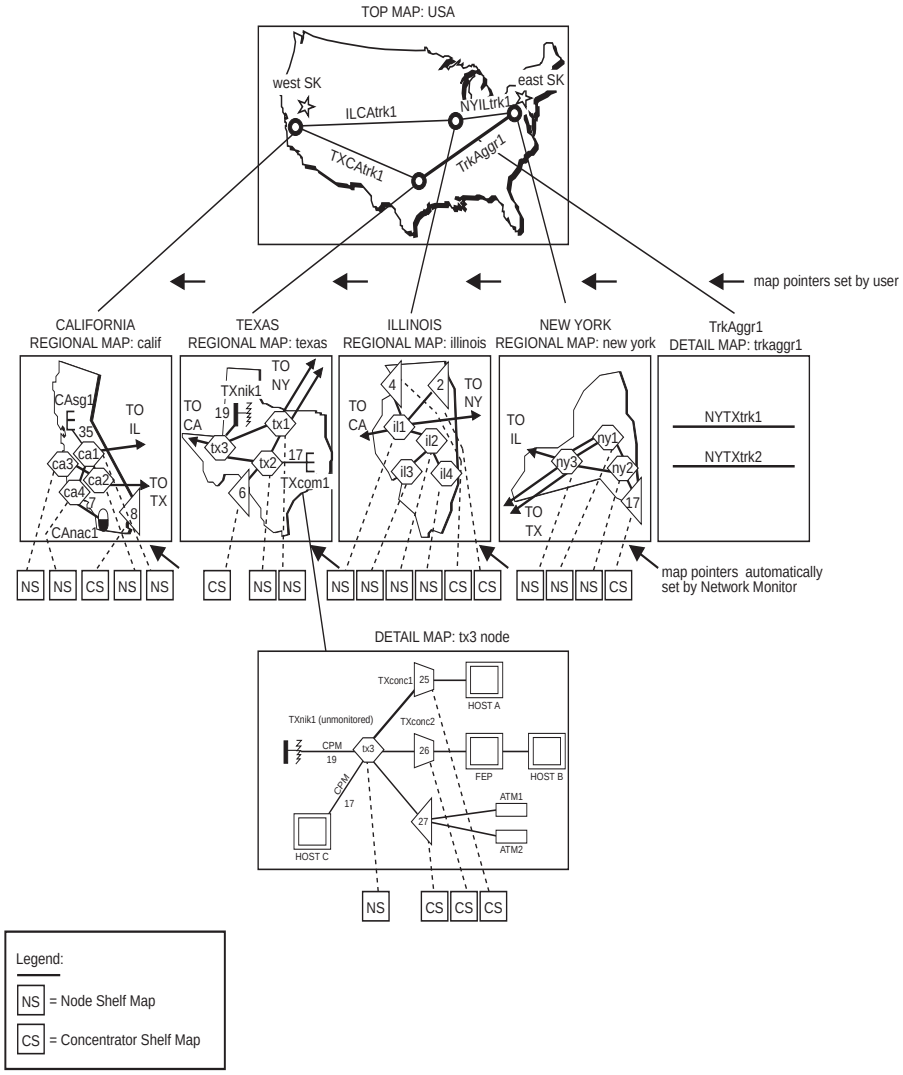


Figure 10-10. Planned Map Hierarchy

Notice that **Figure 10-10** reflects map titles. You will be assigning both a map title and a file name, to serve as a pointer, for each regional and detailed map. **Figure 10-10** also shows the node and concentrator shelf maps—labeled NS and CS, respectively—which are linked to the appropriate node or concentrator/SAM symbols lowest in the hierarchy. This will be automatically done for you by Network Monitor when you generate shelf maps.

For example, the symbol representing tx3 on the detailed map for tx3 is automatically linked to the shelf map for tx3. Other shelf maps are linked directly to the appropriate symbol on one of the regional maps.

Figure 10-10 also illustrates that you can choose any number of levels for different *branches* of your map hierarchy. For example, the shortest branch has only two levels—the top map and the trunk detail map, while other branches have three or four levels. Looking at **Figure 10-10**, an example of four levels is: the top map, the Texas regional map, the detailed map for tx3, and the shelf map for tx3.

You have complete flexibility in deciding the number of levels for your map hierarchy and the level of detail you wish to represent for each branch of the hierarchy. For example, the detailed map of trunks in **Figure 10-10** is on the same level as the regional maps and the shelf maps appear on both levels three and four.

Phase II: Building a Map Hierarchy with Network Monitor

Phase II of this tutorial simulates how you would define a map hierarchy with Network Monitor. This is accomplished by outlining the procedures needed to create a representative sample of the maps planned for the sample network. Specifically, Phase II simulates how to create the top map, the Texas regional map, the detailed maps for tx3 and the trunk aggregate, how to request the automatic generation of shelf maps, and how to link these maps together.

The same type of top-down approach used in Phase I is recommended for Phase II. The following table illustrates the steps to use when creating and generating network maps, once you have planned your map hierarchy on paper

Table 10-6. Phase II: Steps for Building a Map Hierarchy

Step #	*Task*
1	**Setting Up Connections to *StarKeeper* II NMS**
2	**Synchronizing the Database(s)**
3	**Starting Network Monitor**
4	**Starting the Map Editor**
5	**Creating the Top Map** Adding a Geographic Background Adding Aggregate Location Symbols Setting the Map Pointer for Texas Aggregate Location Symbol Adding the Label for Texas Aggregate Location Symbol Adding *StarKeeper* II NMS Symbols Adding Trunks Moving a Label Adding the Trunk Aggregate Symbol Adding the Label for Trunk Aggregate Symbol Setting the Map Pointer for Trunk Aggregate Symbol Setting the Map Title for Top Map Saving the Top Map
6	**Setting Top Map Parameter**
7	**Editing a Regional Map** Loading a Regional Map Adding a Geographic Background Adding Nodes Adding Other Systems

Table 10-6. Phase II: Steps for Building a Map Hierarchy—*Continued*

Step #	*Task*
	Adding a Concentrator/SAM
	Moving a Label
	Adding Trunks and Labels
	Adding a Concentrator/SAM Link
	Adding Other Connecting Symbols
	Adding Scratch Pad Information
	Setting the Map Pointer for a Node Symbol
	Setting the Map Title for Regional Map
	Saving the Regional Map
8	**Editing a Detailed Map of tx3 Node**
	Adding the tx3 Node Symbol
	Adding Concentrators/SAMs
	Adding Concentrator/SAM Links
	Adding Unmonitored Objects
	Adding Other Connecting Symbols
	Adding Labels
	Setting the Map Title for Detailed Map
	Saving the Detailed Map
9	**Editing a Detailed Trunk Map for TrkAggr1**
10	**Generating Shelf Maps**
11	**Testing Maps Checklist**

Step 1: Setting Up Connections to *StarKeeper* II NMS

Prior to starting the map editor, you must set-up your Graphics System's logical connection(s) to one or more Core Systems. Refer to the *StarKeeper II NMS Core System Guide* for more information.

Step 2: Synchronizing the Database(s)

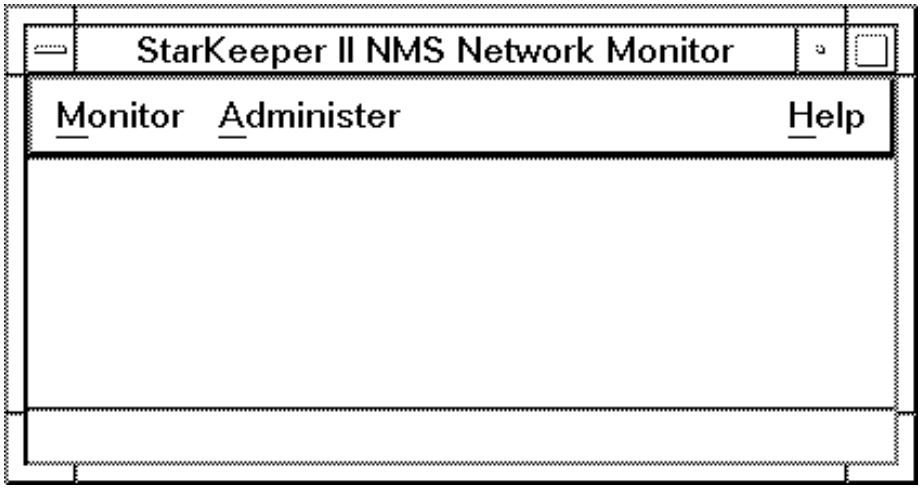
Before editing maps or generating shelf maps, ensure that the Core System databases to which your Graphics System is logically connected are in synchronization with the appropriate node databases. To accomplish this, use the *StarKeeper* II NMS commands, **skload** and **cfg_sync**. Use the Core System **help** command for more information on these commands.

Additionally, ensure that your Graphics System can access the latest configuration data on the Core System to which the Graphics System is logically connected. See **Chapter 2** for more information on synchronizing connections.

Step 3: Starting Network Monitor

To start Network Monitor, click on the Network Monitor icon on the *StarKeeper* II NMS subpanel.

A banner window appears briefly and is replaced by the Network Monitor Control Window.



Screen 10-1. Network Monitor Control Window

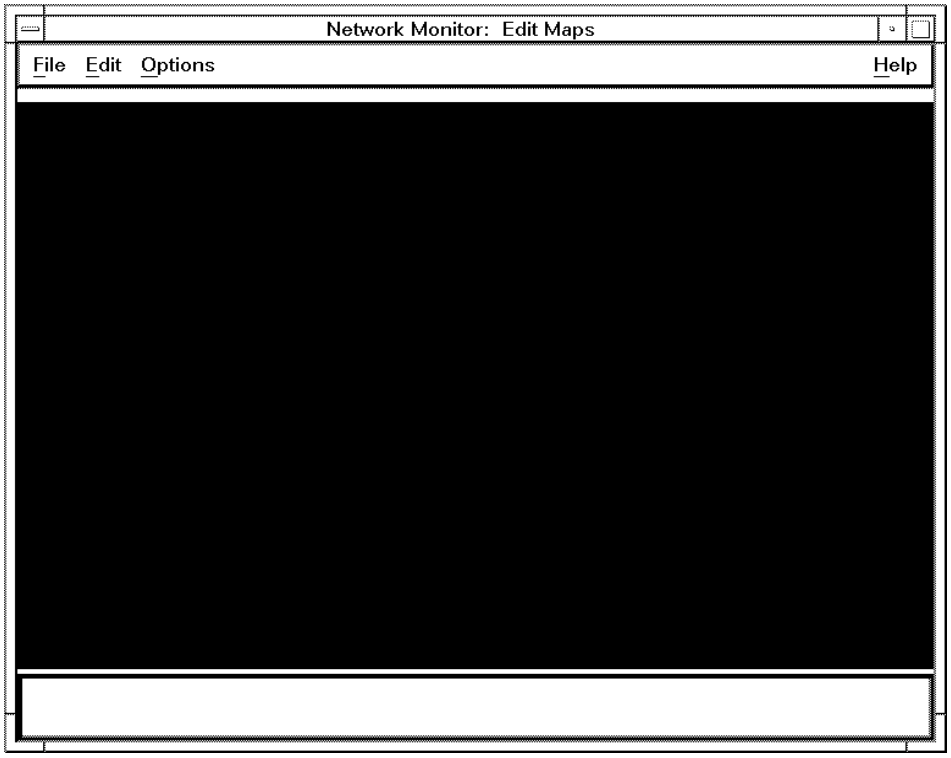
Step 4: Starting the Map Editor

To start the map editor, start from the Control Window.

Procedure 10-1. Starting the Map Editor

1. In the Control Window, choose Administer.
2. In the Administer menu, choose Administer Maps.
3. In the Administer Maps menu, choose Edit Maps.

The Edit Maps Window is then displayed.



Screen 10-2. Edit Maps Window

NOTE:
Expect a delay when the editor process starts. This is due to the fact that the editor must retrieve configuration information from all the Core Systems that are logically connected to your Graphics System. This collected information will then be available in lists to aid in the selection and placement of equipment on your network maps.

Instructional messages appear in the Edit Maps Window footer as you perform tasks with the map editor. Look for these messages to remind you how to perform various tasks (for example, placing symbols on a map). Now follow the next few sections that illustrate how to create network maps.

Step 5: Creating the Top Map

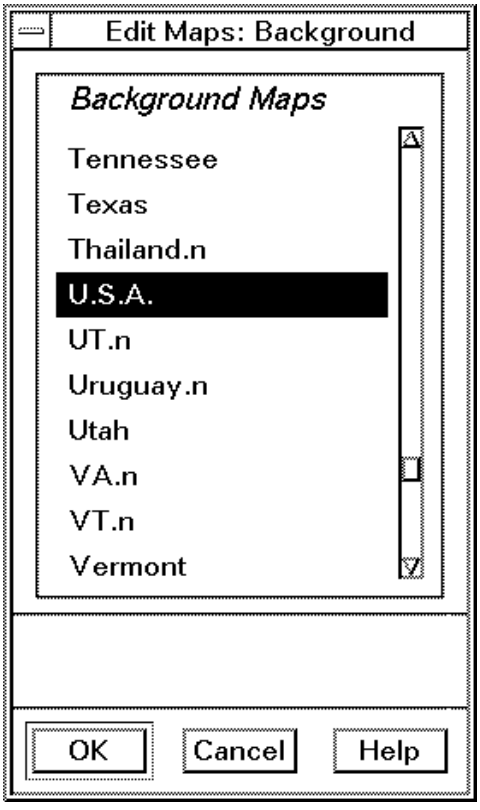
As **Figure 10-6** in Phase I illustrates, the top map for the sample network consists of two Core Systems, four aggregate location symbols that point to four regional maps, and trunks inter-connecting the equipment in the four regions.

Adding a Geographic Background

Now add the USA geographic background to the top map.

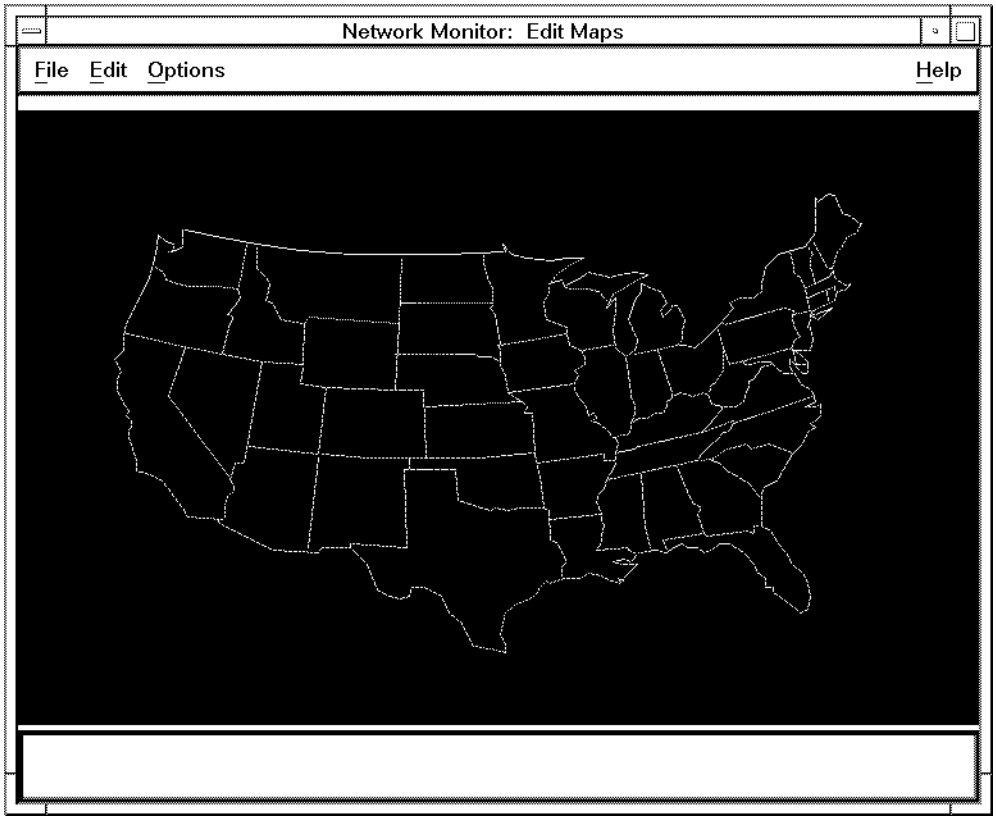
Procedure 10-2. Adding Background for Top Map

1. In the **Edit** menu, choose **Background**.
2. In the pop-up window, scroll down and select ***U.S.A.*** from the list of backgrounds, then choose OK.



Screen 10-3. Choosing Background

The USA background appears on the blank screen.



Screen 10-4. Adding Background for Top Map

NOTE:
The setting of a map background is optional. If no action is taken, a background is not associated with the map.

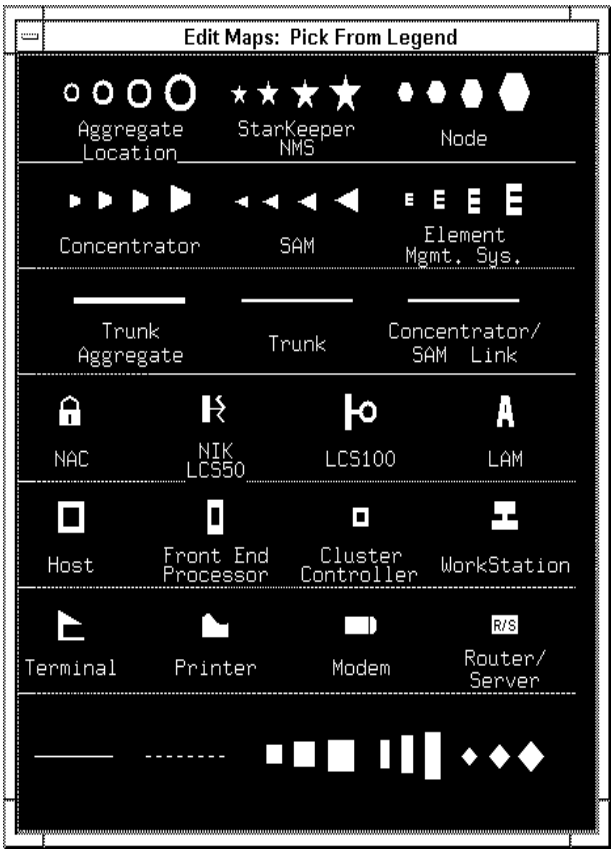
Adding Aggregate Location Symbols

The top map for the sample network contains four aggregate location symbols which correspond to four regional maps. Now add aggregate location symbols to the sample top map.

Procedure 10-3. Adding Aggregate Location Symbols

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Pick From Legend**.

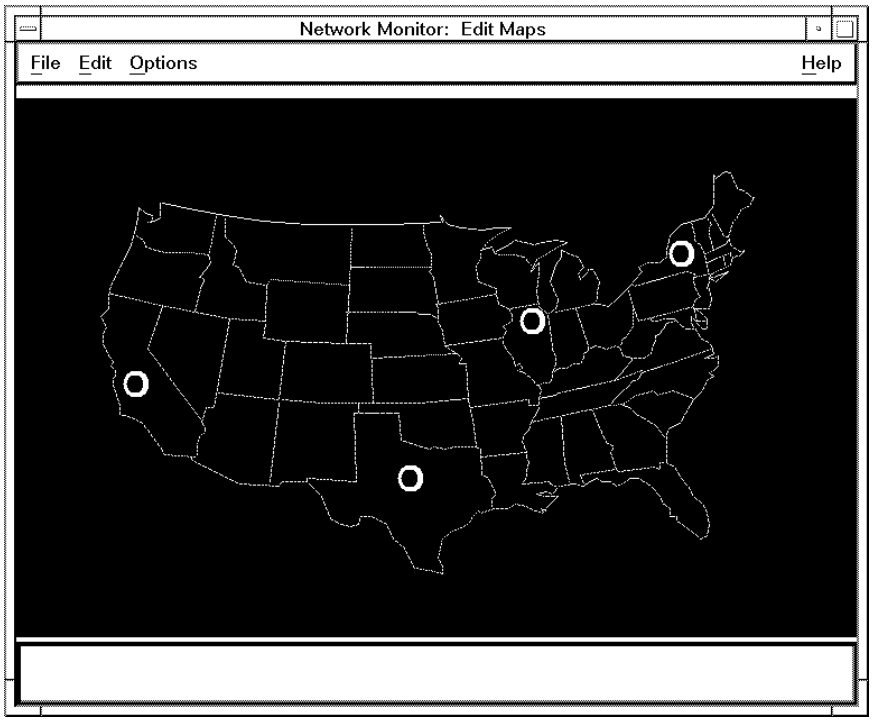
The editor legend is displayed:



Screen 10-5. Editor Legend

2. Place an aggregate location symbol for the New York region on the top map. To do this, click on an aggregate location symbol in the editor legend. Notice that the mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape inside a small square. This indicates that the system is waiting for an object to be placed.
3. To place the aggregate location symbol on the map, point to the New York region on the map with the mouse and click.
4. Repeat Steps 2 and 3 to place the aggregate location symbols for Illinois, Texas, and California.

The top map now looks similar to this:



Screen 10-6. Adding Aggregate Location Symbols

The aggregate location symbols are white. This is because they are not pointing to any other maps. You must sat a map pointer for each one, as the next section illustrates.

NOTE:
To cancel the operation without placing an object when adding equipment, click the third (right) mouse button.

Setting the Map Pointer for Texas Aggregate Location Symbol

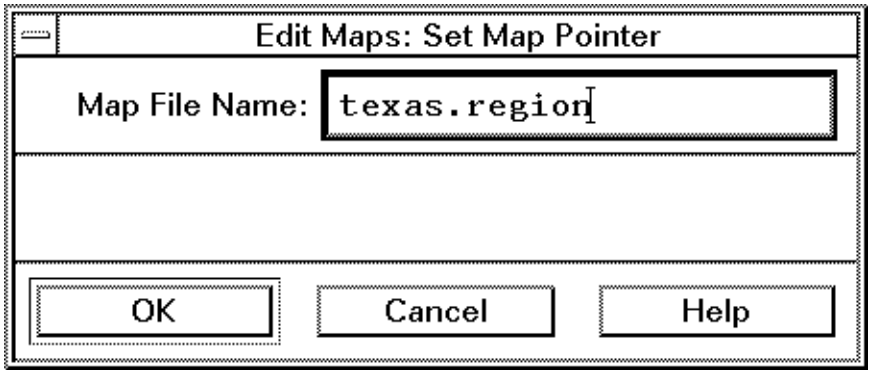
For each aggregate location symbol, you must set a map pointer.

Procedure 10-4. Setting the Map Pointer for Texas Aggregate Location Symbol

1. Click on the Texas aggregate location symbol on the map.

When selected, an object is highlighted (a yellow box appears behind the object).

2. In the Edit Maps Window, choose **Options**, then choose **Set Map Pointer**.
3. In the Edit Maps: Set Map Pointer pop-up window, type ***texas.region*** for the name of Texas regional map, then choose OK.



Screen 10-7. Setting a Map Pointer for an Aggregate Location Symbol

The Texas aggregate location symbol now points to the Texas regional map and turns green to indicate that a map pointer has been set. Setting a map pointer also creates an empty map file with the name of *texas.region*. You can edit this map later to add the symbols for the Texas equipment you want to display.

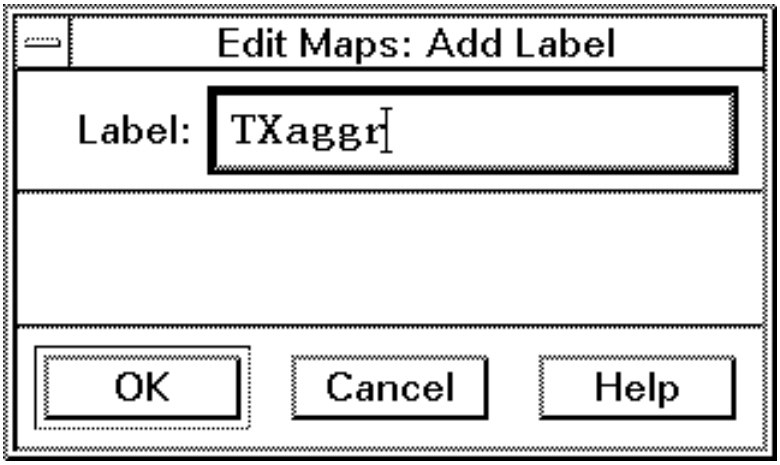
Using the same procedure, set pointers for the other three aggregate location symbols.

Adding the Label for Texas Aggregate Location Symbol

Now add a label for the Texas aggregate location symbol.

Procedure 10-5. Adding the Label for Texas Aggregate Location Symbol

1. Click on the Texas aggregate location symbol on the map.
2. Choose **Edit**, choose **Labels**, then choose **Add**.
3. In the pop-up window, type the desired label, ***TXaggr***, then choose OK .



Screen 10-8. Adding Label for Texas Aggregate Location Symbol

The mouse cursor automatically jumps to the object selected and changes to a *cross-hair* shape inside a small square.

4. To place the label on the map, click near the Texas aggregate location symbol.
5. Repeating Steps 1 through 4, add the respective labels for the other three aggregate location symbols in New York, Illinois, and California.

Adding StarKeeper II NMS Symbols

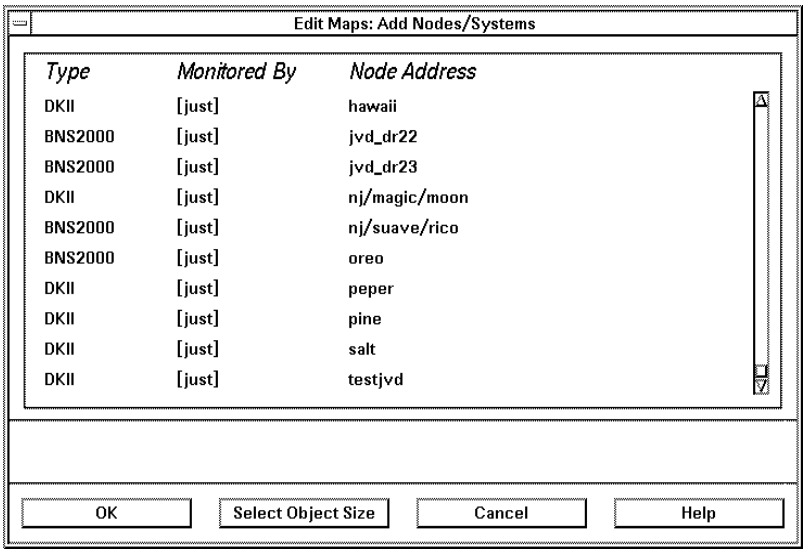
To place network equipment on a map, including *StarKeeper* II NMS, it is recommended that the lists of equipment be used, instead of selecting and placing symbols from the legend. Now add *StarKeeper* II NMS symbols.

Procedure 10-6. Adding *StarKeeper* II NMS Symbols

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Add Nodes/Systems**.

   In a pop-up window, a list appears that contains an entry for each *StarKeeper* II NMS Core System, to which the Graphics System is logically connected, and for each node and system that the Core System monitors.
2. In the pop-up window, choose the Core System, ***eastSK***, then choose OK. If you want the symbol to appear in other than the default size, choose **Select Object Size** first, then select the desired size and choose OK. You can also resize the object after it is placed.

The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape inside a small square.



Screen 10-9. Picking Equipment from a List

3. Point to New York region near the aggregate symbol and click.

   The star symbol appears. By picking equipment from the list, the editor automatically assigns the correct network address to the symbol. Thus, the symbol appears green. Also, a label automatically appears, with the name of the Core System.

NOTE:
Aggregate location symbols appear green in the editor if a map pointer has been associated with the aggregate symbol. All other symbols appear green in the editor if a network address has been associated with the symbol.

4. Repeating Steps 2 and 3, place a second Core System symbol, ***westSK***, in California near the aggregate symbol.

Adding Trunks

Figure 10-6 in Phase I displays the trunks connecting the different aggregate locations in the sample network. With Network Monitor, individual trunks can be chosen from a list of trunks for placement on the map, or a trunk aggregate symbol can be chosen from the editor legend to represent multiple trunks. Now place the individual trunks.

Procedure 10-7. Adding Trunks

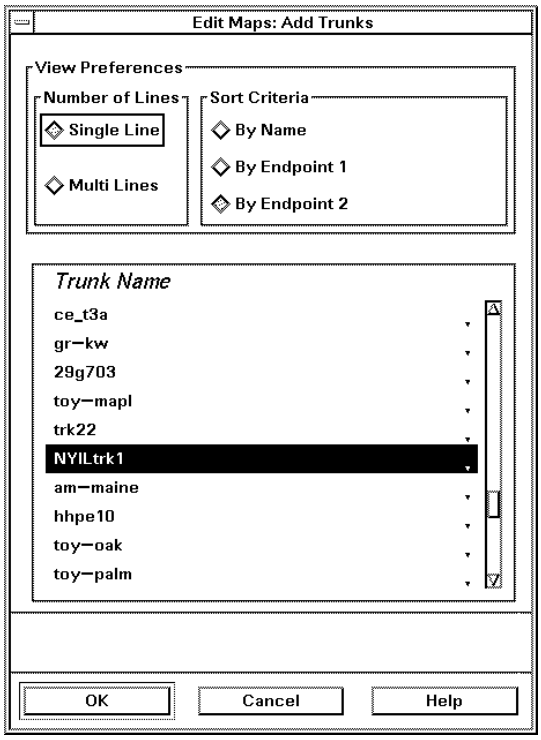
1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Add Trunks**.

   In a pop-up window, a list appears that contains an entry for each trunk in the network (that is, all trunks known by the Core System logically connected to the Graphics System).

NOTE:
Choose **Multi Lines** to display the trunk name and both endpoint addresses. You can also sort the trunk list by **Name**, **by Endpoint 1**, or **by Endpoint 2** if you choose the **Sort Criteria** option.

2. Scroll down and choose the trunk, ***NYILtrk1***, which connects node ***ny3*** in New York with node **il1** in Illinois, then choose OK.

   The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape.



Screen 10-10. Picking Trunks from a List

3. Specify the placement of both ends of the trunk. Place the cursor on the center of the aggregate location symbol for New York and click. Then place the cursor on the center of the aggregate location symbol for Illinois and click.

   The trunk symbol is drawn between the two points just specified. The trunk symbol is automatically given the addresses of the trunk modules on both ends of the trunk and subsequently appears green. The trunk name, as known by the Core System, appears as the trunk label (that is, NYILtrk1).

NOTE:
In the editor, any “line” type symbol (for example, a trunk) that has an endpoint within another symbol is automatically associated with that symbol. In the above example, trunk line symbol NYILtrk1 is associated with the aggregate location symbols for New York and Illinois. If the aggregate location symbols for New York or Illinois are moved or deleted, the associated trunk symbol also is moved or deleted.

4. Repeat Steps 3 and 4 to add ILCAtrk1 and TXCAtrk1 to the map, connecting the appropriate aggregate location symbols.

Moving a Label

When a trunk is added, a trunk label is automatically placed just below the center of the line. If so desired, now move a label.

Procedure 10-8. Moving a Label

1. Click on the TXCAtrk1 label.
2. In the Edit Maps Window, choose **Edit**, then choose **Move Object**.

   The mouse cursor automatically jumps to the map and changes to a *cross-hair* shape inside a small square.
3. Point to the new location for the label and click.
4. Repeat Steps 1 through 3 for the remaining trunk labels.

   When a trunk line, or any line, is moved, a label is automatically repositioned to be under the center of the line.

Adding the Trunk Aggregate Symbol

To add the trunk aggregate symbol for the two trunks between New York and Texas, you must use the editor legend.

Procedure 10-9. Adding the Trunk Aggregate Symbol

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Pick From Legend**.
2. In the editor legend, click on the trunk aggregate symbol.

   The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape.
3. Click on the center of the New York aggregate location symbol and then click on the center of the Texas aggregate location symbol on the map.

   The trunk aggregate symbol initially appears white, since a map pointer has not yet been defined for this aggregate symbol.

Adding the Label for Trunk Aggregate Symbol

To add a label for the trunk aggregate symbol, click on the trunk aggregate symbol on the map and add the label, TrkAggr1, in the same way as you did for the aggregate location symbol (see **Procedure 10-5, Adding the Label for Texas Aggregate Location Symbol**).

Setting the Map Pointer for Trunk Aggregate Symbol

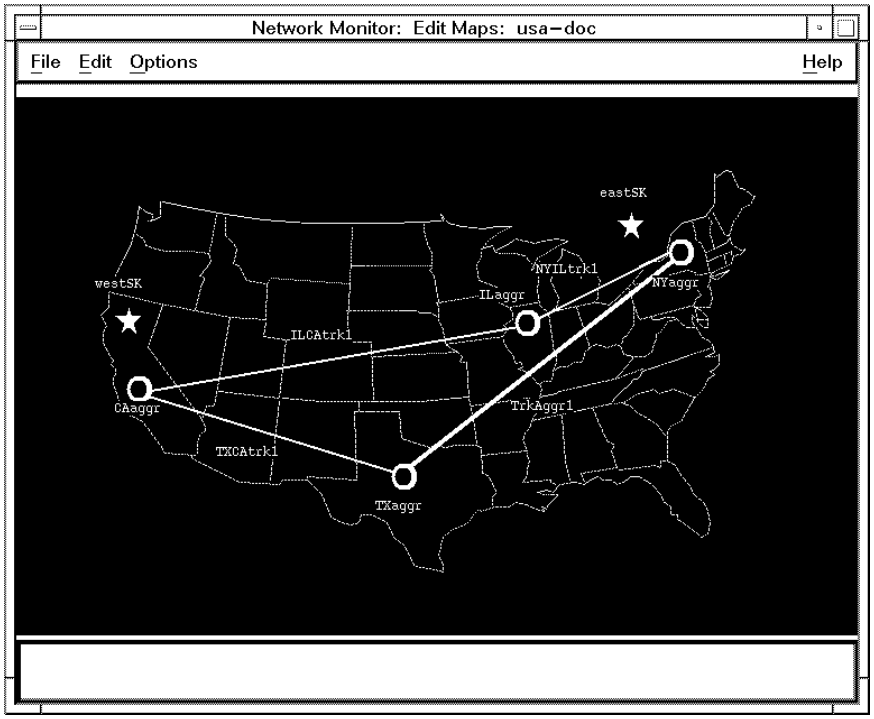
Similar to **Procedure 10-4, Setting the Map Pointer for Texas Aggregate Location Symbol**, set the map pointer for the trunk aggregate symbol.

Procedure 10-10. Setting the Map Pointer for Trunk Aggregate Symbol

1. Click on the trunk aggregate symbol in the map if it is not already selected.
2. In the Edit Maps Window, choose **Options**, then choose **Set Map Pointer**.
3. In the pop-up window, type ***TrkAggr1***, that the trunk aggregate symbol points to, then choose OK.

   This creates an empty map file, *TrkAggr1* and the aggregate location symbol turns green. You can edit this map later to show the individual trunks represented by the trunk aggregate symbol.

After adding trunks, a trunk aggregate symbol, and a label, the map now looks similar to the following screen:



Screen 10-11. Adding Trunks and Trunk Aggregate Symbols

Setting the Map Title for Top Map

Each map can have a title that is displayed in the window title bar (window header of the Edit Maps Window or Network Map Window). Now set the title for the sample top map.

Procedure 10-11. Setting the Map Title for Top Map

1. In the Edit Maps Window, choose **Options**, then choose **Set Title**.
2. In the pop-up window, enter the title, ***USA Network***, then choose OK.

The title then appears in the Edit Maps Window title bar.

Saving the Top Map

Now that you have supplied a background, added aggregate location symbols, added *StarKeeper* II NMS symbols, and have connected the components, you are ready to save the top map. Each map is a separate file and must be named according to HP-UX file naming conventions. The file name must be all one word of 14 characters or less and must contain no spaces. It cannot begin with a character that is not a letter or number; never use special characters (for example, !, ", *, ;, \, &, >, <, |, $, @, /, or ?).

The map is automatically placed in the appropriate directory so that after choosing **View Network Status** from the Control Window, the maps can be found.

Now save the top map.

Procedure 10-12. Saving the Top Map

1. In the Edit Maps Window, choose **File**, then choose **Save**.
2. In the pop-up window, enter the file name, ***USA***, then choose OK.

The map is saved in a file, *USA*, and an informational message appears in the Edit Maps Window footer.

NOTE:
If you have not entered a map title, the file name you supply becomes the default title and appears in the window title bar.

Step 6: Setting the Top Map Parameter

As discussed earlier in the **Map Hierarchy Definition** section, one map must be designated as the top map for the hierarchy. The file name of the map to be used as the top map is set from the Control Window **Administer** menu. Now set the top map parameter.

Procedure 10-13. Setting Top Map Parameter

1. In the Control Window, choose **Administer**, choose **Administer Maps**, then choose **Set Top Map**.
2. In the pop-up window, choose the map, *USA*, then choose OK.
3. A pop-up message window will appear advising the operator that the new Top Map will not appear on the Network Monitor Map until the “View Network Status” task is reinvoked. Choose “OK.”

The next time you choose **View Network Status** from the Control Window, the map hierarchy is loaded into memory using this new top map setting.

Step 7: Editing a Regional Map

After creating and saving the top map, the next step is to edit regional maps for New York, Illinois, California, and Texas. These maps are pointed to from the aggregate location symbols on the top map. For tutorial purposes, only the Texas regional map will be edited.

An empty map file name, *texas.region*, was created when the map pointer was set for the aggregate location symbol, labeled TXaggr. This regional map contains more detail of the network in the Texas region. As drawn on the paper map shown in **Figure 10-7** of Phase I, the Texas regional map contains two BNS-2000 VCS nodes, a BNS-2000 node, a COMSPHERE 6800 Series NMS, an LCS50 *Datakit* II VCS Network Interface, a concentrator, and four trunks.

Loading a Regional Map

To begin editing this map, you must load it first.

Procedure 10-14. Loading a Regional Map

1. In the Edit Maps Window, choose **File**, then choose **Load**.

   In a pop-up window, a list appears that contains the file names of all the network maps.

2. In the pop-up window, scroll down and choose ***texas.region***, then choose OK .

An empty Texas map now appears in the Edit Maps Window.

Adding a Geographic Background

Similar to **Procedure 10-2, Adding Background for Top Map**, add the geographic background to the Texas regional map.

Procedure 10-15. Adding Background for Regional Map

1. In the Edit Maps Window, choose **Edit**, then choose **Background**.
2. In the pop-up window, choose ***Texas***, then choose OK.

NOTE:
The setting of a map background is optional. If no action is taken, a background is not associated with the map. Not choosing a background is acceptable.

Adding Nodes

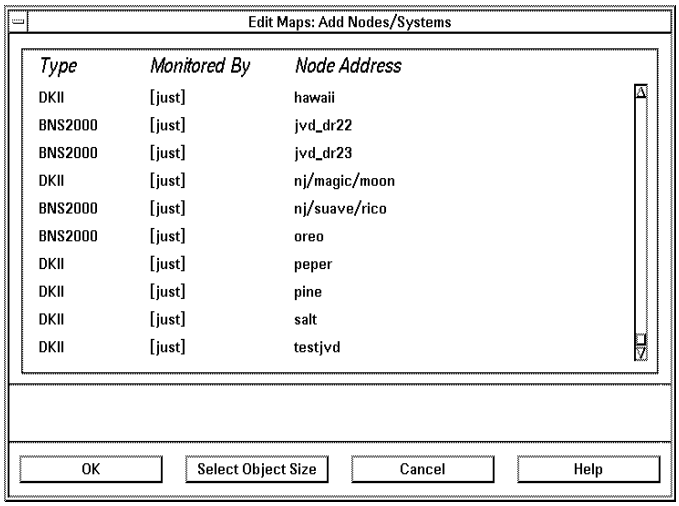
Now place the node symbols on the Texas regional map.

Procedure 10-16. Adding Nodes

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Add Nodes/Systems**.

   In a pop-up window, a list appears that contains an entry for each Core System, to which the Graphics System is logically connected, and for each node and system that the Core System monitors.

2. In a pop-up window, scroll down and choose *[westSK]/USA/TX/Dallas/tx1*, then choose OK. If you want the symbol to appear in other than the default size, choose **Select Object Size** first, then select the desired size and choose OK. You can also resize the object after it is placed.



Screen 10-12. Adding Nodes

The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape inside a small square.

3. Point to the area where you want to place the node and click.

   The node symbol appears green, indicating that the network address for this node symbol was automatically set to what was chosen from the list. The local nodename, tx1, appears as a label.

4. Repeating Steps 3 and 4, choose nodes tx2 and tx3 from the list and place them on the map.

Adding Other Systems

The Texas area also has an LCS50 *Datakit* II VCS Network Interface and a COMSPHERE 6800 Series NMS, which are monitored by the Core System, westSK. Any node or system that is monitored by a Core System logically connected to your Graphics System, as well as the Core System themselves, appears in the list of nodes and systems.

Now add these systems.

Procedure 10-17. Adding Other Systems

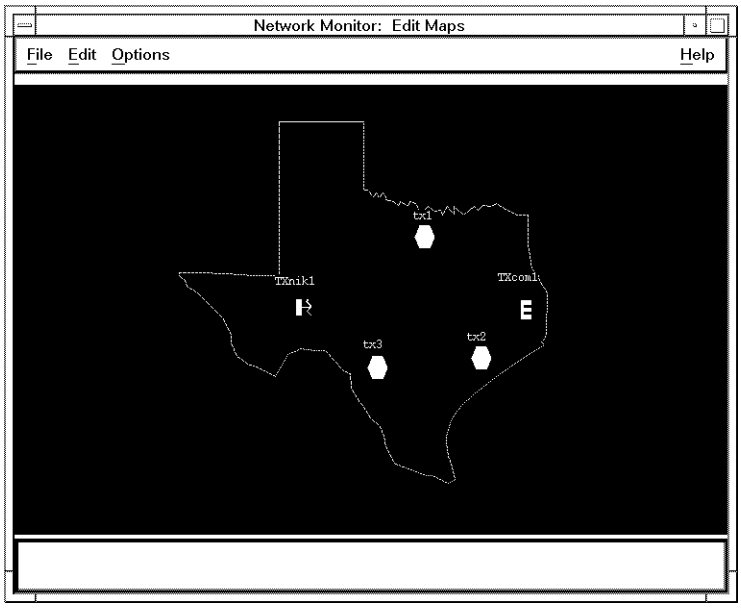
1. In the Edit Maps Window, choose **Edit**, **Equipment**, and then choose **Add Nodes/Systems**. Choose *[westSK]TXnik1*, then choose OK.

   The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape inside a small square.

2. Point to the area where you want to place TXnik1 and click.

3. Repeat Steps 1 and 2 for the COMSPHERE 6800 Series NMS, TXcom1. The COMSPHERE 6800 Series NMS is represented by the general Element Management System (EMS) symbol (E).

The Texas map now looks similar to the following screen:



Screen 10-13. Adding Other Systems

Adding a Concentrator/SAM

To add a Synchronous/Asynchronous Multiplexer (SAM), as shown in **Figure 10-7** in Phase I on the Texas regional map, use the following procedure:

Procedure 10-18. Adding a Concentrator/SAM

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Add Concentrators/SAMs**.

   In a pop-up window, a list appears that contains all known concentrators/ SAMs in the network.

2. In the pop-up window, scroll down and choose the SAM with the network address of *[westSK]USA/TX/Houston/tx2:6*, then choose OK .

   The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape inside a small square.

3. Point to the area where you want to place the SAM on the map and click.

The concentrator symbol is green since its network address has already been set to that chosen from the list. The local node name and module address of the link module in the node that connects to the concentrator appears as a label.

Moving a Label

Sometimes, a symbol's label is blocking the path for drawing a trunk line or other connection (for example, the label for the BNS-2000 VCS tx3).

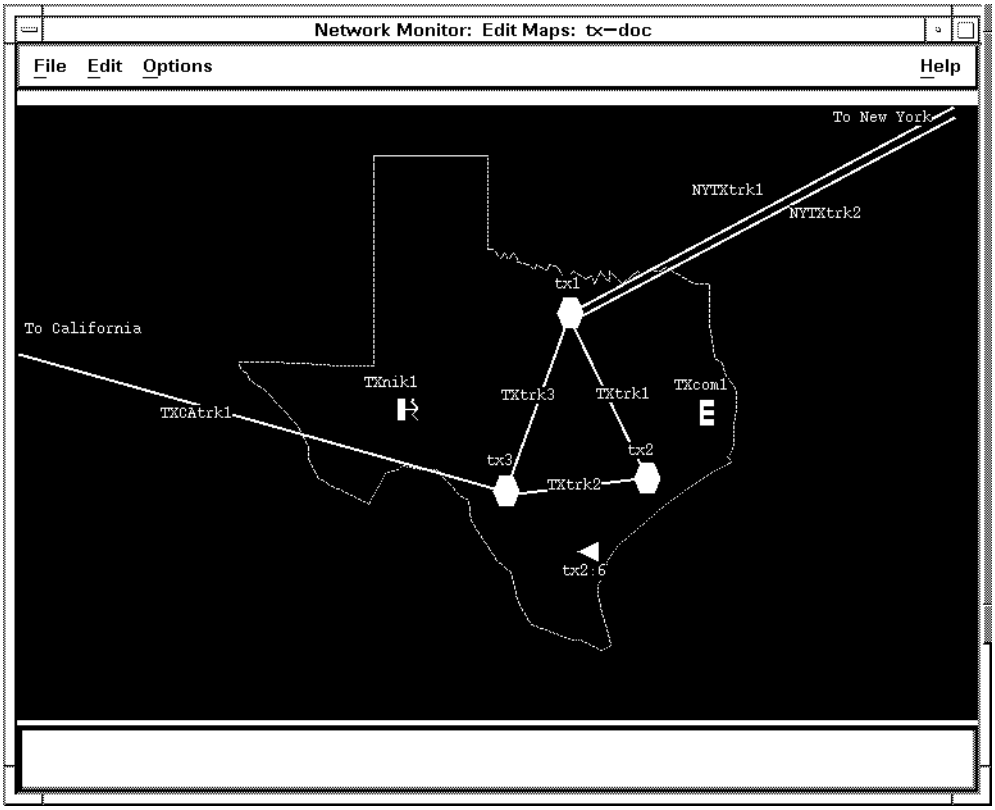
Adding Trunks and Labels

As shown in **Figure 10-7** and **Table 10-3** of Phase I, six trunks are located in part or entirely in the Texas region. Similar to **Procedure 10-7, Adding Trunks**, use the list of trunks to place these trunks on the map in the same way that was done for the top map.

Trunks TXtrk1, TXtrk2, and TXtrk3 connect the nodes within the Texas region. Trunks TXCAtrk1, NYTXtrk1, and NYTXtrk2 connect the Texas region to other areas in the network. The latter trunks can be placed on the map so that one end is on the appropriate Texas node and the other end is placed at the edge of the map.

Adding a label to these trunks is similar to **Procedure 10-5, Adding a Label for Texas Aggregate Symbol**.

Add a label to indicate that the other end is in a different region (for example, "To New York" and "To California"). The regional Texas map now looks similar to this:



Screen 10-14. Adding Trunks and Labels

Adding a Concentrator/SAM Link

Now show the connection between the SAM symbol and the node to which the SAM is subordinate, tx2.

Procedure 10-19. Adding a Concentrator/SAM Link

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Pick From Legend**.
2. In the editor legend, click on the Concentrator/SAM Link symbol.

   This symbol looks like a trunk, but has different properties (that is, one address instead of two).

The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape.

3. Point to the center of the SAM symbol and click.

   This identifies what address to give the concentrator link, since a concentrator link has the same network address as the concentrator.

4. Point to the center of the tx2 node symbol and click.

   The concentrator link appears in green with its network address already set.

Adding Other Connecting Symbols

A CPM connection is not considered a trunk or a concentrator link. To show these connections, or any other generic single address connection on a map, use the following procedure:

Procedure 10-20. Adding Other Connecting Symbols

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Pick From Legend**.
2. In the editor legend, click on one of the two unlabeled line symbols at the bottom of the legend.

   The mouse cursor automatically jumps to the center of the map and changes to a *cross-hair* shape.

3. Point to the center of the tx3 node symbol and click.
4. Point to the center of the TXnik1 symbol and click.

   The line initially appears white, since a network address has yet to be set for it.

5. To set the network address, click on the white line symbol on the map.
6. In the Edit Maps Window, choose **Options**, then choose **Set Network Address**.
7. In the pop-up window, type *[westSK]USA/TX/Austin/tx3:19*, the fully qualified network address for the CPM module, then choose OK.

NOTE:
Square brackets around the Core System name, the slashes, and the colon must be entered correctly.

The line turns green, indicating the address has been set. Add other connecting symbols that are to be reflected on the detail map.

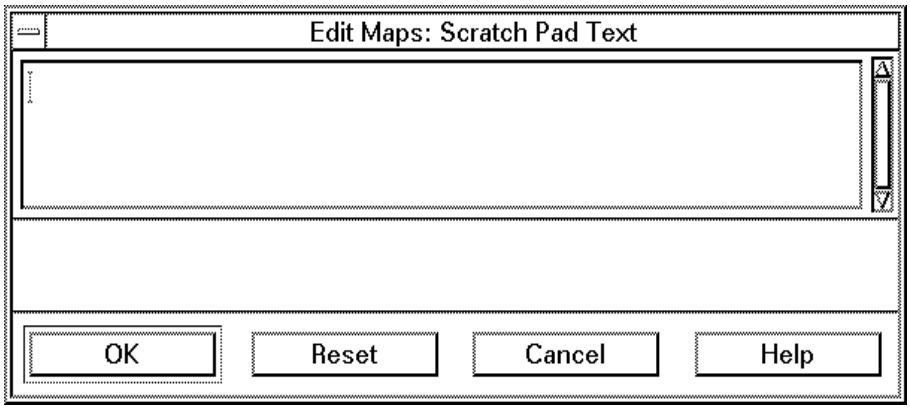
Adding Scratch Pad Information

As discussed in Phase I, Scratch Pad information can be associated with map symbols to aid in solving certain network problems. The information entered for a particular piece of equipment will be displayed when the symbol is selected and you choose **Commands**, then choose **Display Info** in the Network Map Window. You can add Scratch Pad Text only for locally monitored objects (for example, trunks, nodes, and concentrators).

Now add Scratch Pad information for the trunk that exists between the Texas and California nodes.

Procedure 10-21. Adding Scratch Pad Information

1. In the map, click on the trunk symbol for trunk TXCAtrk1.
2. In the Edit Maps Window, choose **Options**, then choose **Scratch Pad Text**.
3. The pop-up window displays Scratch Pad information that has already been entered—none in this case:



Screen 10-15. Adding Scratch Pad Information

4. Enter whatever information is useful for fault management tasks into the Scratch Pad window and when finished, choose OK.

NOTE:
The Scratch Pad text is stored in the configuration database on the Core System and can be a maximum of 200 characters.

Special characters such as the "|" and the "&" should be avoided when entering text into the Scratch Pad window. These characters may interfere with the window formatting.

Setting the Map Pointer for a Node Symbol

The next step in creating this Texas regional map is to set the map pointer for the tx3 node symbol to point to a detailed map showing the tx3 node and its associated concentrators. Now set the map pointer for tx3.

Procedure 10-22. Setting the Map Pointer for a Node Symbol

1. Click on the tx3 node symbol in the map.
2. In the Edit Maps Window, choose **Options**, then choose **Set Map Pointer**.
3. In the pop-up window, overwrite the existing File Name (which will be a pointer to the shelf map) with ***tx3node***, then choose OK.

A blank file, *tx3node*, is automatically created.

NOTE:
If a map pointer is not set for a node symbol or a concentrator or SAM symbol, those symbols automatically point to empty shelf maps and an associated file name has already been assigned; you need not set a map pointer for these symbols if you want them to point to the respective shelf maps. However, if you want to set map pointers to point to other maps besides shelf maps, overwrite the file name that is supplied.

Setting the Map Title for Texas Regional Map

Similar to **Procedure 10-11, Setting Map Title for Top Map**, set the map title for the regional map in the same way.

Procedure 10-23. Setting the Map Title for Texas Regional Map

1. In the Edit Maps Window, choose **Options**, then choose **Set Title**.
2. In the pop-up window, overwrite any existing title that may be present with ***Texas Region***. Then choose OK.

   The title then appears in the Edit Maps Window title bar.

Saving the Regional Map

After supplying a background and title, adding equipment, adding connections, and setting the map pointer for the tx3 node, it is time to save this regional map. Similar to **Procedure 10-12, Saving the Top Map**, save the regional map.

Procedure 10-24. Saving the Regional Map

1. In the Edit Maps Window, choose **File**, then choose **Save**.

   In the pop-up window, the file name *texas.region* appears, since this file existed before you started editing it.

2. In the pop-up window, choose OK.

A confirmation notice appears, asking you if you want to overwrite the file that currently exists. Since you have made changes, choose OK to confirm the overwriting. The map is then saved in the appropriate file and an informational message appears in the Edit Maps Window footer.

Step 8: Editing a Detailed Map of tx3 Node

As shown in **Figure 10-8** of Phase I, it was decided that a map displaying more detail of the tx3 node was needed. This map contains the node itself, two concentrators (TXconc1, TXconc2), a SAM (tx3:27), some unmonitored equipment—hosts, a FEP, an LCS50 *Datakit* II VCS Network Interface (TXnik1) and ATMs. To begin editing this detailed map of the tx3 node, load it first.

Procedure 10-25. Loading a Regional Map of tx3 Node

1. In the Edit Maps Window, choose **File**, then choose **Load**.
2. In the pop-up window, scroll down and choose ***tx3node***, then choose OK.

This reads in the blank map created when the map pointer was set for the tx3 node symbol on the Texas regional map.

Adding the tx3 Node Symbol

Similar to **Procedure 10-16, Adding Nodes**, add the tx3 node to the center of the map using the list of nodes.

Adding Concentrators/SAMs

Similar to **Procedure 10-18, Adding a Concentrator/SAM**, add the concentrator/SAM symbols for the tx3 node to the map by using the list of concentrators/SAMs.

Adding Concentrator/SAM Links

Similar to **Procedure 10-19, Adding a Concentrator/SAM Link**, add the concentrator/sam links between the concentrators/sams and the node symbol using the editor legend.

NOTE:
Remember to place the concentrator/SAM endpoint of the link **first** on the appropriate concentrator/SAM symbol.

Adding Unmonitored Objects

Now place the unmonitored objects that were planned in **Figure 10-8** of Phase I on the detailed map for tx3.

Procedure 10-26. Adding Unmonitored Objects

1. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Pick From Legend**.

   The editor legend is displayed as in **Screen 10-10**.
2. In the editor legend, click on the Front End Processor (FEP) symbol and place it on the map.
3. In the editor legend, click on the Host symbol and place it on the map.
4. Repeat Step 3 two more times to place two more Host symbols on the map.
5. In the editor legend, click on the Terminal symbol and place it on the map to represent a terminal as shown in **Figure 10-8** of Phase I.
6. Repeat Step 5 to place another terminal on the map.
7. As discussed in Step 5 of Phase I, place an unmonitored LCS50 *Datakit* II VCS Network Interface on the map. To do so, click on the NIK symbol in the editor legend and place it on the map.

Adding Other Connecting Symbols

Similar to **Procedure 10-20, Adding Other Connecting Symbols**, add the lines representing connections to unmonitored equipment. Set the network address for the lines so that they will reflect alarm activity on those connections.

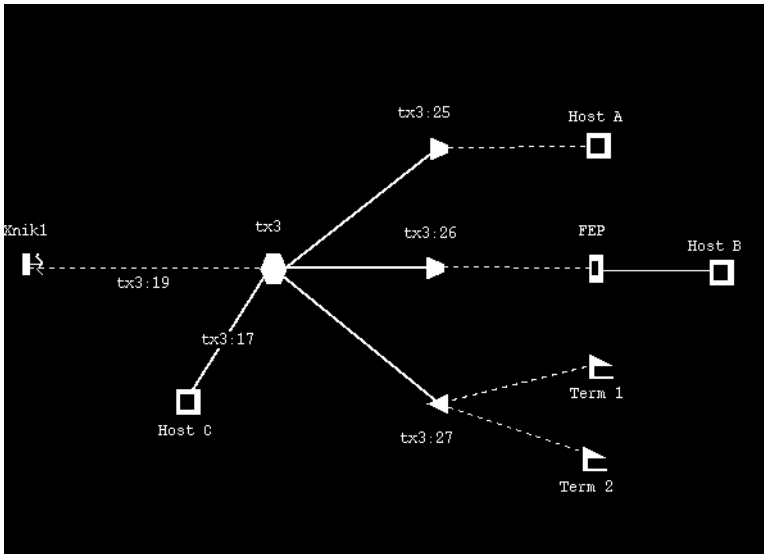
Adding Labels

Similar to **Procedure 10-5, Adding a Label for Texas Aggregate Location Symbol**, add labels for all equipment placed on the detailed map for the tx3 node.

Setting the Map Title for Detailed Map

Similar to **Procedure 10-23, Setting the Map Title for Texas Regional Map**, set the map title for the detailed map of the tx3 node to ***Detailed Map for USA/TX/ Austin/tx3 node***

The detailed map of the tx3 node now looks similar to this:



Screen 10-16. Adding Unmonitored Objects and Connections

Saving the Detailed Map

Similar to **Procedure 10-24, Saving the Regional Map**, save the detailed map of the tx3 node to a file named ***tx3node***.

Step 9: Editing a Detailed Map for TrkAggr1

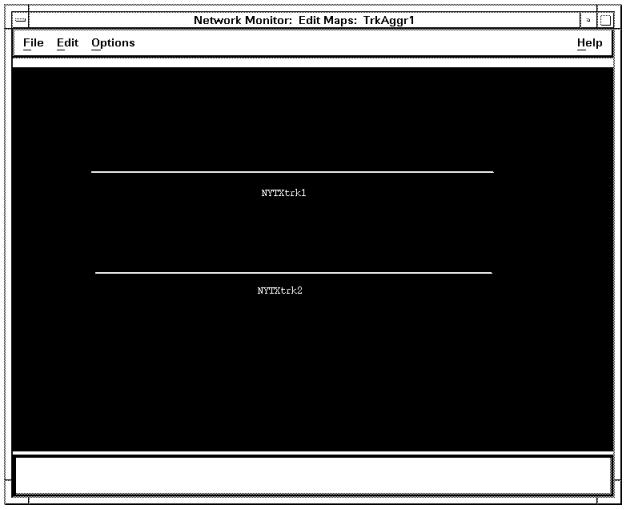
The last map to be edited in this tutorial is the empty trunk detail map, *TrkAggr1*. This empty map was created when you set the pointer for the trunk aggregate symbol on the top map (refer to **Procedure 10-10, Setting Map Pointer for Trunk Aggregate Symbol**). Now begin editing the detailed trunk map so that it matches the detailed trunk map as planned in **Figure 10-9** of Phase I:

Procedure 10-27. Loading a Detailed Map of TRKAggr1

1. In the Edit Maps Window, choose **File**, then choose **Load**.
2. In the pop-up window, choose ***TrkAggr1***, then choose OK.

This reads in the existing empty map.

3. In the Edit Maps Window, choose **Edit**, then choose **Equipment**, then choose **Add Trunks**.
4. In the pop-up window, scroll down and choose ***NYTXtrk1***, then choose OK.
5. Place the first trunk on the map, as shown in **Figure 10-9** of Phase I.
6. In the pop-up window, choose ***NYTXtrk2*** and place it on the map so the final map looks similar to the following screen:



Screen 10-17. Adding Trunks to a Detailed Map of TrkAggr1

7. Similar to **Procedure 10-24, Saving the Regional Map**, save the map and close all pop-up windows.

NOTE:
For tutorial purposes, editing the remaining maps will not be described. Each remaining map would be built by using the same procedures as outlined here, until all the planned regional maps depicted in Phase I had been edited.

Step 10 Generating Shelf Maps

When planning the map hierarchy, it was decided to generate shelf maps for all nodes and concentrators in the sample network. These maps are generated automatically with just a few mouse clicks.

Node and concentrator/SAM symbols are automatically linked to the appropriate shelf map file. Using **Generate Shelf Maps** replaces the contents of the appropriate shelf file. Shelf maps can be kept up to date with changing configurations by re-generating any shelf maps for nodes or concentrators/SAMs that have changed.

Shelf maps can be generated only for nodes and concentrators that are monitored by a Core System to which a Graphics System is logically connected. Information about each module must reside on the Core System. This information can be uploaded from the nodes using the *StarKeeper* II NMS **skload** and **cfg_sync** commands. For more information on these commands, use the Core System **help** command.

Shelf Map generation takes some time to complete. A notice is sent to the Bulletin Board when all the shelf maps have been generated. Any error messages that may result from the shelf map generation are sent to the Bulletin Board with more detailed errors messages being sent to the current log file in *$EVENTLOG* directory.

Generating Shelf Maps for All Nodes

Now generate the shelf maps for all nodes.

Procedure 10-28. Generating Shelf Maps for All Nodes

1. In the Control Window, choose **Administer**, then choose **Administer Maps**.
2. In the Administer Maps menu, choose **Generate Shelf Maps**.
3. In the Generate Shelf Maps menu, choose **All Nodes**.
4. A pop-up message window will appear advising the operator that the new shelf maps will not appear on a Network Monitor shelf map until the “View Network Status” task is reinvoked. Choose “OK.”

The shelf maps for all nodes are populated with the configuration data of the Core System database(s) to which your Graphics System is logically connected.

Generating Shelf Maps for Selected Nodes

Instead of generating shelf maps for all nodes, you can alternatively be selective.

Procedure 10-29. Generating Shelf Maps for Selected Nodes

1. In the Control Window, choose **Administer**, then choose **Administer Maps**.
2. In the Administer Maps menu, choose **Generate Shelf Maps**.
3. In the Generate Shelf Maps menu, choose **Selected Nodes**.

   A pop-up window appears, that contains a scrolling list of nodes.
4. In the pop-up window, choose as many nodes as desired in the list.
5. Choose OK when the correct set of nodes have been highlighted to begin the shelf map creation process.
6. A pop-up message window will appear advising the operator that the new shelf maps will not appear on a Network Monitor shelf map until the “View Network Status” task is reinvoked. Choose “OK.”

The shelf maps for the selected nodes are populated with the configuration data from the Core System database(s) to which your Graphics System is logically connected.

Generating Shelf Maps for All Concentrators/ SAMs

Now generate the shelf maps for all concentrators/SAMs.

Procedure 10-30. Generating Shelf Maps for All Concentrator/SAMs

1. In the Control Window, choose **Administer**, then choose **Administer Maps**.
2. In the Administer Maps menu, choose **Generate Shelf Maps**.
3. In the Generate Shelf Maps menu, choose **All Concentrators/SAMs**.
4. A pop-up message window will appear advising the operator that the new shelf maps will not appear on a Network Monitor shelf map until the “View Network Status” task is reinvoked. Choose “OK.”

The shelf maps for all concentrators/SAMs are populated with the configuration data from the Core System database(s) to which your Graphics System is logically connected.

Generating Shelf Maps for Selected Concentrators/SAMs

Instead of generating shelf maps for all concentrators/SAMs, you can select, by node, which concentrator/SAM shelf maps should be generated.

Procedure 10-31. Generating Shelf Maps for Selected Concentrators/SAMs

1. In the Control Window, choose **Administer**, then choose **Administer Maps**.
2. In the Administer Maps menu, choose **Generate Shelf Maps**.
3. In the Generate Shelf Maps menu, choose **Selected Concentrators/ SAMs**.

   A pop-up window appears, that contains a scrolling list of nodes.
4. In the pop-up window, choose as many nodes as desired in the list.

   Shelf maps will be generated for each concentrator and SAM subordinate to the selected nodes.
5. Choose OK when the correct set of nodes has been highlighted to begin the shelf map creation process.
6. A pop-up message window will appear advising the operator that the new shelf maps will not appear on a Network Monitor shelf map until the “View Network Status” task is reinvoked. Choose “OK.”

The shelf maps for the selected concentrator/SAMs are populated with the configuration data from the Core System database(s) to which your Graphics System is logically connected.

Step 11: Testing Maps Checklist√

Before you actually use the maps that reflect your network, it is recommended that you test them first by exercising prominent features and functionality.

The following checklist is designed to help you perform the testing, but for the actual procedure, you need to review the material in **Chapter 11** that describes the Network Map Window and its functionality, and the remainder of this chapter.

Table 10-7. Steps for Testing Map Hierarchy

Step #	Task	√
1	Check that the map hierarchy initializes when you choose **Monitor** and then **View Network Status** in the Control Window. Error messages are produced if there is a problem.	
2	Check to see that all maps were created and properly linked together, including shelf maps. Do this by navigating up and down through the map hierarchy.	
3	Use these commands on each applicable symbol: a. Display Info b. Diagnostics c. List Alarms	
4	Check for new equipment that may not be reflected in the maps. You can do this by requesting an alarm list and checking that every alarm is reflected in the maps.	
5	Check that the map symbols become appropriately highlighted to show the severities of the alarms received, provided that all relevant equipment is represented on your maps and that you are displaying the appropriate map (for example, the top map). If not, check the alarm filter names specified on the Graphics System and the filter criteria set on the appropriate Core System.	

Defining User Notices

You can define *user notices* so that you are alerted to specific network problem areas. User Notices appear in the Network Status Window. They display the total number of outstanding alarms that match the criteria you defined for the notice. User notices in the Network Status Window can also be used as a short-cut to access the list of alarms that match the criteria specified in the notice. You can define up to six different user notices.

Some possible uses of user notices include highlighting these events:

- alarms on important network addresses (for example, Data Center ports)
- trunk alarms
- CPM alarms
- Session Maintenance (SM) alarms
- link down (LD) alarms
- alarms from a particular server, router, or Element Management System.

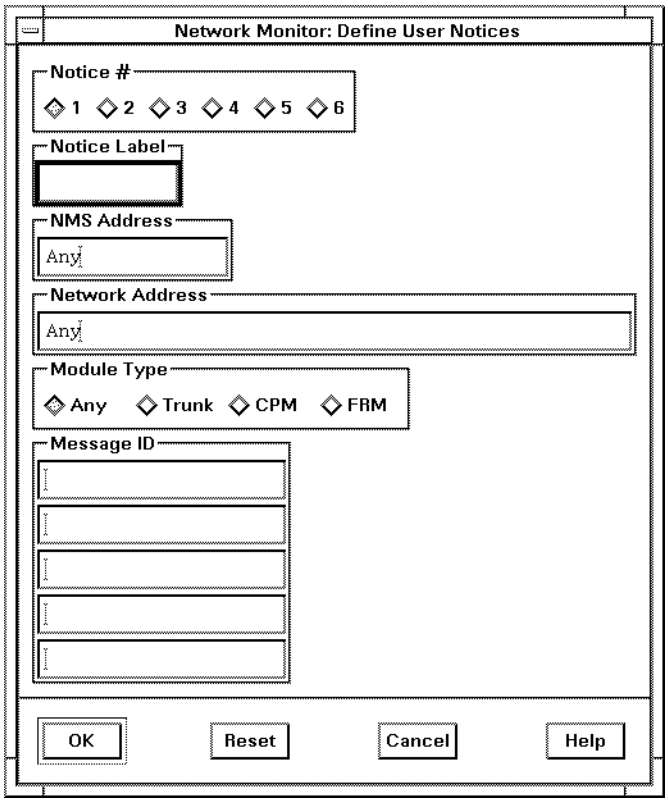
The criteria that are used to define a user notice are:

- network address
- module type category (that is, trunk or CPM)
- one to five alarm message IDs or ranges of message IDs

For the sample network described in the tutorial on building a map hierarchy, a user notice for all trunk alarms will be created.

Procedure 10-32. Defining User Notices

1. In the Control Window, choose **Administer**, then choose **Define User Notices**.
2. Select the notice you want to define on the **Notice #** control.



Screen 10-18. Define User Notices Window

3. In the label field, type ***Trunks***.

   Note that a label is required. This label, Trunks, will appear in the Network Status Window under the first user notice. See **Chapter 11** for an example of a user notice with a label of Trunks in the Network Status Window.

4. Use the default value, **Any**, for the NMS address and Network Address fields. **Any** means that the address criteria will not be used to limit alarms that are received. See **Chapter 12** for more details on these fields.

5. Choose **Trunks** from the **Module Type** setting.

6. Use the default value (blank) for the Message ID field. The default value means that the Message ID criteria will not be used to limit alarms that are received. See **Chapter 12** for more details on this field.

7. Choose OK to save this notice definition and to exit this pop-up window.

For this notice, you need not supply any more information. All alarms on trunk module types (for example, TRK-DDS, TRK-T1, SWT, SFT) on any network address will now be matched by this user notice.

Changes to user notices will take effect on the next initialization of the Network Monitor Status Window.

Defining User Notices for BNS-2000 Messages

In defining Message IDs for user notices, remember Message IDs for BNS-2000 VCS alarms consist entirely of digits, where message IDs for BNS-2000 alarms consist of digits plus a "B" suffix. Ranges specified without a "B" suffix will not match BNS-2000 alarms; ranges specified with a "B" suffix will not match BNS-2000 VCS alarms. Message IDs that are not entered as ranges will match any alarm with the same initial component. The following table will help to illustrate this relationship:

Enter This Message ID	To Specify These Message IDs
8120	8120, 8120B
8120B	8120B
8120-8124B	8120B to 8124B
8120B-8124B	8120B to 8124B
8120-8124	8120 to 8124

Using Wildcards in Network Addressing

Network Monitor has refined the use of wildcards to be more applicable to typical user scenarios, when specifying the network address for the following:

- List Alarms Command Window
- Clear Alarms Command Window
- Define User Notice Command Window

As a brief review, a complete network address consists of information to the left of a colon (:) and to the right of a colon. The data to the left of the colon are the logical components of the four-level addressing scheme; the data to the right of the colon are the physical components (for example; module, port). As an example, `USA/NY/Buffalo/ny2:50.1` has logical components to the left of the colon and physical components to the right of the colon. Refer to *Chapter 3* in the *StarKeeper II NMS Core System Guide* for a full discussion of network addressing components.

Each of the above listed windows has a **Network Address** field, where you can enter an address and use a wildcard pattern matching technique. Enter the desired network address into the field; if you wish, you may append an asterisk (the wildcard symbol) to a partial logical component of the address. This will specify all addresses beginning with the same address string but ending with any pattern. For example `USA/NY/Buffalo/ny*` will match any pattern that starts with the same address string. The "ny*" portion will match such addresses as: ny1, ny2, nystate, nynode, etc.

Be aware of two important limitations of the wildcard symbol in Network Monitor:

1. The asterisk can only be placed at the *end* of a pattern string (representing a partial logical component of the address), not at the start of a string, and not in the middle; although an asterisk may be entered by itself.
2. The asterisk cannot be used to the right of the colon.

Alarms on all components of a specified node or system element to the right of the colon are always matched.

WARNING:
Always use the recommended conventions for addressing components in a network and exercise care in the use of wildcards. For example, getting a list of alarms from more origins than you expected is not as serious a setback as clearing more alarms than you desired.

ind	will NOT match	**indiana/x/y**
ind	will ONLY match	**ind**
indiana	WILL match	**indiana/x/y**
		indiana/z/w
		...anything beginning with **indiana/**
ind*	WILL match	...all of the above
		indabc/x/y
		inddef/x/y
		...anything beginning with **ind**

Specifying Alarm Filters

By default, each Core System in your network sends alarms to your Graphics System. However, you can screen some of these alarms so that only a subset of all alarms are displayed on your Graphics System. This can be accomplished by using alarm filters. Alarm filters regulate the alarms that are sent to your Graphics System. Using alarm filters is purely optional, and if you do not take any action, the default is to send all alarms to your Graphics System.

Alarm filters are created and given names on the Core System. Each filter created contains criteria, such as network address and alarm severities. Refer to the *StarKeeper II NMS Core System Guide* for more information on creating alarm filters. From your Graphics System, you can only specify the filter names to be used for each Core System, not create the filters.

Editing the Alarm Filter File

On your Graphics System, the *$NM_ROOT/lib/filters* file is provided and contains the names of the alarm filters to use for each Core System. This file will need to be edited after you have specified your alarm filters on the Core System, to include your:

- Core System names
- names of your filters to be used

Refer to the **EDIT_FILTER** manual page in **Appendix A** for more information in editing filters. You can use a filter *positively*, which means **send** only the alarms which match the criteria of the filter to the Graphics System, or you can use a filter *negatively*, which means **do not send** any alarm that matches the criteria of the filter to the Graphics System. For a detailed explanation of positive and negative filters, refer to the Alarm Conditioning section in *Chapter 5* of the *StarKeeper II NMS Core System Guide*.

In the *filters* file, you may specify one and only one filter to be used positively and one and only one filter to be used negatively for each Core System machine.

There are two Core Systems in the sample network described in the preceding tutorial. Use the procedure that follows to specify the name of the filters for each of these two Core Systems. Assume that filters named *posfltr1* and *negfltr1* have already been created on the Core System, *eastSK*. Different filters, named *pf2* and *nf2*, have been created on the Core System, *westSK*.

The syntax for specifying a positive filter name in the *filters* file is:

<Core System name>.PF:[Tab] <Filter Name>

The syntax for specifying a negative filter name in the *filters* file is:

<Core System name>.NF:[Tab] <Filter Name>

Procedure 10-33. Specifying Alarm Filters

1. Logon to the Graphics System where you want to edit the filters.
2. Type ***su root*** and press [Enter].
3. Type the *root* password at the prompt and press [Enter].

   You now have permission to write into the *filters* file.
4. Start editing the file *$NM_ROOT/lib/filters* using any editor of your choice (for example, ed or vi).
5. For the sample network described above, append the following lines to the end of the *filters* file:

eastSK.PF: posfltr1
eastSK.NF: negfltr1
westSK.PF: pf2
westSK.NF: nf2

NOTE:
You can specify only one positive and one negative filter for each Core System machine.

6. Save the file.

The *$NM_ROOT/lib/filters* file should look similar to this:

```
# Filter name file
#*****************************************************
# Lines beginning with # are comments.
# Filter name specifications must begin in column 1
#
# For Positive Filtering
# <StarKeeper II NMS Name>.PF:<Filter Name>
#
# For Negative Filtering
# <StarKeeper II NMS Name>.NF:<Filter Name>
#
#*****************************************************
#
eastSK.PF:posfltr1
eastSK.NF:negfltr1
westSK.PF:pf2
westSK.NF:nf2
```

Screen 10-19. Alarm Filters File

You can invoke the new filters immediately by issuing the Network Monitor **filter_sync** command, as the next section discusses. Alternatively, the filters will be used the next time the Core System software is restarted.

Synchronizing Alarms

After editing the *$NM_ROOT/lib/filters* file, you need to use the **filter_sync** command if you want the filters to go into effect immediately. You must have Graphics System administrator privileges in order to issue this command. The **filter_sync** command restarts the alarm collector process on your Graphics System. The alarm collector process, as its name suggests, is responsible for collecting alarms from the Core System to which a Graphics System is logically connected. It is advisable to quit Network Monitor while you are synchronizing alarms, but keep the Bulletin Board active. Any error conditions encountered in the alarm synchronization process are displayed on the Bulletin Board. For more information on error messages, see **Appendix C**.

Procedure 10-34. Synchronizing Alarms

1. All users on this Graphics System must quit Network Monitor.
2. Enter ***filter_sync*** and press Return. You must have Graphics System administrator privileges in order to issue this command.

3. Start the Network Monitor application once again. This restarts the *nm_ac* process.

NOTE:
When you modify the criterion of an existing filter that is in effect on the Core System, the alarm handling process on that Core System is notified of the change by the **alarm conditioning** process. As long as the alarm handler has applied that filter criterion to all alarms it is sending to the Graphics System that is of interest, no action is necessary to make the changed filter criterion apply to new incoming alarms. As long as you only want to apply the changes to the filter criterion to new incoming alarms, **filter_sync** does not have to be run from the particular Graphics System, and the Network Monitor maps will still reflect a consistent alarm database. New alarms that come in will be filtered according to all of the records in the specific filter criterion, including the ones that are additions or changes. Deleted records within that criterion will no longer be included in the filter criterion, so they will not be used on new incoming alarms. So, if you want to affect the stream of new alarms, **filter_sync** is not needed.

However, **filter_sync** is required if you want to apply the new records in the filter criterion to all alarms, including those already in the database. In that case, it is necessary to run the **filter_sync** command, take down the maps, and bring them up again.

Updating Maps

If you know that the configuration data in your network has changed, you must update the network maps. You must manually update the network maps you created by using the map editor. The shelf maps can be updated by requesting that they be automatically generated once again. If a node name has changed, remove the **old** node from each map it is presently on and then add the new node. The same holds true for trunk names and concentrator names if they have changed.

Distributing Maps to Other Graphics Systems

If you have two or more Graphics Systems that use the same set of network maps, you can create and update the maps on one Graphics System and use the *Datakit* II VCS Host Interface push command to send the map files to other Graphics Systems.

NOTE:
Before you can use the *Datakit* II VCS Host Interface **push** command, you must first authorize yourself to **push** to other Graphics System by using the *Datakit* II VCS Host Interface **dk hostname.authorize** command. For example, **dk USA/Austin/system1.authorize**. See the *Datakit II VCS Host Interface Installation and Administration Guide* for more information on these commands.

All of your network maps are contained in the directory named *$NM_ROOT/lib/USERMAPS.* The *USERMAPS* directory contains two sub-directories—*NETWORK* and *SHELVES*. The *NETWORK* directory contains all the map files you created with the map editor. The *SHELVES* directory contains all the automatically generated node and concentrator/SAM shelf map files.

CAUTION:
It is strongly recommended to not manually alter or edit the map files; otherwise, unpredictable results may occur. Only create map files with the map editor or by automatically generating them.

To send all map files to a second Graphics System (for example, wrkstn2) which is physically located on the Albany BNS-2000 VCS node, use the following procedure:

Procedure 10-35. Distributing All Maps

1. Using the Cut-Through application, open a window to your local Graphics System environment.
2. Enter ***cd $NM_ROOT/lib*** and press Return.
3. Enter ***push USA/NY/Albany/wrkstn2 USERMAPS /tmp*** and press Return which copies the maps to the second Graphics System.
4. Enter ***dk USA/NY/Albany/wrkstn2*** and press Return to log onto the second Graphics System.
5. Enter ***su root*** and press Return and enter the *root* password at the prompt.
6. Enter ***cd /tmp*** and press Return.
7. Enter ***$NM_ROOT/bin/copymaps*** and press Return to copy the maps into the correct directory on the second Graphics System.

   An in-progress message will be displayed and the prompt will return shortly. The new maps will be used when View Network Status is restarted on the second Graphics System.

Old maps with the same name as new maps will be overwritten. Old maps with no matching new map names will remain in that directory.

8. Press CTRL ***d*** to log off the second Graphics System.

Using Network Monitor

11

This chapter provides two scenarios that may occur while you are monitoring your network. These examples are not to be taken literally, but may help you get a feel for the type of alarms that could be generated and the sequence of events that you can follow to correct them. To maintain continuity, the sample network that was created in **Chapter 10** is used within this chapter. Concluding the chapter is a discussion of night fold-down.

Figure 11-1 presents the window architecture for Network Monitor. The five windows that are highlighted are the primary subjects in this chapter and include:

- the Control Window
- the Network Status Window
- the Network Map Window
- the List Alarms Window
- the Diagnostics Window

The remaining Network Monitor windows may also be briefly mentioned within this chapter.

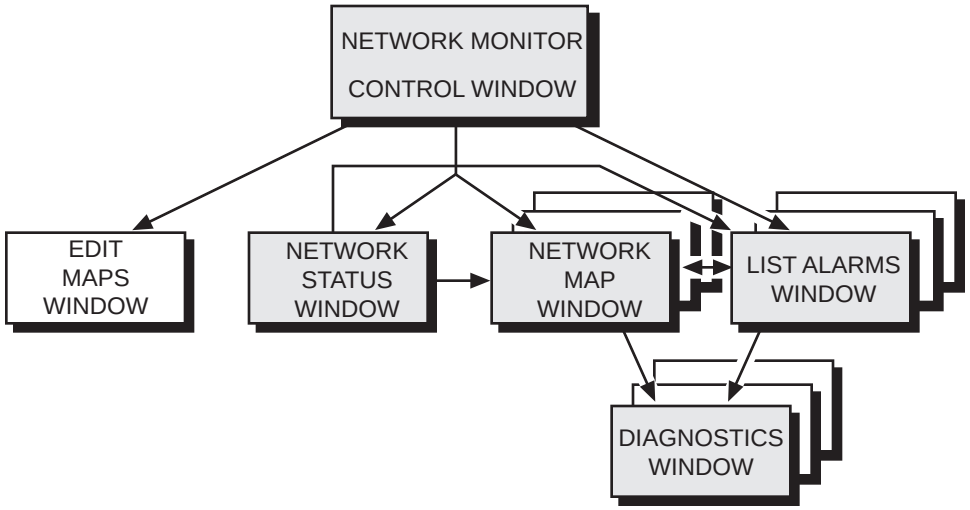


Figure 11-1. Window Architecture

Tutorial on Monitoring the Network

After you have planned for and created your network maps as described in **Chapter 10**, you are ready to begin monitoring your network. The following tutorial illustrates hypothetical problems that could happen as you monitor a network.

The intent of this tutorial is to illustrate possible problems that could occur as you monitor a network and how you might use the features provided by the Network Monitor application to solve those problems. It does not describe every command in detail—see **Chapter 12** for detailed information on each command.

NOTE:
This is a paper-only tutorial and is not interactive. You can try to follow the tutorial on your Graphics System, but your network as well as the configuration data in your Core System database(s), differs from the one presented here. Therefore, you will not be able to monitor the network presented here on your own Graphics System.

If you are monitoring a network for the first time, read this tutorial in its entirety. If you are familiar with the topics, you can skip certain sections and immediately access the section you need or go directly to **Chapter 12**.

The following table outlines the items covered in the tutorial.

Table 11-1. Steps for Monitoring a Network

Step #	Task
1	**Starting HP VUE**
2	**Starting Network Monitor**
3	**Starting to Monitor the Network**
	Example I: A Host Computer Problem Step 1: Check Network Status Window Step 2: Check Top Map Step 3: Display Regional Map Step 4: Display Detail Map Step 5: Display Shelf Level Map Step 6: Display List Alarms Window Step 7: Determine Problem Step 8: Clear Alarms
	Example II: A Trunk Problem Step 1: Check Network Status Window Step 2: Check Top Map Step 3: Display List Alarms Window Step 4: Display Textual Detail for an Alarm Step 5: Display Help for an Alarm Step 6: Run Diagnostics Step 7: Clear Alarms

Generic Monitoring Guidelines

In general, the steps you can use to monitor a network for faults and resolve problems as they occur are as follows:

Table 11-2. Generic Monitoring Guidelines

Step #	Task
1	Detect a network fault
2	Generally estimate what type of problem it is and where the problem has occurred in the network
3	Determine exactly what the problem is and which particular piece of equipment has failed
4	Decide the importance of the problem and if intervention is necessary
5	Consider alternative solutions
6	Implement a temporary and/or permanent fix

The tutorial that follows should help you understand how Network Monitor can be used to aid in performing the above steps in a quick and efficient manner.

Step 1: Accessing *StarKeeper* II NMS

To access the *StarKeeper* II NMS graphics application, select the *StarKeeper* II NMS icon from the HP VUE Front Panel.

The *StarKeeper* II NMS subpanel is then displayed:

Screen 11-1. HP VUE Control Window

Step 2: Starting Network Monitor

To start Network Monitor, click on the Network Monitor icon of the *StarKeeper* II NMS subpanel.

Step 3: Starting to Monitor the Network

To begin monitoring the network for faults, use the following procedure:

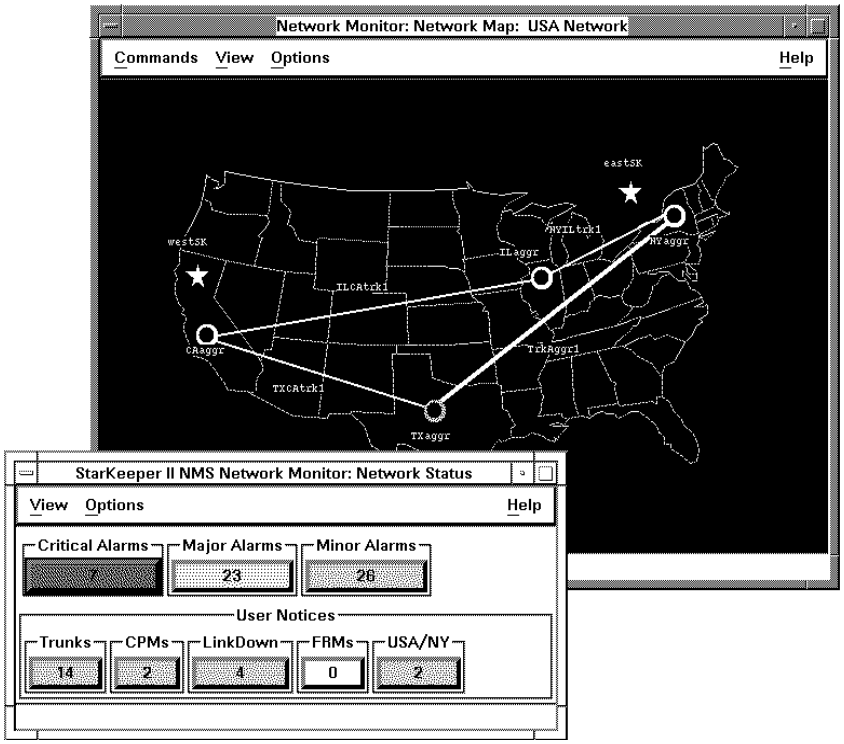
Procedure 11-1. Starting to Monitor the Network

1. To start monitoring the network, in the Control Window, choose **Monitor**, then choose **View Network Status**.

Choosing **View Network Status** loads the hierarchy of maps into memory and produces the Network Status Window and one Network Map Window.

NOTE:
Loading the map hierarchy may take several seconds to a minute, depending on the size of your network and the number of shelf maps you have generated. The map hierarchy will not load unless the Top Map parameter has been correctly set—refer to **Procedure 10-13, Setting Top Map Parameter**.

NOTE:
A maximum of 32 processes that display alarm information, such as the **View Network Status Window** and the **List Alarms Window**, can be run on a single Graphics System.



Screen 11-2. Network Status Window and Network Map Window

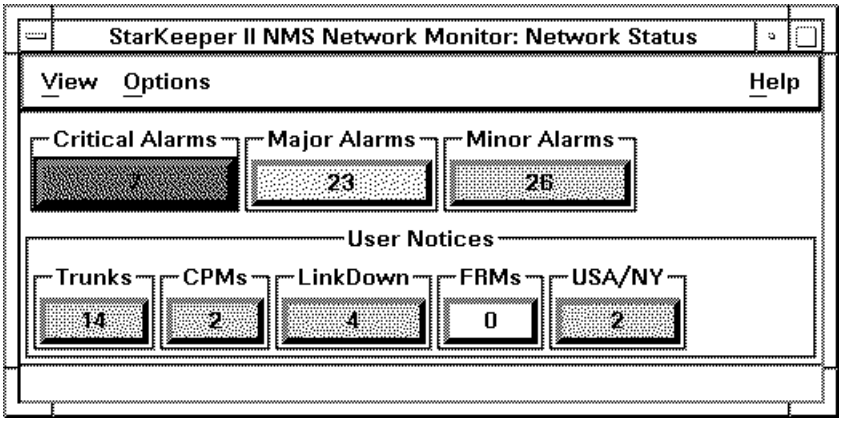
The Network Map Window initially displays the top map and, in this case, it is a map of the USA.

Example I: A Host Computer Problem

For the first example, a host computer connected to the network via a Computer Port Module (CPM) has failed, but you do not yet realize it. Use the following steps to discover the problem and correct it.

Step 1: Check Network Status Window

While watching your Graphics System, notice that the Network Status Window has changed. Both the alarm severity notices and user notices reflect outstanding alarms.



Screen 11-3. Network Status Window with Alarms

Check Network Alarm Severity Notices

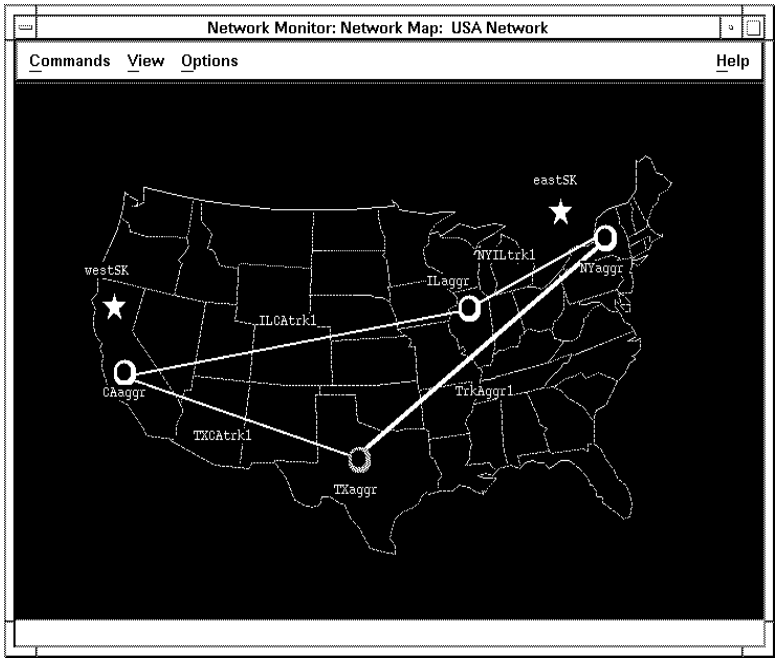
In the Network Status Window, the network alarm severity notices reflect the number of critical, major and minor alarms that have been received.

Check User Notices

NOTE:
In the Network Status Window, the user notice for CPM alarms indicates that CPM alarms have been received. Refer to **Chapter 10** for instructions on how to create user notices.

Step 2: Check Top Map

After checking the Network Status Window, you may want to check the top map to locate the problem visually. The top map shows the aggregate location symbol, representing Texas, as the color yellow—indicating a major alarm:



Screen 11-4. Network Map Window with Major Alarm

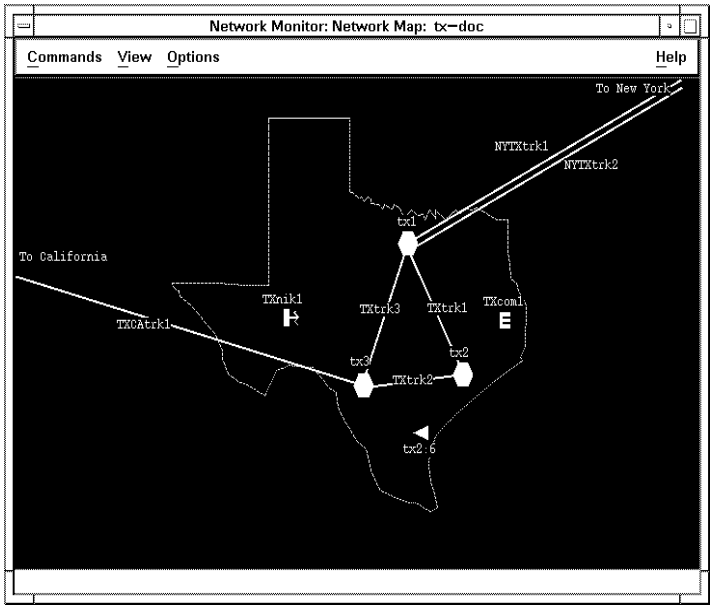
The remainder of the network is green. Remember, that the aggregate location symbol is yellow because it represents the highest severity of alarms of any object on the map under it (map(s) to which this symbol points). See the **Trickle-Up** section of **Chapter 10** for more information.

Step 3: Display Regional Map

In order to get a better perspective of the Texas region and to get closer to the source of the problem, now display the Texas regional map. You can display this regional map in a new Network Map Window while continuing to display the top map in the original Network Map Window. This allows you to observe the entire network while concentrating on the Texas region.

Procedure 11-2. Display Regional Map in a New Network Map Window

1. In the Network Map Window that is displaying the top map, click on the yellow Texas aggregate location symbol.
2. In the same Network Map Window, choose **View** then choose **Down** to display the Down menu.
3. Choose **New Window** to display the Texas regional map in a new Network Map Window.



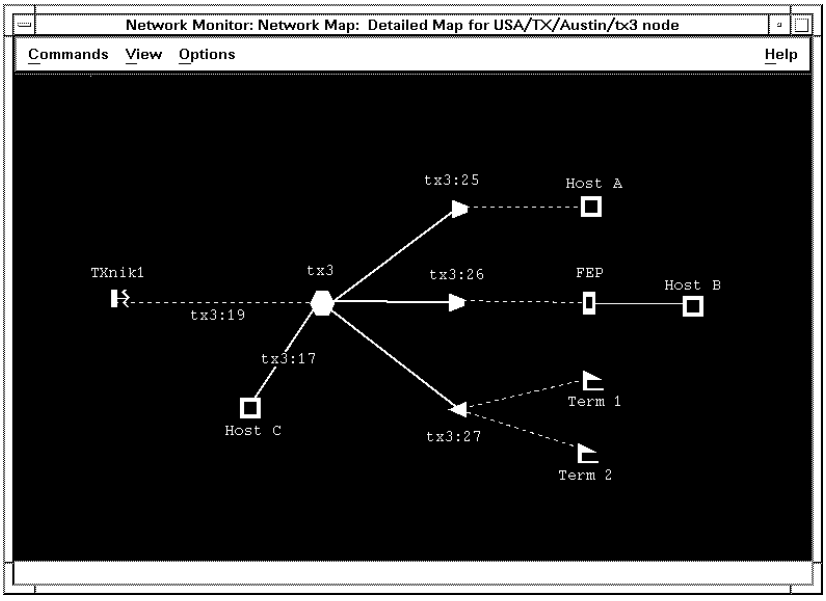
Screen 11-5. Regional Map of Texas with Major Alarm

NOTE:
To save screen space, you may make the original Network Map Window smaller using the re-size corners in the window. You may also move the window to a place where it is still visible, but out of the way.

On the regional map, observe that the tx3 node is yellow, while the rest of the network is green. This indicates that all of the alarms came from the USA/TX/Austin/tx3 node.

Step 4: Display Detailed Map of tx3 Node

At this point, to get closer to the root of the problem, display the detailed map of the tx3 node. To quickly display the detailed map of the tx3 node, click twice on the tx3 node symbol on the Texas regional map.



Screen 11-6. Detailed Map of Node USA/TX/Austin/tx3

This refreshes the Network Map Window that is displaying the Texas regional map and displays a detailed map of the USA/TX/Austin/tx3 node.

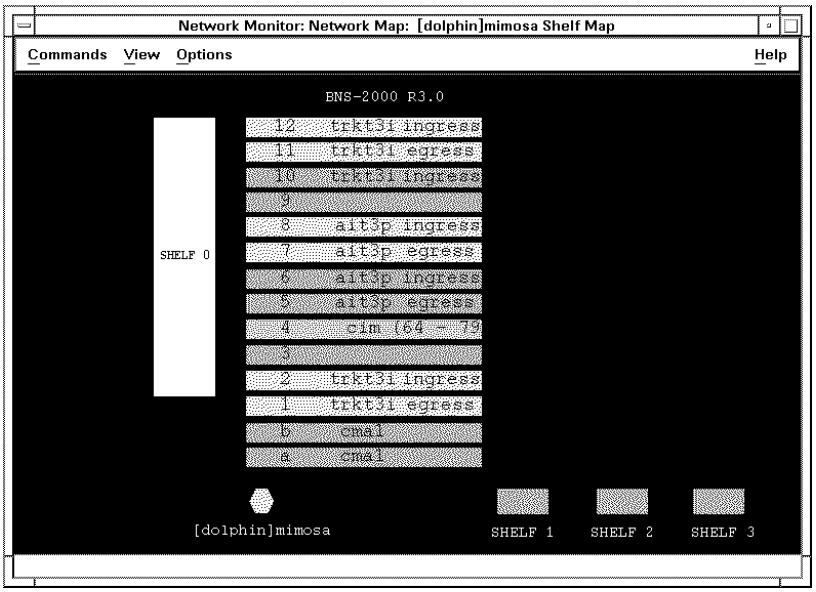
NOTE:
Clicking twice while pointing to a map object is an accelerator for clicking once on the object and choosing **View**, then choosing **Down** and **Same Window**.

Observe that this node has connections to several hosts and an unmonitored LCS50 *Datakit* II VCS Network Interface. The CPM connection to HostC is yellow, indicating there are major alarms on this network address.

Step 5: Display Shelf Level Map

At this point, to get even closer to the root of the problem, display the shelf level map of the node. To display the shelf level map, click twice on the node or entity you wish to view.

The following screen is an example of a shelf level map. The remainder of this tutorial uses the node *mimosa* in the examples.



Screen 11-7. Shelf Level Map: Series M1 and M2 Shelves

Network Monitor representations of the BNS-2000 node start with the Switching Shelf, Shelf 0. From this shelf you can navigate to the Series M1 (low speed) and other M2 (high speed) shelves, as follows:

- To navigate to a Series M1 shelf, click on the desired CIM module in Shelf 0. As an example, as shown in **Screen 11-7**, to choose a representation of M1 Shelf 4, click on the CIM module in Module Address 4 of the Switching Shelf.
- Series M2 Shelves (that are not Shelf 0) have boxes labeled with the shelf number in the lower right hand corner of the windows. To navigate to a Series M2 shelf, click on the desired labeled box, for example you could click on **Shelf 3**.
- If you see numbers in parentheses next to a CIM, they refer to the module address of the shelf to which the CIM is connected.

NOTE:
Some modules require two physical slots on the node shelf but functionally act as one board. The main board module is labeled **egress** and the second board is labelled **ingress**. If you select the second board on the shelf map to do diagnostics or list or clear alarms, you will see the component address of the main board.

At this point, you will want to see exactly what the alarms are, so display the List Alarms Window, as the following section describes.

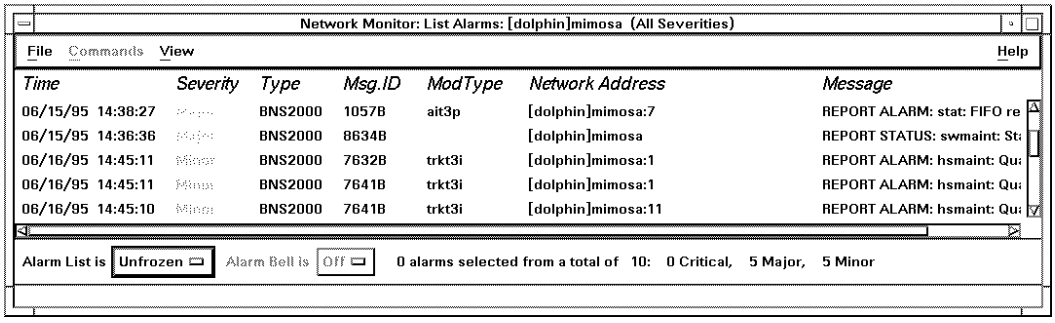
Step 6: Display List Alarms Window

To access the List Alarms Window, use the following procedure:

Procedure 11-3. Display List Alarms Window

1. In the Network Map Window displaying the detailed map of the tx3 node, click on the tx3 node symbol.
2. In the Network Map Window, choose **Commands**, then choose **List Alarms**.

A list of alarms now appears, which displays all the alarms on this node. The status line at the bottom of the window displays the total number of outstanding alarms in this list.



Screen 11-8. List Alarms Window

NOTE:
The default format of all list alarms windows can be changed for each individual user by choosing in the Control Window **Administer**, then choosing **Set Alarm Preferences**. The sorting order and number of lines displayed per alarm can also be dynamically changed by choosing **View** in the List Alarms Window. For more information on these commands, refer to **Chapter 12**.

Step 7: Determine the Problem

From the alarm message text, you can determine that the host is probably down. To validate this, call the administrator of the system HostC. You are then told that the system has crashed and will be down for approximately an hour.

Step 8: Clear Alarms

Since the problem is in the process of being solved, you may wish to clear the alarms in the Core System. Alarms can be cleared from the List Alarms Window, the Network Map Window or the Control Window. For this example, clear alarms from the Network Map Window displaying the detailed map of the tx3 node. To clear the alarms, use the following procedure:

Procedure 11-4. Clearing Alarms

1. In the Network Map Window, click on the CPM connection that is yellow between HOSTC and the tx3 node.
2. In the same Network Map Window, choose **Commands**, then choose **Clear Alarms**.

This action clears all the alarms for that CPM connection of the USA/TX/Austin/tx3 node. The clear command is sent to the Core System, westSK, which clears the alarms from its database and then sends a clearing message to Network Monitor. This process may take several seconds to complete.

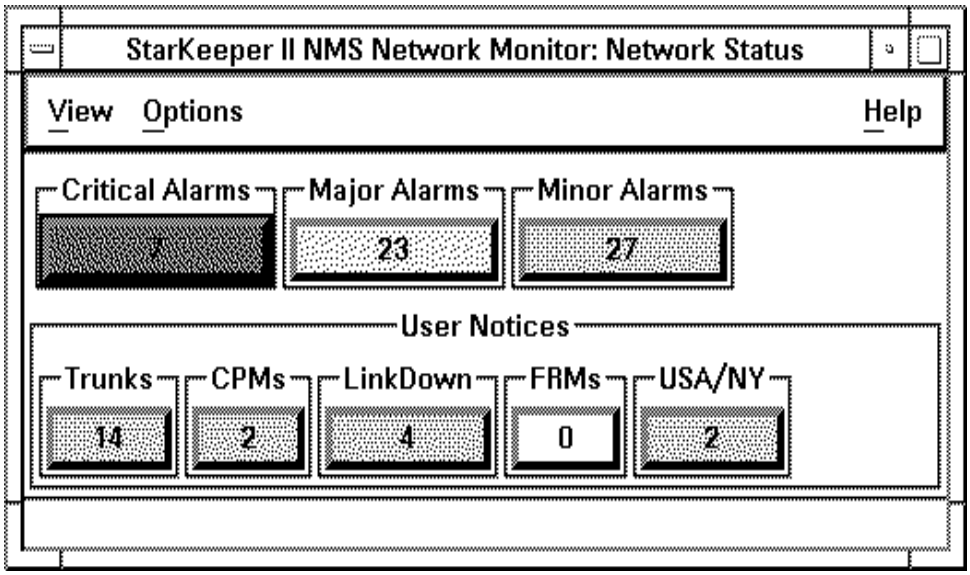
When the clearing message has been received, the corresponding alarms are removed from the alarm list. As a result, both the top map and the detailed map for the tx3 node, in their respective Network Map Windows, display the network in green. Because the network was not displaying any other alarms previously, the Network Status Window also shows no alarms of any severity.

Example II: A Trunk Problem

For the second example, a fiber trunk fails, but you do not yet realize it. Use the following steps to discover the problem and correct it.

Step 1: Check Network Status Window

While watching your Graphics System, notice that the Network Status Window has changed. Both the alarm severity notices and user notices reflect outstanding alarms.



Screen 11-9. Network Status Window with Major Trunk Alarms

Check Network Alarm Severity Notices

In the Network Status Window, the network alarm severity notices reflect that major alarms have been received.

Check User Notices

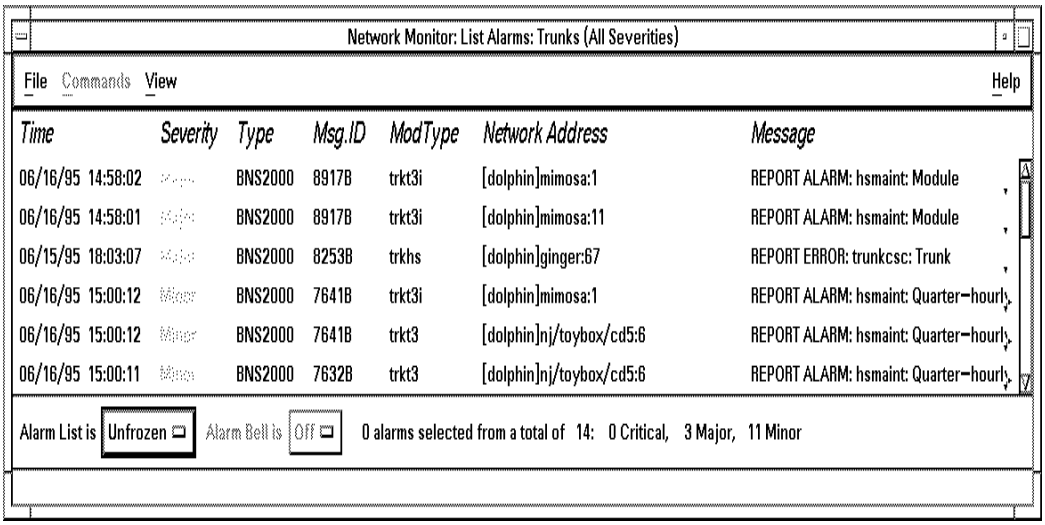
In the Network Status Window, the user notice for trunk alarms indicates that trunk alarms have been received.

Step 2: Check Top Map

As in the previous example, check the top map to gain a visual perspective of the network. Observe that both the aggregate location symbols for Texas and for California are yellow, as well as the trunk line, TXCAtrk1, connecting them. You can conclude that the trkt3i connecting Texas and California is having trouble.

Step 3: Display List Alarms Window

Since you already know you have trunk alarms, and you know which trunk has problems, you may want to get a list of the alarms as quickly as possible. Therefore, in the Network Status Window, choose the Trunks user notice which displays the list of all the trunk alarms.



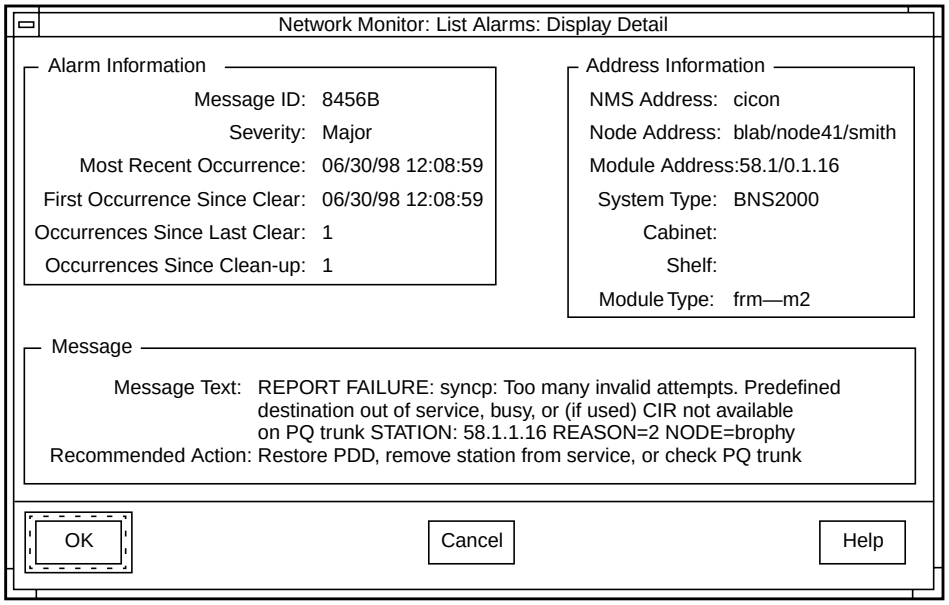
Screen 11-10. Network Status Window, Choosing Trunks User Notice

From the list, observe that two major alarms are on the mimosa. Choose the first alarm in the list. The alarm becomes highlighted.

Step 4: Display Textual Detail for an Alarm

To receive more detailed information about an alarm that is highlighted, in the List Alarms Window, choose **Commands**, then choose **Display Detail**.

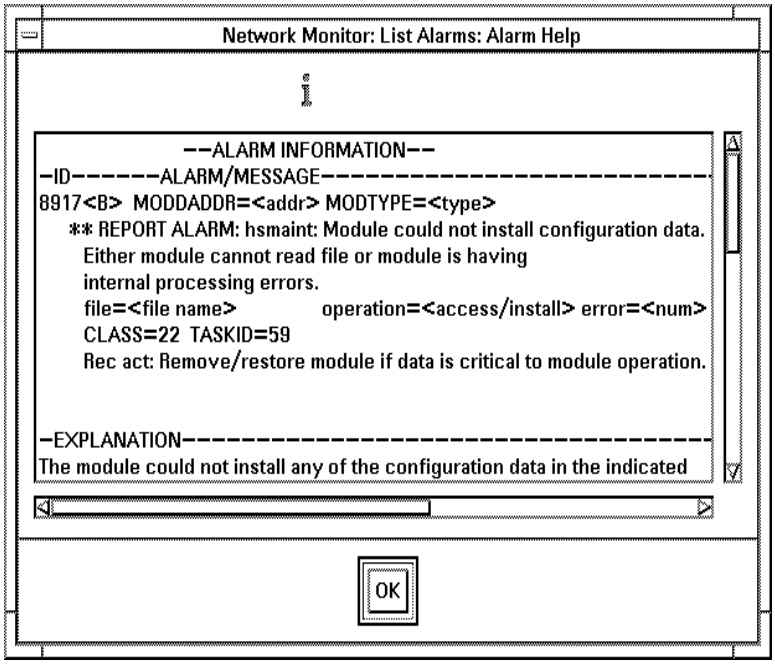
As the following screen displays, a detailed view of this particular alarm is provided. It includes the number of reoccurrences since it was last cleared and since the last alarm clean-up that occurred on the Core System, dolphin:



Screen 11-11. List Alarms Window, Display Detail

Step 5: Display Alarm Help

If you are not sure how to proceed in determining the cause of the problem, you may want to look up the alarm in the appropriate node's *Messages Reference Manual*. You may also use the on-line alarm help feature. To display the on-line help for an alarm, choose **Alarm Help** from the **Help** menu in the List Alarms window. Then enter the alarm Message ID in the Alarm ID field.



Screen 11-12. List Alarms Window, Help

NOTE:
As a convenience, in the List Alarms Window, you may also choose **Help**, then choose **Selected Alarm Help** to display help for the selected alarm.

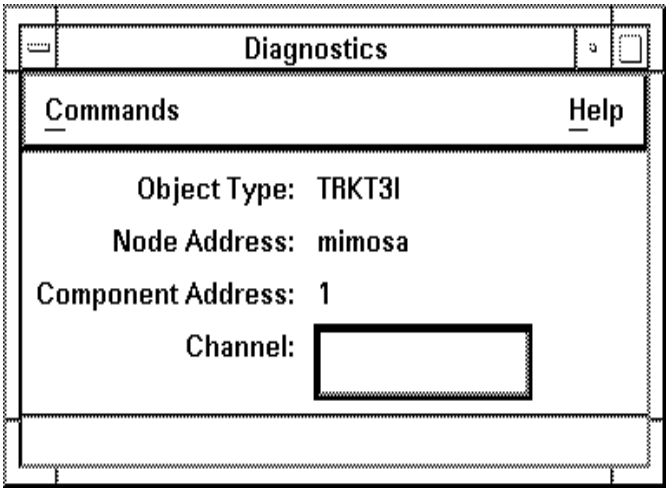
From the alarm help text, you can see the explanation of the problem and also the recommended actions. To send diagnostic commands to the node, first display the Diagnostics Window, as the next section describes.

Step 6: Run Diagnostics

To display the Diagnostics Window for an alarm that is highlighted, in the List Alarms Window, choose **Commands**, then choose **Diagnostics**.

From the Diagnostics Window, you can issue certain commands to the node that is addressed in the selected alarm of the List Alarms Window These commands are useful for problem isolation and resolution.

NOTE:
Formatted command strings for BNS-2000 VCS R2.1 or later and BNS-2000 commands are supported. Commands for other BNS-2000 VCS releases can be initiated through the Diagnostics Window, but the syntax may be incorrect. If incorrect, an output window with the node error message and a re-prompt is displayed.

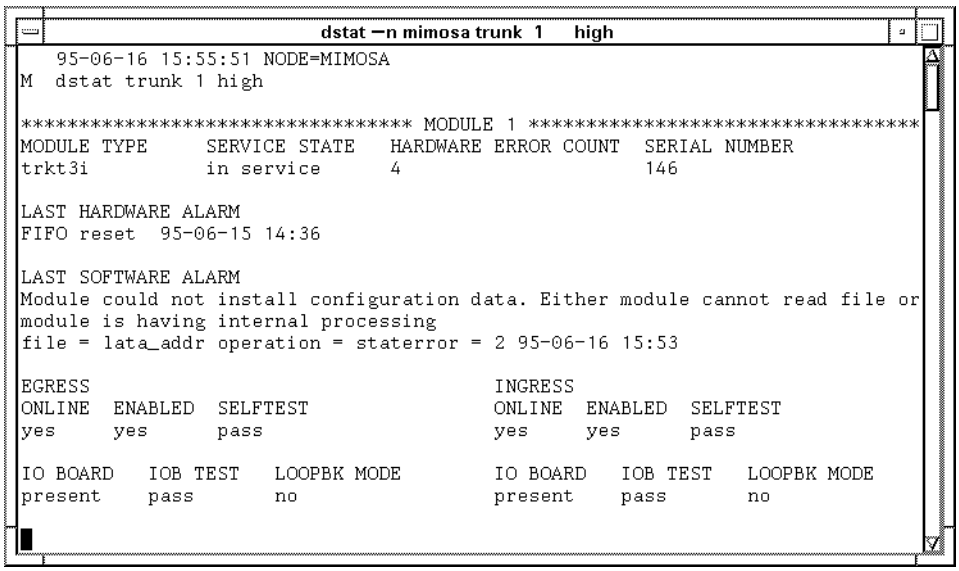


Screen 11-13. Diagnostics Window

NOTE:
Once the Diagnostics Window has been invoked, you cannot change the network address that the commands are issued on, except for the port field. However, you may invoke more than one Diagnostics Window at a time if you wish.

Using Dstat

As a suggestion, issue the **Dstat** command on the trunk module several times. To do this, in the Diagnostics Window, choose **Dstat** from the **Command** menu. The command appears in the bottom of the Diagnostics Window and is also sent to the node. The output appears in a separate window. You may use the scroll-bar in the window to view all the data.



Screen 11-14. Output Window for the Dstat Command

After a few seconds, re-issue the **Dstat** command. A second window appears with the output of the second **Dstat** command. Compare the error counts recorded in the SYNCHRO PROBLEM field of the two dstat output windows. If the value increases every couple of seconds, then the problem is most likely loose or crimped fiber connections to the I/O distribution board on the back of the node cabinet. Call the administrator for the node and have the connections checked.

Once the administrator has checked and corrected the loose connections, choose **Dstat** on the trunk module several more times. If the error counts no longer increase, then the problem has probably been solved.

Using Diagnose

If you want to make sure the trunk is operating properly, in the Diagnostics Window, choose **Diagnose** from the **Commands** menu.

The **diagnose** command is then sent to the node. Since the **diagnose** command has many options, the node prompts you for further input. These prompts appear in the window where the output occurs. Use the following procedure to diagnose the trunk:

Procedure 11-5. Using Diagnose for a Trunk

1. In the Diagnostics Window, choose **Diagnose** from the **Commands** menu.
2. In the pop-up window, select the desired test and press Return.
3. Respond to other prompts as required.

The trunk diagnostic command begins executing. The output appears below the prompts you just answered.

If errors were not encountered in this loop-around test, then the trunk is operating properly. The problem has been fixed and, therefore, the alarms can be cleared.

Step 7: Clear Alarms

Since the alarms are found on different nodes, clear the alarms from the List Alarms Window.

1. Choose all the alarms in the list by clicking on the first alarm in the list and dragging down over the remainder of the alarms and then releasing. Observe that all four alarms are highlighted, meaning they are all now selected.
2. In the List Alarms Window, choose **Commands**, then choose **Clear Alarms**.

Four clear commands are sent to the Core System, westSK. When the clear commands have been processed, the following takes place:

- the alarms are removed from the list
- the top map is updated to display the network in green
- the Network Status Window once again shows no alarms in the network

Night Fold-Down

Transferring the network monitoring responsibility from one location to another, depending on the time of day, is typically called night fold-down.

Since the Graphics System running Network Monitor can communicate with one or more Core Systems, all that is necessary is to change the connections between the Graphics System and the Core System via Workstation Administration, accessible from the *StarKeeper* II NMS subpanel on the HP VUE Front Panel.

Activate Connections

If you wish to receive alarms and have access to the nodes in an additional part of the network, activate a connection to the Core System which monitors that section of the network—refer to **Administering Connections** in **Chapter 2** for more details. Network Monitor begins to communicate with the additional Core System as soon as you restart the Graphics System software or issue the Network Monitor **filter_sync** command, refer to **Procedure 10-34, Synchronizing Alarms**.

Deactivate Connections

To stop monitoring a section of the network, deactivate the Graphics System's connections to the Core System which monitors that section of the network. To deactivate connections, refer to **Administering Connections** in **Chapter 2** for more details. Then follow **Procedure 10-34, Synchronizing Alarms** to remove outstanding alarms from the Network Monitor Graphics System that may have been received from the section of the network that is no longer being monitored.

Network Maps and Night Fold-Down

Modifying the connections between your Graphics System and the Core System that monitors the nodes in your network modifies:

- access to alarms
- configuration data
- console connections of the nodes

However, if you wish to modify your network maps so that you only have maps that correspond to the part of the network you are monitoring, you may do so by modifying the Top Map parameter. Your hierarchy of maps stored on disk should include all the maps of the entire network.

During the day, you may only want to use a subset of maps (for example, only those maps in the Texas region). To do this, set the Top Map parameter to point to a regional map (for example, *texas.region*). Only the Texas regional map and those maps to which it points are loaded into memory when you choose **View Network Status** from the Control Window.

NOTE:
Changing the Top Map parameter only affects the maps. It does not affect the Network Status Window or the List Alarms Window.

At night, you may want to monitor the entire network. To do this, change the Top Map parameter to point to the map of your whole network (for example, *USA*). The next time you choose **View Network Status** from the Control Window, all the maps of the network are loaded into memory.

NOTE:
The symbols on all maps contain the Core System name as part of the network address. If a change is made to a Core System that monitors a node, the addresses in the current maps no longer match alarms received from the node because of the new NMS address in the alarms. For this reason, it is suggested that night fold-down be accomplished using the method described above.

Network Monitor User Reference 12

This chapter systematically describes each user interface component of the Network Monitor application. Use this chapter in conjunction with the extensive on-line help. The window architecture is presented before each window is described.

Window Architecture

The following window architecture illustration represents Network Monitor windows. Refer to this diagram as needed when reading subsequent sections on each window and its associated sub-menus.

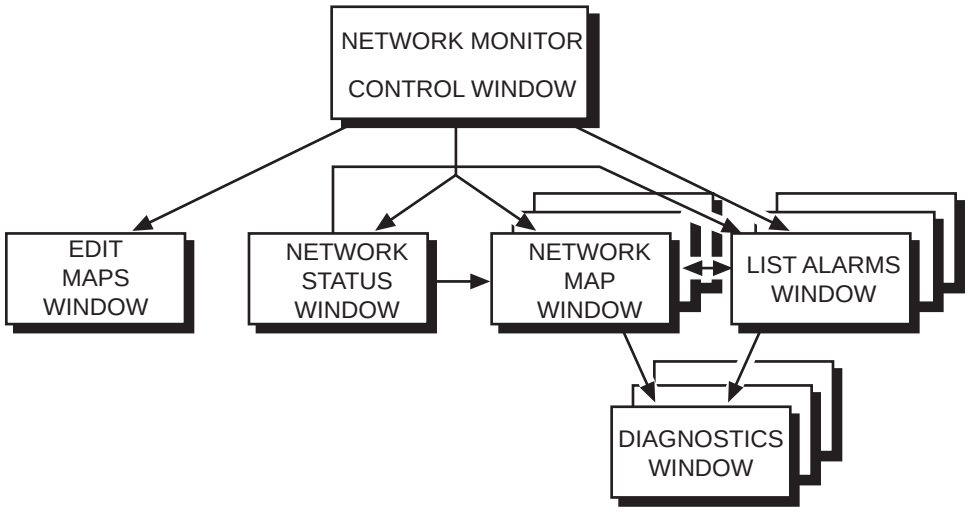
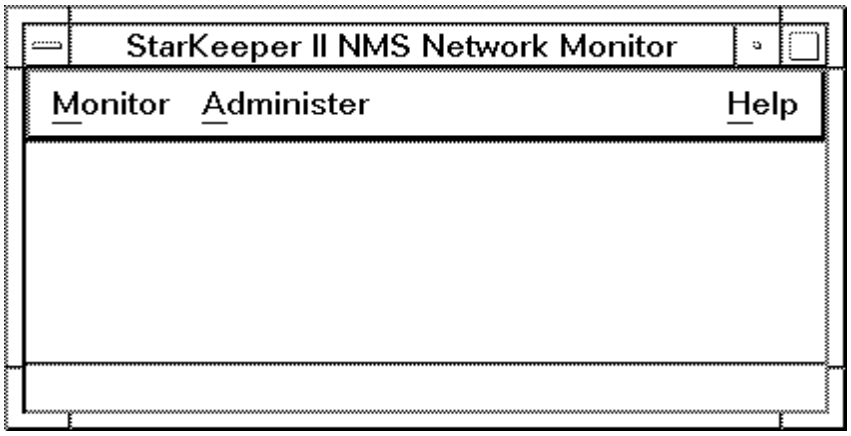


Figure 12-1. Window Architecture

Control Window

After choosing **Network Monitor** from the *StarKeeper* II NMS subpanel of the HP VUE Front Panel, the Control Window appears first. It contains these three menus:

- Monitor
- Administer
- Help



Screen 12-1. Network Monitor Control Window

Monitor Menu

The tasks found in the Monitor menu contain features to monitor the network actively for faults. They are:

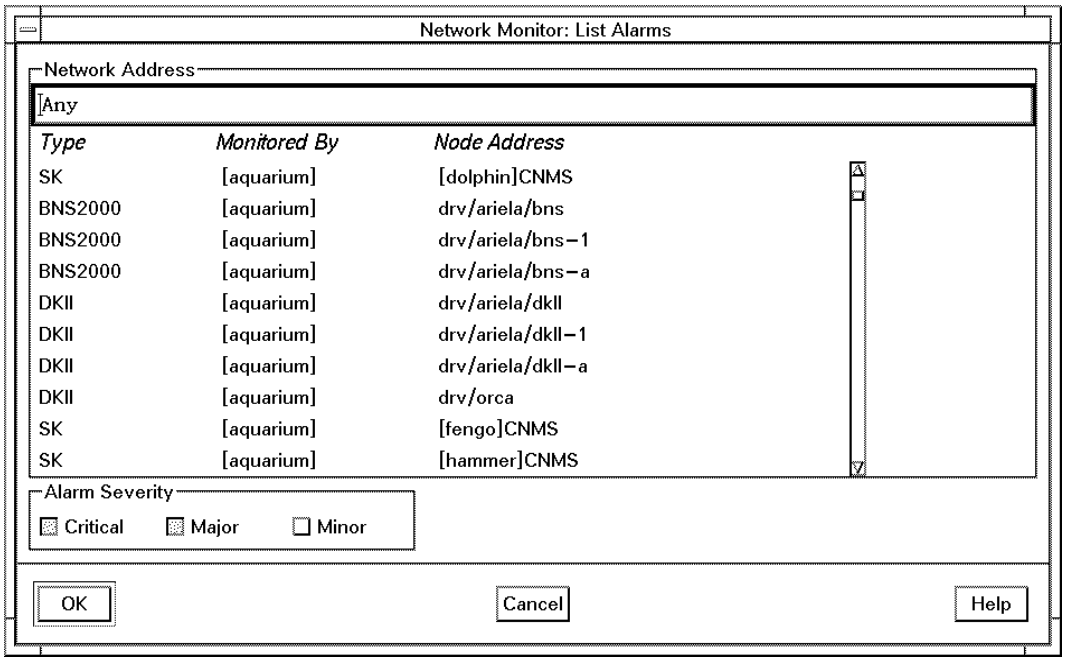
- View Network Status
- List Alarms
- Clear Alarms
- Trace Calls
- Exit

View Network Status

After choosing **View Network Status**, both the Network Map Window, displaying the top map, and the Network Status Window appear. These windows are described in separate sections of this chapter.

List Alarms

After choosing **List Alarms**, the following pop-up window appears asking you to specify selection criteria that will be used to select the alarms to display in a List Alarms window:



Screen 12-2. Monitor Menu, List Alarms Selection Criteria

You must specify:

- network address(es)
- alarm severities

Network Address

The first field allows you to specify a network address. If you wish, you may enter only the beginning portion of an address (that is, only one character is required). Any alarm from a piece of equipment that has the same beginning portion of the network address will be included in the list of alarms.

For equipment monitored by a Core System that is logically connected to your Graphics System, the Core System name portion of the network address may be omitted. However, for equipment monitored by a remote *StarKeeper* NMS or by other Element Management Systems, the Network Management System name must be entered in square brackets. Examples of network addresses are:

Table 12-1. Network Address Examples

Network Address
USA/TX/Austin/tx3
USA/NY/Buffalo/ny2:50
USA/CA
[remSK41]OH/Toledo
[6820_SC]112/2/54

The default value, **Any**, means the network address is not used as a selection criteria for limiting the alarms that appear in the list. If the network address field is blank, then **Any** is used.

A list of nodes and Core Systems is displayed below the Network Address specification field. From this list, you can choose one or multiple nodes. If you choose only one node, its address appears in the Network Address field.

If you choose more than one node, the text **<List_Selection>** appears in the Network Address field and the addresses are saved to be used as selection criteria for the list of alarms.

After you have selected one node from the list, you may edit the address in the Network Address field. For example, you may want to add a component to the address to have that used as selection criteria to display only its particular alarms.

Multiple ranges of list items can be selected in this pop-up command window, in **Alarm Lists** and in the lists that appear in other pop-up command windows: **Clear Alarms**, **Generate Shelf Maps: Selected Nodes**, and **Generate Shelf Maps: Selected Concentrators/SAMs By Node**.

Use the following procedure to select multiple ranges in all of these Network Monitor lists.

Procedure 12-1. Selecting Multiple Ranges in Lists

1. To select a range initially, click on the first item in the range desired and drag the mouse to the last item in the range.
2. To select an additional range, press and hold CTRL while clicking and dragging to identify the new range.
3. To extend an existing range, press and hold SHIFT and then click on the new end-of-range item.

Alarm Severities

In the Alarm Severity field, you can choose the severities of the alarms that are to be displayed. The default value is to include Critical and Major alarms. Depress those buttons that indicate the desired severities.

After specifying values for both criteria, alarms that are displayed must have matched both the address and the severities specified. Choose **List Alarms** to display the list.

NOTE:
If network address(es) are specified, the window title in the List Alarms Window reflects the address. If network address(es) are not specified, the severities that are selected are reflected.

Clear Alarms

After choosing **Clear Alarms**, you will be asked to enter a Network Address. Specify a network address by entering a node address and optionally, a component address. As in **List Alarms**, the Network Management System name portion of the network address may be omitted for nodes that are monitored locally.

If you prefer, you may choose one or more node addresses from the pop-up list. The node address or **<List_Selection>** is placed in the field of this pop-up window. Choose OK to send one or more clear alarms commands to the appropriate Core Systems.

Trace Calls

You must have an up-to-date configuration database to trace calls. This database is updated through Performance Reporter using the **Administer Update Configuration Data** menu option. Be sure you have entered all trunks correctly on each Core System. Network node names should not be duplicated, or trace calls can fail. Only one call at a time is allowed to be traced.

If a Core System is running a release of *StarKeeper* II NMS prior to R9.0, a shell script (trace.sh) must be added to the Core System in **/usr2/SK/r<x>/bin/skcmds/perf**. **<x>** refers to the current release number. The *tracec.sh* script is on the Graphics System in **$NM_ROOT/bin**. The trace calls feature is not enabled if **PR_ROOT** is not set in the environment.

After choosing **Trace Calls**, you will be asked to enter **Trace Call Parameters**. **Trace Call Parameters** are used to specify the originating endpoint of a call.

You must specify a node name and module address, as well as either a channel/port number or port/DLCI.

- For 3270 bisync modules, you must specify a cu, term, and port.
- For calls that originate on a SAM, you must specify a board number and port number.

The node name can be directly entered into a text field, or it may be selected from a list of nodes known to this workstation. The nodes named on this list have a console type connection entered in a Core System database and a workstation connected to the Core System.

After specifying **Trace Call Parameters**, click on the Submit button to initiate the call trace. (Press the Abort button to stop a call trace, or dismiss the window by clicking the Cancel button.) The call trace output is displayed in a **Trace Call Results** window and can be saved in a file or sent to a printer.

Exit

The **Exit** control is found in this menu. You will be prompted to confirm that you want to exit Network Monitor. If you confirm the request, all Network Monitor windows on your Graphics System will be terminated.

Administer Menu

The tasks found in the following menu contain features that are not used for actively monitoring the network for faults. The tasks are:

- Set Alarm Preferences
- Define User Notices

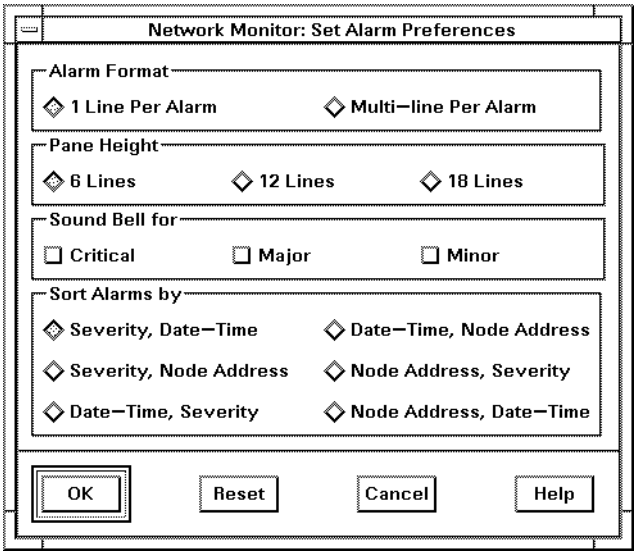
- Administer Maps

Set Alarm Preferences

This task allows you to tailor the format of the alarm lists according to your preferences. The preferences you specify are recorded for your individual login ID only. After you specify your preferences, the settings take effect the next time you invoke a List Alarms Window.

NOTE:
Some settings can be dynamically changed from within a List Alarms Window. Refer to the **View Menu** section under **List Alarms Window** in this chapter.

After choosing **Set Alarm Preferences** from the Administer Menu, this window is displayed:



Screen 12-3. Administer Menu, Set Alarm List Preferences

Alarm Format

You can display alarms in one- or two-line mode. Two-line mode includes the alarm text field.

Pane Height

You can increase or decrease the default size of the List Alarms Window by specifying values for the pane height. Choices are 6, 12, and 18 lines of alarms.

The List Alarms Window can also be individually adjusted to increase or decrease the lines of alarms they display.

Sound Bell For

Your terminal bell will be sounded when a new unique alarm of a specified severity is received. Use this setting to specify the desired severities. You may choose any combination, or none. Choosing none (the default) will disable the Alarm Bell feature. To activate this feature, you must also choose Alarm Bell On in the Network Status and List Alarms windows.

The alarm bell will sound 12 times for critical, six times for major, and three times for minor alarms, by default. Edit the file *$NM_ROOT/lib/alarm_bell* to modify these settings. Changes to this file will take effect the next time Network Monitor is started. The maximum number of bells that will sound on a Netstation is 17; use your Netstation's Preferences screen to set other bell parameters. Due to hardware constraints, only a single bell will sound on an HP 720/730 System Console.

Sort Alarms

The last fields allow you to specify values for sorting the alarm list. You can sort a list by combinations of the following:

- severity, then date-time
- severity, then node address
- date-time, then severity
- date-time, then node address
- node address, then severity
- node address, then date-time

Sorting by severity displays the Critical alarms first, followed by Major and Minor alarms.

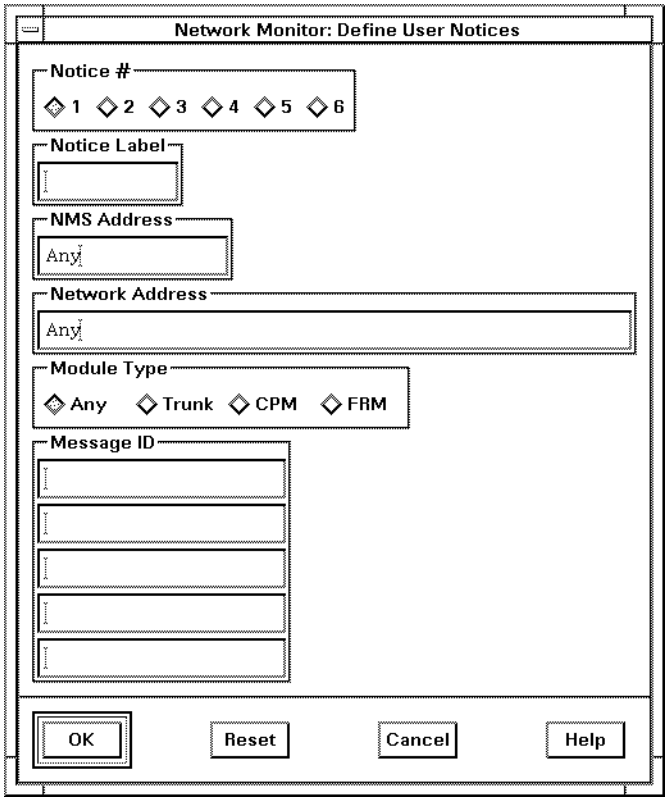
Sorting by date-time displays the alarms in reverse chronological order, with the most recent alarm displayed first.

Sorting by node address displays the alarms in alphanumeric order according to the node address of the alarm.

After making your changes, choose OK to record them. If you do not want to save the changes, choose Cancel to dismiss the window. Choose Reset to change each field's value back to the original value present when you invoked this pop-up window.

Define User Notices

After choosing **Define User Notices** from the Administer Menu, the following window is displayed:



Screen 12-4. Administer Menu, Define User Notices Window

The user notices that you define appear in the Network Status Window. Up to six user notices can be defined.

The NMS address, network address, module type and message ID fields allow you to specify criteria which are used to match alarms. When an alarm is received from the network and, if the alarm matches all the criteria specified in a user

notice, then the notice box in the Network Status Window will change from white to grey. A count of the matching alarms is also displayed in the box.

A field containing the default value, **Any** or a blank message ID field means that this criteria is not used to limit the matching alarms. If three of the criteria use the default value, **Any**, and the message ID fields are blank, then all alarms will be matched. An example of using a default value is as follows: if a network address and module type are specified, and message ID uses the default value, **blank**, then only alarms containing the specified network address and having a corresponding module type will match the notice.

New and changed user notices will take effect when the Network Map Window is restarted.

Label

The label is a mandatory field which can contain a maximum of eight characters. It is the name that, after being defined, appears in the Network Status Window.

NMS Address

For nodes monitored locally, entering the Network Management System name is optional. However, for nodes monitored by a remote Network Management System, you must enter the Network Management System name

Network Address

The same rules apply here as they do for List Alarms . Specifying the beginning portion of a network address is allowable in this field. For example, by entering ***USA/TX***, all network addresses that begin with USA/TX will be matched. Refer to the **List Alarms** section under **Control Window, Monitor Menu** that discusses selection criteria in this chapter.

Using Wildcards in Network Addressing

Network Monitor has refined the use of wildcards, to be more applicable to typical user scenarios, when specifying the network address for the following:

- List Alarms Command Window
- Clear Alarms Command Window
- Define User Notice Command Window

See the section **Wildcarding in Network Addressing** on **Chapter 10** of this document for more information on wildcarding.

Module Type

Use a module type setting to match alarms based on the type of module for which the alarm was generated. The categories of module types available as a pre-defined selection criteria are:

- Trunks
- Computer Port Modules (CPM)
- Frame Relay Modules (FRM and FRM-M2)

Message IDs

User notices can also match alarms based on the message identifier (message IDs) of the alarm. Five fields are available for entering message IDs. In each field, you may enter a complete message identifier, a range of message IDs separated by a dash, or the beginning portion of a set of message IDs. In defining Message IDs for user notices, remember Message IDs for BNS-2000 VCS alarms consist entirely of digits, where message IDs for BNS-2000 alarms consist of digits plus a "B" suffix. Ranges specified without a "B" suffix will not match BNS-2000 alarms; ranges specified with a "B" suffix will not match BNS-2000 VCS alarms. Message IDs that are not entered as ranges will match any alarm with the same initial component. The table below will help to illustrate this relationship:

Table 12-2. Message ID Examples

Enter This Message ID	To Specify These Message IDs
8120	8120, 8120B
8120B	8120B
8120-8124B	8120B to 8124B
8120B-8124B	8120B to 8124B
8120-8124	8120 to 8124

Administer Maps

After choosing **Administer Maps** from the Administer Menu, a pop-up menu appears providing the following options:

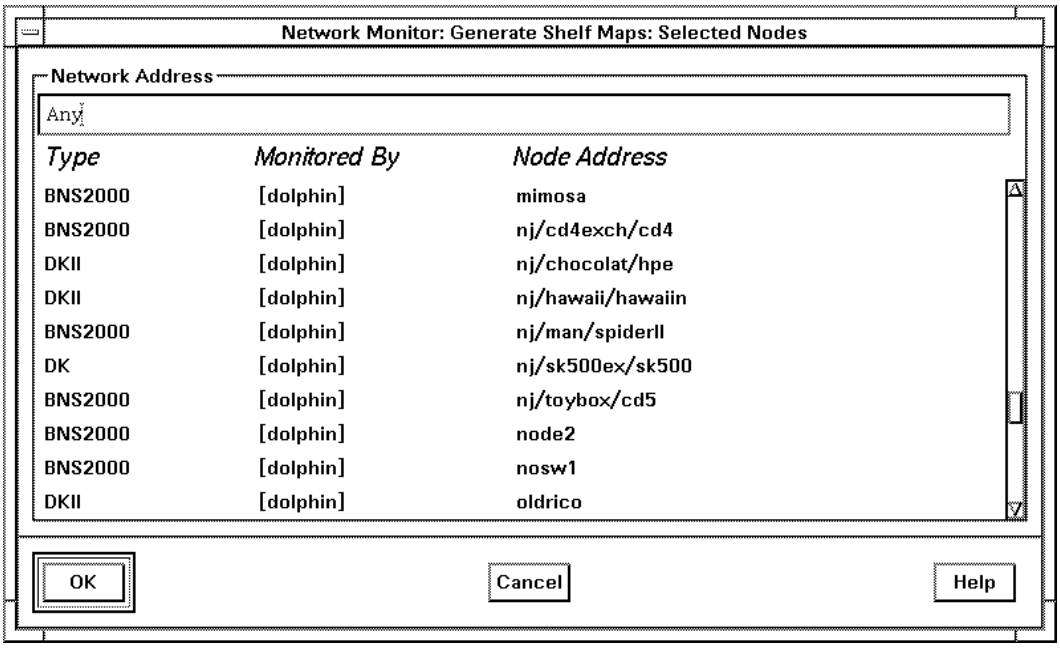
Edit Maps

This first task invokes the Edit Maps Window (see the **Edit Maps Window** section in this chapter).

Generate Shelf Maps

This second task allows you to automatically generate shelf maps for nodes or concentrators. These nodes or concentrators must be monitored by a Core System that is locally attached to your Graphics System; nodes or concentrators that are monitored by either a remote Core System or a Core System that is not locally connected are not supported.

- Choose **All Nodes** to generate shelf maps for all nodes in your network.
- Choose **Selected Nodes** to display the following pop-up window:



Screen 12-5. Generate Shelf Maps, Selected Nodes

Choose one or more nodes from the list, then choose OK to begin the generation process.

- Choose **All Concentrators/SAMs** to generate shelf maps for all the concentrators or SAMs that are attached to the nodes in your network.
- Choose **Selected Concentrators/SAMs By Node** to display a list of nodes. Shelf maps are created for every concentrator or SAM that is attached to the nodes you choose from the list. Choose OK to begin the generation process.

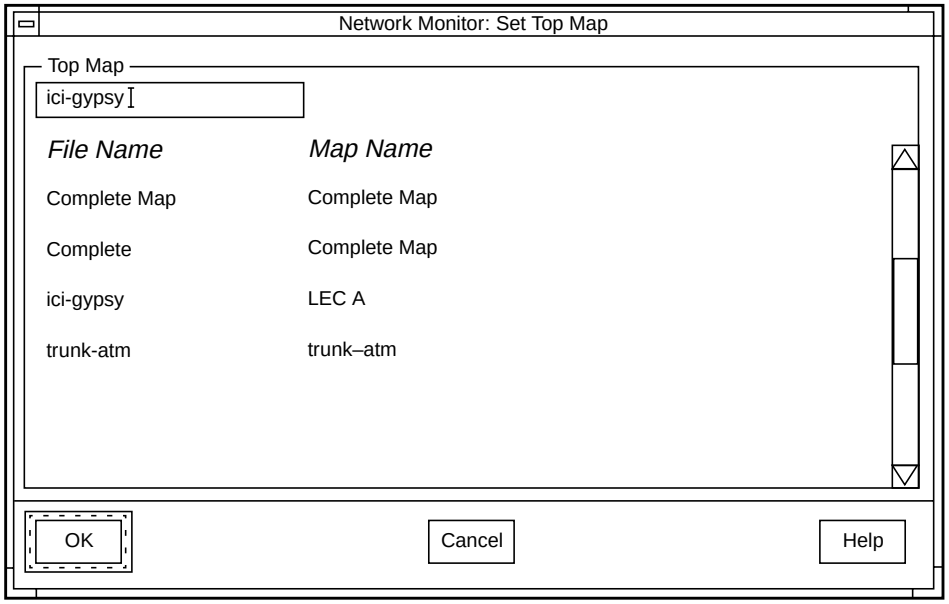
Shelf maps are created as a background job, allowing you to continue working. When the maps have been created, a message is sent to the HP VUE Bulletin

Board. The shelf map files can be found in the *$NM_ROOT/lib/USERMAPS/SHELVES* directory. It is recommended that these map files not be manually edited.

Generating a shelf map replaces the previous contents of the shelf map files. Therefore, shelf maps can be kept up-to-date, reflecting the most recent configuration changes, by simply generating them once again. However, the new shelf maps will not be available for viewing until the “View Network Status” task has been reinvoked.

Set Top Map

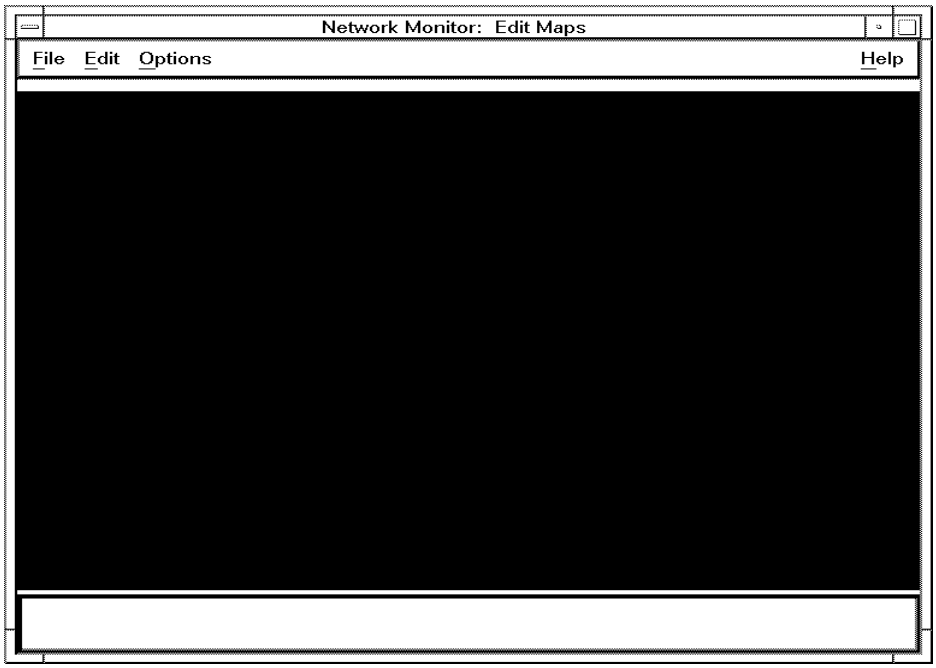
This third and last task in Administering Maps is used to specify the name of the top map for your map hierarchy. After choosing **Set Top Map**, select the file name from the scrolling list. The file name can contain a maximum of 20 characters.



Screen 12-6. Administer Map, Set Top Map

Edit Maps Window

From the Control Window, choose **Administer**, **Administer Maps** then **Edit Maps** to display the following window. You will have to wait a short time for the window to become fully active.



Screen 12-7. Edit Maps Window

The tasks available in the Edit Maps Window are:

- File
- Edit
- Options
- Help

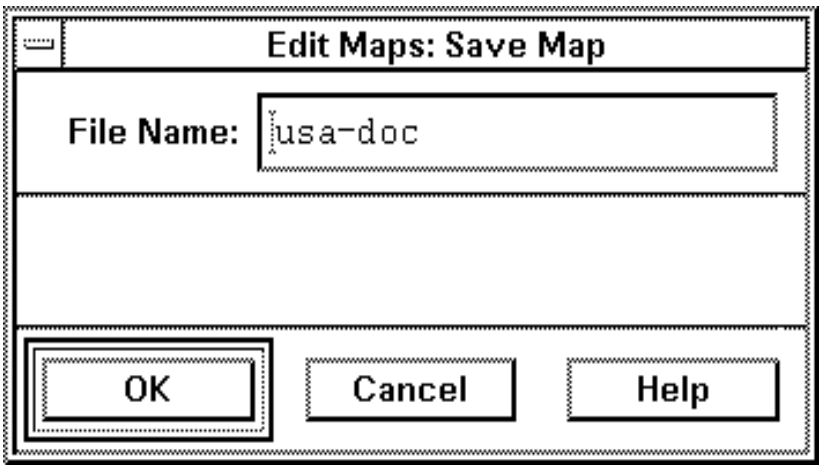
NOTE:
New and changed maps will take effect only after the View Network Status Window has been restarted.

File

After choosing **File**, a pop-up window is displayed:

Save

Choosing **Save** asks you to specify a file name for the current map that you are editing. In the following pop-up window, enter a file name, up to 20 characters:



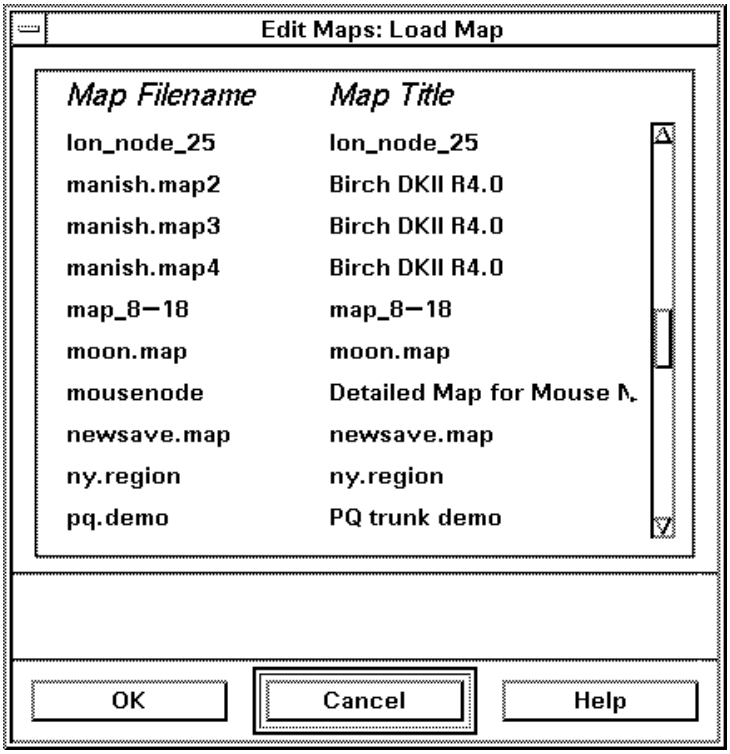
Screen 12-8. Edit Maps Window, Save

Choose OK and the map is written to the file. If the file already exists, a confirmation window will appear.

You may continue editing this map. Changes to maps are not in effect until the View Network Status Window has been restarted.

Load

Choosing **Load** produces a list of map files to choose from. Choose the map you wish to edit and then choose OK. The map is then displayed in the Edit Maps window pane.



Screen 12-9. List of Maps

New

Choosing **New** clears the Edit Maps Window. Maps created using the Edit Maps Window are stored in the *$NM_ROOT/lib/USERMAPS/NETWORK* directory.

Delete

You can delete maps that are no longer needed. Choosing **Delete** produces a window that contains a scrolling list of map files from which you can delete. Choose the map you wish to delete and then choose OK.

After choosing OK from the scrolling list, the map editor will display a message allowing you to confirm the requested deletion or alerting you to a real or potential problem regarding your deletion request. Among these messages are those which indicate when the map you want to delete is referenced in other maps or references other maps. If a map is referenced in other maps, you must edit those other maps to remove the references before you will be permitted to delete the map of interest. If a map references other maps you are permitted to proceed with the deletion, but if the referenced maps are not referenced in any other maps they will no longer be accessible after the map of interest is deleted. In both of these cases the notice containing the list of affected maps may be preserved for your use while you edit the affected maps. Note that you must choose one of the command buttons at the base of the notice window (OK or Cancel) before you can make another deletion request.

The following is a list of all the messages you may receive. They will appear in a pop-up notice window.

- **Are you sure you want to delete map "some_node".**

  This message is displayed when the selected map is not referenced in other network maps and does not reference any other maps.

- **Delete Error: Cannot delete map file "file_name".**
  Cannot find map file.

  This message will only be displayed when another user had deleted the selected map after your scrolling list has popped up and before you chose the selected map and pushed the OK button.

- **Delete Error: Cannot delete map "file_name".**
  Map has incorrect permissions.

  This message is displayed when the selected map has read-only permissions for this user.

- **Map "some_node" is referenced in the following maps:**
  some_region

  To remove the references, you must edit the maps that "some_region" is referenced in before you can delete map "some_node".

  This message is displayed when the selected map is referenced in other network maps such as a higher level regional map.

- **Map "some_region" references the following maps:**
  some_node
  some_node2

  Are you sure you want to delete map "some_region"?

This message is displayed when you are deleting a map that references other maps. It is a warning that you may not be able to access these maps if you delete this map unless they are referenced on another map in the network.

- **Map "some_region" is referenced in the following maps:**
  some_area

  Map "some_region" references the following maps:
  some_node
  some_node2

  You must edit these maps to remove the references before you can delete map "some_region".

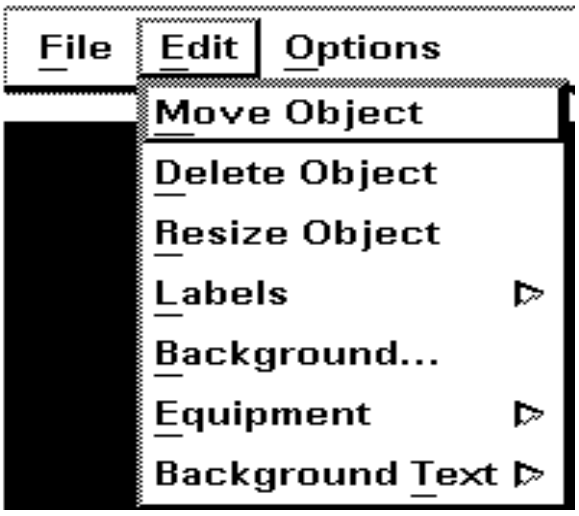
  This message is a combination of the last two messages mentioned above.

Exit

Choosing **Exit** causes a message pop-up window to appear advising the operator that any changes made to a map during a map editing session will not be displayed until the “View Network Status” task has been reinvoked. This window asks the question “Do you want to quit the Edit Maps task?” Press OK to exit the Edit Maps task.

Edit

After selecting a map object, choose **Edit** to display the following menu:



Screen 12-10. Edit Maps Window, Edit

Move Object

After choosing **Move Object**, the cursor changes to a cross-hair shape and you must position it at the new location for the object. Click on the location to which you want to move the object. To move lines, you must click on the location for both ends of the line. When moving objects, the labels and lines associated with an object move with it.

Delete Object

After choosing **Delete Object**, the currently selected map symbol is removed from the map. Any labels or lines associated with the object are also deleted.

An Undo button does not exist, but remember that changes are not stored in the map file until you choose **File** and then choose **Save**.

Resize Object

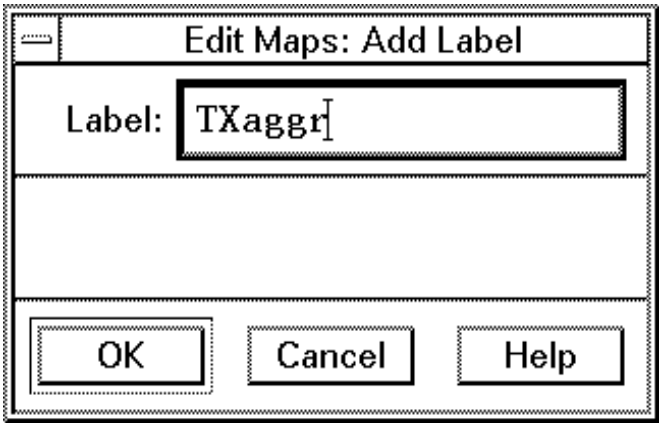
After choosing **Resize Object**, a pop-up window will offer a list of sizes for the selected map object. Select the desired size, then choose OK to change the size. All objects are drawn at their largest size by default.

This function applies only to certain objects. Refer to the Editor Legend (Screen 10-5) to see which objects may be resized.

Labels

Most map objects can be assigned as many as three labels. Labels are used to help identify an object. Some labels are placed automatically by the map editor when you add objects from equipment lists. Only background text and labels themselves cannot have labels assigned to them. When you select a map object that allows labels and the object has not already exceeded three labels, **Labels** becomes active. Choosing **Labels** displays a pop-up window:

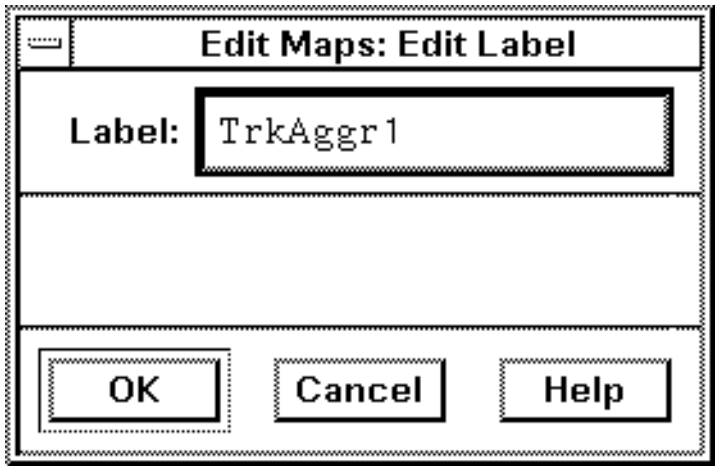
If the currently selected map object allows for labels and does not already have three labels assigned to it, then you can choose **Add** and the following pop-up window will be displayed.



Screen 12-11. Add Labels Window

Type the desired label in the pop-up window and choose OK. The outline of a box appears around the cross-hair shaped mouse pointer. Point to the location on the map where you want to place the label and click . Click the third mouse button to cancel the operation.

To change an existing label, first select the label on the map, then choose **Edit, Labels**, and then **Edit** to display the following pop-up window:

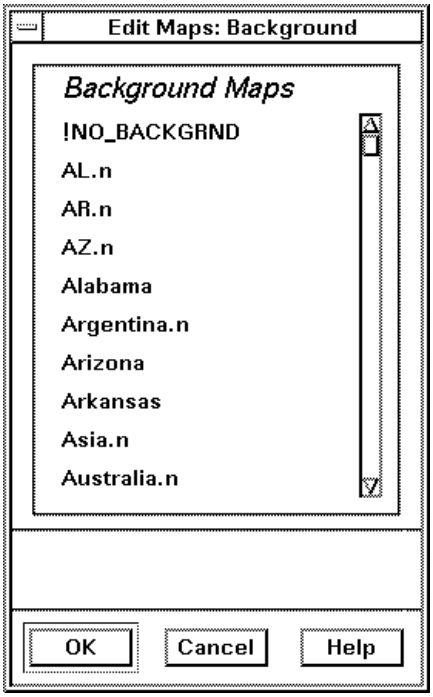


Screen 12-12. Edit Labels Window

Change the label as desired, then choose OK in the pop-up window to change the label on the map. Labels are centered on the point where they were originally located.

Background

Choosing **Background** allows you to specify a background for the map you are editing. Supplied backgrounds include outlines for the world, the United States, individual states, or no background. From the following list in the pop-up window, choose the one you need and choose OK to place the background in the map:



Screen 12-13. Edit Maps Window, Set Background

Choosing a new background removes the current background on the map. To delete a background from the map, choose ***!NO_BACKGRND*** from the list.

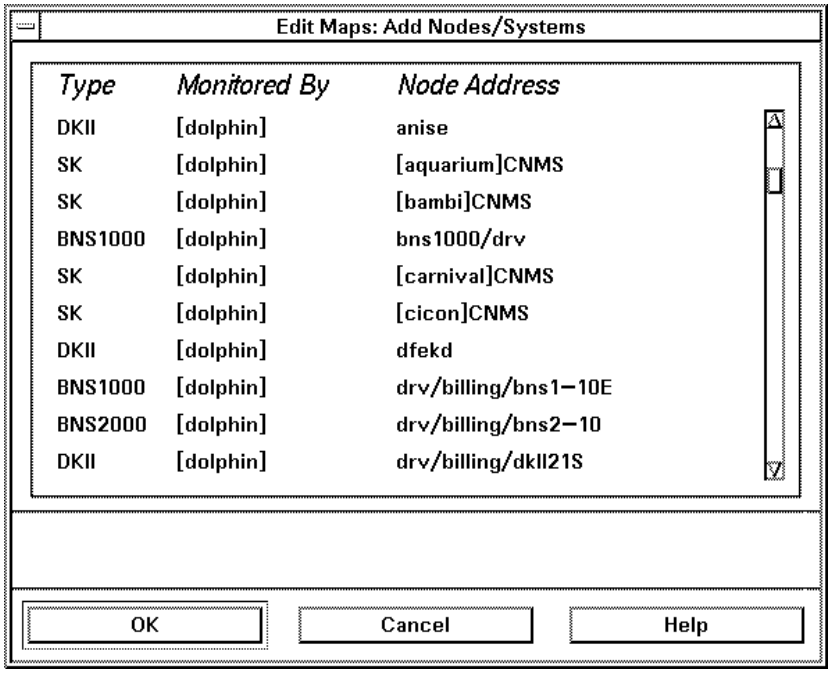
NOTE:
If you need a different background but want to keep the equipment that appears in the window, you can change the background and leave the equipment intact.

Equipment

Choose **Equipment** to display a menu.

Add Nodes/System

Choosing **Add Nodes/Systems** displays a list of nodes and routers and servers that are monitored by a Core System to which your Graphics System is logically connected. It also lists a Core Systems to which your Graphics System is logically connected. Choose a name from the list, then choose OK.

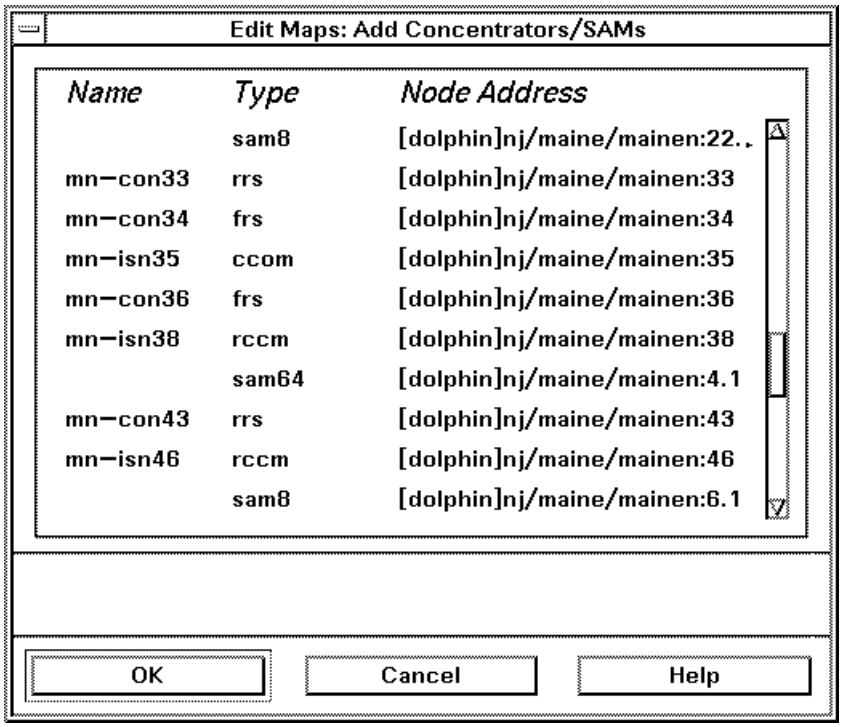


Screen 12-14. Picking Equipment from a List

The mouse pointer changes to a cross-hair shape and jumps to the map. Point to the area where you want the equipment symbol to appear, then click. The appropriate symbol appears at that spot, with the correct network address and label already associated with the symbol.

Add Concentrators/SAMs

Choosing **Add Concentrators/SAMs** displays a list of concentrators and SAMs that are known by a Core System to which your Graphics System is logically connected. Choose a concentrator or SAM from the list, then choose OK.

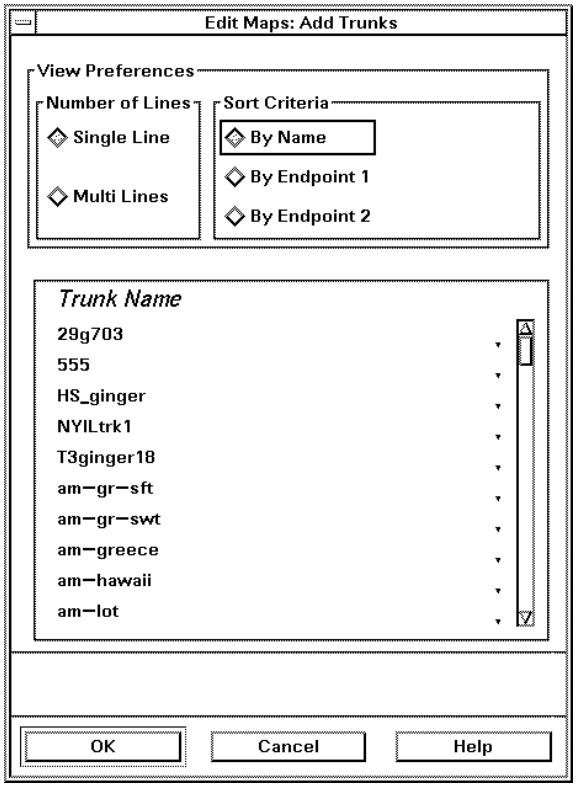


Screen 12-15. List of Concentrators/SAMs

Click on the map to place the concentrator or SAM symbol.

Add Trunks

Choosing **Add Trunks** displays a list of trunks that are known by a Core System to which your Graphics System is logically connected. Use the scroll-bar to find the trunk of interest. Choose the trunk from the list, then choose OK.



Screen 12-16. Picking Trunks from a List

The mouse cursor changes to a cross-hair shape and jumps to the map. Point and click to specify the two endpoints of the trunk — at least one endpoint should be on a node symbol.

Choose **Multi Lines** to display the trunk name and both endpoint addresses. Select a criteria to sort the trunks alphabetically by either name, endpoint 1 or endpoint 2.

Pick From Legend

Choosing **Pick from Legend** invokes the editor legend.

Choose a symbol from the legend and place it on the map. Some symbols at the bottom of the legend have no specific meaning and are available for any purpose you wish. Symbols placed from the legend do not automatically have a network address associated with them.

Therefore, it is recommended that objects be chosen via the List Node, List Concentrator/SAM, and List Trunks commands whenever possible.

Table 12-3. Editor Legend Symbol Explanation

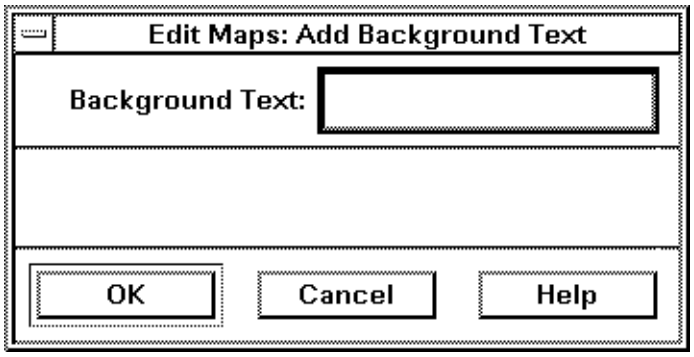
Symbol	Explanation
Aggregate Loc.	A pointer to a lower level map
StarKeeper NMS	*StarKeeper* or *StarKeeper* II NMS
Node	BNS-2000 VCS, BNS-2000
Concentrator	MPC7, MPC15
SAM	SAM8, SAM64, SAM504
Element Mgmt. Sys	Paradyne, COMSPHERE 6800, etc.
Trunk Aggregate	Represents multiple trunks
Trunk	A trunk between nodes
Concentrator/SAM Link	A link to a concentrator or SAM
NAC	Network Access Controller
NIK, LCS50	LCS50 *Datakit* II VCS Network Interface
LCS100	LCS100 *Datakit* II VCS Network Gateway
LAM	AppleTalk LAN Manager
Host	A generic symbol for hosts
Front End Proc.	A generic symbol for FEPs
Cluster Controller	A generic symbol for CCs
Workstation	A generic symbol for Workstations
Terminal	A generic symbol for terminals
Printer	A generic symbol for printers
Modem	A generic symbol for modems
Router/Server	A generic Router or Server
unlabeled symbols	Can be used for any purpose

Background Text

Choosing **Background Text** allows you to add text to a map that is independent of any object on the map. This text, as opposed to object labels, are used to identify areas of the map background or perhaps, company names. Choosing **Background Text** displays a menu.

Add Background Text

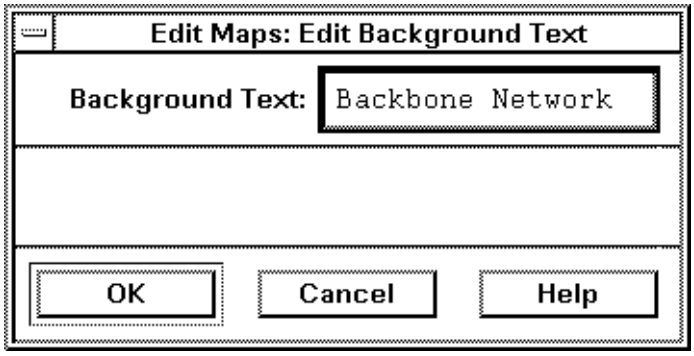
Choose **Add** to add new text to the map. This operation is similar to adding a label, except that you do not need to select a map object first.



Screen 12-17. Background Text, Add Background Text

Edit Background Text

You can edit existing background text on a map by first selecting the text and choosing **Edit, Background Text** and then **Edit**. This operation is also similar to that of editing a label.



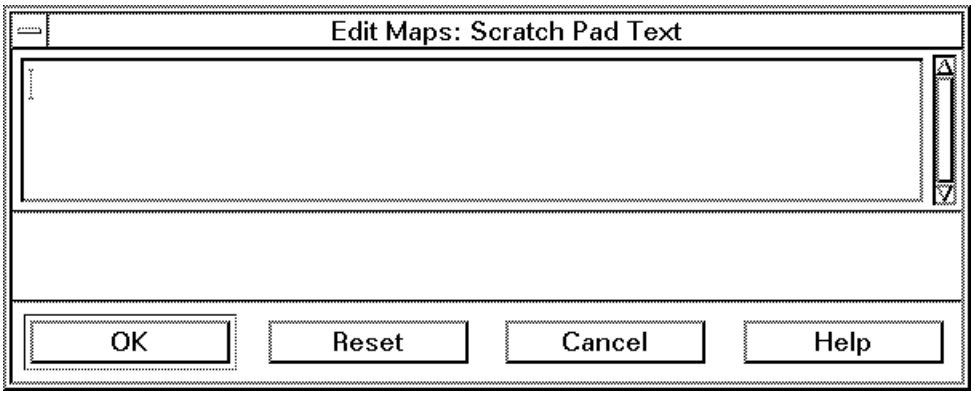
Screen 12-18. Background Text, Edit Background Text

Options

After selecting a map object, choose **Options** to display a menu. Not all menu items apply to all objects; items that do not apply will be inactive.

Scratch Pad Text

Before you choose **Scratch Pad Text**, you must have previously selected a network component from a map. You can set Scratch Pad Text only for locally monitored objects (for example, trunks, nodes, and concentrators). Scratch Pad information is defined by you and is used for storing additional comments about a network component as the following pop-up window displays:

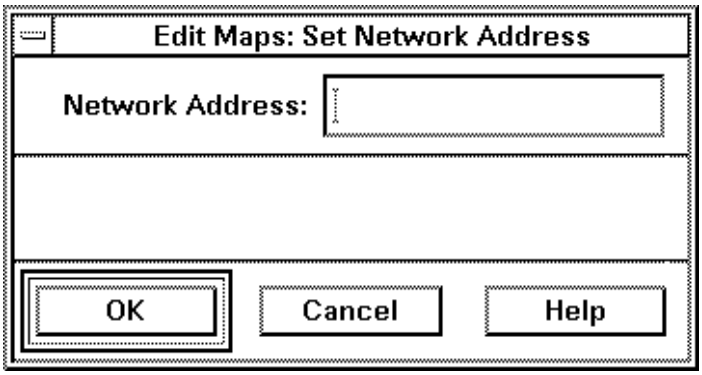


Screen 12-19. Properties, Scratch Pad Text

The Scratch Pad text you specify here is displayed when you choose **Display Info** in the Network Map Window. For more details on how to use **Display info**, see **Display Info** under **Commands Menu** in the **Network Map Window** section in this chapter.

Set Network Address

Before you choose **Set Network Address**, you must have previously selected a network component from a map. In the following pop-up window, specify the fully qualified network address for the component (for example, [westSK]USA/TX/Austin/tx3:19):



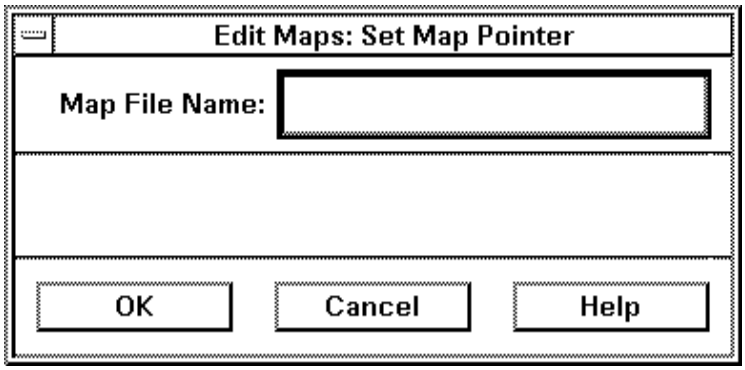
Screen 12-20. Properties, Set Network Address

Choose OK in the window to make the change.

NOTE:
Any map object with a network address appears green in the editor.

Set Map Pointer

Before you choose **Set Map Pointer**, you must have previously selected a network component with a network address or an aggregate location symbol from the map. In the following pop-up window, specify the file name of the map to which the selected map object will point:



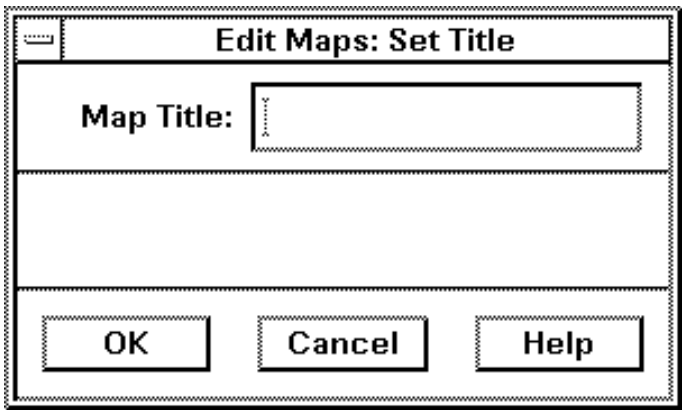
Screen 12-21. Properties, Set Map Pointer

Choose OK in the pop-up window and an empty map with the appropriate file name is instantly created. Otherwise, the map hierarchy cannot load when you choose **View Network Status** when a symbol points to a map that does not exist.

NOTE:
When map pointers have been set for aggregate location symbols, they appear green in the Map Editor.

Set Title

Choosing **Set Title** allows you to specify a title for the map. The title will appear in the Edit Maps Window title bar. The title can be longer than the field appears, in which case, scrolling buttons appear in the field. After specifying a name, choose OK in the following pop-up window to reflect the name:



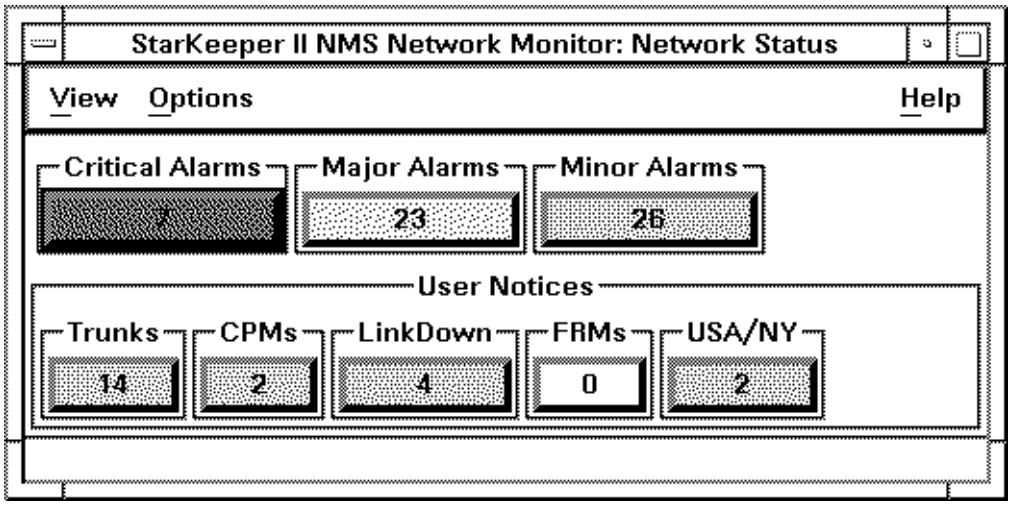
Screen 12-22. Edit Maps Window, Set Title

View Network Status Window

Both the Network Status Window and Network Map Window are displayed when **View Network Status** is selected from the Network Monitor Control Window. This window displays outstanding alarms that reflect the current state of the network via:

- alarm severity notices
- user notices

If you choose either of these from the View Network Status Window, you will invoke the List Alarms Window. The label name of the user notice will be the title of the List Alarms Window.



Screen 12-23. Network Status Window

NOTE:
Only one Network Status Window can be displayed at any time. Exiting a Network Status Window closes the window and additionally any Network Map Windows that are being displayed. Other windows (for example, Diagnostics Window, List Alarms Window) that were invoked from either the Network Status Window or Network Map Window are also closed.

File

Choosing the **File** menu displays an **Exit** option. Choose **Exit** to close the Network Status Window.

View

Choosing the **View** menu displays the **Display Top Map** option.

Display Top Map

Choose **Display Top Map** to invoke a new Network Map Window containing the Top Map.

Options

Choosing the **Options** menu displays the **Turn Alarm Bell On/Off** option.

Turn Alarm Bell On/Off

Choose **Turn Alarm Bell On** to enable the Alarm Bell for alarm severities selected in the Set Alarm Preferences window. Choose **Turn Alarm Bell Off** to temporarily disable the Alarm Bell. This button is inactive if no severities were selected in the Sound Bell For preference. See the section **Set Alarm Preferences** under the Administer Menu.

Alarm Severity Notices

Alarm severity notices display the number of unique outstanding alarms according to severity (for example, critical, major, or minor). When your Graphics System receives alarms, the notice changes color to reflect the following severities of alarms:

Table 12-4. Alarm Colors

Color	Severity
red	critical alarm
yellow	major alarm
blue	minor alarm

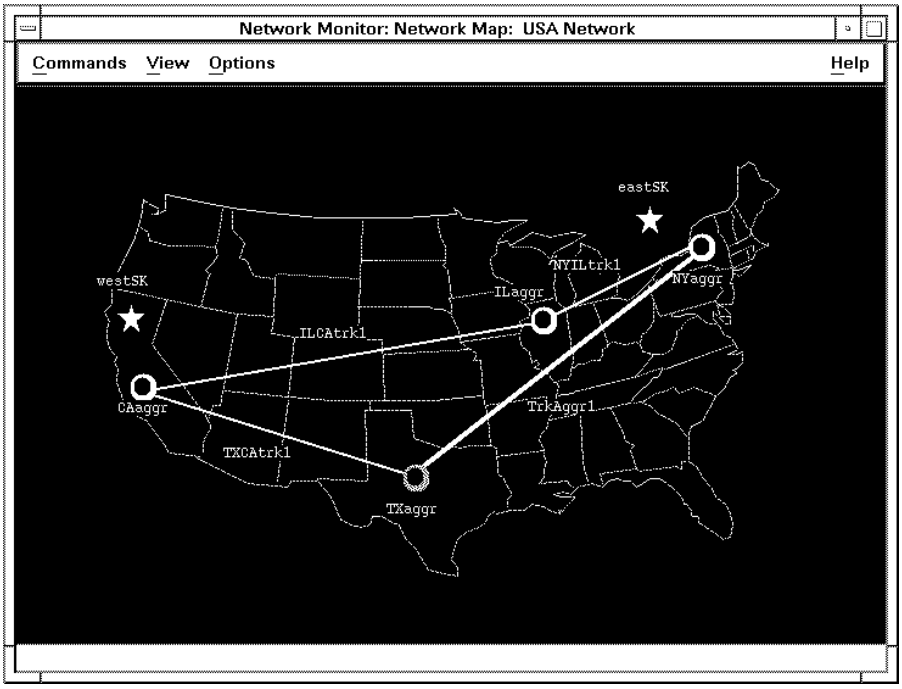
User Notices

User notices are defined by you, and unlike the alarm severity notices, do not change color to reflect alarm severity. Instead, they turn grey when matching alarms exist. The labels for a user notice can contain up to eight characters. If a notice has not been defined, it will not appear in the Network Status Window. For instructions on defining user notices, see **Define User Notice** section under **Administer Menu** in this chapter.

Network Map Window

Both the Network Map Window and Network Status Window are displayed when **View Network Status** is chosen from the Control Window.

NOTE:
It is possible to have more than one Network Map Window displayed. Exiting a Network Map Window dismisses that window only, and does not affect additional Network Map Windows.



Screen 12-24. Network Map Window

Map objects with network addresses are color-coded to reflect the highest severity alarm received from that address. Refer to the **Trickle-Up** section under **Map Hierarchy Principles** of **Chapter 10** in this guide for more information.

NOTE:
If communication between your Graphics System and the connected Core System is broken, the appropriate *StarKeeper* II NMS symbol on a map will turn red. All the nodes and systems monitored by this Core System remain in their current state since new alarms cannot be received and current alarms cannot be cleared for these nodes and systems.

File

Choosing the **File** menu displays an **Exit** option. Choose **Exit** to dismiss the Network Maps Window.

Commands Menu

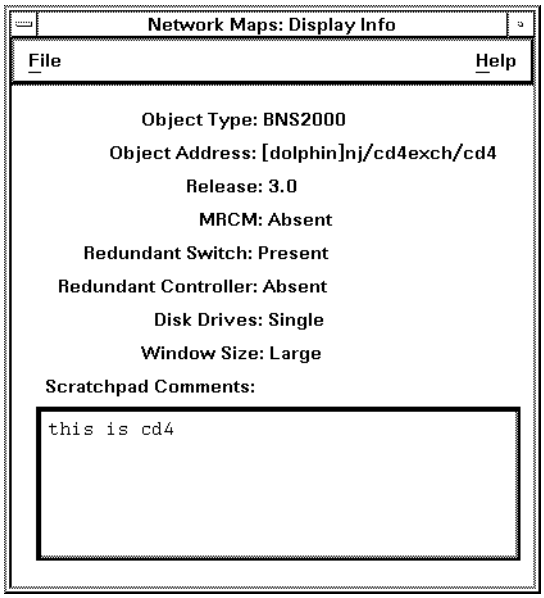
After selecting an object on the map, choose **Commands** to display a menu.

Display Info

Before you choose **Display Info**, you must have previously selected a network component from a map. You can choose **Display Info** only for locally monitored nodes, routers and servers, trunks, concentrators, and concentrator links.

NOTE:
This information is retrieved from the Core System database.

After choosing **Display Info** from the Commands Menu, both Configuration Data and Scratch Pad comments are displayed in the following pop-up window.



Screen 12-25. Network Map Window, Display Info

This information varies and is dependent on the type of object you select from the map. Scratch Pad information is defined by you and is used for storing additional comments about a network component. For more details on how to enter Scratch Pad information, see the **Scratch Pad Text** section under **Options** in the **Edit Maps Window** section of this chapter. For more information on the Configuration Data that is displayed, see the *StarKeeper II NMS Core System Guide*.

List Alarms

Before you choose **List Alarms**, you must have previously selected a network component from a map. After choosing **List Alarms** from the Commands Menu, the List Alarms Window is displayed and the network address of the object you selected or "Multiple Addresses" is reflected in the title bar. For more information, refer to the **List Alarms Window** section in this chapter.

Clear Alarms

Before you choose **Clear Alarms**, you must have previously selected a network component from a map. After choosing **Clear Alarms**, a clear alarms command is sent to the appropriate Core System and all alarms on the selected map object

are cleared. If the selected map object is monitored by a remote Network Management System, you will be asked to confirm a force clear operation. A forced clear only clears the alarm in the Core System database. Therefore, the Core System alarm database may become inconsistent with the remote system database.

Diagnostics

Before you choose **Diagnostics**, you must have previously selected a valid node or concentrator or module in a shelf map that is locally monitored by a Core System. If you choose a trunk, the number of Diagnostics Windows that appear depends on the configuration of the endpoints. A Diagnostics Window appears for each endpoint that is locally monitored by a Core System. For endpoints that are monitored by a remote Network Management System, a Diagnostics Window is not invoked.

For more information, refer to the **Diagnostics Window** section in this chapter.

View Menu

The following options are found under the **View** menu.

Legend

Choosing **Legend** displays the map legend. This identifies the meaning of the various map symbols. Alarm severity color-coding is also described.

Top Map

Choose **Top Map** to quickly display the top map in your hierarchy, provided the top map is not already displayed. The map can be displayed in the same (current) window that will override the current contents, or in a new window.

Up

Choose **Up** to display the next map above the one you are currently displaying in the map hierarchy, if one exists. The map can be displayed in the same (current) window that will override the current contents, or in a new window.

Down

After selecting a map symbol, choose **Down** to display the map to which the map symbol points, if one exists. The map can be displayed in the same (current) window that will override the current contents, or in a new window.

Options Menu

The following options are found under the **Options** menu.

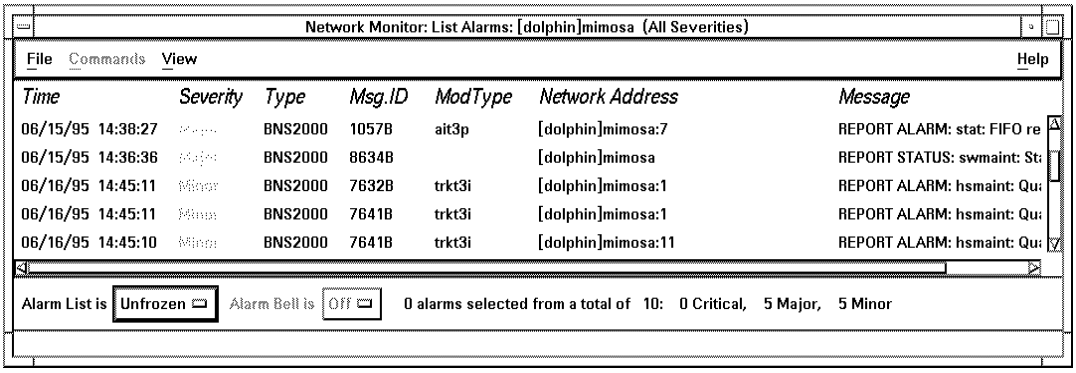
Labels Off

This operates in a toggle fashion. When labels are currently displayed on a map, choosing **Labels Off** makes them disappear. Conversely, when labels are not displayed, choosing **Labels On** displays them.

List Alarms Window

The List Alarms Window displays the text of all outstanding alarms that match the selection criteria and it contains these four menus:

- File
- Commands
- View
- Help



Screen 12-26. List Alarms Window

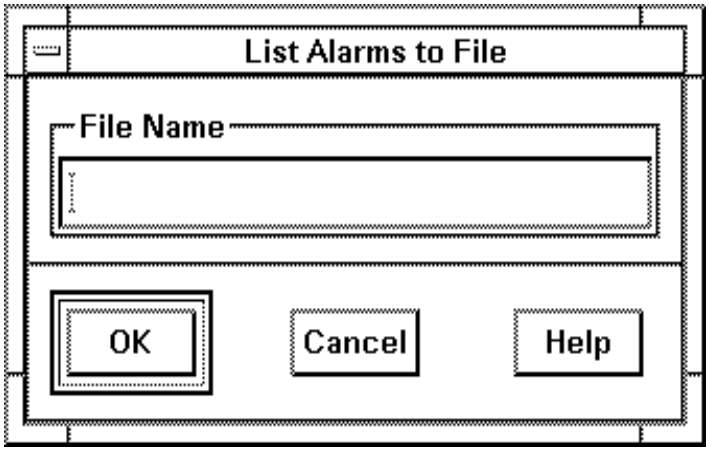
NOTE:
It is possible to have more than one List Alarms Window displayed. Exiting a List Alarms Window closes that window only, and does not affect additional List Alarms Windows. Other windows (for example, Diagnostics Window, Network Status Window) that were invoked from the List Alarms Window are also closed.

File Menu

After choosing **File**, a menu is displayed.

Save As

Choosing **Save As** displays the following pop-up window and allows you to save the entire alarm list:



Screen 12-27. File, Save

Enter a file name, up to 14 characters long, and choose OK. The file will be saved in the *NM* subdirectory in your home directory.

Print

This task is only available if a printer has been configured to your Graphics System. See the *StarKeeper II NMS Core System Guide* for information on configuring the printer. When you choose **Print**, the entire alarm list is formatted and sent to the default printer.

Exit

Choose **Exit** to close the List Alarms window.

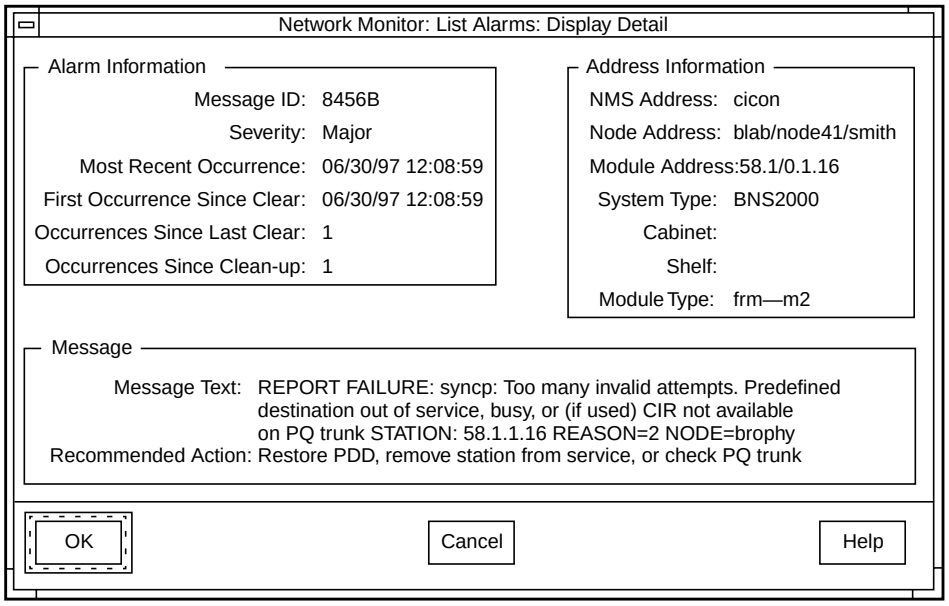
Commands Menu

You can choose **Commands** only when one or more alarms have been selected from the list. After choosing **Commands**, a menu is displayed.

NOTE:
If more than one alarm has been selected, only **Clear Alarms** is active. All other commands apply to a single alarm only.

Display Detail

After selecting one alarm from the alarm list, choosing **Display Detail** invokes the following pop-up window that describes the alarm in greater detail:



Screen 12-28. Commands, Display Detail

Find Map

After selecting one alarm from the alarm list, choosing **Find Map** invokes the Network Map Window that displays the map containing the equipment associated with the selected alarm. The Network Map Window must be running when **Find Map** is invoked.

Clear Alarms

After selecting one or more alarms from the alarm list, choosing **Clear Alarms** sends a clear message for each alarm to the appropriate Core System. A message notifies you of the number of clear requests that have been sent to the Core System. This task does not remove the alarms from the list; they are removed only when a clear message is received by the Core System.

NOTE:
Core System Link Down alarms cannot be cleared by you. The Core System automatically clears these alarms when it re-establishes its connection to the node on which the alarm was generated.

For alarms from a remote Network Management System, a notice window appears, asking you to confirm or cancel the clear. The notice appears because the databases of the local Core System and remote Core System could get out of synchronization. If you confirm by choosing OK, then the forced clear occurs.

If you choose Cancel, then the entire clear operation is canceled. If for any reason an alarm cannot be cleared, then a message notifies you that it cannot be cleared manually. Choose Dismiss to remove the notice. For more information on clearing alarms, refer to the *StarKeeper II NMS Core System Guide.*

Diagnostics

After selecting an alarm that has been generated by a node, choosing **Diagnostics** invokes the Diagnostics Window. For more information, see the **Diagnostics Window** section in this chapter.

View Menu

After choosing **View**, a menu is displayed which allows you to temporarily change the presentation of data in the List Alarms Window.

Display Alarms Lines

If you choose **View**, then **Display Alarm Lines** you will be able to choose either **One Line Alarm Display** or **Multi-line Alarm Display**.

Sort Alarms By

Choosing **View,** then **Sort Alarms By** displays a sub-menu allowing you to dynamically change the sorting criteria.

Choose from one of the combinations of sorting criteria displayed in the above screen. The Alarm Display will dynamically change based upon your input.

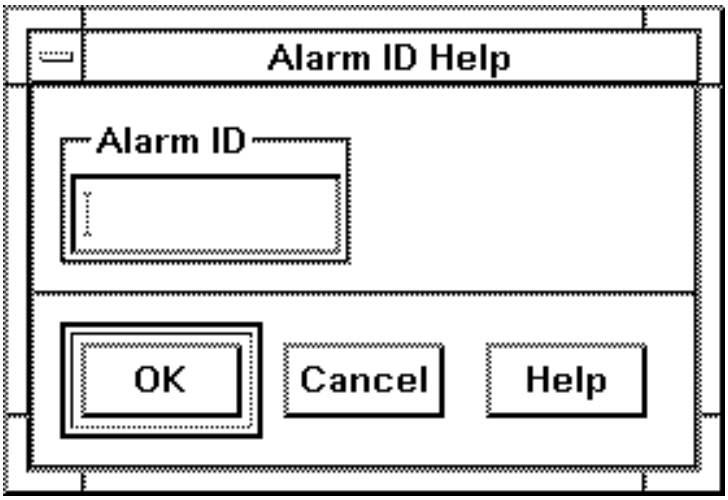
Help Menu

Choose **Help** to display a menu.

In addition to the standard Help System described in **Chapter 3**, Alarm Help is also accessed via this menu.

Alarm Help

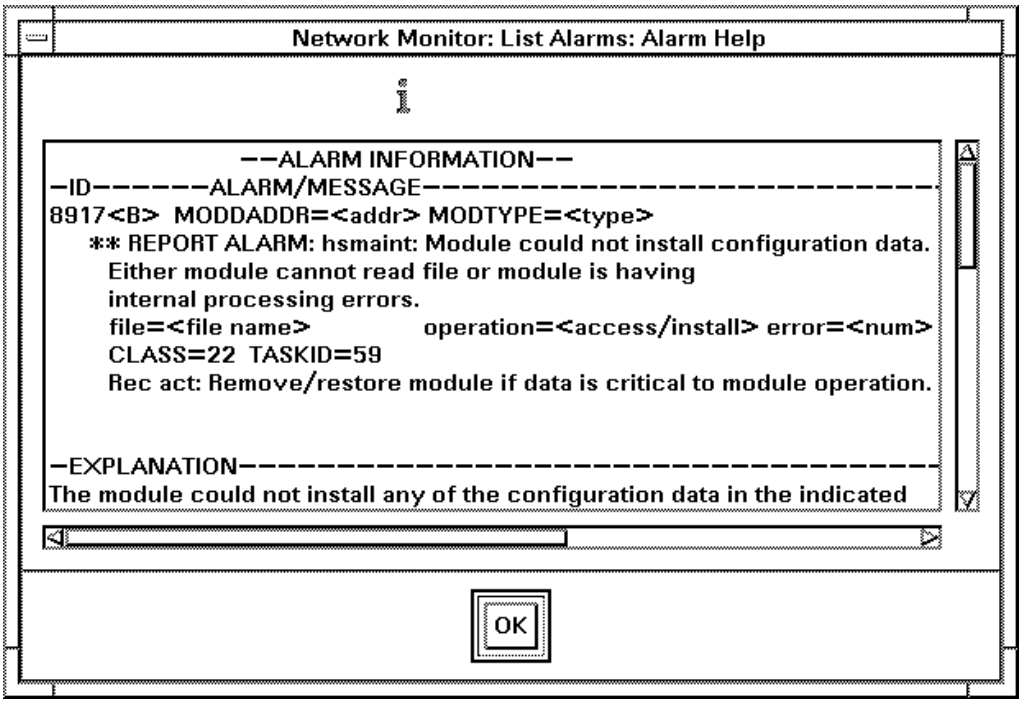
After choosing **Alarm Help**, a pop-up window appears asking you to enter an alarm ID. Help for that alarm is displayed as described in **Selected Alarm Help** following this screen.



Screen 12-29. Help, Any Alarm

Selected Alarm Help

After selecting one alarm from the alarm list, choosing **Selected Alarm Help** displays help information in the following pop-up window on the selected alarm:



Screen 12-30. List Alarms, Commands, Help

NOTE:
A delay may occur while the help text is being retrieved from the Core System.

Alarm List is Frozen/Unfrozen

This task operates in a toggle fashion. Choosing Frozen suppresses displaying new, repeated, and cleared alarms for a short period of time to allow you to read or interact with the alarms on the current list. A message on the bottom of the List Alarms Window informs you that the list is frozen. The list's content will not change until you unfreeze the list by choosing Unfrozen or the freeze timer expires (after one minute). If the timer expires, a message appears, saying that the alarm list is now unfrozen.

Alarm Bell is On/Off

This task operates in a toggle fashion. Choose On to enable the Alarm Bell for alarm severities selected in the Set Alarm Preferences window. Choose Off to temporarily disable the Alarm Bell. This button is inactive if no severities were selected in the Sound Bell For preference. See the section **Set Alarm Preferences** under the Administer menu.

Diagnostics Window

File Menu

Choose **Exit** to dismiss the Diagnostics Window.

Commands Menu

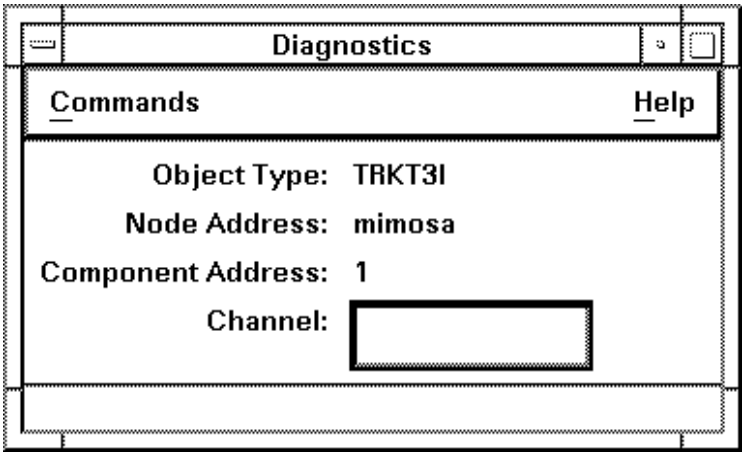
Choosing **Commands** displays diagnostic commands that are available for use on alarms generated by nodes. The following commands are available:

- **verify**
- **remove**
- **restore**
- **display connections**
- **dstat**
- **dmeas**
- **diagnose**
- **display EIA**
- **display traffic**
- **nping**
- **route**
- **smeas**
- **tmeas**

Choose any of these commands to send the command to the node for execution. The formatted command string is then displayed in the footer of the Diagnostics Window. The output appears in another window.

Each of the commands can be run directly from the node console, except for **nping**. The **nping** command is a special command available only from *StarKeeper* II NMS. It utilizes the diagnose facility on the node to measure network round trip delay on any Frame Relay PVC in the network. More information on the **nping** command can be obtained by running the command **help nping** on a Core System.

NOTE:
Formatted command strings for BNS-2000 VCS R2.1 and later and BNS-2000 commands are supported. Commands for other BNS-2000 VCS releases can be initiated through the Diagnostics Window, but the syntax may be incorrect. If incorrect, an output window, with the node error message and a re-prompt, will be displayed.



Screen 12-31. Diagnostics Window

The Diagnostics Window refers to a particular piece of equipment based on the network address of the map symbol or alarm you selected.

Configuration information about the piece of equipment to be diagnosed must reside in the Core System database. To accomplish this, use the *StarKeeper* II NMS commands, **skload** and **cfg_sync**. For more information on these commands, see the Core System On-line help facility. If the Diagnostics Window is invoked from a trunk map symbol, (which has two addresses associated with it), two separate Diagnostics Windows will appear, one for each end of the trunk.

Diagnostic Window Field Descriptions

The fields in the Diagnostics Window obtain their values from the map symbol you selected, or from the alarm you selected in a list of alarms. The fields are:

- object type
- node address
- component address
- port
- channel

Object Type

This field displays the type of object to which this window is displaying (for example, SAM64, trunk-hs, ty12). Diagnostics are supported for the following objects:

- node
- concentrator
- SAM
- trunk
- concentrator/SAM link
- modules

Node Address

This field displays the node address to which commands will be sent.

Component Address

This field displays which component will be addressed in the commands sent to the node.

Port

If a value is present in the port field, it is used by the commands that support specifying a port value. It is ignored for commands that do not support specifying a port.

For modules that have more than one value in the port field, you can edit this field to add, change, or delete its contents.

Channel

This field displays the number of the channel on which the diagnostics commands will be issued. The channel field is optional and may be edited. Some of the supported diagnostic commands do not use this field. In those cases, the channel field will be ignored.

Administering Performance Reporter

13

This chapter explains the administrative tasks that you must perform before you begin using Performance Reporter to run reports.

Adding Users

See **Chapter 2** for information on adding users.

Removing Users

See **Chapter 2** for information on removing users.

Administering Performance Data on the Core System

For information about administering Performance Data on the Core System, refer to *Chapter 3*, *Performance Measurements Management* of the *StarKeeper II NMS Core System Guide*.

Administering the Threshold Feature

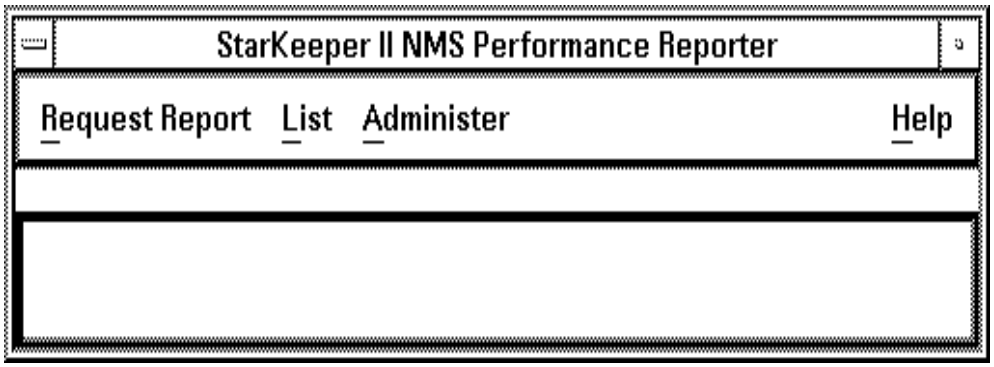
The Threshold Feature is included as part of Performance Reporter. You have the option of turning it on or off as desired. Turning on the feature causes the automatic generation of Exception Reports. Turning off the feature halts the calculation and storage of Exception Reports.

NOTE:
The threshold feature is set globally on a per Graphics System basis. If a user sets it on or off it is set that way for all users on that Graphics System.

The same holds true for threshold values and whether fields are to be included or excluded in Exception Reports.

Activating the Thresholding Feature

When you install or reinstall the Performance Reporter, the Threshold Feature is not active. The following procedure activates the Thresholding Feature.

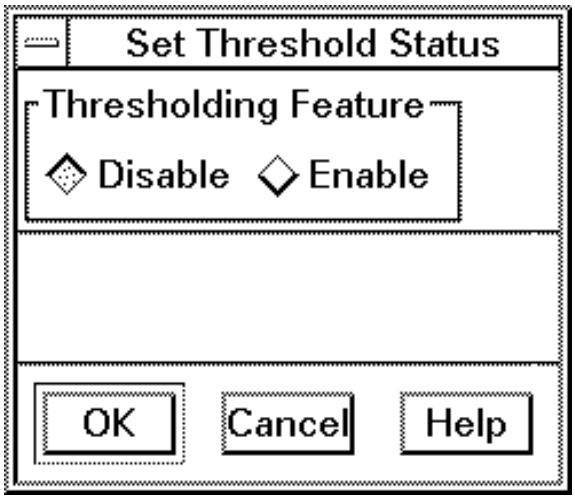


Screen 13-1. Performance Reporter Control Window

Procedure 13-1. Activating the Thresholding Feature

1. At the Performance Reporter Control Window, (**Screen 13-1**), select **Administer**, **Threshold**, and then **Threshold Status** from the sub-menus.

The following pop-up window **Set Threshold Status** is displayed.



Screen 13-2. Set Threshold Status Window

2. Position the pointer on Enable and click.
3. Position the pointer on OK and click.

   The following message will be displayed in the footer of the window.

```
Thresholding has been turned ON
```

4. To dismiss the window, click on the Cancel button.

The first Daily Exception Reports will be generated at the beginning of the next day and filed.

NOTE:
Once the Thresholding Feature is active, you have the ability to change the threshold values and select which threshold fields you wish to have included in the Exception Reports. See **Procedures 13-3** and **13-4**.

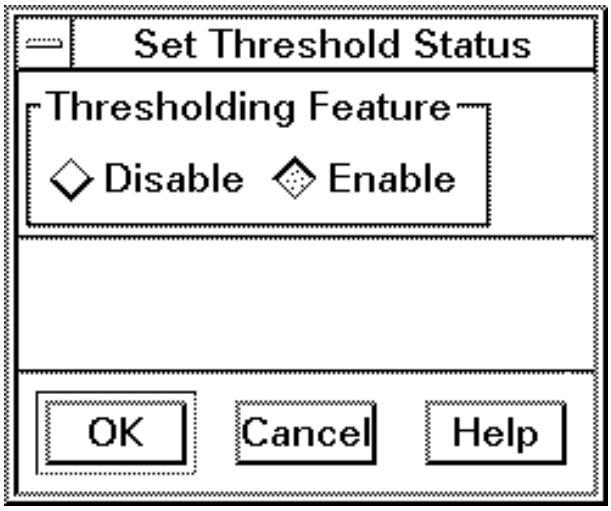
Deactivating the Thresholding Feature

You may wish to deactivate the feature. For example, if you find you do not use the Exception Reports at all, it is not useful to have the feature running. The following procedure will deactivate the Thresholding Feature.

Procedure 13-2. Deactivating the Thresholding Feature

1. At the Performance Reporter Control Window, (**Screen 13-1**), select **Administer**, **Threshold**, and then **Threshold Status** from the sub-menus.

   The following pop-up window **Set Threshold Status** is displayed.



Screen 13-3. Set Threshold Status Window

2. Position the pointer on Disable and click.
3. Position the pointer on OK and click.

   The following message will be displayed in the footer of the window.

```
Thresholding has been turned OFF
```

4. To dismiss the window, click on the Cancel button.

Exception Reports that were previously generated and filed will still be available by way of the **List** option on the Performance Reporter Control Window. You may view them even though the Thresholding Feature has been deactivated. Reports will remain on the list until they are removed by the cleanup process.

No Exception Report will be generated for the day in which the feature was deactivated. If it also happens to be the end of a week or month, then the Weekly or Monthly Exception Report will not be generated either. All Exception Reports are automatically generated according to a fixed or non-administrable schedule.

Setting Threshold Values

The Threshold Feature comes with default values for the threshold fields. These are the recommended values, based on average customer configurations and uses. When the Threshold Feature is activated, the default values apply and all the threshold values are included in the report.

However, you have the ability to change the values and select the fields to be included in the report. There is a User Value field for each threshold field, which matches the initial default setting. You can change the User Value field to reflect a new value that you want. You can also exclude a threshold field from Exception Reports. Any value change will be reflected in the Exception Reports.

A suggestion is to use the default values at first and review the Exception Reports. If you find that the default values do not meet your needs, they can easily be changed.

Threshold Alarm Reminder

Customers can use a threshold alarm to remind administrators that the Exception Report should be examined. If a customer does not want to see the alarm, the severity can be downgraded to informational using the Core System alarm conditioning commands. To notify one or more people about this alarm reminder, use a PI script to send e-mail to those who should be notified and then clear the alarm explicitly. The script must be run on every Core System on which exception report data is processed.

Customers should evaluate the list of fields administered for thresholding/ exception report generation in order to have an alarm that matches their needs. For example, if the list is focused on fields for a particular module type, the alarm relates to that module type only.

Changing Threshold Values

The following procedure illustrates how to change threshold values.

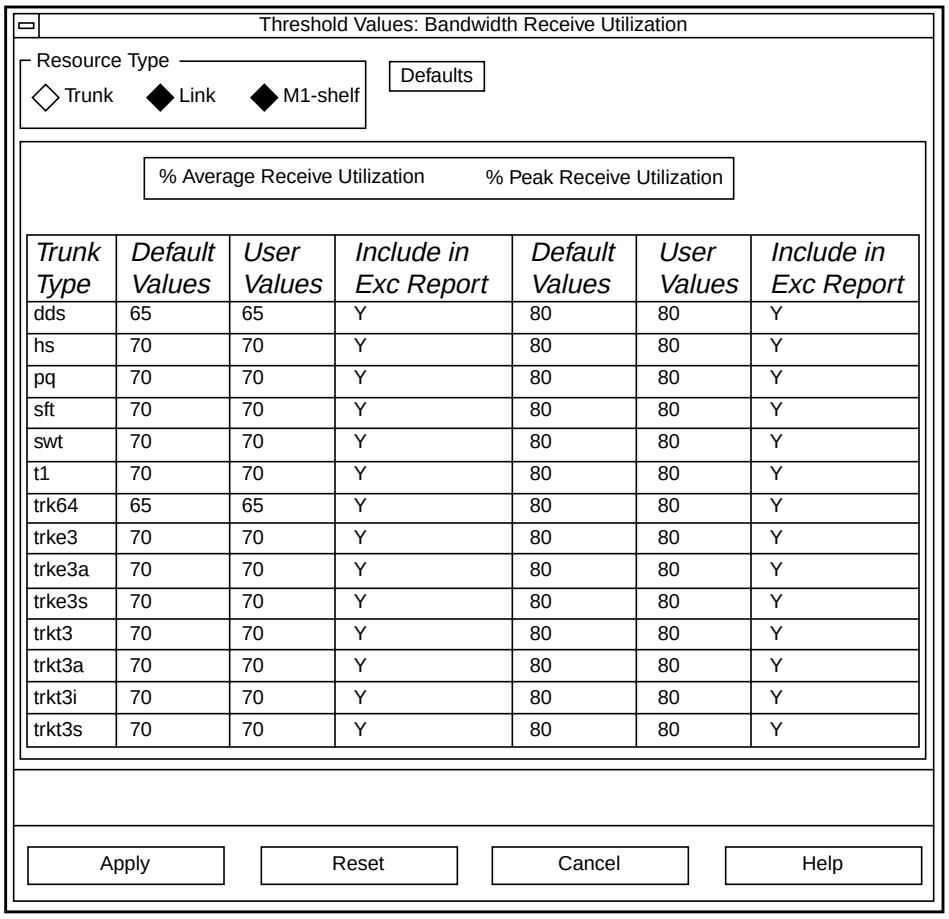
For this example, you want to change the threshold value of DDS Trunk Average Receive Utilization from the default value of 65% to 70%. You have mostly DDS trunks in your network, the Exception Reports are too big, and you want to focus on just the busiest DDS trunks.

Procedure 13-3. Changing Threshold Values

1. At the Performance Reporter Control Window, (**Screen 13-1**), select **Administer**, **Threshold**, **Threshold Values,** and **Bandwidth Utilization** from the sub-menus.

2. Position the pointer on **Receive Utilization** and click.

   The following pop-up window **Threshold Values: Bandwidth Receive Utilization** is displayed with the default of trunk.



Trunk Type	*Default Values*	*User Values*	*Include in Exc Report*	*Default Values*	*User Values*	*Include in Exc Report*
dds	65	65	Y	80	80	Y
hs	70	70	Y	80	80	Y
pq	70	70	Y	80	80	Y
sft	70	70	Y	80	80	Y
swt	70	70	Y	80	80	Y
t1	70	70	Y	80	80	Y
trk64	65	65	Y	80	80	Y
trke3	70	70	Y	80	80	Y
trke3a	70	70	Y	80	80	Y
trke3s	70	70	Y	80	80	Y
trkt3	70	70	Y	80	80	Y
trkt3a	70	70	Y	80	80	Y
trkt3i	70	70	Y	80	80	Y
trkt3s	70	70	Y	80	80	Y

Screen 13-4. Threshold Values for Bandwidth Receive Utilization Window

3. Review the form that is displayed. Look for the trunk type **dds**. This will be the default value because you have never changed it.
4. Position the pointer on the **User Values** field under **Average Receive Utilization** that you wish to change and click.
5. Using your keyboard, enter the value 70.
6. Position the pointer on (Apply) at the bottom of the screen and click.

An appropriate message will be displayed at the bottom of the form.

7. To dismiss the windows, click on Cancel.

The Daily Exception Report will be generated using the **User Value** that you just entered. The Weekly and Monthly reports are summaries of the **Daily Exception Report** reports. The **Threshold Value** column in the Weekly and Monthly reports are displayed to show the current threshold value set. It will reflect the most recent threshold values for the entire week or month even if the change was made on the last day of the week or month.

Including or Excluding Items from Exception Reports

The following procedure illustrates how to include or exclude certain items from exception reports. By default, when the threshold feature is activated, all items are included in the Exception Reports.

You may want to exclude all Peak Trunk Utilization exceptions from the Exception Reports because you are using the reports only for Long-Term Engineering. You have Average Trunk Utilization on the reports, which is more useful for engineering; and you're not interested in having peak data on the reports.

Procedure 13-4. Including or Excluding Items from Exception Reports

1. At the Performance Reporter Control Window (**Screen 13-1**), select **Administer**, **Threshold**, **Threshold Values,** and **Bandwidth Receive Utilization** from the sub-menus.
2. Position the pointer on **Receive Utilization** and click.

   The pop-up window (shown in **Screen 13-4**) is displayed with the default of trunk.
3. Review the form that is displayed. Look for the Peak Receive Utilization columns. Position the pointer on the field under the **Include in Exc Report** column for the first trunk type that you wish to include or exclude. Depending on what has been set in previous sessions, a **Y** or an **N** will be in the field. A **Y** in the field means that the resource type will be included in the report.
4. Position the cursor on the field and change the field from **Y** to **N** or back by clicking on the field.
5. Repeat this step for all trunk types on the form that you wish to change.
6. Position the pointer on Apply at the bottom of the screen and click.

   An appropriate message will be displayed at the bottom of the form.
7. To dismiss the windows, click on Cancel .

The Daily Exception report will no longer include the peak receive utilization exceptions for the trunks where you specified **N** in the field. However, the Weekly and Monthly reports will still include Peak Receive Utilization exceptions for trunks up until the change was made. A procedure similar to Procedure 13-4 can be used to exclude peak trunk transmit utilization exceptions from the Exception reports.

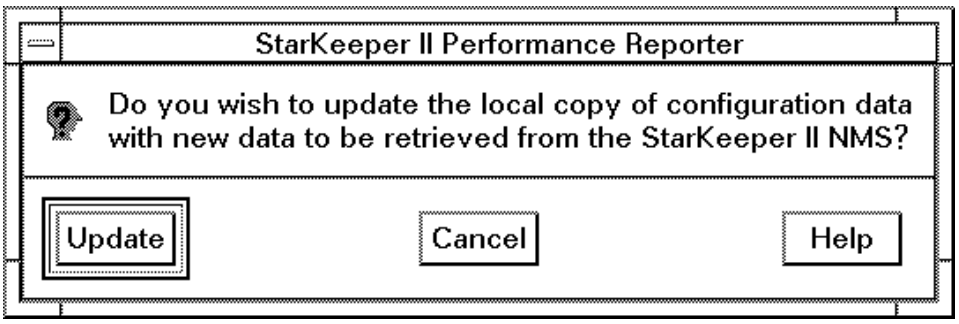
Updating Configuration Data

The following procedure illustrates how to update configuration data. Updating configuration data is the process of synchronizing node, trunk, group, and module configuration information on the Graphics System to the node and trunk information on the connected Core Systems. You will want to do this if there have been changes to the node, group, or trunk names on which you are running reports. This process may take a few minutes to complete.

Procedure 13-5. Updating Configuration Data

1. At the Performance Reporter Control Window, (**Screen 13-1**), select **Administer** and then **Update Configuration Data** from the sub-menu.

   The following notice window is displayed.



Screen 13-5. Update Configuration Data Notice Window

NOTE:
If you wish to dismiss the window, position the pointer on Cancel and click. This can only be done if you have not already chosen Update. Once Update is chosen, the update cannot be stopped.

2. Position the pointer on Update and click. Progress messages or error messages will be displayed in the footer of the base window.

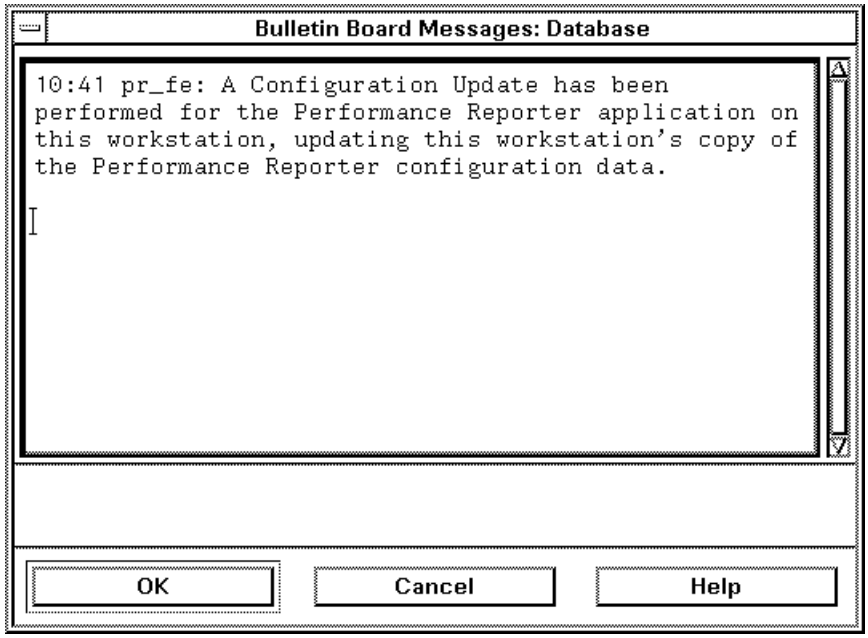
The following message will be displayed in the footer of the base window.

```
Configuration data update is in progress
```

When the update has completed, the following message will be displayed in the footer of the base window.

```
Configuration data update is complete
```

Also, after the update is complete, a database glyph is displayed in the Bulletin Board. Clicking on the glyph brings up a message.



Screen 13-6. Database Bulletin Board Message

Updating Configuration Data Via a Cron File

To make the **Updating Configuration Data** process more convenient, you can run the task on your Graphics System via a cron file. The following procedure illustrates an example to help you in setting up a *StarKeeper* II NMS Performance Reporter cron file:

Procedure 13-6. Updating Configuration Data via a Cron File

To ADD the pr_cron process to the **root** crontab file, and to activate the pr_cron process weekly, on every Monday at 2:00 am, you should do the following:

1. ***su*** to **root**, or login as **root**.
2. Edit the */var/spool/cron/crontabs/root* file and add the following entries:

   # Activate PR cron configuration data update at 2:00 AM weekly o Mon.
   0 2 * * 1 PR_ROOT=/usr2/PR /usr2/PR/bin/pr_cron >/dev/null 2>&1

3. Enter **crontab /var/spool/cron/crontabs/root** to update the crontab entry on your system.

   Once your Performance Reporter cron is set up, the following information will be displayed in the *$EVENTLOG* for the pr_cron process every Monday morning:

```
 02:00
107006 REPORT CNMSMSG pr_cron: PR cron configuration data update
started.

02:01
107006 REPORT CNMSMSG pr_cron: PR cron configuration data update
has completed.
```

To delete the pr_cron process from the **root** crontab file, you should do the following:

1. ***su*** to **root**, or login as **root**.
2. Edit the */var/spool/cron/crontabs/root* file and delete the pr_cron entries.
3. Enter **crontab /var/spool/cron/crontabs/root** to update the crontab entry on your system.

Specifying the Retention Period for Filed Reports

The Performance Reporter allows daily, weekly, and monthly reports to be run regularly according to the schedule that you set. These reports can be sent to a file or to a printer. When sent to a file, the reports are accessible for a certain period of time and then deleted. When sent to a printer, the reports are printed only and not saved to a file.

Exception Reports are automatically generated according to a fixed or non-administrable schedule. They are filed and accessible for a certain period of time before being deleted. The same retention period applies to both Scheduled Reports and Exception Reports.

There are default values for the retention period of these reports. The values are: 2 or 7 days for daily depending on the module type, 31 days for weekly, and 92 days for monthly. You can change the retention period value using the Disk Clear Administration window of the Workstation Administration application

The purpose of increasing the retention period for filed reports is to allow them to be accessible, for displaying or printing, for a longer time.

NOTE:
This retention value is not associated with the retention of the raw performance data which is controlled by the Core System. To change the retention period of the data, see the *StarKeeper II NMS Core System Guide*.

Even though a filed report has been deleted, it is possible to request that report again as long as the performance data is still retained by the Core System.

Troubleshooting Performance Reporter

If this happens...	Do this...
At the *StarKeeper* II NMS subpanel, Performance Reporter does not appear.	Either Performance Reporter was not installed on your Graphics System or you have not been added as Performance Reporter user.
The Request Report button is greyed out in the Performance Reporter Control Window.	The Performance Reporter application was started before the configuration data was transferred from the Core System. Wait a minute, then try again or invoke the Update Configuration Data choice from the Admin window.
My node, (link, trunk, group) list seems incomplete or the message tells me that the list is incomplete.	Configuration data from one or more of the Core System connections has been changed. From the ADMIN window select the Update Configuration Data choice.
I tried to access a second report request, but the window is frozen. A notice window is on the screen from a previous request.	Notice windows must be acted upon before another window can be accessed.
Expected Exception reports are not being generated or are generated with different threshold values.	Thresholding is a per Graphics System feature. A subsequent Performance Reporter user may have changed the status or values. Check the Thresholding Status and the Thresholding Values windows to see if they have been updated.
Previous days, weeks or months exception reports have been deleted.	Exception reports are saved with a specific retention time. It can be changed through Workstation Administration. See **Specifying the Retention Period for Filed Reports earlier** in this chapter.
Large reports are not complete	Reports time out after approximately 15 minutes. Select criteria that will narrow the report search or offload the data.

Using Performance Reporter for Routine Performance Assurance

14

Routine performance assurance is the daily monitoring of key performance measurements in the network to identify service-affecting or potential service-affecting conditions. A service-affecting condition is defined as something that affects user response time or availability (access to network services). It can be equipment failures or performance problems, such as a traffic problem. While alarms are often generated for equipment failures, the more elusive performance problems in the network may be identified through routine performance assurance.

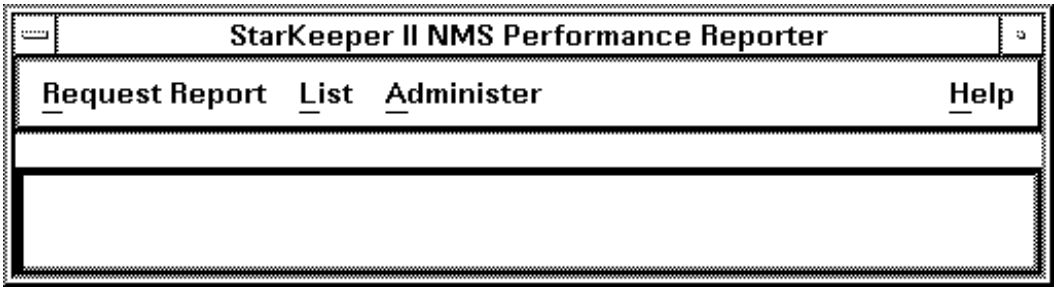
There are three steps in routine performance assurance. The first is identifying a performance problem. The second is troubleshooting the problem. The third is solving the problem. While it is not always possible to solve a problem in real time, it is important that the Network Administrator be aware of it. Sometimes a problem can be fixed, other times a problem will be set aside for an engineering solution.

The focus of this chapter is in using the Performance Reporter to identify and troubleshoot performance problems. The Performance Reporter is not the vehicle for solving the problem. It provides access to information, and the Network Administrator must use that information to arrive at conclusions. This chapter shows examples of both how the information is accessed and how the user might interpret the information to be used in solving problems.

This chapter will show the procedures for accessing the exception reports and for requesting on-demand performance measurement reports. It will also present a scenario for using the reports, followed by some examples.

The Performance Reporter Control Window

The following is the Performance Reporter Control Window.



Screen 14-1. Performance Reporter Control Window

Accessing Exception Reports

There are two types of Daily Exception Reports. The two types are:

- Daily Exception Report - Summary
- Daily Exception Report - Detail

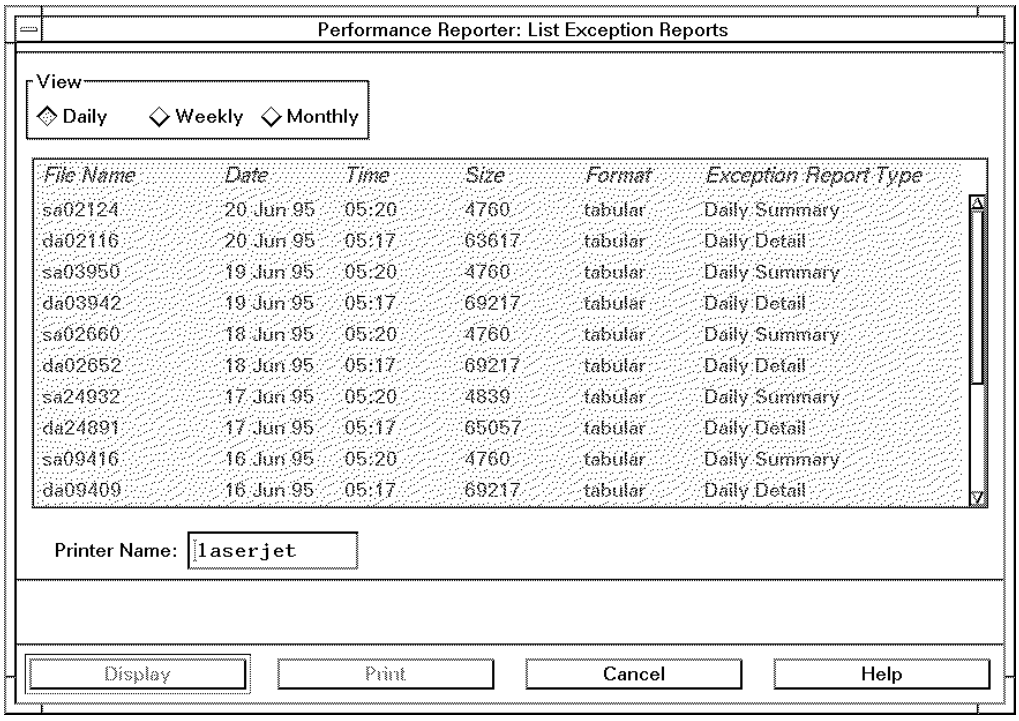
Daily Exception Report - Summary

To view a Daily Exception Report - Summary, perform the following procedure.

Procedure 14-1. Accessing a Daily Exception Report - Summary

1. At the Performance Reporter Control Window, using the mouse, position the pointer on **List** and click. A menu will be displayed.
2. Position the pointer on **Exception Reports** and click.

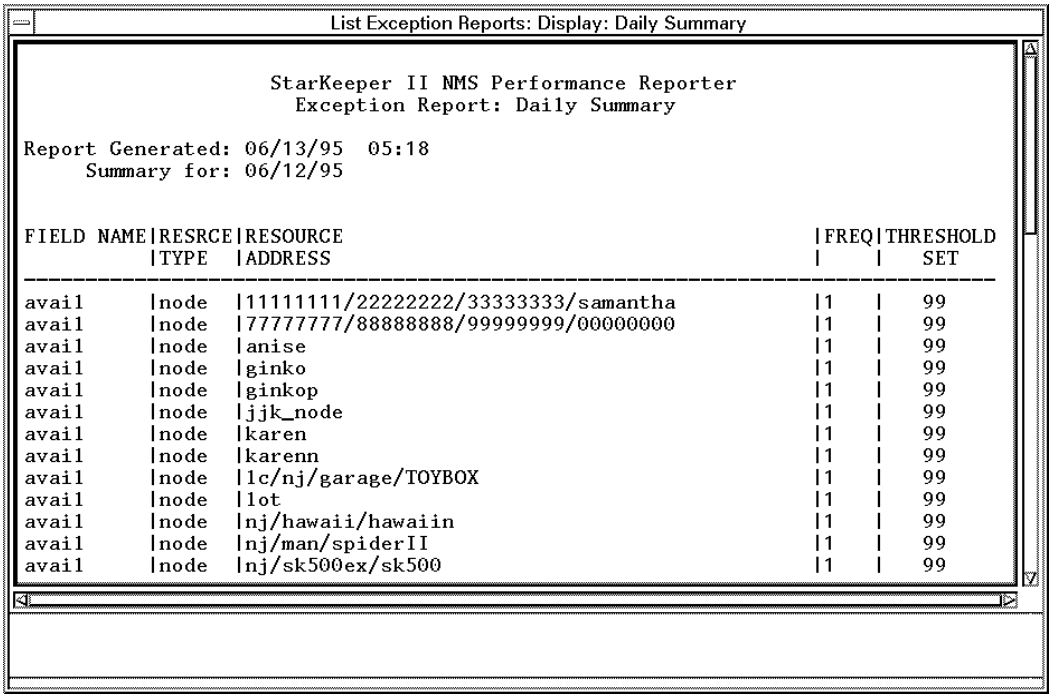
The following pop-up window, listing the exception reports, is displayed with the default of daily.



Screen 14-2. Exception Reports Pop-Up Window

3. Position the pointer on the Summary Report, with the desired day's date and click to highlight your selection.
4. To display the report on the screen, click on Display.

The following pop-up window will be displayed with the contents of the Exception Report that you chose.



Screen 14-3. Exception Reports: Daily Summary Report

5. Use the scrollbar to move up and down the list of items.

   This report shows the exceptions by resource type. Frequency is the number of hourly intervals in which the threshold was reached. For example, if the frequency is **12**, the threshold value was reached 12 times out of the 24 hourly intervals in a day. It is useful in determining the order in which problems should be worked.

   If the summarized list is sufficient, you can either work from the screen or print a hardcopy of the list.

6. To print a hardcopy of the report, click Print. You may have to reposition the window to access the Print button on the previous window.

7. To dismiss the window, click Cancel.

If a more detailed report is needed, for example, an itemized list of when each exception occurred, you can access the Daily Exception Report - Detail.

Daily Exception Report - Detail

To view a Daily Exception Report - Detail, perform the following procedure.

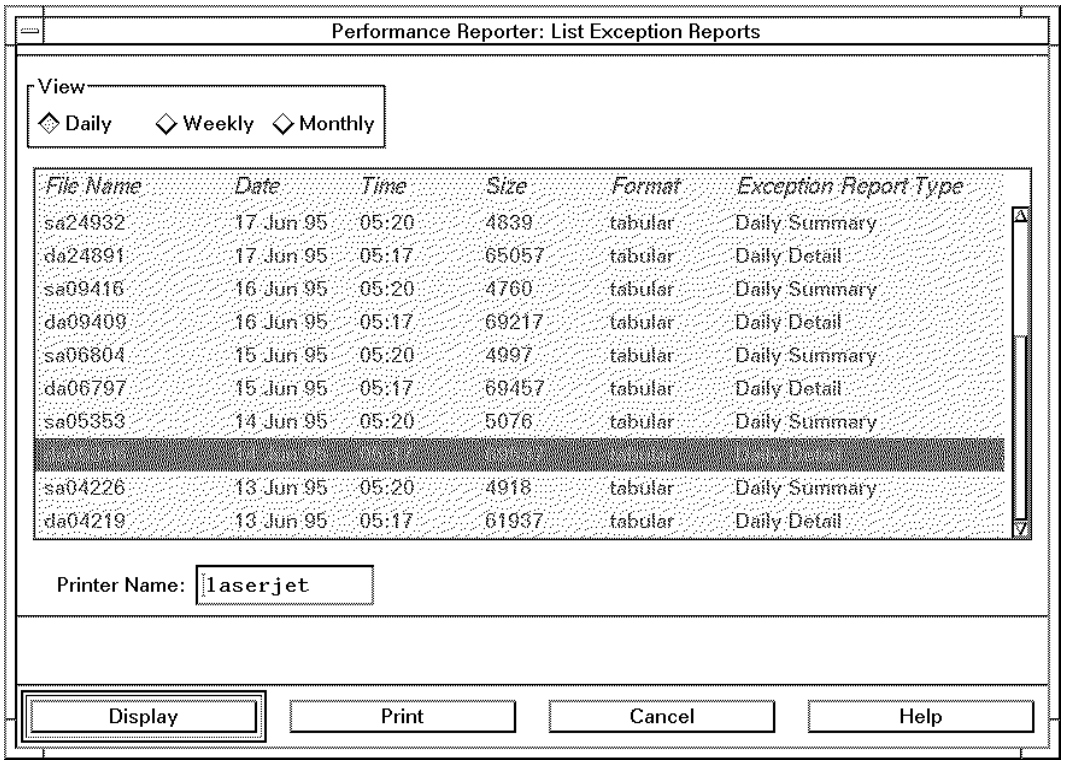
Procedure 14-2. Accessing a Daily Exception Report - Detail

1. At the Performance Reporter Control Window, (**Screen 14-1**), select **List,** then select **Exception Reports**.

   The pop-up window (shown in **Screen 14-2**), listing the exception reports, is displayed with the default of daily.

2. Position the pointer on the Detail Report, with the desired day's date and click.

   The screen will be redrawn with your selection displayed within a box and the Display and Print buttons will no longer be greyed out.

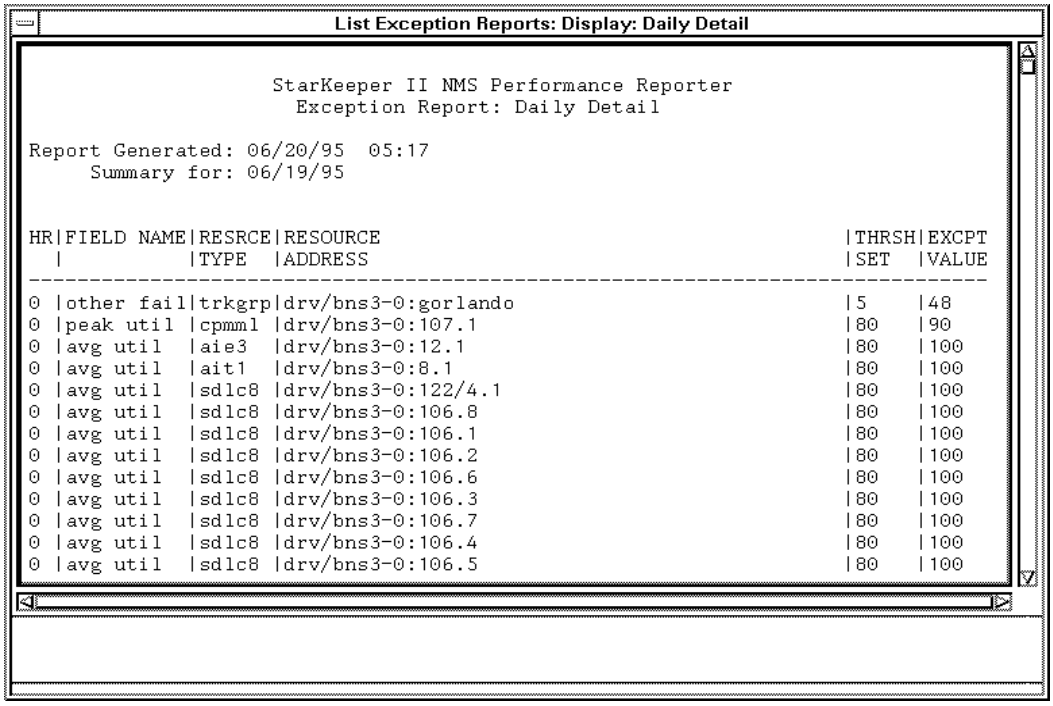


Screen 14-4. Exception Reports Pop-Up Window Redrawn

Depending on the size of the Exception Report and your operation, you have the option to either print or just display the report. The reports are available to print or display for a 5-day period. To eliminate unnecessary printing, you may choose to display the report first and then print it only if you want a hardcopy.

3. To display the report on the screen, click on Display.

   The following pop-up window will be displayed with the contents of the Exception Report.



Screen 14-5. Exception Reports: Daily Detail Report

4. Use the scrollbar to move up and down the list of items.
5. To print a copy of the report, click Print.
6. To dismiss the window, click Cancel.

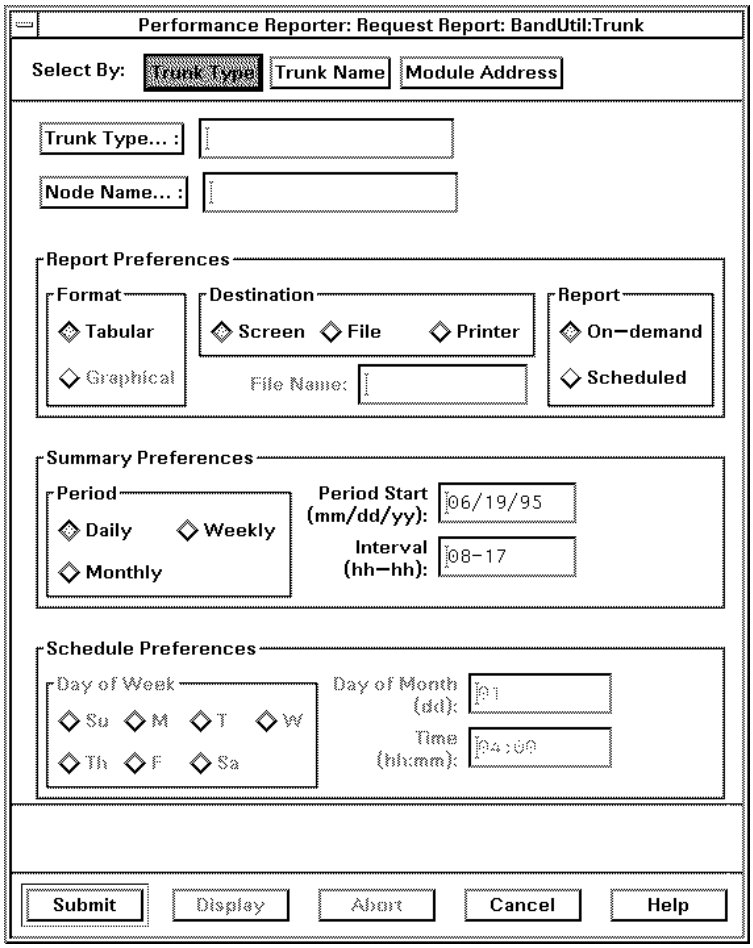
Requesting On-demand Reports

On-demand reports are generated immediately and sent to the screen, a printer, or a file. To obtain on-demand reports, perform the following procedure.

Procedure 14-3. Requesting On-demand Reports

1. At the Performance Reporter Control Window, (**Screen 14-1**), select **Request Report, Bandwidth Utilization**, then select **Trunk**.

   The following form will be displayed with the default of Trunk Type.



Screen 14-6. Bandwidth Utilization - Trunk Form

NOTE:
Identifying trunks by trunk name or module address is useful for requesting on-demand reports for a specific trunk or module address. To request a report by **Trunk Name** or **Module Address** position the pointer on Trunk Name or Module Address in the **Select By** field and click. If **Trunk Name** or **Module Address** were selected, the screen will be displayed again with new fields.

2. Fill out the form using the following field descriptions as a basis for your entries. The fields will vary for different report types. Refer to on-line help for those fields.

   - **Trunk Type**
     You can either enter a single trunk type via the keyboard or pick from the trunk type list. To access the trunk type list, click on Trunk Type. A scrolling list of all trunk types will be displayed. Click on one or more of the trunk types in the list, or choose ALL for all trunks. When you are finished, click on OK. The list will disappear and your selections will be displayed in the text field area.

   - **Node Name**
     You can either enter a single node name via the keyboard or pick from the Node Name list. To access the node name list, click on Node Name and click. The list changes as nodes are added or deleted. Click on one or more of the node names in the list, or choose ALL for all nodes. When you are done, click on OK. The list will disappear and your selection will be displayed in the field provided.

- **Report Preferences**

  — **Format**
  Position the pointer on the tabular or graphical option and click. Since graphs are available only for some types of reports, this option will only be displayed when applicable. Tabular is the default for this field.

  — **Destination**
  The recommendation is to display on-demand reports on the screen, even if you want to file or print them. Once you see the report, you can decide whether you want to file it, print it, or run it again.

  — **File Name**
  If you have requested that your report be filed, you are prompted for the File Name. The File Name can be from 1 to 14 alphanumeric characters long. It will be validated against your other file names when the report has been submitted.

- **Report**
  Position the pointer on on-demand or scheduled and click. on-demand is the default for this field.

- **Summary Preferences**

  - **Period**
    Position the pointer on the daily, weekly, or monthly option, and click. Daily is the default for this field.

  - **Period Start**
    The default is the last completed day, week, or month. You can change the date up to today's date, which will give you reports for partial periods of days, weeks, or months. The format for this field is mm/dd/yy. Leading zeros are not required.

  - **Interval**
    This field specifies the hours of data that you want in the report. The format is hh-hh. The default is ***08-17***, that is from 08:00 to 17:00 hours (8 a.m. to 5 p.m.). You can decrease the interval to a single hour or increase it to 24 hourly intervals.

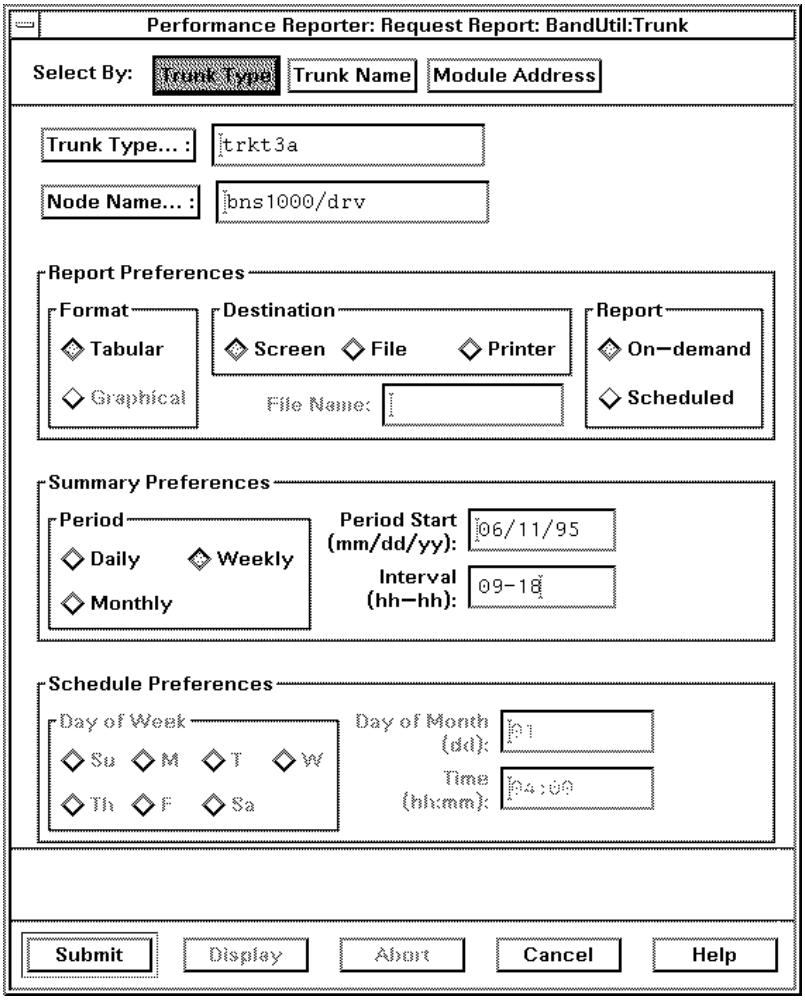
- **Schedule Preferences**

  - **Day of Week**
    Enter the day of the week that you want the report to be run. This field only appears when a summary period of weekly was selected.

  - **Day of Month**
    Enter the day of the month that you want the report to be run. This field only applies when a summary period of monthly was selected.

  - **Time**
    Enter the time of day that you want the report to be run.

The following is an example of a completed form.



Screen 14-7. Bandwidth Utilization - Trunk Form, Completed

The command buttons at the bottom of the form are used to execute your request. They are: Submit, Display, Abort and Cancel

- Submit

  Once you select Submit, it is greyed out and a message **`Report is being requested`** appears in the message area. If you close the window, the request form disappears and the request is not processed.

NOTE:
If you dismiss the window by mistake, you can retrieve the request information by accessing the form again.

The default values are from the last report request that was made.

After the request has been validated, the message **Report is being requested** is displayed in the message area. Submit is now greyed out, which means that you cannot select it. Display is still greyed out, which means that it does not apply. Abort is active.

If you dismiss the pop-up window, the request form disappears and the report generation is stopped. If the request was directed to the screen, it will not be accessible. However, if the request was directed to a file or printer, it **may** be completed, depending on when you stopped it. The only way to tell if the report was appended to the list is to check the **List Filed Reports** (for on-demand reports) or check the printer.

A request will be completed when the message **Report has been generated** is displayed on the message line of the pop-up window, and the report can be either displayed on the screen or can be retrieved from the file or sent to the printer. A bell will ring when the request is complete.

- Display

This button is active only when you have requested the report to be sent to the screen and the report is available. The message **Report has been generated** will be displayed in the message area. Display will be active; Abort and Submit will be greyed out.

Selecting Display will grey out that button, making all buttons on the request form inactive. A separate pop-up window will be displayed with the contents of the report, with Print, Save, Cancel and Help buttons at the bottom.

Print allows you to print the entire report to the printer connected to the Graphics System.

Save allows you to enter a file name. It will be validated against other file names, and you have the option to overwrite an existing file of the same name if you choose.

Previous Graph and Next Graph allow you to page backwards and forwards respectively, through graphs. Cancel allows you to dismiss the report window.

If you dismiss the window before you select Display, then the request window goes away and no report is displayed.

- Abort

  This button is active only between the time the **`Report is being requested`** and **`Report has been generated`** messages are displayed. It allows you to stop a report and hence free up the window for another request. For example, maybe the request is taking too long (in which case you should schedule it), or you realize in looking at the request form that you have made a mistake.

- Cancel

  This button is used to dismiss the window.

3. Position the pointer on the desired command button and click.

Troubleshooting Performance Problems

This is a suggested scenario for troubleshooting performance problems that were identified in the Daily Exception Reports.

1. The first step in troubleshooting performance problems is to review the contents of the Daily Exception Reports. Focus on the most frequently occurring exceptions, which will be listed at the top of the Daily Exception Report - Summary, covered at the beginning of this chapter.

   If you want more detail on the exceptions, check the Daily Exception Report - Detail, also covered in this chapter.

2. Compare the current summarized exception report (which is from yesterday) against the previous summarized exception report (which is from the day before yesterday).

   If you don't have a hardcopy from the previous days report, refer to the procedures on Accessing Daily Exception Reports in this chapter and obtain a report with the desired date.

   - See if the problem still exists, stayed the same, or got worse.
   - If you performed a fix yesterday, see if it worked.

3. Compare the data against the current network.

   - Obtain an on-demand report to see if the trouble still exists.
   - Request status from the node. For example, execute the node's **dstat** command.
   - Look for related alarms that could explain trouble.

4. Request more detailed information on the exception.

   If trouble still exists, request on-line detailed exception report for the previous day, showing the hours that the threshold was exceeded and by how much.

5. Decide which troubles are important to be fixed or referred.

   - Disregard expected or known troubles that will be relieved by a planned fix.
   - Disregard troubles that can be explained by known events; for example, power outage, alarm, user traffic, day of the week.
   - Concentrate on potential service-affecting troubles.

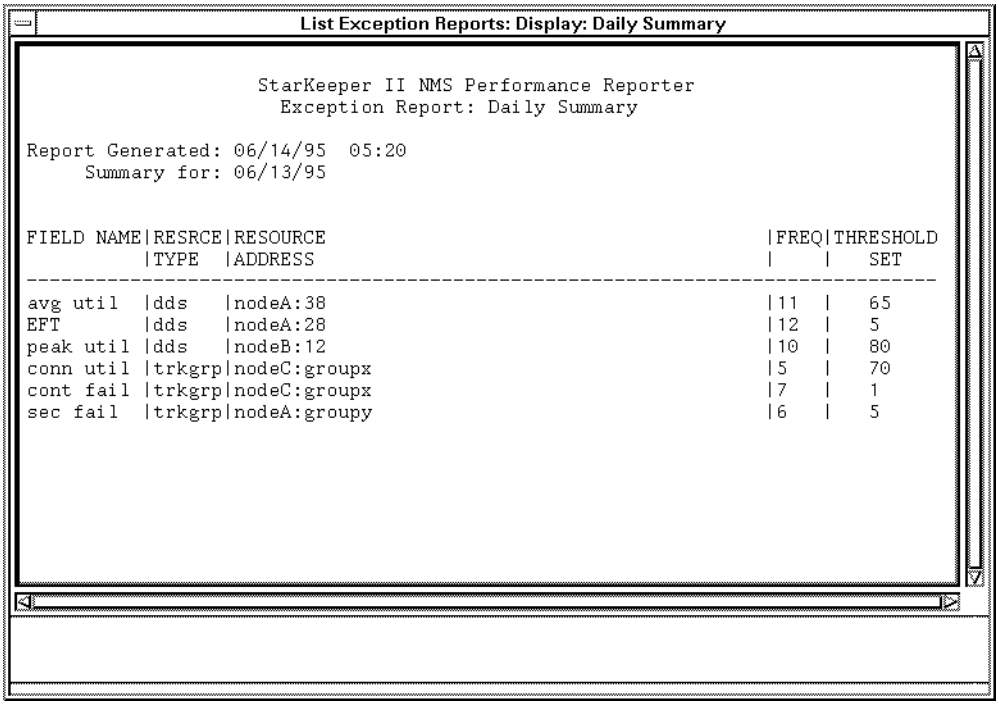
Fixing Performance Problems

Performance problems can be fixed in a number of ways. The following list shows a few things that can be done to fix a performance problem.

- Implement short-term fix for logical resource problems, for example, change group assignments, change destination, or add channels to name a few.
- Refer recurring problems or important physical resource problems to the engineering group.
- Follow-up on today's fixes by periodically running on-demand reports for the latest data to see if the fix worked. See the procedure on **Requesting On-demand Reports**.

Examples

The following is a sample Daily Exception Report - Summary that is the basis of the following examples.



Screen 14-8. Daily Exception Report Example

Error Free Transmission (EFT) Thresholds

- Note that the EFT for the DDS trunk is the most frequently exceeded threshold.
- Compare to the previous day's exception report and note that the frequency has increased.
- Compare against the current network.
  - — look at today's alarms (via Network Monitor) for CRC and RECVR ABORT errors. CRC errors indicate noise on the line, which is a facility problem. RECVR ABORT errors indicate that the module is overloaded: there is either too much traffic on the line, the line speed is low, or the module is reaching its capacity. A RECVR ABORT error requires a logical reconfiguration.

- Request an on-line detailed daily exception report for DDS trunk; see at what time the EFT threshold was exceeded, and by how much.
- Refer the problem to the engineering group. Print or save pertinent supporting information to a file. CRC errors should be referred to the vendor. RECVR ABORT errors require logical reconfiguration.

Peak and Average Trunk Utilization Thresholds

- See that the peak and average trunk utilization for the DDS trunks are frequently exceeded thresholds (in the receive direction).
- See that the same trunk has EFT problems, indicating a related trouble.
- Compare to the previous day's trunk utilization report (on-line) for the DDS trunk.
  - Check the transmit peak and average utilization figures. If high also, suspect a line problem. If not high, suspect a module problem with the receiving end. Continue to investigate; for example, **dstat** or **dmeas** on the trunk module, module-level performance report for the trunk module, CRC or RECVR ABORT errors on the module.
- Refer the problem to the engineering group, to pursue with vendor. Print or save pertinent supporting information to a file. Indicate whether line or module problem is suspected.

Contention Failure Thresholds

- See that the number of contention failures for **groupx** exceeded the threshold 7 times yesterday. Assume that these are during the typical busy hours.
- Request the on-line detailed exception report for the previous day to see during what hours it exceeded the threshold and by how much.
- Compare to the previous day's summary report and see that this is a new problem.
- If possible, relate it to a known network condition for example, a trunk was down yesterday, a number of new users were added, etc.
- Compare against the current network.
  - look at today's utilization - trunk group connections report (high level) to see if the call success rate is low and/or % peak channel utilization is high.
  - look at today's utilization - trunk group connections report (failure detail) to see if there are a high number of contention failures.
- If problem still exists today, allocate more channels to the group using the node's **change group** command.

Security Failure Thresholds

- See that the number of security failures for **groupy** exceeded the threshold 6 times yesterday.
- Request the on-line detailed exception report for the previous day to see during what hours it exceeded the threshold and by how much.
  - If it exceeded the threshold after midnight, consider it a possible security breach.
- Compare to the previous day's summary report and see that this is the second time in a row for this trunk group. You may want to check the previous summary reports, either on-line or hardcopy, to see if the trunk group was also on those reports.
- Refer the problem to the System Administrator. Print or save to a file the supporting information.

Peak Connection Utilization Thresholds

- See that the percent peak channel utilization for **groupx** exceeded the threshold 5 times yesterday. This can lead to an increased response time for calls going through the trunk group, and may also lead to call blocking.
- Compare to the previous day's summary report. If the number of exceptions for **groupx** has decreased, it may not be worth pursuing. If the number of exceptions has increased, then request the detailed exception report.
- Request the on-line detailed exception report for the previous day to see during what hours it exceeded the threshold and by how much.
- Request the on-line utilization - connections report for **groupx**, using yesterday's date looking at 24 hourly intervals.
  - Look for the hours in which the threshold for % peak channel utilization was exceeded.
  - For those hours, see if the call success rate was less than 100%, indicating call failures.
  - If there are failures, request the detailed failure analysis to determine whether these are security, contention, or other (most likely indicating a hardware or software problem). Since failures are also thresholded, it is likely that there will be a corresponding entry in the exception report for a failure.
- Refer chronic or serious security failures to the System Administrator. Print or save to a file the supporting information.

- If it is a contention problem and there are unused channels in existing modules, allocate more channels to that trunk group by administering the trunk module(s) in that group. See **Chapter 8**, or the node's **change trunk** command to add channels.
- If there are no known spare channels, refer the problem to the engineering group. Either a new module must be used or channels must be found in existing modules.

Frame Relay Thresholds

- The Exception report displays module, port, facility, virtual port, and dlci level fields in the *Field Name* column. For the FRM module, module, port, facility, and dlci fields are shown; for the FRM-M2 module, module, port, virtual port, and dlci fields are shown. The *Resource Type* column displays:
  - **module** specifies the frame relay module level field
  - **port** specifies the port level field for FRM or the physical port level for FRM-M2
  - **facility** specifies the facility level field for FRM
  - **virtual port** specifies the virtual port level field for the FRM-M2
  - **dlci** specifies the DLCI level field.
- Execute **skschema -t <*table_name*>** to determine field definitions for FRM and FRM-M2. The threshold field names are selected as follows:
  - —*frm_mod* for the FRM module level
  - —*frm_fac* for the FRM facility level
  - —*frm_port* for the FRM port level
  - — *frm_dlci* for the FRM DLCI level
  - —*frm_m2_mod* for the FRM-M2 module level
  - —*frm_m2_pport* for the FRM-M2 physical port level
  - —*frm_m2_vport* for the FRM-M2 virtual port level
  - —*frm_m2_dlci* for the FRM-M2 DLCI level.

NOTE:
Although **skschema** will indicate that the FRM and FRM-M2 DLCI fields listed on the next page are stored as counters in the database, Exception Reports will present these fields as percentages (ratios of the counter value to the total number of frames received or transmitted on the DLCI). When setting the threshold values for these fields, you must specify the desired value as a percentage in the range 0 to 100. For details on how each is calculated, refer to the

Performance Reporter On-Line Help. The affected fields are:

frms_de_rcv	*frms_de_xmit*
frms_fecn_rcv	*frms_fecn_xmit*
frms_becn_rcv	*frms_becn_xmit*

Using Performance Reporter for Long-Term Traffic Engineering

15

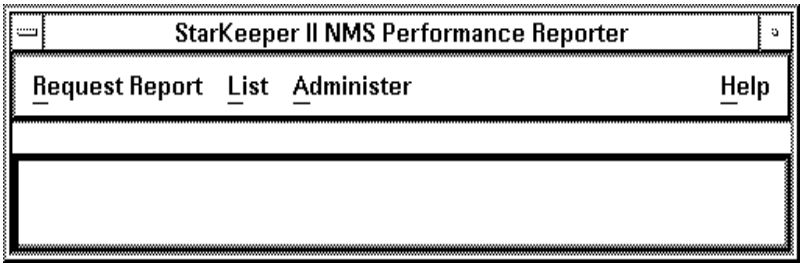
The purpose of long-term engineering is to keep the network running optimally over time, taking into consideration its past performance and anticipated changes. There are several supporting activities: accessing, reviewing, and analyzing performance data are the primary activities. Three sets of information should be available to you for long-term traffic engineering: the specifications for the current network, with performance objectives; performance measurement reports to see if the objectives are being met; and a network plan for the future, which may be modified to address deficiencies of the current network or future changes.

Performance objectives are usually end-to-end measures that you establish. The threshold values that you select (see **Chapter 13)** are useful for identifying physical and logical resource problems, but they are not necessarily performance objectives.

This chapter provides the procedures to schedule performance measurement reports. It also presents a scenario for using the reports and some examples.

The Performance Reporter Control Window

The following is the Performance Reporter Control Window.



Screen 15-1. Performance Reporter Control Window

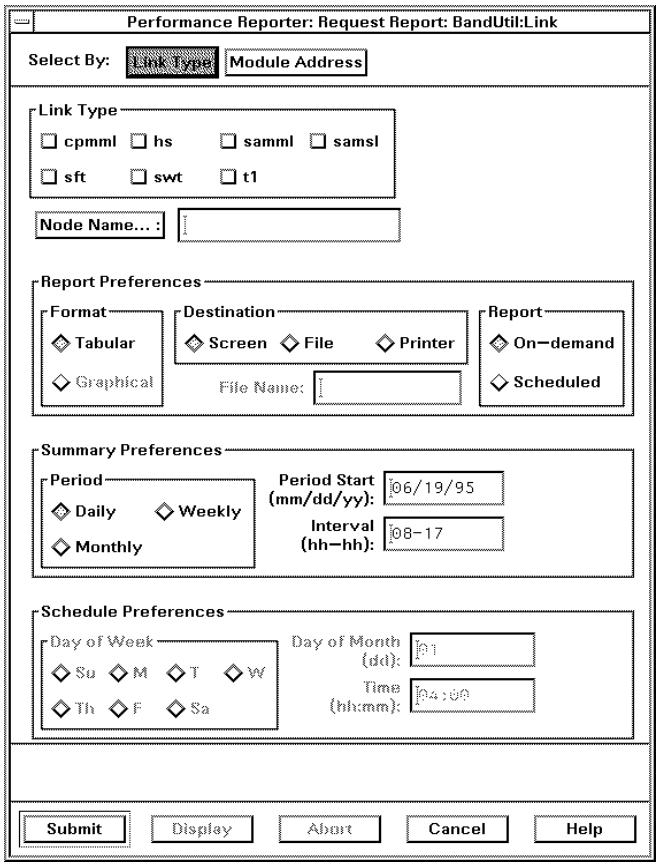
Requesting Scheduled Reports (Bandwidth Utilization Link)

Scheduled reports are generated according to the date and time you specify. You can review these report requests by choosing **List** and then choosing **Request Report**.

Procedure 15-1. Requesting Scheduled Reports (Link Bandwidth Utilization)

1. At the Performance Reporter Control Window, (**Screen 15-1**), select **Request Report**, **Bandwidth Utilization**, and then **Link** from the sub-menus.

The following form will be displayed with the default of Link Type. This screen is dynamically displayed, so some of the information will be displayed according to your input. The screen will be redrawn as information is entered.



Screen 15-2. Scheduled Report Link Bandwidth Utilization Form

2. Fill out the form using the following field descriptions as a basis for your entries. The fields will vary for different report types. Refer to on-line help for those fields.

   - **Link Type**
     Position the pointer and click for any or all link types. For a scheduled report, you will probably want to report on all links and run the reports by link type. You can select any or all of the link types for a single report.

- **Node Name**
  You can either enter a single node name via the keyboard or pick from the Node Name list. This is the scrolling list of all nodes that are known to the Core System. The list changes as nodes are added or deleted. You can select specific **Node Name(s)** or all.

- **Report Preferences**

  - **Format**
    Position the pointer on the tabular option and click. Since graphs are available only for some types of reports, this option will only be displayed when applicable. Tabular is the default for this field.

  - **Destination**
    The recommendation is to display on-demand reports on the screen, even if you want to file or print them. Once you see the report, you can decide whether you want to file it, print it, or run it again.

  - **File Name**
    If you have requested that your report be filed, you are prompted for the File Name. The File Name can be from 1 to 14 alphanumeric characters long. It will be validated against your other file names when the report has been submitted.

  - **Report**
    Position the pointer on on-demand or scheduled and click. On-demand is the default for this field.

- **Summary Preferences**

  - **Period**
    Position the pointer on the daily, weekly, or monthly option, and click. Daily is the default for this field.

  - **Period Start**
    The default is the last completed day, week, or month. You can change the date up to today's date, which will give you reports for partial periods of days, weeks, or months. The format for this field is mm/dd/yy. Leading zeros are not required.

  - **Interval**
    This field specifies the hours of data that you want in the report. The format is hh-hh. The default is ***08-17***, that is from 08:00 to 17:00 hours (8 a.m. to 5 p.m.). You can decrease the interval to a single hour or increase it to 24 hourly intervals.

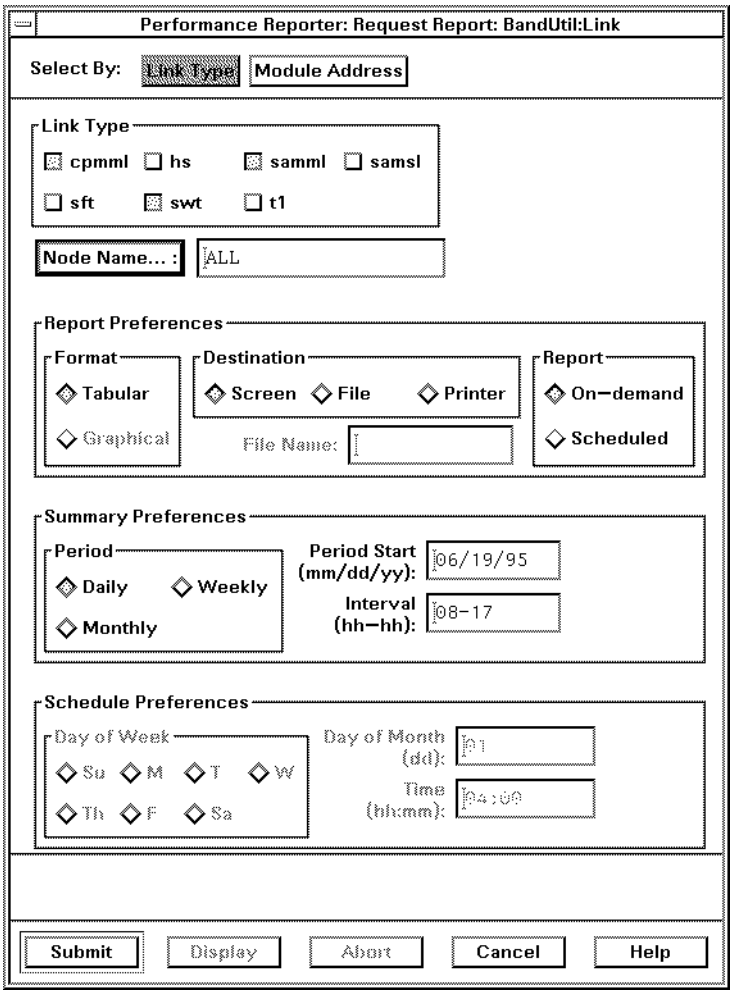
- **Schedule Preferences**

  - **Day of Week**
    Enter the day of the week that you want the report to be run. This field only appears when a summary period of weekly was selected.

— **Day of Month**
Enter the day of the month that you want the report to be run. This field only applies when a summary period of monthly was selected.

— **Time**
Enter the time of day that you want the report to be run.

The following is an example of a completed form.



Screen 15-3. Scheduled Report Link Bandwidth Utilization Form Completed

The command buttons at the bottom of the form are used to execute your request. They are: Submit, Display, Abort and Cancel.

- Submit

  This is the only active button at the bottom of the report request. It works like Submit at the bottom of the on-demand request window.

  Once you select Submit, the button is grayed out and the message **`Report has been scheduled`** is displayed in the footer of the window. If you unpin the window, the request form disappears and the request is not processed.

  NOTE:
  If you dismiss the window by mistake, you can retrieve the request information by accessing the form again. The default values are from the last report request you made.

  After the request has been validated, and the report scheduled, the message **`Report has been scheduled`** is displayed in the footer of the window. Submit is now active again.

  If you dismiss the window while it is being validated, the form goes away and a report request may have been generated if you didn't catch it in time. There is no way to display a message to tell you what has happened. Choose Display from the **List** menu to check if the request has been entered. It will be the most recent request, if it is there.

- Display

  This is not valid for scheduled reports, because they can go only to a file or a printer.

- Abort

  This is not valid for scheduled reports, because it will not be necessary to wait a long time for a report request to be created. If you have made a mistake and want to delete the request, complete the following steps:

  — Choose **List** on the Performance Reporter menu.

  — Position the pointer on **Report Requests** and click. The system displays a list of requested reports.

  — Select the report to be deleted.

  — Position the pointer on Delete and click. The report request is deleted.

- Cancel

  This button is used to dismiss a window.

3. Position the pointer on the desired command button and click.

Scenario

1. Identify performance problems which require a long-term solution
   - Receive chronic problems from the operations group
   - Review trend reports for troubles
     - weekly exception report
     - monthly exception report
     - weekly and monthly reports for network resources (e.g., network availability, trunk utilization, connections). Run the graphical versions of these reports.
   - Initiate studies, as needed, to investigate troubles further
     - schedule standard Core System reports
     - create and schedule customized reports
   - Identify vendor troubles and refer them to vendor for resolution (most likely will be facility problems to be referred to a carrier)
2. Identify network growth needs
   - review trend reports, looking for increase or decrease in usage over time. Use thresholds as a guide.
   - compare to what the network was engineered for
   - refer to planned network changes (e.g., new users, new applications, new hosts)
3. Arrive at one solution that solves both problems and growth needs
   - Modify current plan
   - Create new plan

Examples

The following are long-term traffic engineering procedural examples.

Bandwidth Utilization Trunk/Link

1. Run the weekly and monthly graphical Bandwidth Utilization Trunk/Link reports on a regular basis.
2. Review the reports after they are run. Determine if you want to look at the corresponding tabular reports while they are still available four weeks for weekly reports, three months for monthly reports).
3. Look for peaks and averages that exceed thresholds. These are problem areas. Look also at the difference between peak and average values of overutilized trunks. The smaller the difference, the more frequently the trunk is running at a higher utilization.
4. Look for averages that are decreasing over time. These may be underutilized resources that can either have more traffic on them or be downgraded.
5. Look for peaks and averages that grow steadily over time. These are growth areas, requiring either an upgrade or additional resources.

Bandwidth Utilization Node

1. Run the weekly and monthly tabular Bandwidth Utilization Node reports on a regular basis.
2. You may want to run the daily version of these reports for new nodes or for nodes that are being watched (e.g., a node that is known to be over the peak and average threshold). For new nodes, you may want to reposition the modules; e.g., move to a higher or lower priority backplane slot or find out if you have spare bandwidth.
3. Review the reports after they are run. Determine if you want to look at the detailed information while it is still available; e.g., daily Bandwidth Utilization Node reports, corresponding alarm reports, user trouble calls. You are looking for information that could be used to interpret a high utilization percentage.
4. The backplane utilization can be high without impacting throughput or delay. A high utilization is desirable because it indicates that you are making use of the bandwidth you've purchased. However, there may be a level (depending on the types of modules and traffic) at which a particular node starts to function less than optimally. Also, a particular module may be performing less than optimally because of its type and its position on the backplane.
5. Look for peaks and averages that exceed thresholds. These are potential problem areas. Look also at the difference between peak and average values of overutilized nodes. The smaller the difference, the more frequently the node is running at a higher utilization. Again depending on the node configuration, this may or may not be a problem.

Port Capacity Utilization

1. Run the weekly and monthly graphical Port Capacity Utilization reports on a regular basis.
2. Review the reports after they are run. Determine if you want to look at the corresponding tabular reports while they are still available (four weeks for weekly reports, three months for monthly reports). You may also want to look at the Module Performance Reports for specific addresses, which shows the % busy occurrences of the module as well as module-level errors.
3. Look for peaks that exceed thresholds. These are potential problem areas. To determine whether or not this is a service-affecting problem, check the following:
   - Utilization for other ports on the same module. If all ports have high peak utilization (not necessarily over the threshold) at the same time, then the module capacity may have been exceeded.
   - Module level errors on the Module Performance Report.
   - % busy occurrences of the module.
   - The capacity of the module. To see the throughput of the module, add up all the bytes passing through it and divide by the module capacity. A high throughput can indicate a problem.
   - The port line speeds. There may be a mismatch in the port configuration and the facility itself.
4. Look for unusually low utilization. These resources are either underutilized because of low user traffic or module congestion. If the module is congested and it is not due to traffic across the port, then check the Bandwidth Utilization Node Report for high utilization. You may need to change the physical location of the module to a higher priority backplane slot.
5. Some of the other possible solutions are: change the line speed, decrease the number of groups using this module, or replace the board.
6. Look for averages that are decreasing over time. These may be underutilized resources.
7. Look for peaks and averages that grow steadily over time. These are growth areas, requiring either logical or physical changes.

Network Availability Trunk/Node

1. Run the weekly and monthly tabular Network Utilization reports on a regular basis. Availability is ideally 100%, and small deviations are considered important.
2. You may want to run the daily version of these reports for new resources or for resources that are being watched (e.g., a trunk that is unpredictable).
3. Review the reports after they are run. Determine if you want to look at the detailed information while it is still available; e.g., daily network availability reports, corresponding alarm reports, user trouble calls. You are looking for information that could be used to explain why a resource was unavailable.
4. For nodes, the availability represents the availability of the node to the Core System. A low availability could be the result of Core System trouble, a bad connection (an interface module or the line) between the node and the Core System, or a problem with the node itself.
5. For trunks, the availability represents the availability of the trunk, based on the two trunk modules. A low availability could be the result of either one of the trunk modules or the facility itself being down.

Managing Performance Reporter Files and Requests

16

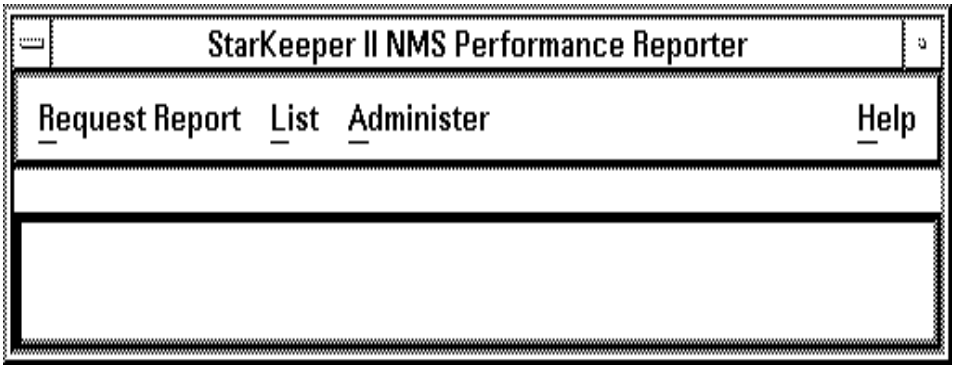
This chapter provides procedures for the maintenance of files and report requests.

Managing Filed Reports

Performance Reporter allows you to save a report in a file. If you are requesting a report to be run now and saved in a file, you enter a file name. If you are requesting a report to be run according to a schedule, the Performance Reporter generates a file name automatically when the report runs.

The purpose in filing reports is to make them available for displaying or printing at a future time. Use the file name or report type and date as a key. For reports that you have scheduled, there is a retention period and automatic cleanup. See **Chapter 14** for more information on retention periods. You also have the ability to remove those files manually. Reports that you have requested on-demand must be deleted manually.

Managing filed reports is the process of accessing, reviewing, and deleting files.



Screen 16-1. Performance Reporter Control Window

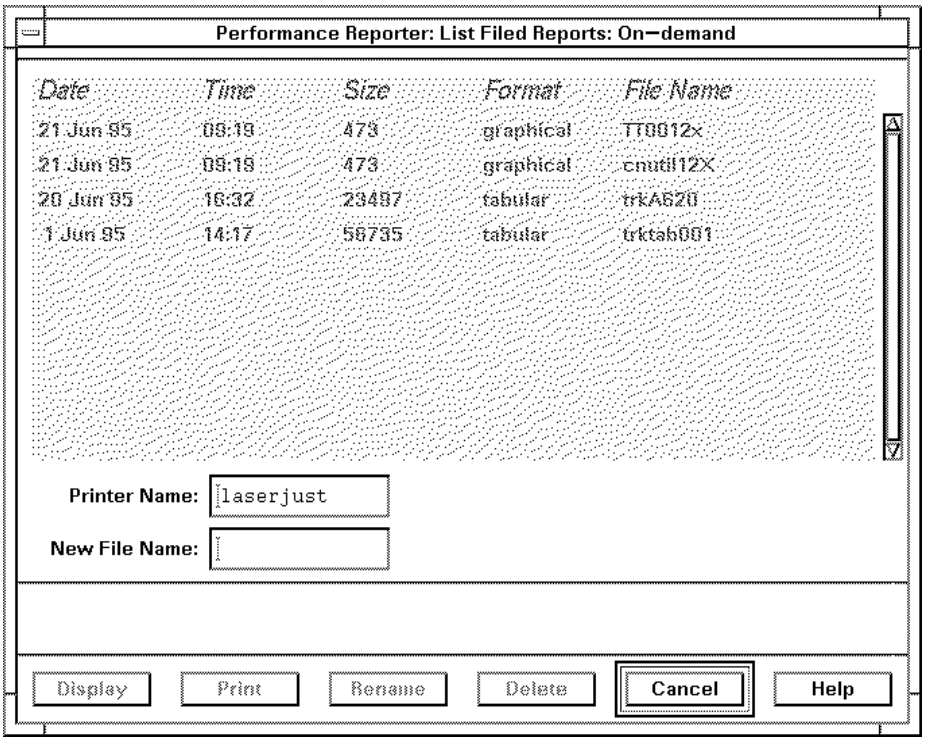
Managing On-demand Filed Reports

On-demand reports can be viewed, printed, renamed, or deleted.

Procedure 16-1. Managing On-demand Filed Reports

1. At the Performance Reporter Control Window, (**Screen 16-1**) select **List**, **Filed Reports**, and then **On-demand Reports** from the sub-menus.

   The following scrolling list will be displayed.



Screen 16-2. On-demand Reports Pop-Up Window

The files are listed with the most recently created files first. DATE and TIME represent when the file was created, or updated if you overwrote an existing file. SIZE is the number of characters in the file. This number gives you an idea of the size of the report relative to other reports. FORMAT tells you whether the report is tabular or graphical. FILE NAME tells you the name of the file. If there are no files in the scrolling list, the list will be empty and the message **`List contains no report files`** will be displayed.

2. Initially, all buttons are greyed out. When you pick a file(s) the appropriate buttons become valid. Select which file(s) you want and decide what action you want to take.
3. Position the pointer on your desired selection and click.

- Display

  You can select a single file to be displayed. Position the pointer on the report you wish to display and click. Position the pointer on Display and click. The contents of the report will be displayed in a pop-up window. To display another report, go back to the previous pop-up window, position the pointer on the report that is already displayed and click. This will deselect the report. Position the pointer on the next report you wish to display and click. Position the pointer on Display and click. The contents of the new report will be displayed in another pop-up window.

- Print

  You can print multiple files. The files that you selected from the scrolling list will be highlighted.

- Rename

  You can select only one file at a time to rename. If more than one file is selected, Rename is greyed out.

  Enter the new file name in the text field before you click Rename.

  If the new file name already exists, the following message will be displayed: **`Cannot rename over existing file.`** You must either delete the existing file and then reselect the file you wish to rename, or choose another file name.

- Delete

  You can delete multiple files. A notice window will be displayed prompting you to confirm the deletion.

  You must choose Delete, or Cancel before you can do anything else in Performance Reporter.

  If you chose Delete, the list is frozen until the deletion(s) have been completed. Once completed, the list is unfrozen and you may scroll through it again.

- Cancel

  This button is used to dismiss a window.

Managing Scheduled Filed Reports

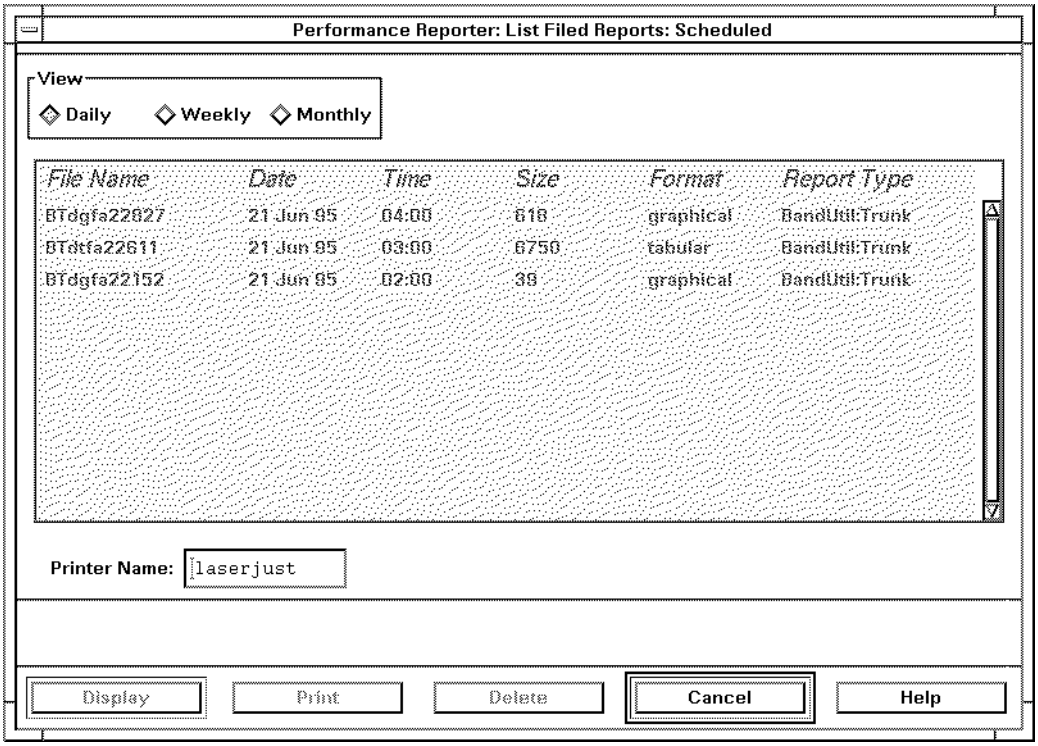
These are reports that you have scheduled to be run repeatedly. Scheduled reports are the kind that you will use for management reports or for long-term engineering. You must access them within the retention interval or else they will be automatically deleted. Even though these files are deleted automatically, you have the option to delete them manually.

Scheduled reports can be viewed, printed, or deleted.

Procedure 16-2. Managing Scheduled Filed Reports

1. At the Performance Reporter Control Window, (**Screen 16-1**), select **List**, **Files Reports**, and then **Scheduled Reports** from the sub-menus.

   The following scrolling list will be displayed with the default of daily.



Screen 16-3. Scheduled Reports Pop-Up Window

The files are listed with the most recently created files first. DATE and TIME represent when the file was created, or updated if you overwrote an existing file. SIZE is the number of characters in the file. This number gives you

an idea of the size of the report relative to other reports. FORMAT tells you whether the report is tabular or graphical. REPORT TYPE tells you the type of report. If there are no files in the scrolling list, the list will be empty and the message **`List contains no report files`** will be displayed.

2. There are several buttons at the bottom of the screen. Initially, all buttons are greyed out. When you pick a file(s) the appropriate buttons become valid. Select which file(s) you want and decide what action you want to take. You can: Display, Print, Delete or Cancel a report.

   - Display

     You can choose a single file to be displayed. Position the pointer on the report you wish to display and click. Position the pointer on Display and click. The contents of the report will be displayed in a pop-up window. To display another report, go back to the previous pop-up window, position the pointer on the report that is already displayed and click. This will deselect the report. Position the pointer on the next report you wish to display and click. Position the pointer on Display and click. The contents of the new report will be displayed in another pop-up window.

   - Print

     You can print multiple files. The files that you selected from the scrolling list will be highlighted.

   - Delete

     You can delete multiple selections. A notice window will be displayed prompting you to confirm the deletion.

     You must choose Delete or, Cancel before you can do anything else in Performance Reporter.

     If you chose Delete, the list is frozen until the deletion(s) have been completed. Once completed, the list is unfrozen and you may scroll through it again.

   - Cancel

     This button is used to dismiss a window.

Managing Report Requests

The Performance Reporter allows you to run daily, weekly, and monthly reports according to a schedule. Scheduled reports are used for management reports or for long-term engineering. For example, you will probably schedule the Network Availability reports for nodes and trunks to be run at least weekly, if not daily, to evaluate the level of service that the physical network provides.

The scheduling capability allows you to specify the request once and have the report run repeatedly. See **Chapter 14** for the procedure to schedule reports. The procedure described below is for managing the schedule requests that you have already entered. In most cases, you will be fine-tuning the schedule that you have been running. You have the ability to review what you have scheduled.
You can make changes to the contents of the report as well as to the schedule. For example, you may find that you want to run reports on different groupings of resources, or you may find that you're not getting the right report because you have specified the wrong report generation time.

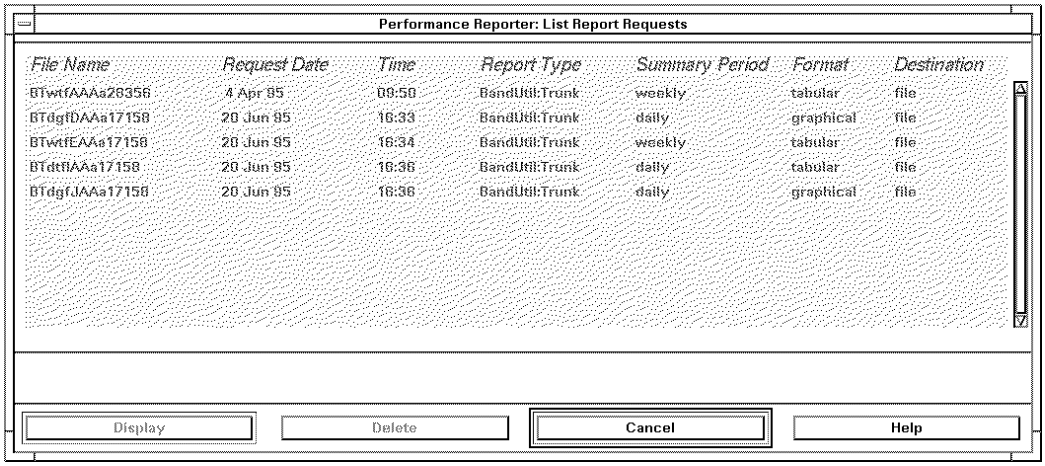
When you enter a request for a scheduled report, the default report generation time is 4 a.m. This allows the daily data to be summarized and it also takes advantage of off-hours processing time. More than one report can be scheduled for the same time, but it is a good idea to stagger them. Be sure that the date and time you specify to run them is after all the data is complete but before it is automatically deleted.

Managing report requests is the process of accessing, reviewing, and then making changes to them.

Procedure 16-3. Managing Report Requests

1. At the Performance Reporter Control Window, (**Screen 16-1**) select **List**, and then **Report Requests** from the sub-menu.

   The following scrolling list will be displayed.



Screen 16-4. List Report Requests Pop-Up Window

All the report requests are displayed on this list, in order of request date, beginning with the oldest request. This is the date that the **cron** was created or last changed. Use the request date, report type, and summary period information to identify the report request that you're interested in. If there are no requests, the scrolling list will be empty and the message **`List contains no report requests`** will be displayed in the footer of the window.

2. Position the pointer on the item(s) and click.
3. There are four buttons at the bottom of the screen. Initially, the Display and Delete buttons are greyed out. When you pick a request(s) the appropriate buttons become valid. Select which request(s) you want and decide what action you want to take. You can view the full request with the option to update it or delete the request(s).
4. Position the pointer on the desired button and click.

- Display

  You can choose only one item at a time. This button will bring up a report request form, with the information you originally entered. There are three buttons at the bottom of the form, Update, Cancel and Help.

  If you are done viewing and do not wish to make any changes, click the Cancel button. If you wish to make changes to the request, position the pointer on the field(s) you want to change and enter the changes. Refer to **Procedure 15-1, Requesting Scheduled Reports** for information on changing fields. When you are satisfied with the changes you have made, choose Update.

  You cannot change the Run Report field from scheduled to on-demand. In order to make that change, you must delete the request and then enter an on-demand request. Refer to **Procedure 14-3, Requesting On-demand Reports**.

  NOTE:
  Due to the fact that the node list reflects the most current status of the nodes, the node list may be different from the nodes that you originally requested. If a node is no longer valid, you will be notified via a pop-up window and will have the option to delete it.

- Delete

  You can delete multiple selections. The following notice window will be displayed prompting you to confirm the deletion.

  You must choose Delete, or Cancel before you can do anything else in Performance Reporter.

  If you chose Delete, the list is frozen until the deletion(s) have been completed. Once completed, the list is unfrozen and you may scroll through it again.

Performance Reporter: Report Examples and Interpretation

17

This chapter contains examples of the tabular and graphical reports that are generated when using **Performance Reporter**.

NOTE:
The following abbreviations may appear in the output fields of any report generated using Performance Reporter:

- N/A - not applicable;
- UA - unavailable;
- I - incomplete measurement intervals, the data is suspect as far as the utilization numbers are concerned. For example, on a daily report an “I” means a complete hours information is not available, the time has changed, or the speed of the module has changed within the hour.

Report Types

The following table lists the reports that are available from Performance Reporter. All reports are available as tabular reports. Those reports also available as graphical reports are indicated below.

Table 17-1. Report Types

Request Report	Utilization Type	Select Type	Graphical Report Available
Bandwidth Utilization	Trunk	Trunk Type	
Bandwidth Utilization	Trunk	Trunk Name	Yes
Bandwidth Utilization	Trunk	Module Address	Yes
Bandwidth Utilization	Link	Link Type	
Bandwidth Utilization	Link	Module Address	Yes
Bandwidth Utilization	Node	Detail	
Bandwidth Utilization	Node	Summary	
Bandwidth Utilization	M1 Shelf		
Connection Utilization	Recv Group		
Connection Utilization	Trunk Group		
Connection Utilization	X25		
Connection Utilization	Node		
Port Capacity Utilization		Module Type	
Port Capacity Utilization		Module Address	Yes
Network Availability	Trunk		
Network Availability	Node		
Module Performance		Module Type	
Module Performance		Module Address	

Tabular reports:

Performance Reporter provides the ability to obtain tabular reports for all reports. The vertical scroll bar in the tabular report window allows you to scroll through the report. The **Printer Name** field displays the default printer in the system. Change the printer name if you wish. The **Save File Name** field is for you to enter the file name if you wish to save the report to a file.

The following buttons are displayed at the bottom of a tabular report: Print, Save and Cancel.

- Print

  This button will send the tabular report to the printer.

- Save

  This button will save the tabular report to a file.

- Cancel

  This button is used to dismiss the tabular report window.

Graphical Reports

Performance Reporter provides the ability to obtain graphical reports for some of the five report types.

When using graphical reports, Performance Reporter provides the ability to change the graph type and axis orientation dynamically. You can change the type of graph from a plotted graph to a bar graph or vice versa by clicking on **bar** or **plot** under the **graph types** option at the top of the report. Most graphs display the X-axis horizontally and the Y-axis vertically.

It is often desirable to invert the axis positioning. In a plotted graph, inverting causes the Y values to be plotted against the horizontal axis, and the X values to be plotted against the vertical axis. In a bar chart, inverting causes the bars to be displayed horizontally instead of vertically. You can invert a graph by clicking the **invert** option under **Axis Orientation** at the top of the report.

The following buttons are displayed at the bottom of a graphical report: Print, Save, Next Graph, Previous Graph and Cancel.

- Print

  This button will send the graphical report to the printer. Only the graphical parts of the report will be printed. The printout will display and go to the system default printer. To change the destination, enter the desired printer name before you click the Print button.

- Save

  This button will save the graph to a file. Enter the desired file name in the **Save File Name** field before clicking the Save button.

- Next Graph

  This option is only active when more than one page of graphs are available. The next graph will be displayed in the same window.

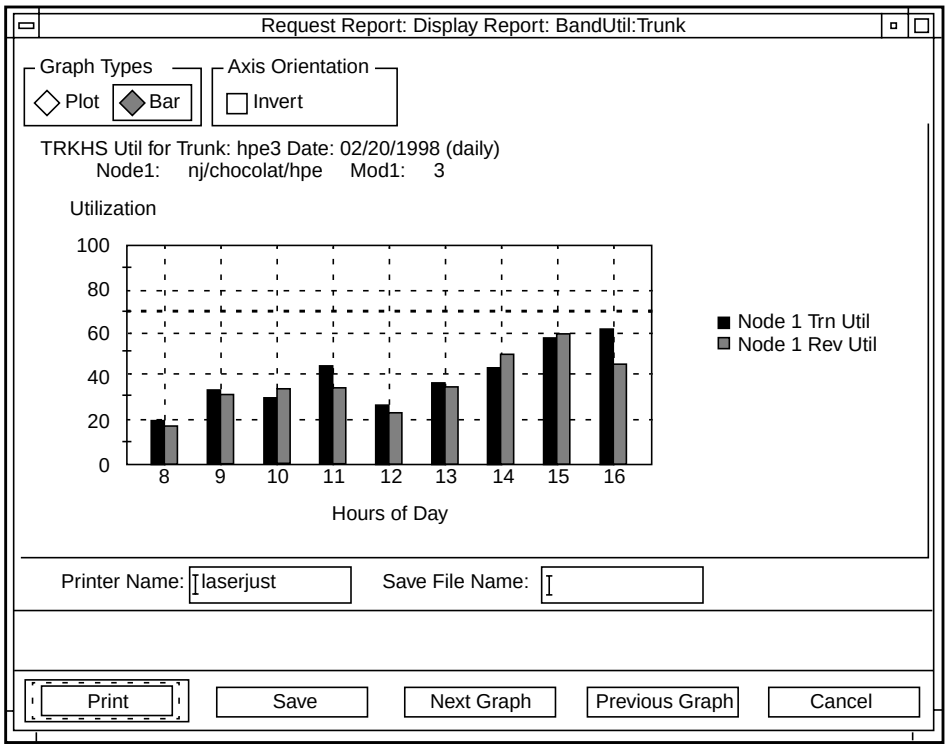
- Previous Graph

  This option is only active when more than one page of graphs are available. The previous graph will be displayed in the same window.

- Cancel

  This button is used to dismiss a window.

In the example below, a single trunk's utilization is shown for both the receive and transmit directions.



Screen 17-1. Sample Bandwidth Utilization Link Graphical Report

Report Interpretation

The Bandwidth Utilization reports show the usage and performance of the link, trunk, node, or M1 shelf. The key field is %UTIL, which represents how much of the physical link, trunk, node, or M1 shelf is being used. The %UTIL is the average utilization of the link, trunk, node, or M1 shelf during the interval. A general guideline is that average utilization should not exceed 70%.

If a value in the %UTIL field cannot be explained by usage or errors, it is possible that the configuration information was entered incorrectly in the database. The link report uses the speed of the link from the database in its calculations.

Report Categories

There are five report categories. This section lists and describes each of these categories. There are daily, weekly, and monthly reports available for all reports unless otherwise noted.

Bandwidth Utilization

Bandwidth Utilization reports show the utilization of the main physical components in a network. The main physical components in a network are: nodes, trunks, links, and shelves. Bandwidth Utilization reports are high-level reports that are run daily, weekly, and monthly. Error counts are not included in these high-level reports; they are found in the Module Performance reports.

Bandwidth Utilization reports show how much capacity is being used. Trunk utilization is the usage of facilities between nodes. Link utilization is the usage of facilities between nodes and other products, such as, concentrators, hosts, and servers. Node utilization is the bandwidth used by the node backplane. M1 shelf utilization shows the aggregate usage of M1 shelves in BNS-2000 nodes. Usage is defined as the traffic carried, as a percentage of the shelf capacity.

- Trunk Utilization Report

  These reports identify both ends of the trunk (node name and group), and show utilization data from both ends.

- Link Utilization Report

  These reports show utilization data for Multipurpose Concentrators, SAMs and CPMML servers.

- Bandwidth Utilization Node Report

  These reports show the usage of the node's backplane. Usage is defined as the number of packets/segments switched across the backplane divided by the backplane capacity.

  There are two levels for Bandwidth Utilization Node reports: Detail and Summary. The Bandwidth Utilization Node Summary Report shows what percentage of the backplane is being used, as that indicates how close a node backplane is to its maximum data transfer rate.

  The Node Bandwidth Utilization Detail Report shows the contribution of each module in the node to the total backplane utilization. This report provides the detail information of the traffic contribution to the BNS-2000 node backplane. It also shows the percentage of utilization for each of the slots in the series M2 shelves. This report is used to determine the source of heavy utilization on a node.

- Shelf Utilization Report

  These reports show the aggregate usage of the M1 shelves on a BNS-2000 node by displaying the percentage of the M1 shelf that is being used. The usage is defined as the traffic carried divided by the shelf capacity.

Connection Utilization

Receiving group and trunk group reports show the utilization of logical components in your network. The logical components are trunk groups and receiving groups that you have set up to route calls. By looking at the data in these reports, you can determine if the groups can handle the call traffic effectively, or if the groups should be reconfigured.

There are two levels of these reports. The summary report shows the channel utilization, call success rate, and a failed call indication. The detail report shows the breakdown of failed calls listed by cause, such as contention conflict or a security problem.

X.25 reports show the utilization of X.25 channels that are allocated to X.25 ports. Using the data in this report, you can determine if the present number of channels is handling the call traffic effectively. The summary report shows the channel utilization and call success rate. If the call success rate is less than 100% it indicates that there were failed calls.

Node reports show what percentage of the backplane is being used. Using this data, you can determine if a node can support additional concentrators or multiplexers.

Port Capacity Utilization

Port Capacity Utilization reports show the port utilization for access modules in the backplane. Ports in access modules are connected via facilities to other devices and therefore are similar to other transmission facilities; for example, trunks and links.

Network Availability

Network Availability reports show the percentage of availability of nodes and trunks. Availability is calculated from a centralized network management perspective. Both node and trunk availability are based on alarms coming from the node via the console connection. The percentage is the average daily availability. If the console connection is down for any reason, the percentage in the report will be less than 100%.

Module Performance

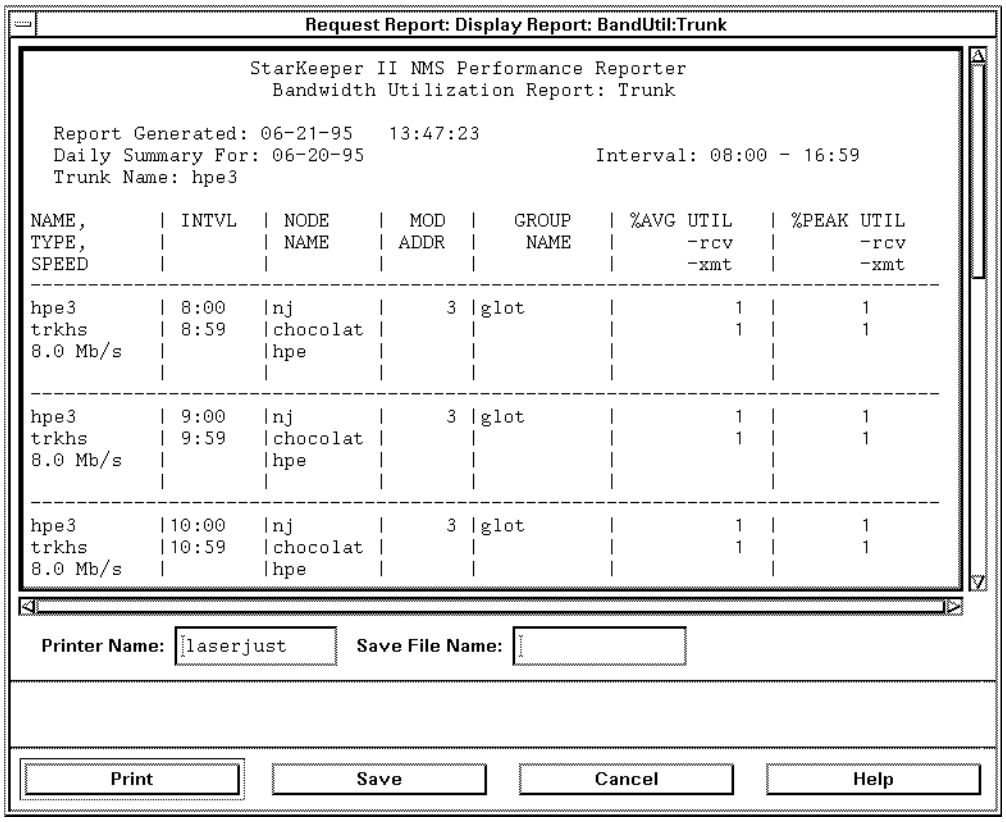
Lower level reports are available for all types of modules. These reports are used to troubleshoot specific problems on a module or port that have been identified in a high level report. The primary information on these reports is error related. The user can select from module, port, or channel level information, depending on what they need.

Bandwidth Utilization Reports

Bandwidth Utilization reports show how much capacity is being used. Trunk utilization is the usage of facilities between nodes. Link utilization is the usage of facilities between nodes and other products, such as hosts and servers. Node utilization is the usage of the node backplane. Shelf utilization is the aggregate usage of the M1 shelves.

Bandwidth Utilization Trunk Report

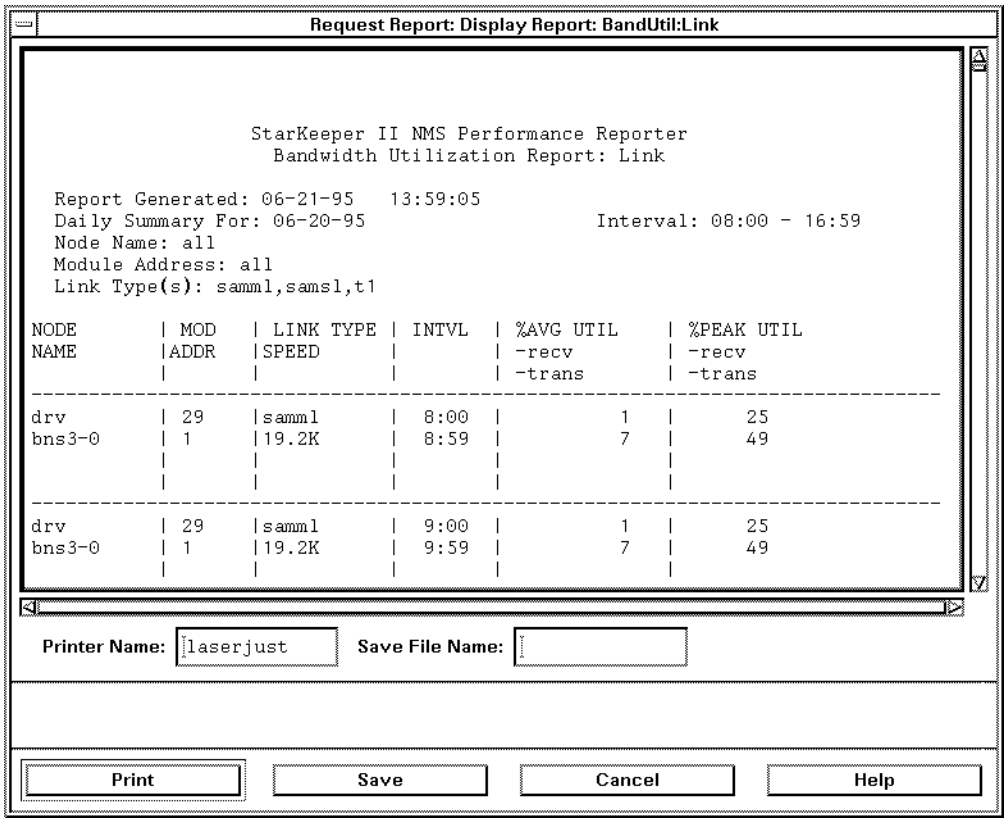
These reports identify both ends of the trunk (node name and group), and show utilization data from both ends.



Screen 17-2. Sample Bandwidth Utilization Trunk Report

Bandwidth Utilization Link Report

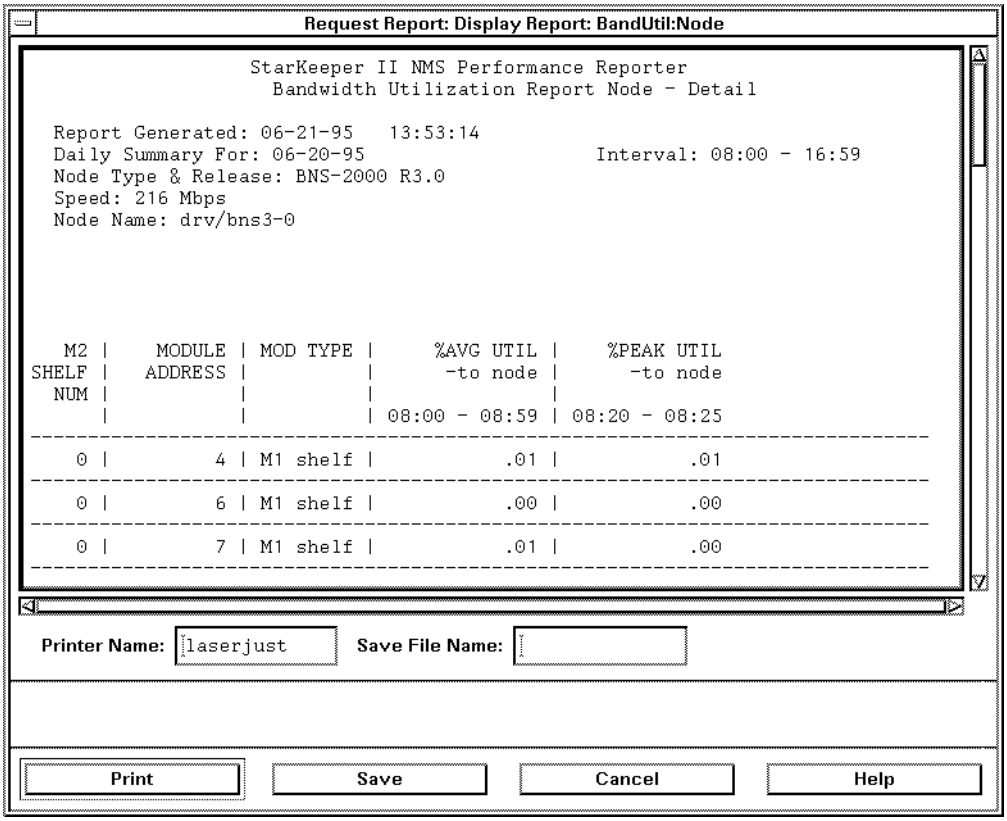
These reports show utilization data for SAMs and CPMML servers.



Screen 17-3. Sample Bandwidth Utilization Link Report

Bandwidth Utilization Node Report

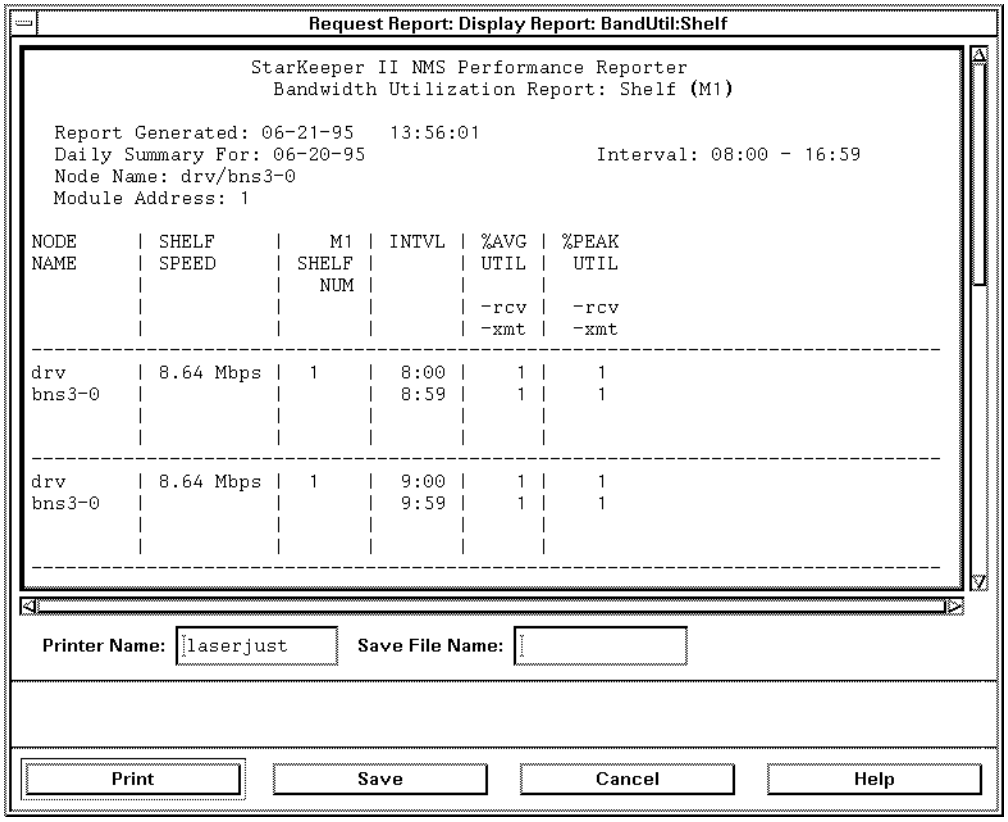
This report provides the detailed information of the traffic contribution to the BNS-2000 node backplane. It also shows the percentage of utilization for each of the slots in all Series M2 shelves. This report is used to determine the source of heavy utilization on the node.



Screen 17-4. Sample Bandwidth Utilization Node Report

Bandwidth Utilization Shelf Report

This report shows the aggregate usage of M1 shelves in the BNS-2000 node by displaying the percentage of the M1 shelf that is being used.



Screen 17-5. Sample Bandwidth Utilization Shelf Report

Field Descriptions

Note that some of the columns have a tiered format; that is, one field of information rests on top of another field in the same column. For example, the third column of the Bandwidth Utilization Link report has LINK TYPE over SPEED, so the data is in two lines with the link type shown over the link speed of the port. Some fields are abbreviated to save space so that more information can be incorporated in the reports. For example, MOD ADDR and MODULE ADDRESS represent the same fields.

- %AVG UTIL - Average utilization. Percentages are on two lines: the first line is receive and the second line is transmit. For weekly and monthly reports, these fields represent the average utilization for the entire week or month.
- %PEAK UTIL - Peak utilization. Percentages are on two lines: the first line is receive and the second line is transmit. For weekly and monthly reports, these fields represent the peak utilization value for the entire week or month.
- GROUP NAME - The name of the group for reported connection data.
- (I) INCOMPLETE INTERVAL - If the database does not represent a full interval of data, an “I” will be displayed at the far right of the corresponding interval on the report.
- INTVL - The start and end time of the report interval.
- LINK TYPE/ SPEED - The type of link and the link speed (bps).
- MOD ADDR (MODULE ADDRESS) - The module address.
- MOD TYPE - The type of module being reported on. Some valid types are M1 shelf and TRUNK-T3.
- M1 SHELF NUM - The shelf number for the M1 shelf (the controller resides in an M1 shelf). There can be up to seven M1 shelves. The M1 shelf number corresponds to the module address for the CIM module in the switching shelf.
- M2 SHELF NUM - The shelf number (the switch resides in M2 shelf 0). In addition, there may be shelves numbered 1, 2, and 3 for a total of up to four M2 shelves. An M2 shelf can support modules that in total, generate up to 216 Mbps. The sum of M1 shelves and M2 shelves can total up to eight.
- NAME/TYPE/SPEED - The name of the trunk, its type, and its speed, in bits per second (bps).
- NODE NAME - The full path name of the node using the four-level mnemonic/numeric address format.
- SHELF - A unit that resides in a stackable cabinet. It is a receptacle for node modules.
- SHELF SPEED - The speed of the shelf backplane, in megabits per second (Mbps).
- TYPE & REL./SPEED - The type of the node, the release number of the node, and the backplane speed in megabits per second (Mbps).

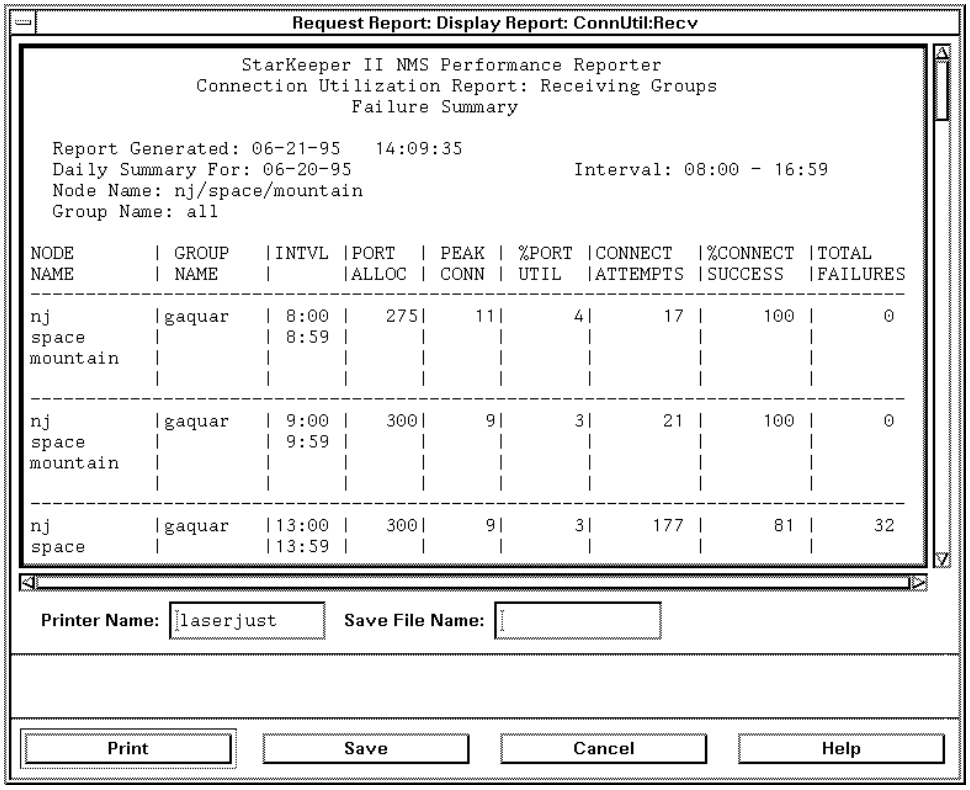
Connection Utilization Reports

Connection Utilization reports represent the utilization of logical components in your network. The logical components are trunk groups and receiving groups that you have set up to route calls. By looking at the data in these reports, you can determine if the groups can handle the call traffic effectively, or if the groups should be reconfigured.

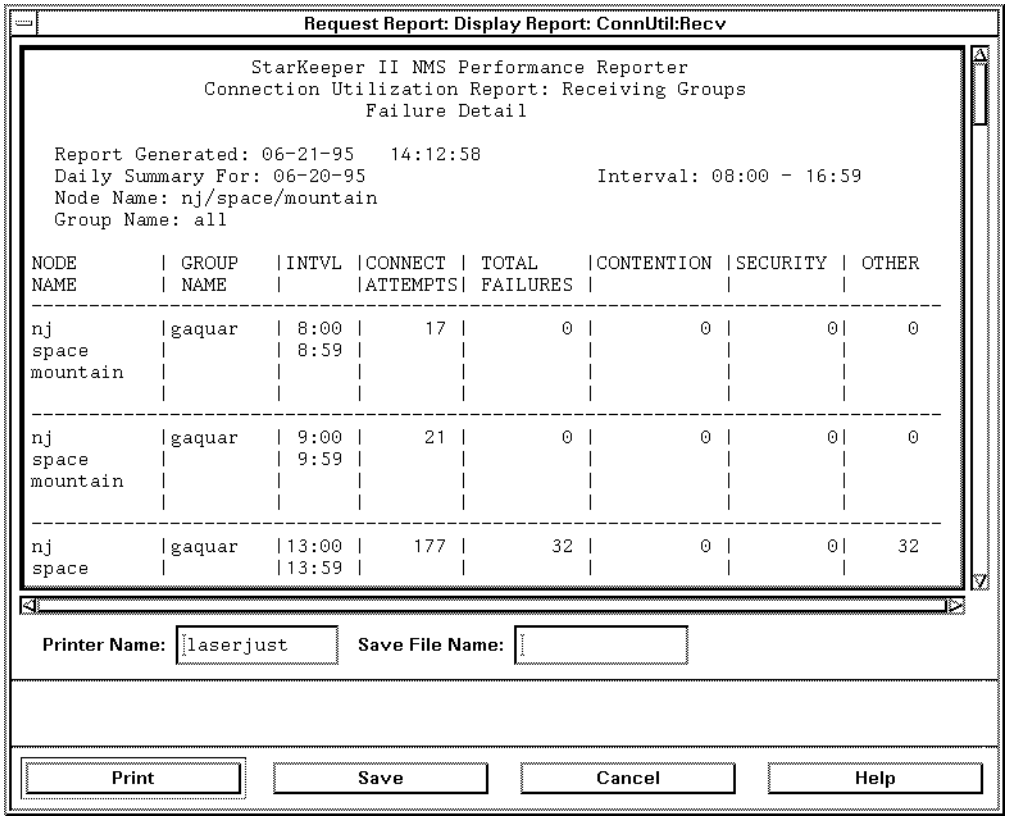
There are two levels of these reports. The summary report shows the channel utilization, call success rate, and a failed call indication. The detail report shows the breakdown of failed calls listed by cause, such as contention conflict or a security problem.

Connection Utilization Receiving Group Report

Receiving Group reports show connection data for each specified receiving group or two-way group.



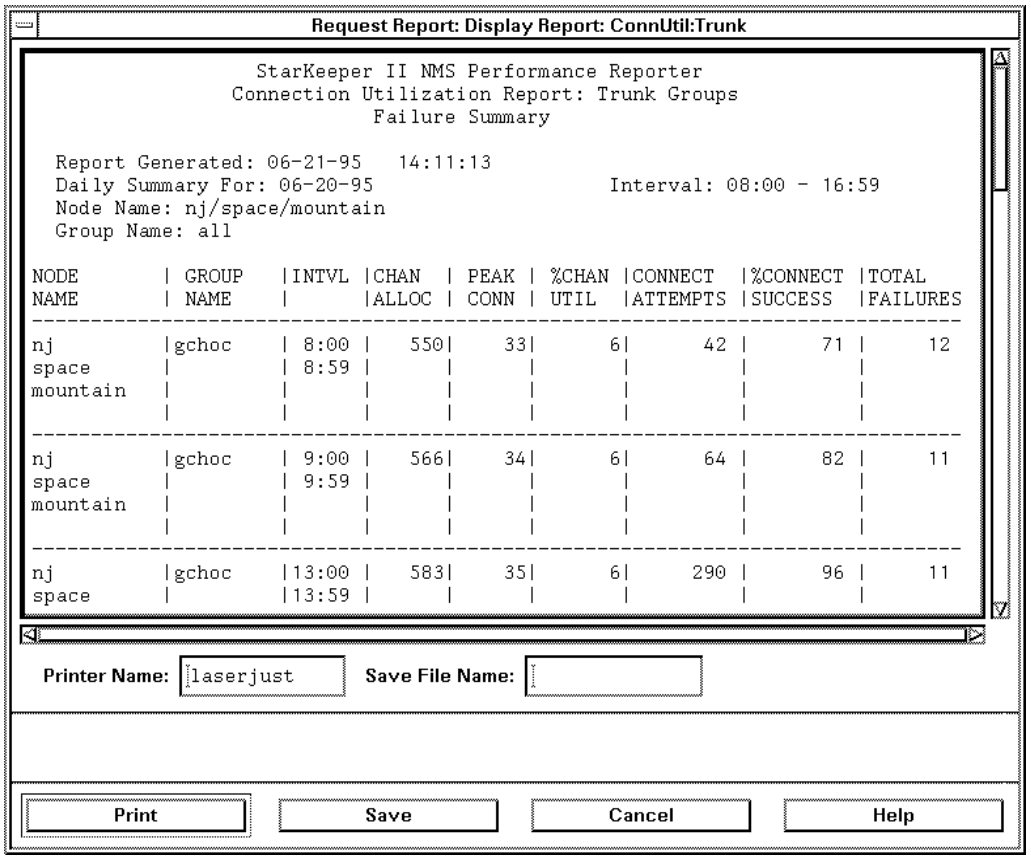
Screen 17-6. Sample Connection Utilization Receiving Group Report - Summary



Screen 17-7. Sample Connection Utilization Receiving Group Report - Detail

Connection Utilization Trunk Group Report

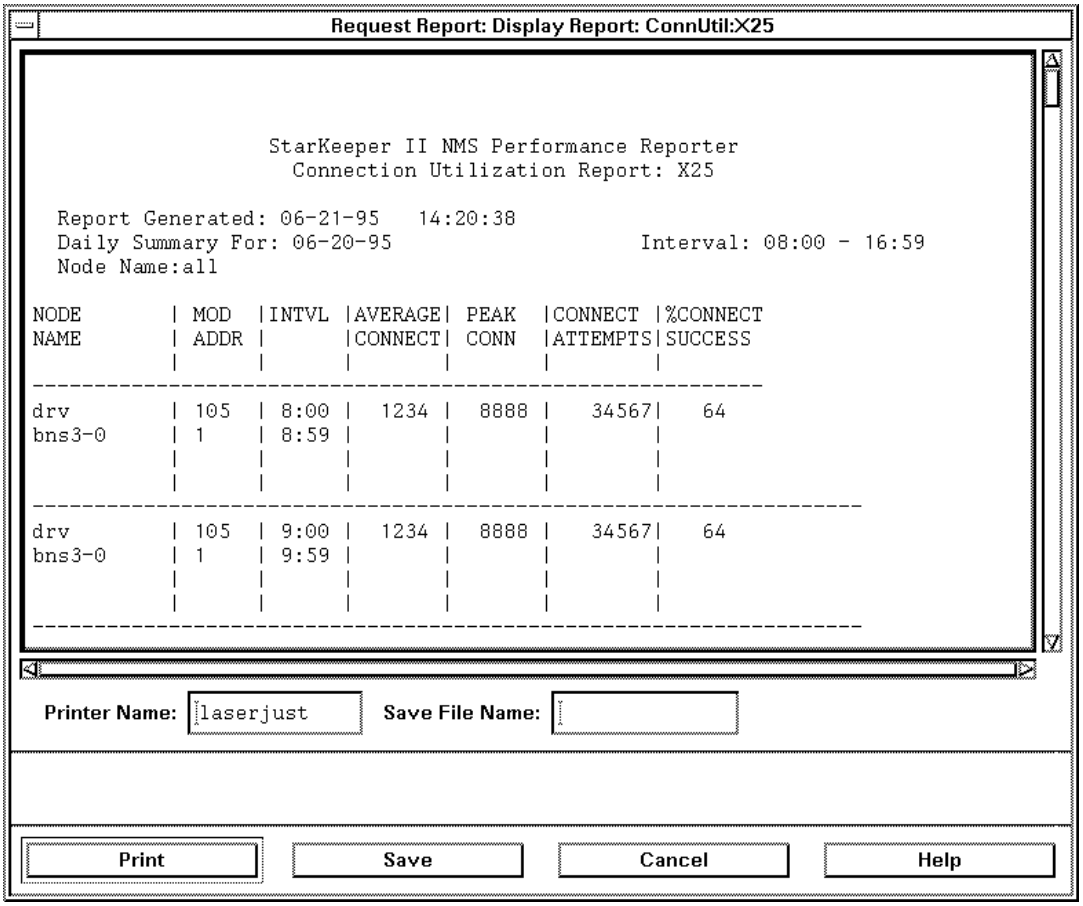
Trunk Group Reports show connection data for each specified trunk group.



Screen 17-8. Sample Connection Utilization Trunk Group Report - Summary

Connection Utilization X.25 Report

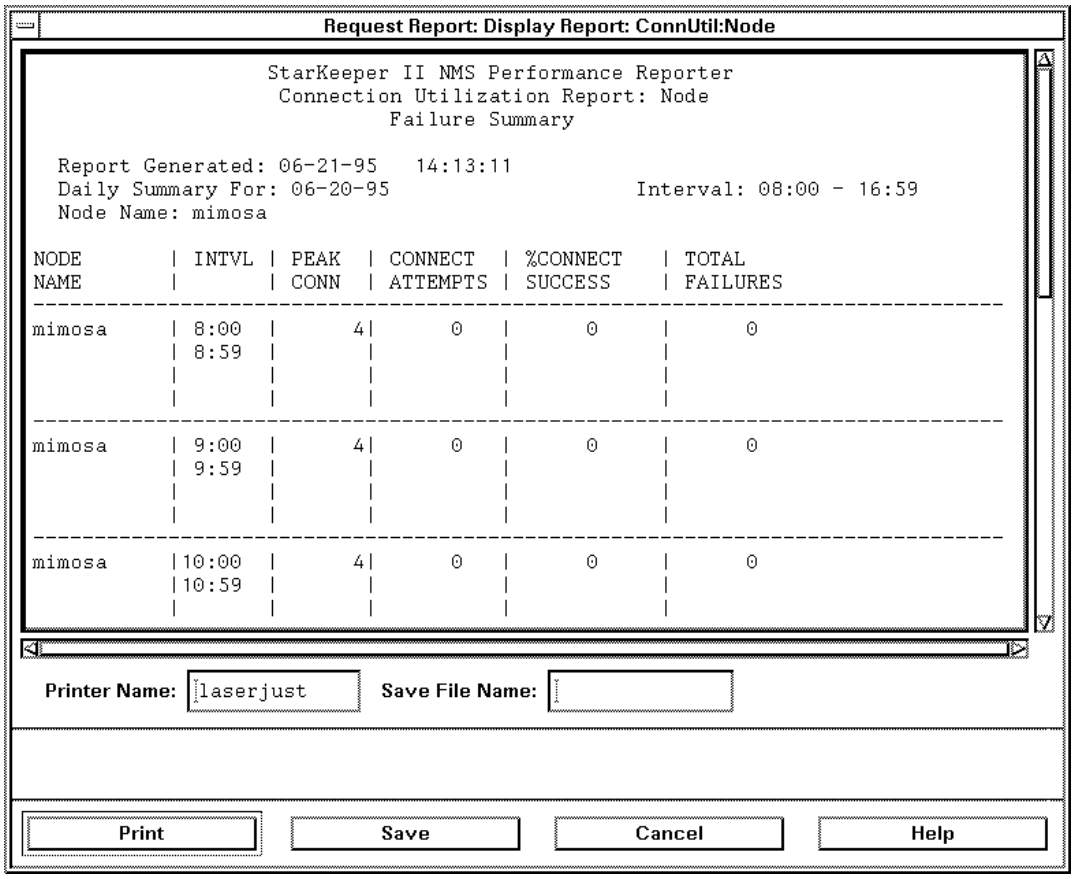
X.25 reports show the utilization of X.25 channels that are allocated to X.25 ports.



Screen 17-9. Sample Connection Utilization X.25 Report

Connection Utilization Node Report

Node reports show what percentage of the backplane is being used. Using this data, you can determine if a node can support additional concentrators or multiplexers.



Screen 17-10. Sample Connection Utilization Node Report - Summary

Field Descriptions

- %CHAN UTIL - The percentage of channels in a group that are used, divided by those actually available.
- %CONNECT SUCCESS - The total number of successful connection attempts during the reporting interval.
- %PORT UTIL - The percentage of ports in a group that are used, divided by those actually available.

- AVERAGE CONNECT - The average number of simultaneous calls.
- CHAN ALLOC - The total number of channels that were allocated or configured in this group.
- CONNECT ATTEMPTS - The total number of attempts to create a new connection into this group during the reporting interval.
- CONTENTION - The number of unsuccessful connection attempts due to contention.
- GROUP NAME - The name of the receiving or two-way group for the reported connection data.
- INTVL - The start and end time of the report interval.
- MOD ADDR - The module address.
- NODE NAME - The full node name is listed here, using the four-level mnemonic/numeric address format.
- OTHER - The number of unsuccessful connection attempts due to reasons other than those given above. For example, the service name accessing this group is out of service, or the host has crashed.
- PEAK CONN - The maximum number of simultaneous connections (incoming and outgoing, switched and non-switched) that occurred during the report interval.
- PORT ALLOC - The total number of ports that were allocated or configured in this group.
- SECURITY - The number of unsuccessful connection attempts due to closed user group security.
- TOTAL FAILURES - The total number of unsuccessful connection attempts due to contention (no free ports into this group) problems, security problems, and other problems. It is the sum of FAILS CONT, FAILS SEC, and FAILS OTHER, defined below.

Report Interpretation

You want to determine if the receiving and trunk groups are set up in the node in an optimal way; that is, to see if the number of ports assigned to a group is optimal. High values in the FAILS CONT field indicates that not enough ports were assigned to that group. There may be accompanying response time delays as the number of call attempts may be higher along with the number of failures due to contention. All failed connection attempts are reported. FAILS SEC must be monitored to determine whether attempts to breach network security are being made.

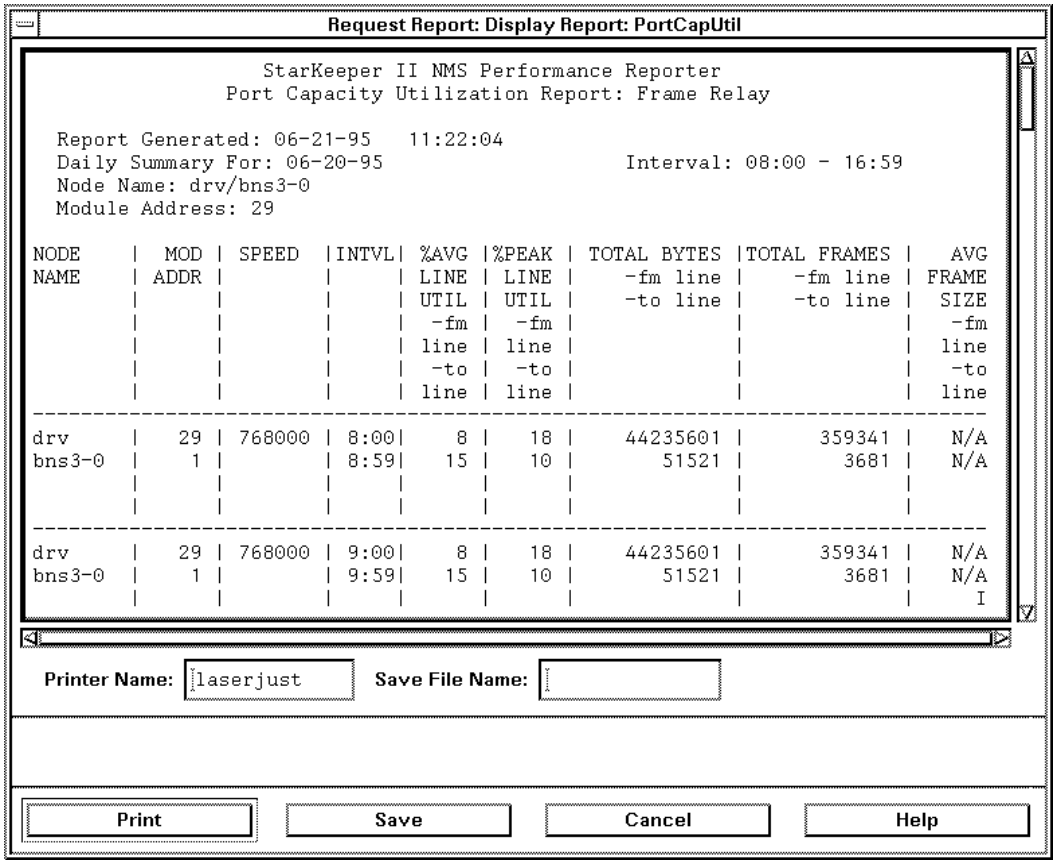
Port Capacity Utilization Reports

Port Capacity Utilization reports show the port utilization for access modules in the node backplane. Ports in access modules are connected via facilities to other devices and therefore are similar to other transmission facilities; for example, trunks and links.

Port Capacity Utilization reports for other module types may look different, however, all field description definitions are applicable.

Frame Relay Report

This report provides usage data for the node's frame relay port.



Screen 17-11. Sample Port Capacity Utilization Frame Relay Report

Field Descriptions

Note that in some reports like an Access Interface (AI) report, there are two sets of data information in the same column. The AI report, for example has a column that displays the SPEED and the SIR data in both receive and transmit directions. The SIR data for receive and transmit directions are enclosed in parentheses.

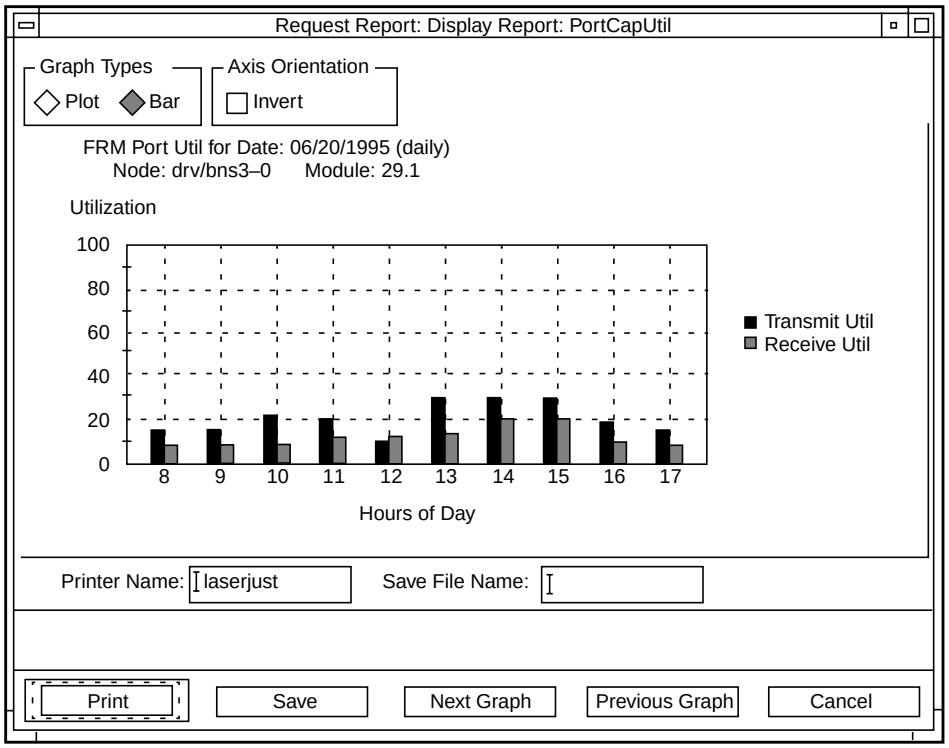
- %AVG LINE UTIL - The average percent utilization of the line over the measurement interval. The percentage is calculated by dividing the message units by the full capacity of the line.
- %AVG UTIL - The average percent utilization of the port over the measurement interval. The percentage is calculated by dividing the message units received by the full capacity of the line during the reporting interval.
- %PEAK LINE UTIL - The largest percent utilization encountered on the line during the measurement interval.
- %PEAK UTIL - The largest percent utilization encountered on the line during the measurement interval.
- %PORT UTIL - The percentages equivalents of the characters received and transmitted divided by the line capacity, during the interval.
- AVG FRAME SIZE - Transmit (to line) and receive (from line) average frame size.
- AI TYPE - There are two different types. One is the T1 AI and the other is the T3 AI. The T1 AI has four ports and the T3 AI has only one port. The T3 AIs have class **2** and class **5**.
- DATA BYTES - The total bytes which includes all overhead.
- DUPLEX - The value either half or full.
- FRAME BYTES - The total number of bytes in level 2 frames received from and transmitted to the port.
- INTVL - The start and end time of the report interval.
- L2_PDU - The SIP level 2 protocol data entity.
- L3_PDU - The SIP level 3 protocol data entity. It is made up of one or more L2_PDUs.
- MOD ADDR - The module address is on the first line and the port address is on the second line. If the module is in a concentrator, the module address will be two levels; for example, 12/4.
- NODE NAME - The full path name of the node, using the four-level mnemonic/numeric address format.
- SIR - Sustained Information Rate. SIR is the effective speed of the user data.

- SPEED - The speed (bps) for which this port was configured; not necessarily the speed at which it is running.
- TOTAL BYTES - The total number of bytes transmitted to and received from the external host or device.
- TOTAL FRAMES - The total frames received from and transmitted to the port.
- TYPE - The service type. Indicates host (h) or pdn (p) port.
- USER BYTES - The total user data bytes received from and transmitted to the port.

Graphical Option

You can obtain a graphical output report if you requested a single access module by module address (with the exception of AI). The graphs will represent the ports in that module. You will get a separate graph for each port.

The lines display the average utilization in the receive and transmit directions for all the ports for which there is data. The threshold will be marked by a horizontal line.



Screen 17-12. Sample Port Capacity Utilization Frame Relay Graphical Report

Report Interpretation

The Port Capacity Utilization report shows the usage and performance of the ports in relation to the user endpoints, which helps to identify and troubleshoot line problems. A line problem can be caused by a faulty transmission facility (for example a wire). It can also be caused by too much traffic coming in from all ports on that module or by administering the wrong port speed in the database.

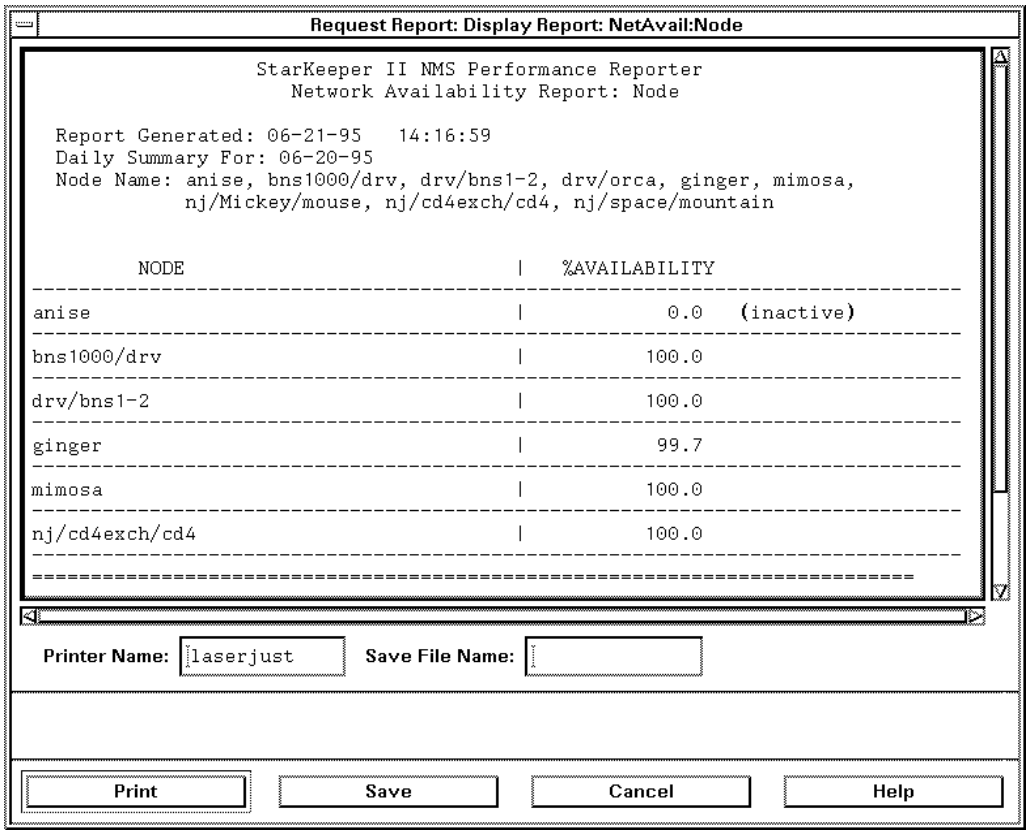
The key field in this report is the %UTIL for the port. Port utilization is similar to trunk utilization. The port utilization is the average value for that interval, and it is calculated by dividing the traffic by the capacity. Some reports, like AI reports, show both average and peak utilization in the receive and transmit direction. A general guideline is that average port utilization should not exceed 70%, not because of the port itself but because of the transmission facility to which it is connected.

Network Availability Reports

Network Availability reports show the percentage of availability of nodes and trunks. Availability is calculated from a centralized network management perspective. Both node and trunk availability are based on alarms coming from the node via the console connection. The percentage is the average daily availability.

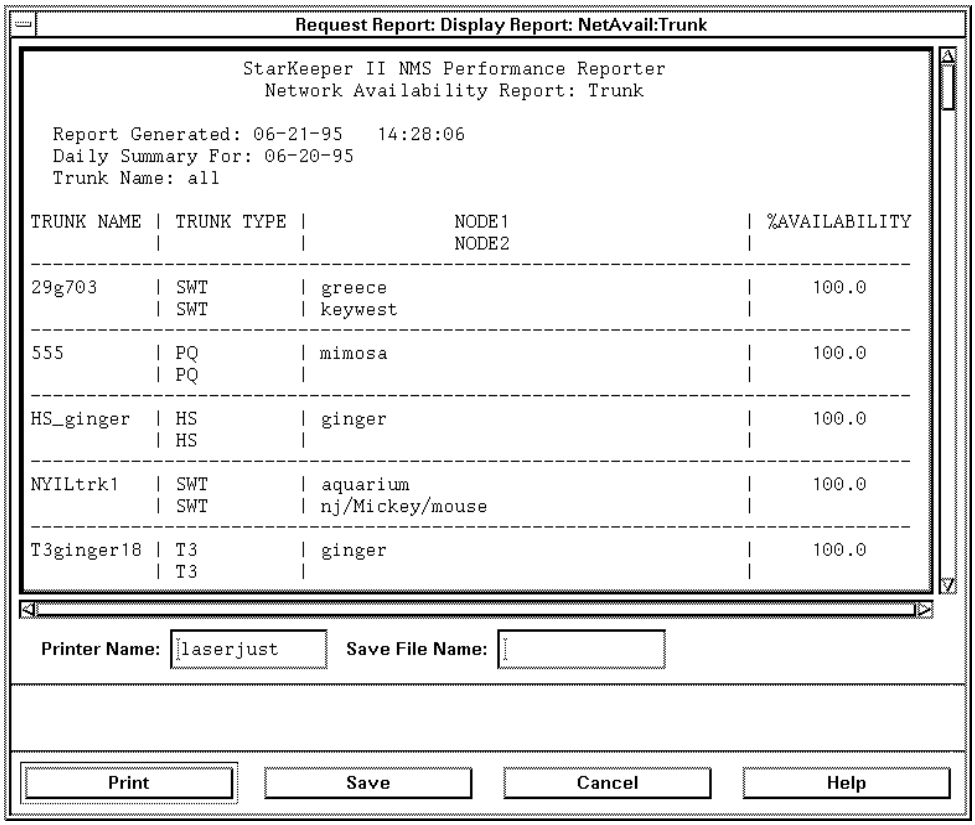
This report is divided into two sub-reports: the Node Availability Report and the Trunk Network Availability Report. Together they give the administrator a broad overview of network availability. The most significant item is the percent availability of the node and the trunk.

Network Availability Node Report



Screen 17-13. Sample Network Availability Node Report

Network Availability Trunk Report



Screen 17-14. Sample Network Availability Trunk Report

Field Descriptions

- Y - The percent availability of a node or trunk to the Core System; it is measured by the proportion of time a connection can be maintained between the Core System and that node or trunk.
- NODE - The name of the node being reported on, in the four-level mnemonic/numeric address format.
- NODE1 - The full name of one of this trunk's end nodes.
- NODE2 - The full name of the other end node for this trunk.
- TRUNK NAME - The name of the trunk being reported on.
- TRUNK TYPE - The type of trunk being reported on.

Report Interpretation

For nodes, look for low availability percentages and consider expanding the facilities of those nodes. For trunks, look for low availability percentages and consider upgrading the trunk type, or adding and/or rerouting nodes. Perhaps low percentages are caused by equipment failures.

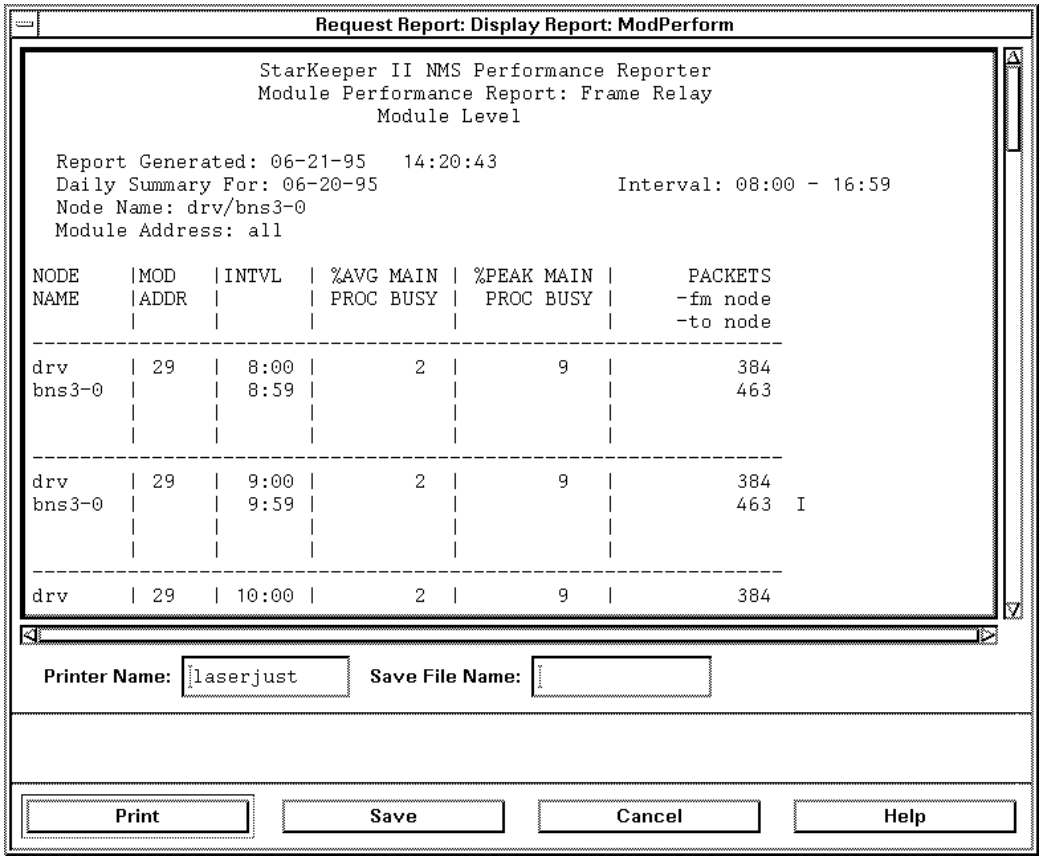
An availability percentage of 75% means a downtime of 25%. Node downtime is the time the node is not available to the Core System because it is disconnected or made inactive (using the **cfchange** command). Trunk downtime is the time the trunk is down during the corresponding node connect time.

Module Performance Reports

These reports are used to troubleshoot specific problems on a module or port that have been identified in a high level report. The primary information on these reports is error related. Module Performance Reports cover all types of modules that are supported on the node.

Module Performance Frame Relay Report

This report provides performance information for the node's Frame Relay modules. An example of the report is shown below.



Screen 17-15. Sample Module Performance Frame Relay Report

Field Descriptions

Note that in some reports like an Access Interface (AI) report, there are two sets of data information in the same column. The AIT3P report, for example, has a column that displays the SPEED and the SIR data in both receive and transmit directions. The SIR data for receive and transmit directions are enclosed in parentheses. Also, some fields are abbreviated to save space so that more information can be incorporated in the reports. For example, MOD ADDR and MODULE ADDRESS represent the same fields.

A GAR module takes a group-addressed PDU and resolves it into its remote members (outside the network). The Module Performance Report for GAR includes columns that have both pre-resolution and post-resolution data. Pre-resolution data is the data coming into the GAR. Post-resolution data is the resolved data coming out of the GAR.

- %AVG BUFFER UTIL (%AVG BUFF UTIL) - The average percentage utilization of the available buffer.
- %AVG CPU UTIL - The average percentage of CPU utilization.
- %AVG MAIN PROC BUSY (%AVG M PROC BUSY) - The average percent utilization of the main processors on the frame relay module over the measurement interval.
- %BUSY - The percentage of time the module was busy, averaged over the interval.
- %EFS - The percentage of error free seconds for the full line in both directions.
- %EFT - The percentage of error free transmission data.
- %I/O BD UTIL - Percent channel input/output utilization.
- %OVERHEAD - The percentage of the bytes considered as overhead transmitted or received.
- %PEAK CPU UTIL - The peak percent of CPU utilization.
- %PEAK MAIN PROC BUSY (%PEAK M PROC BUSY) - The peak percent utilization of the main processors on the frame relay module over the measurement interval.
- ABNORMAL TERM - The number of abnormal terminations of transmission.
- ABORTS - The number of frames discarded by the node due to receiving an abort sequence from the port. It represents the total number of frames discarded from all aborts in the interval for this port.
- AI TYPE - There are several different types.
- AIS SECS - A count of seconds AIS was active.

- BAD CRC - The number of frames received with CRC errors.
- BAD FCS - The number of frame check sequence errors detected on frames received.
- BAD FRAMES - The number of faulty frames received.
- BER6 SECS - The number of seconds with more than two CRC errors (BER 10e-6).
- BP PARITY ERROR - The number of times that a backplane parity error is detected within the measurement interval period.
- BUFFER NOT AVAIL (BUFF NOT AVAIL) - The number of times a request for buffers was made and none were available.
- CALLS ABN TERM - The number of calls abnormally terminated.
- CARRIER COUNT - Count of DCD or CTS lead state changes.
- CHANNEL ERROR - The total number of backplane packets discarded due to a channel error.
- CODE VIOL - The number of occurrences of CRC errors.
- CRC ERROR (CRC ERR) - The number of CRC errors found in the data received within the time interval.
- DATA BYTES - The total bytes which includes all overhead.
- DLCI ADDR - The Data Link Connection Identifier address.
- ERR SECS (ERRD SECS) - The total number of any second with at least one code violation. There are two ERR SECS: one for receive CRC-6 errors and one derived from PRMs.
- ERROR INTVLS - The number of intervals the device received a block (a subset of packets) from the node that contained an error.
- FIFO INTRPT - The number of FIFO synchronization errors.
- FIFO OVRFLW - The buffer overflow errors in both directions. This can happen when data is coming in to fast or leaving to fast.
- FRAME BYTES - The total number of bytes in level 2 frames received from and transmitted to the port.
- FRAME ERROR (FRAME ERRS) - The count of a frame code violation at the near end (local) or far end (remote).
- FRAMES - The total number of frames received from and transmitted to the port/module.
- FRAMES DISCARDED (FRAMES DISCRD) - The number of frames to or from the node that were discarded due to congestion or unavailable buffers.
- FRM FMT - The framing format. Valid formats are **efs** or **d4**.

- INTRPTS - The number of half FIFO interrupts (X.75 module).
- INTVL - Start and end time of the reporting interval.
- K BYTES DROPPED - The number of receive bytes and transmit bytes (in thousands) dropped due to congestion.
- K LINE SEGMENTS - The bytes multiplied by 57.9 bytes-per-segment for T1 modules, the bytes multiplied by 58.25 bytes-per-segment for T3 (and GAR) modules, the bytes multiplied by 60.8 bytes-per-segment for E1 modules, and the bytes multiplied by 59.7 bytes-per-segment for E3 modules. This value is given in thousands.
- L-F ERR - The number of link frame errors.
- LCODE VIOL - A count of bipolar violations.
- LINE ERRD SECS (LINE ERR SECS) - Any second with at least one line code violation.
- LINE SEVR ERRD SECS - Any second with 16 or more line code violations monitored at the T1 rate.
- LINK TYPE - The type of device supplying the measurement data.
- L2_PDU - The SIP level 2 protocol data entity.
- L3_PDU - The SIP level 3 protocol data entity. It is made up of one or more L2_PDUs.
- MAX %MID USED - The count (in percentages) of the maximum number of MIDs used on the trunk at any one instant during the interval.
- MOD ADDR (MODULE ADDRESS) - The module (slot number) being reported on.
- MOD TYPE (TYPE) - The type of device that is providing the service.
- NAME - The trunk being reported on.
- NODE NAME - The node being reported on, using the four-level mnemonic/numeric address format.
- NON-CIR K BYTES - The number of non-CIR bytes (in thousands) received from and transmitted to the port/module.
- NON-CIR K BYTES DROPPED - The number of non-CIR receive bytes and transmit bytes (in thousands) dropped due to congestion.
- OVRFLW - The overflow error during the measurement interval.
- PACKETS - The total number of packets coming in or going out of the module to the backplane. It is the sum of in-service packet counts.
- PARITY ERROR - The number of times a fiber protocol violation (this includes parity errors, coding violations, CRC errors, and incorrect protocol flags) is found in data received from the remote end within the time interval.

- PEAK CIR ALLOCATED - The peak CIR allocated during the interval.
- PEAK K BYTES - The peak number of bytes (in thousands) received from and transmitted to the port/module.
- RCVR ABORTS - The number of frames discarded by the node due to receiving an abort sequence from the port. It represents the total number of frames discarded from all aborts in the interval for this port.
- RCVR OVRNS (RCVR OVRUN) - The number of receiver overruns that occurred on the port/module. This occurs when frames are being received faster than can be stored and forwarded.
- REJ FRAMES - The number of transmitted/received “Rejected” frames. A rejected frame is used by an X.75 module to request retransmission of I frames starting with the frame numbered N(R). I frames numbered [N(R)-1] and below are acknowledged.
- REJCTS - The number of rejects received indicating bad data received at the other end of the virtual circuit. The number of rejects sent to the remote port, indicating bad data was received and discarded or data was missing or out of sequence.
- RETRANS INTVLS - The number of intervals in which data blocks required retransmissions from the specified device.
- RNR (Received Not Ready) FRAMES - The number of transmitted/ received RNR frames. RNR frames are used by an X.75 module to indicate a busy condition; i.e. the temporary inability to accept additional incoming I frames.
- SEVR ERRD SECS - Any second with 15 or more code violations monitored at the T1 rate.
- SEVR ERRD FRM SECS - A count of one second intervals containing one or more Severely Errored Framing (SEF) events. A SEF event is declared when 2 or more framing bit errors occur within a 3 millisecond period, or 2 or more errors out of 5 or less consecutive framing bits occur.
- SIR - Sustained Information Rate. SIR is the effective speed of the user data.
- SPEED - The speed for which the port/module was configured. This is shown in bits per second (bps) unless the heading unless the heading indicates megabits per second (Mbps).
- STATUS QUEUE OVRFLW - The number of times a SAM status queue overflow was detected.
- SYNC LOST - The count of the number of times synchronization was lost on the lines. These errors can occur at the local or the remote end.
- TOTAL BYTES - The total number of bytes received from and transmitted to the port/module.

- TOTAL FRAMES - The total number of frames received from and transmitted to the port/module.
- TOTAL K BYTES - The total number of bytes (in thousands) received from and transmitted to the port/module.
- TOTAL PACKETS - The total number of packets received from and transmitted to the port/module.
- TOTAL TRANS UNDRUN - The number of frames aborted.
- TRAFFIC INTVLS - The number of intervals in which one or more characters of traffic traveled to or from the node or to or from the port.
- TYPE - The type of device that is providing the service.
- UNAVL SECS - A count of seconds during which the DS1 service is unavailable. Service becomes unavailable at the declaration of a transmission failure condition.
- USART ERR INTVLS - The number of intervals in which USART associated with the specified port had either an overflow, parity, or framing error.
- USER BYTES - The total user data bytes received and transmitted.

Report Interpretation

These reports provide information to assist in maximizing network efficiency. Information on usage and data loss is provided. The reports are module specific and provide appropriate measurement data for the type of module specified. Where applicable, module level and port level data are supplied.

The Module Performance Frame Relay Report provides data that assists in the evaluation of actual usage. This data can be compared to the port capacity and information on three types of data loss that the Frame Relay port may be experiencing. Incidents of transmission delay, congestion, and data loss can be determined from this data, and the source identified.

Manual Pages

A

This section provides manual pages for several commands for the *StarKeeper* II NMS Graphics System.

DISPLAY(1)

NAME

Display - list the installed Graphics System software packages

SYNOPSIS

Display [-g] [-i] [-l [-r<release>]]

DESCRIPTION

The **Display** command lists the Graphics System software packages that have been installed on the machine.

Specify **-g** for a list of Graphics System applications currently in use.

Specify **-i** for a list of installed software packages.

Specify **-l** for a list of licensed software packages. The **-r** option can be used with the **-l** option to specify a specific release, like **7.0** or **all** for all releases. If the **-r** option is not used, the command will default to the current release.

EXAMPLES

Display -g

Display -i

Display -l

Display -l -r7.0

EDIT_FILTER(1)

NAME

edit_filter - edit the filter names specification file

SYNOPSIS

edit_filter

DESCRIPTION

The **edit_filter** command allows a Network Monitor user to edit the *filters* file and specify positive and negative filter names for *StarKeeper* II NMS Core Systems which are connected to the Graphics System.

Once executed from an *xterm* window, the following is displayed:

```
Hit return to edit filter name file '/usr2/NM/lib/filters'
or DEL to cancel...
```

The above prompt assumes that Network Monitor is installed in the */usr2/NM* directory.

FILES

$NM_ROOT/lib/filters

EXAMPLES

edit_filter

SEE ALSO

filter_sync(1)

NOTES

The **edit_filter** command resides in the *$NM_BIN* directory. The **edit_filter** command uses the *vi* editor as it's default editor. You may change the default editor by defining a different editor, e.g., *emacs*, by setting the environment variable EDITOR as follows:

EDITOR=emacs; export EDITOR

Make sure the editor is in your *$PATH*.

FILTER_SYNC(1)

NAME

filter_sync - make a set of filters active for a Graphics System

SYNOPSIS

filter_sync

DESCRIPTION

The **filter_sync** command restarts the Network Monitor Alarm Collector process causing it to re-read the set of filter names from the *$NM_ROOT/lib/filters* file. This makes the filters active for a Graphics System.

FILES

$NM_ROOT/lib/filters

EXAMPLES

filter_sync

CAVEATS

The user should bring down Network Monitor before issuing this command. If Network Monitor is still running, the View Network Status process will be terminated. After the **filter_sync** command has executed successfully, you may restart Network Monitor.

SEE ALSO

edit_filter (1)

NOTES

The **edit_filter** command resides in the *$NM_BIN* directory.

REMOVE(1)

NAME

Remove - remove an installed Graphics System software package

SYNOPSIS

Remove

DESCRIPTION

The **Remove** command lists the Graphics System software packages that have been installed on the machine and prompts for a selection. **Remove** will then remove the selected package from the machine.

This command may be found in *$AP_ROOT/bin*. The default for *AP_ROOT* is */usr2/AP*; the actual value of *AP_ROOT* may be determined by displaying the contents of */usr/share/lib/pub/AP_ROOT* file.

You must have *root* permission to run this command (i.e. log in as *root* or *su* to *root* before running this command).

Note that you do not have to remove a package in order to upgrade. Instead, simply install the upgrade, which will replace the old package. The only reason that you must remove a package before re-installing it is if you want to change the base directory under which the package is installed.

STARTWS(1)

NAME

startws - start the Graphics System software

SYNOPSIS

startws

DESCRIPTION

startws first ensures that the user has Workstation Administrator permissions. **startws** then checks that the Graphics System software is not already running. It then creates the necessary run-time environment and executes the Graphics System daemon process *ap_mon*, which starts all other Graphics System daemon processes and also establishes *StarKeeper* II NMS connections.

OUTPUT

If the user does not have Workstation Administrator permissions, **startws** will print the following message:

```
You must have administrative permissions to run this com-
mand.
```

If the Graphics System software is already running, **startws** will print the following message:

```
StarKeeper II NMS Workstation Software is already running.
Execute "stopws" to terminate the StarKeeper II NMS Worksta-
tion Software.
```

If the *ap_mon* process has trouble initializing the system, appropriate diagnostic error messages will be printed.

STOPWS(1)

NAME

stopws - stop the Graphics System software

SYNOPSIS

stopws [-k]

DESCRIPTION

stopws first ensures that the user has Workstation Administrator permissions. **stopws** then checks that the Graphics System software is running. Finally, it sends a terminate message to the *ap_mon* process, which terminates the *StarKeeper* II NMS connections and Graphics System deamon processes.

Use the **-k** option to kill all non-deamon Graphics System processes on a Graphics System.

OUTPUT

If the user does not have Workstation Administrator permissions, **stopws** will print the following message:

`You must have administrative permission to run this command.`

If the Graphics System software is not running, **stopws** will print the following diagnostic message:

`StarKeeper II NMS Workstation Software has already been stopped.`

Graphics System Platform Error Messages

B

This section contains a listing of possible Graphics System Platform error messages and provides

- Error message number
- Explanation of the message
- Recovery procedures to clear the message

2 The contents of the form could not be written out to disk, and therefore, a permanent record of changes could not be made. The probable cause is insufficient disk space. Clean up old and unwanted files in your home directory.

3 The program could not locate or could not load the necessary preference files in your home directory. The file(s) may be missing or corrupted in some way. It is recommended that you add yourself again as a Graphics System Platform user via the **adduser** command. You need root permissions to run this command. Contact your Workstation Administrator for assistance if you do not have root permissions.

4 The program could not locate or could not load the necessary factory settings files in the *$AP_ROOT/etc/env* directory. The file(s) may be missing or corrupted in some way. Reinstallation of the Graphics System Platform may be required. Contact your support organization for recovery assistance.

9 The Graphics System Platform is currently controlling the maximum number of applications it was designed to manage. You may wish to terminate an application for which you no longer have immediate use in order to bring up the desired application.

10 The Graphics System Platform could not allocate the required system resources to attempt execution of the desired application. This is due to excessive demands made of the system, and may be attributed to any graphics applications you are currently running. Try again later, or attempt to reduce system load by terminating applications or programs that are no longer needed.

11 The Graphics System Platform could not execute the desired program. This is due to excessive demands made of the system, and may be attributed to any graphics applications you are currently running. Try again later, or attempt to reduce system load by terminating applications or programs that are no longer needed.

15 The chosen application failed to start up properly. The probable causes include (1) you are not authorized to run the desired application, (2) your environment is not set properly to run the desired application, and (3) the application is already in use by someone else and does not support multiple simultaneous users.

20 Both the machine name and dialstring are required to form a valid Computer entry. Confirm that you have entered both before applying your changes.

27 The connection cannot be established to the desired computer. If you added the computer yourself via the Add-On Computers Window, you may have made an error in the dialstring, or you may have incorrectly specified the connection type. Be sure the dialstring is spelled correctly and that you have correctly specified the connection type. The most probable cause is that the computer is indeed unavailable. Check with the Workstation Administrator of the specific computer for information on system availability.

28 The character ":" should not be entered in text fields, as this may be misinterpreted by the Graphics System Platform software as a field separator.

29 Both the pathname of the target file or directory and age must be specified before applying your changes.

30 The pathname of the target file or directory contains an environment variable (for example, a token preceded by the character "$") that is not defined. Be sure the spelling of the environment variable is correct.

31 The pathname of the target file or directory does not exist. You must re-enter a valid pathname.

32 The specified path refers to a directory, not a file as expected. Double check the **Path** and **Type** settings on the Disk Cleaner Administration Window for correctness and consistency.

33 The specified path refers to a file, not a directory as expected. Double check the **Path** and **Type** settings on the Disk Cleaner Administration Window for correctness and consistency.

36 The path cannot be cleaned as directed. Verify that the permissions on the directory and the files contained therein are readable and writable.

37 The Reset failed because the connection data is missing or corrupted. It is recommended that you add yourself again as a Workstation Administration user via the **adduser** command. This re-initializes the application and related connection tables. You need root permissions to run this command. Contact your Workstation Administrator for assistance if you do not have root permissions.

38 Valid unames consist of no more than 8 characters, with no slash (/) characters.

39 Valid machine IDs consist of whole numbers in the range of 1 and 100, inclusive.

40 Valid addresses consist of no more than four slash (/) characters separated levels, with no more than 8 characters per level.

41 A given uname can appear only once in the uname list. Re-enter a unique uname.

42 The computer cannot allocate memory. This is due to excessive resource demands, and may be attributed to any graphics applications you are currently running. Attempt to reduce system load by terminating applications or programs that are no longer needed.

45 Pathname is already entered. Enter a unique pathname.

47 No connections are entered. Enter connections to desired Core Systems. These connections are needed so that the Graphics System applications can obtain node data.

51 Only one empty entry is allowed. Fill in the empty entry before attempting to insert another.

52 Maximum number of connections has been reached. Delete unneeded connections to make room for new ones.

53 There is no response from the monitor. Wait a few minutes and try the execution again. If you still have problems, restart the Graphics System.

Network Monitor Error Messages

C

This section lists the set of error messages that may occur when the Network Monitor application is used and recommends what action to take should any error occur.

How to Read the Error Messages

Some of the following error messages have these conventions included in the text:

- <name>
- tag=<hex number>
- <number>

<name>	is variable text information; for example, the name of a process.
tag=<hex number>	is variable hexadecimal number information that represents an internal number associated with a process.
<number>	is variable error code information that usually represents a specific HP-UX system error. A table of HP-UX system error codes and their meaning is included at the end of this section.

Error messages in this section are grouped according to which window or process displayed the error message. The messages within a group are listed alphabetically. Following each message is a recommended action number. Use the number to find the recommended action text in **Table D-2** of this section.

How Error Messages Are Displayed

The following sections discuss how and where specific error messages are displayed.

Notice Windows

Error messages may appear in notice windows. These windows remain on the screen until you dismiss them.

Bulletin Board

Some error messages, especially those from background processes, are sent to the Bulletin Board. When a Bulletin Board message is received, an icon appears in a window and the terminal will beep. Click on the icon in the Bulletin Board to display the message(s) in a popup window.

System EVENTLOG

All error messages are also sent to the Graphics System's EVENTLOG. This is a file that resides in the *$EVENTLOG* directory. A new EVENTLOG file is created every day and also every time the Graphics System software is re-started. All Core System applications and the Graphics System software write messages into the *$EVENTLOG* file. When errors occur, you may want to view the EVENTLOG to see if additional messages were received from other processes.

$EVENTLOG is a variable that is defined for all users who have been authorized to use the Graphics System software.

Network Monitor Processes

In the EVENTLOG, all messages are preceded by the date and time of the message as well as the name of the process that sent the message. The following table relates the Network Monitor window names, process names, and process descriptions in the order they are presented.

Table C-1. Network Monitor Processes

Window	Process Name	Process Description
Control	*nm_con*	The first Network Monitor window to appear after starting the Network Monitor application.
Network Status and Network Map	*nm_stat*	The View Network Status task. All map windows and the status window belong to one *nm_stat* process.
List Alarms	*nm_al*	List alarms in a textual format. There is one *nm_al* process for each List Alarms Window.
Diagnostics	*nm_diag*	Issue commands to nodes. There is one *nm_diag* process for each Diagnostics Window.
Display Info	*nm_di*	Display information about the selected map object. There is one *nm_di* process for each Display Info Window.
Edit Maps	*nm_edit*	Create and/or edit network maps.
—	*nm_ac*	The Alarm Collector *daemon* process that is in constant communication with all Core Systems to receive outstanding alarms and alarm cleared messages. *nm_ac* is active whenever the Graphics System software is running.
—	*nm_clear*	The Clear Alarms *daemon* process which sends clear alarms messages to the appropriate Core System(s). *nm_clear* is active whenever the Graphics System software is running.
—	*nm_map_gen*	The Shelf Map Generation process that uses the Core System configuration databases to create shelf maps.

Recommended Actions

The following table of recommended actions covers all of the error messages, which are listed later in this section.

Table C-2. Recommended Actions

Recommended Action Number	Recommended Action Description
RA1	A HP-UX system error has occurred. This might be a transient problem. Try again. If the problems persists, log off and then log on again. You may need to reboot your Graphics System. Contact your support organization.
RA2	There are too many processes running, or insufficient resources to execute additional processes. Try again later, or attempt to reduce the system load by terminating non-essential programs.
RA3	Communications to a Core System have failed or there was an internal communications error. Check to see if the logical connection between the Graphics System and the named Core System is established. If the connection is established, see RA12.
RA4	The configuration data for the named equipment was not found in the Core System database. Use the **cfenter** command as described in the *StarKeeper II NMS Core System Guide*. Use the **skload** command to load module information in the Core System database.
RA5	The communications software probably is not running. It should restart automatically. Try again in a few minutes. If the problem persists, either the Graphics System software or the Core System should be restarted.
RA6	*dbserver*, the configuration database server on the Core System, cannot be accessed and probably is not running. It should restart automatically. Try again after a few minutes. If the problem persists, the Core System should be restarted.
RA7	*tmserver*, the server responsible for process execution, is not running. It should restart automatically. Try again after a few minutes. If the problem persists, restart the Graphics System software using the **stopws** and **startws** commands.
RA8	The Network Monitor Alarm Collector *daemon* process is not running or is busy. If it is not running, it should be restarted automatically within a couple of minutes. Try again later. Use the HP-UX system command ***ps -ef | grep nm_ac*** to determine if the process is running. If the problem persists, restart the Graphics System software using the **stopws** and **startws** commands.

Table C-2. Recommended Actions—*Continued*

Recommended Action Number	Recommended Action Description
RA9	The Network Monitor Clear Alarms *daemon* process is not running or is busy. If it is not running, it should be restarted automatically within a couple of minutes. Try again later. Use the HP-UX system command ***ps -ef | grep nm_clear*** to determine if the process is running. If the problem persists, restart the Graphics System software using the **stopws** and **startws** commands.
RA10	The Network Status and Network Map Window process *nm_stat* is not running or is busy. Use the View Network Status option on the Monitor menu of the Network Monitor Control Window to restart the process.
RA11	The alarms server on a Core System is not running or communications to a Core System may have failed. Verify that the Graphics System can communicate with a Core System. The alarms server should restart automatically in a couple of minutes. Try again later. If the problem persists, restart the Core System.
RA12	An internal communications error has occurred. This may be a transient problem. If it persists, restart the process reporting the error or restart the Graphics System software using the **stopws** and **startws** commands.
RA13	An internal error has occurred in the Network Monitor application. Try again. If the problem persists, quit, then restart Network Monitor. If the problem still occurs, contact your support organization.
RA14	There are a maximum of 32 simultaneous processes per Graphics System that can communicate with the Alarm Collector process. The *nm_con*, *nm_stat*, and *nm_al* processes, (Network Monitor Control, Network Status/Network Maps, and List Alarms Windows), communicate with the Alarm Collector. Also, there is a limit of 16 simultaneous List Alarms Windows. Reduce the number of these processes currently running. To determine the number and owners of these processes, use the HP-UX system command ***ps -ef | egrep -e nm_con***. Repeat, using ***nm_stat*** and ***nm_al***.
RA15	The Graphics System cannot be simultaneously connected to more than 16 Core Systems. Make some existing connections inactive before adding new connections to additional Core Systems. There is also a limit of 300 nodes and 1000 unique outstanding alarms that can be supported by Network Monitor.
RA16	Look for other messages that should explain the cause of the problem.
RA17	There is a problem with the filter file *$NM_ROOT/lib/filters*. Check the format of the file to make sure it is correct. When corrected, restart the Alarm Collector using the **filter_sync** command.

Table C-2. Recommended Actions—*Continued*

Recommended Action Number	Recommended Action Description
RA18	The named filter does not exist on the specified Core System. Either change the name in the Network Monitor filter file *$NM_ROOT/lib/filters* or create a filter with the corresponding name on the Core System. Use the **filter_sync** command to restart the Alarm Collector using the new filter.
RA19	When the Alarm Collector process shuts down, the View Network Status task and the List Alarms Windows must be terminated. Re-start these tasks/windows after the Alarm Collector process has been restarted.
RA20	There is a problem with the User Notice named in the error message. Try re-creating the user notice definition using the Define User Notices option from the Network Monitor Control Window. The View Network Status task must be quit and then restarted to use the new User Notice definitions.
RA21	Use the Set Top Map option in the Administer Maps sub-menu of the Network Monitor Control Window to specify the file name of the map to be used as the top map of the hierarchy.
RA22	Either an internal error has occurred or there is a problem with one of the network maps created using the Edit Maps Window. Re-create the map in error.
RA23	Environment variables are set up through the **adduser** command. Use the **adduser** command again to set up the environment properly.
RA24	Either the system administrator killed the process or the Graphics System is being shut down. Try again later.
RA25	Communications with a Core System may have failed. Check the messages from *nm_map_gen* to see which shelf maps were generated. When communications are re-established, try again for those maps that were not generated.
RA26	Non-unique data exists for the named node. The Core System config database may be corrupted. Contact your support organization.
RA27	A partial node name was supplied to Diagnostics that is not unique across the network. If a node is defined in more than one Core System database, all instances must have exactly the same name. Use the **cf** commands as described in the *StarKeeper II NMS Core System Guide* to make the node names identical.

Table C-2. Recommended Actions—*Continued*

Recommended Action Number	Recommended Action Description
RA28	Either the node/system is not known by the Graphics System (see **Synchronize Connections** in the Graphics System administration task), or the equipment type or generic is not supported by the Graphics System and/or Network Monitor. Use the **cf** commands to confirm the node is entered in the configuration database, and verify that the node's type (for example, DKII) and generic are supported by the *StarKeeper* II NMS distributed architecture.
RA29	An internal communications error has occurred. The *daemon* process has exited. It should be restarted automatically within a couple of minutes. Try again later. If the problem persists, restart the Graphics System software using the **stopws** and **startws** commands.
RA30	An internal communications error has occurred. The *daemon* process is still running, but service might be impaired. If so, restart the *daemon* process. The Alarm Collector process can be restarted by issuing the **filter_sync** command. All *daemon* processes can be restarted using the **stopws** and **startws** commands to restart the Graphics System software.
RA31	A (Find Map) command was issued for a certain network address. No maps were found containing an object which has that address. Edit your maps to add the new equipment.
RA32	Access to the database on the Core System has failed. This may be a transient problem. Try again. If the problem persists, restarting the Core System may help.

Error Messages from the Network Monitor Control Window

Table C-3. Error Messages from the Network Monitor Control Window

Control Window Error Messages	Recommended Action
Address must be specified.	RA13
Alarm collector service is not being offered currently.	RA8
Both ':' and '*' may not be specified for address.	RA13
Can't open preference file <name> Using default preferences for list alarms. Check permissions on file.	RA1
Can't write preferences to file <name> Using default preferences for list alarms. Check permissions on file.	RA1
Cannot access user defined notice file <name>. Check file permissions.	RA1
Cannot cancel subscription to alarm collector service.	RA12
Cannot get node data from SCP tables for NMS=<name>. Check connection status.	RA3
Cannot get StarKeeper II NMS data from SCP tables. Check connection status.	RA3
Cannot get SK NMS data from SCP tables. Error = <number>.	RA12
Cannot open Set Top Map file. Please check directory permissions. <name>	RA1
Cannot open user defined notice file <name>. Please check the file and or directory permissions, then try again.	RA1
Cannot subscribe to <name> service. Errno=<number>.	RA12
Control process: Alarms collector service aborted. It will be restarted by the system again.	RA8
Control process: Alarms collector service withdrawn. It will be restarted again by the system.	RA8
Control process: Cannot initialize the fielded buffer.	RA1
Control process: Clear alarm service withdrawn.	RA9
Control process: Error in Input/Output (ioctl) setup	RA1
Control process: Error while receiving SCP message. Errno =<number>.	RA12

Table C-3. Error Messages from the Network Monitor Control Window —*Continued*

Control Window Error Messages	Recommended Action
Control process: Error while sending SCP message. Errno=<number>.	RA12
Control process: Network Monitor clear server aborted. Alarm clear service will be restarted again.	RA9
Control process: Network Monitor netmap server aborted. Please restart the netmap server again.	RA10
Control process: Received unknown message. Msg id = <number>.	RA12
Control process: Unable to signup with the alarm collector service.	RA8
Control process: Unable to subscribe to Alarm Collector Status service.	RA8
Control process: Unable to subscribe to Clear Alarms service.	RA8
Control process: Unable to subscribe to the netmap service.	RA10
Environment variable <name> not set.	RA23
Error in address specified.	RA13
File name cannot be '.' or '..'.	RA13
File name cannot contain a '/'.	RA13
File name cannot exceed <number> characters.	RA13
File name must be specified.	RA13
Last character of address must be alphanumeric.	RA13
Network Monitor netmap service withdrawn.	RA10
Network Monitor unable to terminate SCP communications. Errno=<number>.	RA12
Server <name> denied to offer its services.	RA12
Severity must be specified.	RA13
Task Manager returns bad arguments error for tmexec request.	RA13
Task Manager returns bad pathname error for tmexec request.	RA13
Task Manager returns exec failed error for tmexec request.	RA2
Task Manager returns fork failed error for tmexec request.	RA2
Task Manager returns system limit error for tmexec request.	RA2
Task Manager returns unknown return code for tmexec request.	RA13

Table C-3. Error Messages from the Network Monitor Control Window —*Continued*

Control Window Error Messages	Recommended Action
Unable to cancel clear services. Errno=<number>.	RA12
Unable to cancel netmap services. Errno=<number>.	RA12
Unable to initialize seamless communication. Exiting.	RA5
Unable to subscribe to tmexec service.	RA8
Warning: Outstanding alarms exceeding 75% of the capacity. Please clear some alarms.	RA15
Warning: Outstanding alarms reached 100% of the capacity. New alarms will be dropped. Please clear some alarms.	RA15
Will not be able to clear alarms from control window.	RA16
Will not be able to list alarms from control window.	RA16
Will not be able to use netmap services from control window.	RA16

Error Messages from the Network Status and Network Map Windows

Table C-4. Error Messages from Network Status and Network Map Windows

Network Status and Network Map Window Error Messages	Recommended Action
<Server name> has withdrawn its service.	RA16
<Server name> has terminated abnormally.	RA16
AD_ALARMS service has terminated. Network Status cannot be provided.	RA5
Alarm Collector has terminated normally.	RA19
Cannot cancel <service name> service. Unix error=<number>.	RA12
Cannot determine top map name. Execute “Set Top Map” function.	RA21
Cannot offer service <service name> to Clients. Unix error=<number>.	RA12
Cannot withdraw service <service name> from Clients. Unix error=<number>.	RA12
Error in determining top map name. Execute “Set Top Map” function.	RA21
Error in ad_find_obj().	RA13
Error in adding field <field name> to FB.	RA13
Error in building search routines for map hierarchy.	RA13
Error in creating a map widget.	RA13
Error in creating icon for Network Status or Network Map window.	RA13
Error in creating map legend.	RA13
Error in determining top map name. Execute “Set Top Map” function.	RA21
Error in format of user notice <notice number>.	RA20
Error in initializing FB.	RA13
Error in initializing map hierarchy Reason: <reason>.	RA22
Error in initializing search routines for map hierarchy.	RA13
Error in notice(s) specification.	RA20
Error in processing clear request.	RA16

Table C-4. Error Messages from Network Status and Network Map Windows —

Network Status and Network Map Window Error Messages	Recommended Action
Error in reading input queue. Unix error=<number>.	RA1
Error in SCP_ack() to tag=<hex number>. Unix error=<number>.	RA12
Error in SCP_send() to tag=<hex number>. Unix error=<number>.	RA12
Error in setting environment for task execution. Unix error=<number>.	RA23
Error in trunk address specification: <address pair separated by '='>.	RA22
Failed to execute <process name>.	RA2
Found object with no name.	RA13
Internal graphics error encountered in gp_build_gcs: Cannot build GCs.	RA13
Map not found for selected address.	RA31
Received a FB with invalid <field name> field.	RA12
Received an SCP_ACK from unknown service <service name>.	RA12
Received bad message type seamless communications.	RA12
Received subscription request for unknown service <service name>.	RA12
Received unknown message type from seamless communications.	RA12
Received unknown operation (op) code from seamless communications.	RA12
Too many errors in reading input queue.	RA1
Unable to create initial network map widget.	RA13
Unable to initialize seamless communication. Exiting.	RA5
Unable to sign up for the AD_ALARMS service. The AD_ALARMS service is not running at this time.	RA8
Unable to subscribe to SCP services.	RA12
Usage: nm_stat -D -T <top_mapname> -L <legend_mapname> -B <Bell_flag> -C <Num_bells_critical> -J <Num_bells_major> -N <Num_bells_minor> -M <gp_printmalloc>	RA16

Error Messages from the List Alarms Window

Table C-5. Error Messages from the List Alarms Window

List Alarms Window Error Messages	Recommended Action
Alarm collector service is not currently being offered.	RA8
Alarms service aborted. List alarms process exiting. Try again later.	RA8
Alarms service being withdrawn. Alarm List process exiting. Alarm service will be restarted. Try again later.	RA8
Bad Address given on command line.	RA16
Bad User Notice file name.	RA16
Cannot get StarKeeper II NMS data from SCP tables. Check connection status.	RA3
Cannot open list alarms address selection data file.	RA1
Cannot open user defined notice address selection data file.	RA1
Cannot read alarm list preference file. Using default preferences for list alarms.	RA1
Environment variable <name> not set.	RA23
Error in Input/Output (ioctl) setup.	RA1
File name must be specified to save alarm list.	RA16
Internal error: unable to allocate memory.	RA2
List alarms cannot add fields to the Fielded Buffer.	RA1
List alarms cannot initialize the fielded buffer.	RA1
List Alarms: Diagnostics process returns bad return. Please check if the connection to the node is active.	RA28
List Alarms process unable to send <Find Map> request to netmap server. Start the View Network Status task.	RA10
List Alarms processing error. Try again later.	RA13
List Alarms unable to get alarm help. Please check to ensure all local StarKeeper (R) II NMSs are administered and active.	RA3
List alarms unable to subscribe to the clear alarms service.	RA9
List alarms unable to subscribe to the netmap service.	RA10
List alarms: cannot open node name file.	RA16

Table C-5. Error Messages from the List Alarms Window —*Continued*

List Alarms Window Error Messages	Recommended Action
List alarms: Error while process was accessing an alarm record.	RA13
List alarms: Error while process was leaving an alarm record.	RA13
List alarms: Error while receiving SCP message. errno =<number>.	RA12
List alarms: Error while sending SCP message. errno=<number>.	RA12
Maximum number of clients for alarm collector's service exceeded. Please quit some list alarms, then try again.	RA15
Maximum number of list alarms exceeded. Please quit some list alarms, then try again.	RA15
Memory allocation error, re-start Alarm List.	RA13
Netmap status service aborted. Find map service will be disabled.	RA10
Network Monitor clear alarms service aborted. Clear Alarms will be disabled until the service is restarted.	RA9
Network Monitor clear alarms service withdrawn. Clear service will be disabled until the service is restarted.	RA9
No alarms in the list.	RA16
Received unknown message. Type=<number>.	RA12
Server <name> denied acknowledgment. Not providing service.	RA12
Task Manager returns bad arguments error for tmexec request.	RA13
Task Manager returns bad pathname error for tmexec request.	RA13
Task Manager returns exec failed error for tmexec request.	RA2
Task Manager returns fork failed error for tmexec request.	RA2
Task Manager returns system limit error for tmexec request.	RA2
Task Manager returns unknown return code for tmexec request.	RA13
The alarms database has 999 or more outstanding alarms. List Alarms will be restricted to 999 alarms. Please clear some alarms.	RA15
Unable to access alarm record.	RA13

Table C-5. Error Messages from the List Alarms Window —*Continued*

List Alarms Window Error Messages	Recommended Action
Unable to attach alarms SHM segment.	RA2
Unable to attach roca SHM segment.	RA2
Unable to get alarms SHM segment address.	RA2
Unable to get block lock SEM.	RA2
Unable to get record lock SEM.	RA2
Unable to get roca shared memory id.	RA2
Unable to get roca shared memory id.	RA8
Unable to get roca shared memory pointer.	RA2
Unable to get shared memory address.	RA2
Unable to get shared memory id.	RA2
Unable to initialize seamless communication.	RA5
Unable to lock alarms SHM segment.	RA2
Unable to obtain client id from AD_ALARMS.	RA8
Unable to obtain client id from AD_ALARMS.	RA13
Unable to parse a node address listed in the node file.	RA16
Unable to signup for the AD_ALARMS service.	RA8
Unable to start new List Alarms process. The maximum number of List Alarms processes has been reached.	RA2
Unable to subscribe to AD_ALARMS.	RA8
Unable to subscribe to Find Map service.	RA8
Unable to subscribe to tmexec service.	RA8
Unable to unlock alarms SHM segment.	RA2
Usage: ad_al <-n # nodes> <-a|-f|-h filename|address> -s severity.	RA13
Wrong user defined notice selection data format.	RA20
You must select exactly one alarm.	RA16
You must specify an alarm ID.	RA16

Error Messages from the Diagnostics Window

Table C-6. Error Messages from the Diagnostics Window

Diagnostics Window Error Messages	Recommended Action
Address: <network address> is invalid.	RA13
An inter-application protocol error has occurred.	RA13
Cannot focus on node: <nodename>.	RA28
Communications aborted. Try again later.	RA5
Communications cannot be initialized. Try again later.	RA5
Conc slot: <number/number> on node: <nodename> is not defined in the database.	RA4
Could not set environment for user: <login_id>.	RA1
Database server subscription failed. Try again later.	RA6
Dbserver is not available. Try again later.	RA6
Error was encountered loading resource file: <filename>.	RA23
Error was encountered loading window structures.	RA23
Internal Diagnostics error. Offset for object definitions was not found.	RA13
Internal Diagnostics error. Offset for verb definitions was not found.	RA13
Module needs to be configured in core database.	RA4
Module type: <Modtype> is not supported.	RA28
Mux slot: <number.number> on node: <nodename> is not defined in the database.	RA4
Node: <nodename> id not found in database.	RA4
Node: <nodename> is an unsupported system type: <type>.	RA28
Node: <nodename> is not unique.	RA27
Node: <nodename> is running unsupported generic: <number>.	RA28
Node: <nodename> not found in database.	RA4
Setup procedure has timed out. Try again later.	RA2
Slot: <number> at node: <nodename> is not defined in the database.	RA4
System cannot exec process. Try again later.	RA2
System cannot fork process. Try again later.	RA2

Table C-6. Error Messages from the Diagnostics Window —*Continued*

Diagnostics Window Error Messages	Recommended Action
Tmserver is not available. Try again later.	RA7
Too many programs are running. Try again later.	RA2
Unable to access a data base. Try again later. error code = < error code>.	RA6
Undefined error condition has been encountered.	RA13

Error Messages from the Display Info Window

Table C-7. Error Messages from the Display Info Window

Display Info Window Error Messages	Recommended Action
Access to config database server denied.	RA6
Database server config aborted.	RA6
Database server is busy. Cannot send more than one request at a time.	RA13
Database services being withdrawn currently.	RA6
Display Info process cannot open the datafile send by database server.	RA1
Display Info process invoked with incorrect options.	RA16
Display Info process received INFORMIX Error for transaction id <trans id> INFORMIX error code <error code> and error message <message>.	RA13
Display Info process received seamless communication error - DB_SCP_ERRNO. Error = <number>.	RA12
Display Info process received unknown control message. Mtype = <type>.	RA13
Display Info process unable to cancel subscription to database server. Errno=<number>.	RA12
Display Info process unable to find node address.	RA4
Display Info process unable to get a server tag for node address <address> Errno = <error number>. Check if the node addr is configured in SK database.	RA16
Display Info process unable to initialize seamless communication. Errno=<number>.	RA5
Display Info process unable to send message to database server. Check if the database server is active. Try again later.	RA32
Display Info process unable to subscribe with config database service. Errno=<number>.	RA6
Display Info process unable to terminate SCP communication. Errno=<number>.	RA12
Display Info server cannot read the datafile sent by database server.	RA1

Table C-7. Error Messages from the Display Info Window

Display Info Window Error Messages	Recommended Action
Display Info server received database query format or syntax error.	RA32
Display Info unable to open trunk addresses data file.	RA1
Display Info unable to put FILEDTBLS as an environment variable.	RA1
Display Info: Cannot initialize the fielded buffer.	RA1
Display Info: Cannot initialize the fielded buffer.	RA13
Display Info: Error in Input/Output (ioctl) setup.	RA1
Display Info: Error in seamless communication receive message. Errno =<number>.	RA12
Display Info: Error in seamless communication send message. Errno=<number>.	RA12
Unknown server responded with a subscription response. server = <server>.	RA13

Error Messages from the Edit Maps Window

Table C-8. Error Messages from the Edit Maps Window

Edit Maps Window Error Messages	Recommended Action
Access failure to database server on StarKeeper II NMS <name>.	RA6
Cannot delete map file <filename>. Cannot find map file.	RA22
Can't load map file. File= <filename>	RA22
Can't write map file.	RA22
Communication failure to StarKeeper II NMS <name>.	RA3
Communication initialization failure.	RA12
Database retrieval failed.	RA32
Database update failed.	RA32
Editor invocation failure.	RA13
Graphics initialization failure.	RA1
Input map name must not contain a '/'.	RA16

Table C-8. Error Messages from the Edit Maps Window —*Continued*

Edit Maps Window Error Messages	Recommended Action
Internal communication failure.	RA12
Map name cannot be '.' or '..'.	RA16
Map name cannot exceed <maximum length> characters.	RA16
Request node data not available, check connections status.	RA3
Request conc/mux data not available, check connections status.	RA3
Request trunk data not available, check connections status.	RA3
Save error: Can't Write Map File: Check Permissions (Error = error number> File = <file name>).	RA22
Set Network Address Error: Can't Write Map File: Check Permissions (Error = <error number> File = <filename>.	RA16

Error Messages from the Alarm Collector Process

Table C-9. Error Messages from the Alarm Collector Process

Alarm Collector Process Error Messages	Recommended Action
Abnormal termination of client (tag=<hex number>).	RA16
Abnormal termination of client or server, but (tag=<hex number>) not found in internal table.	RA12
Abnormal termination of server (tag=<hex number>).	RA16
Alarm Collector terminating abnormally.	RA13
Alarm Collector will not receive alarms from this StarKeeper II NMS.	RA16
Cannot cancel <service name> service. Unix error=<number>.	RA12
Cannot convert tag = <hex number> to StarKeeper II NMS name.	RA12
Cannot free seamless communication resources. Unix error=<number>.	RA12
Cannot offer services to Clients. Unix error=<number>, Exiting.	RA29
Cannot subscribe to Alarm Handlers' services. Unix error=<number>, Exiting.	RA29
Cannot withdraw from <service name> service. Unix error=<number>.	RA12
Could not add Alarm Handler (tag=<hex number>, on StarKeeper II NMS <name>) to internal table.	RA30
Could not add Client (tag=<hex number>) to internal table.	RA30
Could not find client (tag=<hex number>) in internal table.	RA12
Could not find client (tag=<hex number>) in list to delete.	RA12
Error in adding field <field name> to FB.	RA13
Error in bad filter type. Line read is <line>.	RA17
Error in format of filter file. Line read is <line>.	RA17
Error in initializing free list manager, Exiting.	RA30
Error in opening filter file. Unix error=<number>.	RA17

Table C-9. Error Messages from the Alarm Collector Process

Alarm Collector Process Error Messages	Recommended Action
Error in processing A_SYNC message.	RA12
Error in reading input queue. Unix error=<number>.	RA1
Error in SCP_ack() to tag=<hex number>. Unix error=<number>.	RA12
Error in SCP_send() to tag=<hex number>. Unix error=<number>.	RA12
Error waiting on a block semaphore. Unix error=<number>, Exiting.	RA1
Filter specification for StarKeeper II NMS <name> is invalid. No filtering will be applied for alarms from this StarKeeper II NMS.	RA18
Memory allocation error. Unix error=<number>, Exiting.	RA1
Number of Alarm Lists have exceeded the limit of 16.	RA14
Number of StarKeeper II NMSs connected to this Graphics System has exceeded the limit of 16.	RA15
Number of clients of Alarm Collector has exceeded the limit of 32.	RA14
Number of filter specifications exceed the number of StarKeeper II NMSs (16) supported.	RA17
Out of node storage memory. Number of nodes exceeds <number>.	RA15
Out of shared memory to store alarms. Number of outstanding alarms exceed <number>.	RA15
Received a FB with invalid <field name> field.	RA12
Received a FB with missing <field name> field.	RA12
Received a FB with unknown <field name> field.	RA12
Received bad message type from seamless communications.	RA12
Received control message for tag=<hex number>, but client not found in internal table.	RA12
Received control message for tag=<hex number>, but server not found in internal table.	RA12
Received subscription request for unknown service <service name>.	RA13

Table C-9. Error Messages from the Alarm Collector Process

Alarm Collector Process Error Messages	Recommended Action
Received unknown message type from seamless communications.	RA12
Received unknown operation (op) code from seamless communications.	RA12
Too many errors in reading input queue, Exiting.	RA29
Unable to initialize seamless communication. Exiting.	RA5

Error Messages from the Clear Alarms Process

Table C-10. Error Messages from the Clear Alarms Process

Clear Alarms Process Error Messages	Recommended Action
Alarms service not being offered. Clear service disabled.	RA11
Alarms services denied. Clear services will not be available.	RA11
Clear process unable to ack clients. errno=<number>.	RA12
Clear process unable to cancel subscription to alarms. errno=<number>.	RA12
Clear process unable to initialize seamless communication.	RA5
Clear process unable to initialize the fielded buffer.	RA1
Clear process unable to send broadcast message. errno=<number>.	RA12
Clear process unable to send NACK to the clients. errno=<number>.	RA12
Clear process unable to send withdraw message. errno=<number>.	RA12
Clear process unable to subscribe with alarms service.	RA11
Clear process unable to terminate SCP communication. errno=<number>.	RA12
Clear process: Error in Input/Output (ioctl) setup.	RA1
Clear process: Error while receiving SCP message. errno =<number>.	RA12
Clear process: Error while sending SCP message. errno=<number>.	RA12
Clear service unable to offer services to clients. errno<number>.	RA12
No alarms services being offered currently. Clear service disabled.	RA11

Error Messages from the Shelf Map Generation Process

Table C-11. Error Messages from the Shelf Map Generation Process

Shelf Map Generation Process Error Messages	Recommended Action
Address <address> not found in map file.	RA13
Badly formatted NMS address in input file.	RA13
Command line option <-option> not recognized.	RA13
Communication service aborted due to system error: <system error description>.	RA25
Communication service aborted, error: <number>.	RA25
Communication service could not be established due to system error: <system error description>.	RA25
Communication service could not be established, error: <number>.	RA25
Communication service failed to receive message due to system error: <system error description>.	RA25
Communication service failed to receive message, error: <number>.	RA25
Communication service failed to send message due to system error: <system error description>.	RA25
Communication service failed to send message, error: <number>.	RA25
Communication service termination failed due to system error <error>.	RA25
Communication service termination failed, error <number>.	RA25
Communication service withdrawn due to system error: <system error description>.	RA25
Communication service withdrawn, error: <number>.	RA25
Concentrator map generation failed for node [<NMSaddr>]<node>.	RA16
Could not access hardware type definition file: <system error description>.	RA1
Could not open node list input file, system error: <system error description>.	RA1

Table C-11. Error Messages from the Shelf Map Generation Process —*Continued*

Shelf Map Generation Process Error Messages	Recommended Action
Could not remove node list input file.	RA1
Database service could not be established due to system error: <system error description>.	RA6
Database service could not be established, error: <number>.	RA6
Environment variable NM_ROOT is not set.	RA23
Insufficient configuration data exists for [<NMSaddr>]<node>.	RA4
Invalid format in *nm_htype* file on line <number>.	RA13
Map generation failed for NMS: <NMSaddr>.	RA16
Missing node address in input file.	RA13
No database servers are currently available.	RA6
Node list input file multiply defined.	RA13
Node list input file not specified.	RA13
Node map generation failed for node [<NMSaddr>]<node>.	RA16
Non-unique data returned for node [NMSaddr]<node name>.	RA26
Object <object label> in shelf map template could not be found or is not unique.	RA13
Shelf map files not generated for [<NMS addr>]<node> - cannot get configuration data.	RA6
Termination due to receipt of SIGTERM signal.	RA24
The database interface process has suffered a fatal error, processing terminated.	RA6
The database interface process returned error <error number>, processing continues.	RA6
The database interface process received communication process error number <number>, processing terminated.	RA6
Unable to access concentrator data file: <file name> System error: <system error description>.	RA1
Unable to access concentrator module data file: <file name> System error: <system error description>.	RA1

Table C-11. Error Messages from the Shelf Map Generation Process —*Continued*

Shelf Map Generation Process Error Messages	Recommended Action
Unable to access node data file: <file name> System error: <system error description>.	RA1
Unable to access node module data file: <file name> System error: <system error description>.	RA1
Unable to access shelf data file: <file name> System error: <error>.	RA13
Unable to access shelf map label in shelf map template: <filename>.	RA13
Unable to access shelf map object label in shelf map template: <filename>.	RA13
Unable to read from database transaction concentrator data file: System error: <system error description>.	RA1
Unable to read from database transaction concentrator module data file: <System error: <system error description>.	RA1
Unable to read from database transaction node data file: FML error: <error>.	RA1
Unable to read from database transaction node module data file: FML error: <error>.	RA1
Unable to read shelf map template: <template file> System error: <system error description>.	RA1
Unable to remove database transaction file: <file_name>. System error: <system error description>.	RA1
Unable to write shelf map to disk file: <template file>.	RA1
Unexpected communication service application message.	RA25
Unknown communication service control message received.	RA25
Unknown type of message received by communication process.	RA25
WARNING: <NMSname> database service not available, no maps generated for <NMSname>.	RA6

Table of HP-UX System Error Codes

Table C-12. HP-UX System Error Codes

HP-UX System Error Number	Error Description
1	Not super-user
2	No such file or directory
3	No such process
4	Interrupted system call
5	I/O error
6	No such device or address
7	Arg list too long
8	Exec format error
9	Bad file number
10	No children
11	No more processes
12	Not enough core
13	Permission denied
14	Bad address
15	Block device required
16	Mount device busy
17	File exists
18	Cross-device link
19	No such device
20	Not a directory
21	Is a directory
22	Invalid argument
23	File table overflow
24	Too many open files
25	Not a typewriter
26	Text file busy
27	File too large
28	No space left on device
29	Illegal seek
30	Read only file system

Table C-12. HP-UX System Error Codes —*Continued*

HP-UX System Error Number	Error Description
31	Too many links
32	Broken pipe
33	Math arg out of domain of func
34	Math result not representable
35	No message of desired type
36	Identifier removed
37	Channel number out of range
38	Level 2 not synchronized
39	Level 3 halted
40	Level 3 reset
41	Link number out of range
42	Protocol driver not attached
43	No CSI structure available
44	Level 2 halted
45	Record locking deadlock

Table of SCP Error Codes

Table C-13. SCP Error Codes

SCP Error Code	Description
64 (EX_USAGE)	command line usage error
65 (EX_DATAERR)	data format error
66 (EX_NOINPUT)	cannot open input file
67 (EX_NOUSER)	addressee unknown
68 (EX_NOHOST)	host name unknown
69 (EX_UNAVAILABLE)	service unavailable
70 (EX_SOFTWARE)	internal software error
71 (EX_OSERR)	system error (e.g., can't fork)
72 (EX_OSFILE)	critical OS file missing
73 (EX_CANTCREAT)	can't create output file
74 (EX_IOERR)	input/output error
75 (EX_TEMPFAIL)	temporary failure; user is invited to retry
76 (EX_PROTOCOL)	remote error in protocol
77 (EX_NOPERM)	permission denied
78 (EX_HBUSY)	all channels busy
79 (EX_TOSRV)	remote node not answering
80 (EX_HOSRV)	server not answering
81 (EX_TBUSY)	all trunk channels busy
401 (SCP_ESYSERR)	UNIX system error, examine errno
402 (SCP_ENOEXIST)	SCP_CTL function calls: tested field does not exist
403 (SCP_ENOTFULL)	specified path is not a full pathname
404 (SCP_ESH)	system(3) calls RC not 0
405 (SCP_EBADENV)	environment variable not found
406 (SCP_EBADTAG)	bad session id
407 (SCP_EQ)	trouble with queues
408 (SCP_EALLOC)	could not allocate memory
409 (SCP_EMEM)	trouble with shared memory
410 (SCP_ECOMPAT)	compatibility problem with code
411 (SCP_EBADARG)	bad argument to routine
412 (SCP_EBADMACH)	trouble with machine table

Table C-13. SCP Error Codes —*Continued*

SCP Error Code	Description
413 (SCP_ETOOLONG)	argument too long
414 (SCP_EFMLERR)	FML error, examine Ferror
415 (SCP_EMINIT)	called SCP init more than once
416 (SCP_ENIT)	SCP init not called
417 (SCP_EFILE)	trouble with a file
418 (SCP_EXQ)	trouble with expandable queues
419 (SCP_ELINT)	lint forced a return, need errno set
420 (SCP_EBADFENV)	file environment variable not found
421 (SCP_EBADSRVC)	service name is not good
422 (SCP_ENOENT)	error, no entry exists in a table
423 (SCP_EINVAL)	error in the way arguments were passed (INVALID) to a function
424 (SCP_ENOTUNIQUE)	error, partial node name NOT UNIQUE
425 (SCP_EBADFLAG)	error in SCP_Waitf flag set to a value
426 (SCP_ENOCNCLASS)	error, no connection class to connection field mapping in connection SHM segment
427 (SCP_EBADVERSION)	invalid VERSION/SK_RELEASE

Performance Reporter Error Messages

D

This section contains a list of error messages that are displayed by Performance Reporter.

- `Cannot create link to report file. See event log for more information.`

  This message is displayed when the Performance Reporter application tries to create a link to its report file. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot delete request. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to delete a report request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot find form data file. See event log for more information.`

  This message is displayed when the Performance Reporter application cannot find a form data file for a selected report request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get a list of group names. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of group names due to an internal error. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get a list of node names. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of node names due to an SCP error. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get a list of StarKeeper II NMS host names. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of Core System names due to an SCP error. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get a list of trunk names. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of trunk names due to an internal error. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get list of report files. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of report files for the List Exception Reports and List Filed Reports options. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot get list of report requests. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to get a list of report requests for the List Report Request option. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot open data file <datafile>. <Reason>.`

  This message is displayed when the Performance Reporter application fails to open a data file <datafile> for reading or writing. Look at <Reason> for further details. <Reason> is given by the HP-UX system.

- `Cannot open report file <rptfile>. <Reason>.`

  This message is displayed when the Performance Reporter application fails to open a report file <rptfile> for reading or writing. Look at <Reason> for further details. <Reason> is given by the HP-UX system.

- `Cannot print report. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to print a report. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot re-create cronfile. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to re-create the user's missing *.cronfile*. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot rename over existing file.`

  This message is displayed when the user attempts to rename a file over an existing file. Choose a different file name or delete the existing file and execute the Rename option again.

- `Cannot rename report. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to rename a report. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot save report. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to save a report. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot schedule report requests. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to schedule report requests. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot send report request. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to send a report request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot send threshold status update request. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to send a threshold status update request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot send threshold update request. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to send a threshold update request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Cannot update request. See event log for more information.`

  This message is displayed when the Performance Reporter application fails to update a report request. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Environment variable "<variable name>" is not set. Contact your System Administrator.`

  This message is displayed when one of the environment variables needed by the Performance Reporter application is not set. Contact your System Administrator.

- `Initialization failed. See event log for more information.`

  This message is displayed when you bring up the Performance Reporter application but it encounters problems during its initialization. Look at the EVENTLOG for more information and report it to your Support Personnel/Organization.

- `Missing directory or file <home_directory>/.cronfile. Attempting to re-create.`

  This message is displayed when a user tries to bring up Performance Reporter but the application cannot find the file *.cronfile* for that user as part of its initialization. Performance Reporter will attempt to re-create this missing file.

- `No data available`

  This message can appear in the body of a report you have requested where you would expect to see data. It will be displayed whenever your entire report request cannot be met. However, if you have requested a trunk report for two trunks and there is data for one of the trunks, then the report for only one of the trunks will be printed. There will be no message.

  There are several places where things could be out of synch in the data collection, summarization, and reporting process. Here are some trouble-shooting guidelines for when you encounter this message.

  1. There are no resources of the specified type in your network or in the node(s) that you selected.
  2. The resources were not in service.
  3. The data was not scheduled on the node or the Core System.

4. The data was not generated on the node.

   The node could be out of service or something could be wrong with the data generation; for example, a malfunctioning module.

5. Core System was not connected to the node.

6. The data was not summarized (for weekly and monthly reports).

   This can happen if you request a report earlier than when the data is scheduled to be summarized.

7. The data has been deleted and is no longer in the Core System database.

   Check the data retention periods.

8. You have requested a report for a future date.

9. Performance Reporter cannot access the data on the Core System to generate the report.

10. The configuration information has changed on the node or on the Core System and Performance Reporter is not aware of the changes.

    To synchronize the configuration information on a Core System with that on the node, run the **cfg_sync** command on the Core System. To synchronize the configuration information on Performance Reporter, use **Update Configuration Data** available from the **Administer** menu in the Performance Reporter Control Window.

- `Node/Module configuration file does not exist. Check connection(s) to StarKeeper II NMS.`

  This message is displayed when you don't have any connections to your Core System or the connections have not been established long enough before you bring up the Performance Reporter application. Check your connections using Workstation Administration. If there exists one or more connections from your Graphics System to your Core System, you may want to exit Performance Reporter now, wait for a few seconds and then try to bring it up again.

- `Unable to process the request for the appropriate StarKeeper II NMS`

  This message is displayed when the Core System is disconnected, inactive, or has not been synchronized. Possible solutions are to update the connections and perform a **conn_sync** on the Core System, activate the Core System and **Synchronize** through Workstation Administration, or **Update Configuration Data** through Performance Reporter.

Glossary

The definitions in this section appear in alphabetical order. Cross references in the entries are printed in **bold** type.

A

aau *command parameter.* An abbreviation for alarm activator unit.

absolute pathname. The pathname used to specify a command or program from the *root* directory.

access. To connect with and use a software package or hardware device.

ACE. An abbreviation for Automated Cable Expertise (OS).

ACF. An abbreviation for Access control field (SMDS) .

adapter. 1. An auxiliary device or unit used to extend the operation of another system. 2. An electronic part used to connect two dissimilar parts or machines.

address. An identifying name or code for a network element or a service that end users can **access**. Addresses reflect a network hierarchy of four level mnemonic addressing: **network/area/exchange/ local service address** or the X.121 scheme of: **DNIC/SR/SA/EPN**.

administration connection. A connection in which the transfer of node data to *StarKeeper* II NMS databases using *StarKeeper* II NMS Network Builder, the **skload** and **cfg_sync** commands, and the Session Maintenance **smverify** and **smstat** commands used to monitor Session Maintenance trunks is permitted.

AI. An abbreviation for Alarm indication signal (SMDS) .

AIM. An abbreviation for Asynchronous Interface Module (ISN) .

AIM8. An abbreviation for Asynchronous Interface Module 8-port (ISN) .

alarms connection. A connection type in which alarms from external system elements other than BNS-2000 or BNS-2000 VCS nodes are collected.

alias. An alternative (usually shortened) **area** or **exchange** name for a **node**.

American Standard Code for Information Interchange (ASCII). ASCII represents characters, numbers, punctuation marks, or signals in seven on-off bits plus a **parity** bit.

AMUX. An abbreviation for Asynchronous Multiplexer.

anchor. A method, used in *StarKeeper* II NMS network addressing, to limit the matching criteria when searching for specified records in the database. *Compare* **wild card**.

ANSI. An abbreviation for American National Standards Institute .

application. A program that performs a specific task, such as displaying network alarms or running diagnostics.

area. Part of the destination code used in addressing; similar to a telephone area code. Each area may include multiple exchanges and each **exchange** may include multiple **local service address**es.

ASCII. An abbreviation for American Standard Code for Information Interchange.

Async. An abbreviation for asynchronous communication/protocol. *See* **Bisync.**

asynchronous. Transmission in which the time intervals between data characters can be of unequal length, controlled by start and stop bits at the beginning and end of each character. *Compare* **synchronous**.

Asynchronous Interface Module 8-port (AIM8). An eight-port module for placement in a bridging concentrator.

Asynchronous Multiplexer (AMUX). A **concentrator** that provides either 32, 64, or 504 asynchronous ports. *See also* **Synchronous/Asynchronous Multiplexer.**

B

background processing. The automatic execution of a job, to be run in the background, while the user continues to perform other tasks.

backplane. The **bus** in a **node** to which all control and interface modules connect.

backup. A spare copy of data or software kept in case the original is damaged or lost.

bad track. A part of the hard disk which is not usable.

billing. A service that allows the network administrator to track the date and connection time of asynchronous, multiplexed host, synchronous, and X.25 calls through the network on a per-port basis and assign a charge for the service.

billing connection. A connection type used to capture billing data. There must be a billing connection to *StarKeeper* II NMS from each node reporting billing data.

BISYNC. A Binary Synchronous Communication, link-layered, character oriented IBM protocol used in synchronized transmission of binary coded data.

BNS-2000. A cell relay switch that offers connection-oriented service and connectionless, high-speed service using broadband technology.

board. A rectangular piece of fiberglass that has pins on one side and electronic parts on the other; also called a card, PC board, or PCB (printed circuit board). The system is always supplied with a system board. Other boards can include a video adapter board, a disk controller board, a network communication board, memory boards, multiplexed host interface boards, and multifunction boards.

bps. An abbreviation for bits per second.

bridge modules. Interface modules residing in a bridging concentrator.

BSC3270. *See* SYNC8 .

buffer. A temporary storage location for information being sent or received. It is usually located between two different devices that have different abilities concerning speeds for handling the data.

bus. The parallel wiring through which bits of data travel to and from the parts of a computer.

C

CAC. An abbreviation for Customer Assistance Center.

call hold. A feature that allows a user to have more than one call active at any time.

call setup. The **node** activity that establishes a **virtual circuit** connection across the network.

CCS. An abbreviation for Customer Control System (*StarKeeper* II NMS) .

central office (CO). An operating telephone company location where call switching is done.

central office local area network (CO LAN). A data communications network switched through a **central office**.

central processing unit (CPU). A component of the **control computer**.

channel. A transmission path or link.

CIC. An abbreviation for Customer Information Center.

CNM. An abbreviation for Customer network management (SMDS) .

CO. An abbreviation for Central office .

CO-LAN. An abbreviation for Central office local area network .

command partitioning. A *StarKeeper* II NMS security feature that allows certain users access only to specified commands.

Computer Port Module-High-speed (CPM-HS). A multiplexed optical fiber interface.

Computer Port Module-Multiple Link (CPM-ML). The CPMML can be located in nodes and Multipurpose Concentrators to provide up to eight wire connections to LAN servers that use a version of *Datakit* II VCS Host Interface Software for multiplexed communications with the network. It supports speeds up to 64 Kbps over RS-232-C or V.35 interfaces.

concentrator. A communications device that can connect many devices of differing speeds to the **node**.

config. An abbreviation for configuration.

configuration. 1. The hardware and software components of a system that determine its capacity and performance. 2. The task of populating databases with information to identify the components with which they communicate.

connector. A device allowing the connection of various electrical elements.

console. A video display terminal with **keyboard** used as an interface to the node or network management system.

console security. A password optionally required for administrative access to a node or network management system.

contention. A condition where several systems are vying for access to a line and only one can establish a connection. When a connection cannot be established, it is said that this device is lost in contention.

control computer (CC). The modules making up node intelligence.

controller. *See* **control computer.**

Core System. Core *StarKeeper* II NMS processor. A processor equipped with *StarKeeper* II NMS Core processes. This processor does not contain any graphic system software.

Co-resident System. A *StarKeeper* II NMS processor equipped with *StarKeeper* II NMS Core and Graphics processes.

CPE. An abbreviation for Customer premises equipment.

CPM. An abbreviation for Computer Port Module.

CPM-HS. An abbreviation for Computer Port Module–High Speed.

CPMML. An abbreviation for Computer Port Module Multiple Link

CPU. An abbreviation for Central processing unit.

CRC. An abbreviation for Cyclic redundancy check.

cron. An abbreviation for chronological.

critical modules. The Clock, Eswitch/ Switch, and Repeater modules; if these modules fail, the **node** fails.

crons. *StarKeeper* II NMS processes that run automatically at specified times, usually to clean up old files. *Cron* is an abbreviated form of the word *chronological*.

crontab. A *StarKeeper* II NMS criteria listing that allows crons to be automatically run at specified times. *Crontab* is an abbreviated form of the words *chronological table*.

cursor. 1. In computer graphics, a movable marker used to indicate position on a display. 2. A displayed symbol that acts as a marker to help the user locate a point in text, in a system command, or in storage. 3. A movable spot of light on the screen of a display device, usually indicating where the next character is to be entered, replaced, or deleted.

Cut-Through Application. A Graphics System application that allows simultaneous access to several different computers from a single workstation. Direct access to a host by way of a terminal emulation program in *StarKeeper* II NMS.

Cyclic Redundancy Check (CRC). A common method of establishing that data was correctly received in data communications. A check performed on data to determine if an error has occurred in the transmitting, reading, or writing of the data.

D

database. A collection of data that can be immediately accessed and operated upon by a data processing system for a specific purpose.

database conversion. Upgrading a machine running a previous release of *StarKeeper* II NMS to the latest release of *StarKeeper* II NMS.

***Datakit* Applications Processor (DKAP).** A programmable module for customized applications.

***Datakit* II VCS Host Interface Software.** Multiplexed host software that enables a host connection to the node's Computer Port Module (CPM).

***Datakit* II Virtual Circuit Switch (VCS).** A multiple feature data switch that provides high-speed data communication between different networks and various computer equipment. The switch can connect **local area networks** to **wide area networks**, and can be used in a single building or an environment with multiple buildings such as a college campus; it can also connect multiple campuses or businesses nationwide. Each *Datakit* II VCS switch is called a **node**.

DCE. An abbreviation for Data Communication Equipment. Usually a **modem**.

DDS. An abbreviation for Digital Data System (ACCUNET® DATAPHONE® Data Service).

diagnostic. Pertaining to the detection and isolation of a malfunction or mistake.

Digital Data Service (DDS). Digital transmission carrier service.

direct connection. A connection in which a *StarKeeper* II NMS host computer is cabled directly to a remote element with RS-232-C (port B on a BNS-2000 or BNS-2000 VCS node).

Disk Cleaner Administration Application. A feature that allows a Workstation Administrator to monitor disk storage space and remove directories/files.

disk crash. A malfunction that may result in loss of data or an inoperable system due to unreadable sectors.

DKAP. An abbreviation for *Datakit* Applications Processor.

DLCI. An abbreviation for Data link connection identifier (frame relay) .

DN. An abbreviation for Distinguished name (SMDS); Data Networking.

DNIC. An abbreviation for Data Network Identification Code as used in **X.121** addressing.

download. From the viewpoint of the reference computer or node, the act of receiving data from another computer. Choosing the *download* option in some communications programs automatically erases a file of the same name that was meant for transmission. *See* **upload**.

DTE. An abbreviation for Data Terminating Equipment. Usually a terminal or computer.

DTF. An abbreviation for Digital transmission facility (DS1/DS3) .

DXI. An abbreviation for Data Exchange Interface (SMDS) .

DXI/SNI. An abbreviation for Data Exchange Interface/Subscriber Network Interface (SMDS) .

E

EBIM. An abbreviation for Ethernet Bridge Interface Module.

EGA. An abbreviation for Enhanced graphics adapter.

EISA. An abbreviation for Extended Industry Standard Architecture.

Element Management System (EMS). A system designed to manage a specific element or group of elements in a network, other than BNS-2000 or BNS-2000 VCS nodes. An EMS sends alarms to a user's workstation that is logically connected to *StarKeeper* II NMS via the Uniform Alarm Interface (UAI).

EMS. An abbreviation for Element Management System.

end user. Designates a terminal user in the network or, the user who is operating one of the optional graphics-based applications.

envelope. A 10-bit value containing a data or **control byte**, a control bit, and a parity bit.

EPN. An abbreviation for endpoint number, which is part of the **X.121** addressing scheme.

error message. A response from a program indicating that a problem has arisen or something unexpected has happened, requiring attention.

Ethernet Bridge Interface Module (EBIM). An interface module that supports **LAN bridging** for Ethernet environments.

exchange. Part of the node destination code used in the addressing scheme. See also **network, area,** and **local service address**.

exit. To leave the operations of a program or a routine of a program.

F

factory default. Parameters defined and set prior to shipment that may or may not be changed or customized.

FCC. An abbreviation for Federal Communications Commission.

FEP. An abbreviation for Front-end processor.

female connector. A cable connector in which the conducting elements are embedded in recessed sockets designed to receive complementary male parts such as a pin or prong.

First-in, First-out (FIFO). A queue that interprets and processes messages, one by one, in the order in which they arrive.

floppy disk drive. A device that reads and writes information on a floppy diskette.

format. 1. To prepare a new floppy diskette or hard disk for use with the computer. 2. The way data is displayed. Pertains to the way data appears on the screen or on printed copy.

Frame Relay. A data service incorporating basic aspects of CCITT's LAPD protocol. It is used as one means of providing LAN interconnect service over packet switching networks.

Frame Relay Module (FRM). A node module providing a standard-based multiplexed interface to routers and **gateway**s from other FRMs resident on the network.

FRM. An abbreviation for Frame Relay Module.

front end processor (FEP). A computer under the control of another, larger computer in a communications network. The FEP performs basic housekeeping operations on data streams as they arrive to be processed by the larger computer.

function keys. Numbered keys (F1, F2, and so forth) located on the side or across the top of a keyboard, programmed to perform specific commands with a single keystroke.

G

gateway. A conceptual or logical network station that serves to interconnect two otherwise incompatible networks, nodes, subnetworks, or devices; performs a protocol-conversion operation across a wide spectrum of communications functions, or layers.

GB. An abbreviation for “gigabyte.” A gigabyte equals 1000 megabytes.

Graphics System. A separate processor that contains graphics capabilities to run application packages.

Graphics System Platform. A base software package on which all optional, graphics-based *StarKeeper* II NMS application packages are installed.

group. A database component identifying a set of ports or channels that are considered a unit. There are two kinds of groups: local (can include any module except a **trunk**) and **trunk** (can include only trunk modules).

group name. An identifying label for a database element consisting of a set of ports.

GUI. An abbreviation for Graphical user interface.

H

hardcopy. Printed characters on paper. Any off-line documentation.

HDLC. An abbreviation for High Level Data Link Control.

help. A *StarKeeper* II NMS interface that provides on-screen assistance. Each application supplies help for its own application functions and elements.

High Level Data Link Control. A link-layer, bit-oriented synchronous data communications protocol included in the X.25 packet-switching protocol.

High-speed Trunk (HS-TRUNK). A high-speed **trunk** module in the **node** or in a SAM64/504.

hop. The logical distance between one node and an adjacent node, at the routing layer.

hop count. The number of nodes a call setup attempt traverses.

host computer. A computer attached to a network that provides services such as computation, database access, or special programs system languages.

host connection. A connection in which a *StarKeeper* II NMS host computer is connected to a node by a fiber optic cable.

Host Interface Software, *Datakit* II VCS. Multiplexed host software that enables the host connection to a node's Computer Port Module (CPM).

HP. An abbreviation for Hewlett-Packard.

HP-UX system. A general-purpose, multi-user, interactive, time-sharing operating system used with your computer.

HS (**High Speed**). *See* **Trunk-HS**.

HS-TRK. An abbreviation for High Speed–Trunk (link) module (in SAM64/504).

hub node. The network node to which the *StarKeeper* II NMS host computer is connected.

hunt group. The association of a list of receiving devices with a single **service address**.

Hz. An abbreviation for Hertz.

I

ICI. An abbreviation for Inter-Carrier Interface.

ID. An abbreviation for identification.

init. An abbreviation for initialize.

interactive. The ability to interact with a computer, or to be in a conversational mode with a computer. Interactive processing is time dependent, since a user is waiting for the computer to ask questions and the user responds to the questions.

Inter-Carrier Interface (ICI) The Inter-Carrier Interface is a network-to-network interface. XA-SMDS and intercompany serving arrangements are available via the ICI. Since the ICI is an open interface, networks can interconnect with other vendors' SMDS networks, provided those networks comply with the proper requirements.

interface. The relationship between communicating modules, usually in the same node; between different computers; and also the method of access between a program and an end user.

interface module. A printed-circuit board providing network access for a specific type of end device.

interrupt. A suspension of a process, such as the execution of a computer program, caused by an event external to that process and performed in such a way that the process can be resumed.

ISDN. *CCITT Recommendation*. An abbreviation for Integrated Services Digital Network.

J

jumper block. An electrical connector designed to form a connection, or jumper, between corresponding pins on a **jumper strip**.

jumper strip. A component on a printed circuit board that contains pairs of pins that can receive **jumper blocks** to set hardware options for the board.

K

KB. An abbreviation for kilobytes.

Kbps. An abbreviation for Kilobits per second.

keyboard. Commonly used input device.

L

LAN. An abbreviation for Local area network.

LCS. An abbreviation for LAN Communication System(s).

legend. A set of symbols a user selects and places on network maps to represent network equipment.

LIM. An abbreviation for Link Interface Module.

link interface module (LIM). A **trunk** module (SFT or SWT) that connects **concentrator**s to the node.

listener address. The address recognized by a *StarKeeper* II NMS Core System's listener process. This address must be entered into the database of the node(s) that provides *Datakit* II VCS Host Interface Access to the Core System.

local area network (LAN). A data network with communicating devices and connection media that occupy a single geographic location.

local listener address. The address that the listener process on the local machine responds to when a remote *StarKeeper* II NMS attempts to establish a connection to the local machine. The local listener address must be fully qualified and entered as a service address in the BNS-2000 VCS node that provides network connectivity to the local machine.

local machine ID. An integer between 1 and 100, inclusive, and unique among other *StarKeeper* II NMS machines within the *StarKeeper* II NMS network. The assignment of the local machine ID must be made with consideration of the machine IDs assigned to the other *StarKeeper* II NMS machines that comprise the network.

local service address. Part of the BNS-2000 VCS (R2.0 and later) addressing scheme that refers to endpoints or a host on a network that receive calls. *See* **addressing**. *Also see* **network, area**, and **exchange**.

LPM. An abbreviation for LAN Protocol Module.

M

MAC *protocol.* An abbreviation for Media Access Control (IEEE 802); Master Alarm Collector (*StarKeeper* II NMS).

machine. A generic term for a computer or workstation.

machine ID. See **local machine ID**.

Maintenance and Redundancy Control Module (MRCM). An (optional) intelligent module that monitors the operational state of the control computers in a node; a multiport administrative interface that gives enhanced maintenance and automatic recovery capabilities to a node.

male connector. A cable connector in which the connections are made with pins or prongs that fit into complementary receptacles in a **female connector**.

Master Alarm Collector (MAC). A *StarKeeper* II NMS configured to receive and collect alarm messages from other network and element management systems.

MB. An abbreviation for megabyte(s).

Mbps. An abbreviation for megabits per second.

message of the day. A node feature that allows the network administrator to send up to three lines of text to terminal users when they connect to the network.

meta-characters. Special keyboard characters used in *StarKeeper* II NMS for searches (patterns matching) and substitutions.

message units. Can be either **packets** or **segments**; depends on the type of node from which this data was collected.

modem (modulator-demodulator). A device pair that allows a terminal user to communicate with network services over telephone lines.

M1. Series M1 shelf (BNS-2000).

monitor. 1. A device for visual presentation of information as temporary images. A video display. 2. *Syn*: cathode ray tube display.

MPC. An abbreviation for **Multipurpose Concentrator**.

MRCM. An abbreviation for Maintenance and Redundancy Control Module.

MRCM connection. A connection type in which a connection is made to the MRCM module.

MS-DOS . An abbreviation for Microsoft Disk Operating System.

multiplexer. A device that allows multiple devices to communicate with **host**s, public data networks, or a data switch.

Multipurpose Concentrator. A **concentrator** consisting of a **modular cabinet** without a **Control Computer**. Connects to the **node** via optical fiber or wire **trunk,** and has interface slots for **TY12, BA12, TSM8, CPM-HS, CPM-422B, Sync8,** and **X.25** modules. Two types of Multipurpose Concentrators are available: 7-slot and 15-slot.

MUX. An abbreviation for multiplexer.

N

NAC. An abbreviation for Network Access Controller (Network Access Control System) .

NB. An abbreviation for Network Builder (*StarKeeper* II NMS) .

Netstation. A supported device, on a Local Area Network, that supports *StarKeeper* II NMS graphics application packages.

network. 1. The interconnection of a number of points (nodes, computers, terminals, and so forth) by communications facilities. 2. Part of the BNS-2000 VCS addressing scheme that is equivalent to the overall network name. *See* **addressing**. *Also see* **area**; **exchange**; **service address**.

network address. A *StarKeeper* II NMS representation, input by keyboard characters, of a specified **network element**. The network address positively identifies the component. Often abbreviated *netaddr.*

network administrator. Individual responsible for the operation, administration, and maintenance of a network.

Network Builder. *StarKeeper* II NMS Graphics application used for configuration management and analysis. The application provides a Forms Interface to configure network elements.

network connection. A connection in which a *StarKeeper* II NMS host computer is cabled to a TY port on a node and uses the node to connect to a remote element.

network elements. The equipment and services that comprise a data communications network.

Network Management System (NMS). A centralized system used to operate, administer, and maintain an entire data communications network.

Network Monitor. *StarKeeper* II NMS Graphics application used for fault management by providing alarms and diagnostics capabilities on geographic network maps. The application provides an easy-to-use map editor and can generate maps automatically.

NM. An abbreviation for Network management; network manager; Network Monitor (*StarKeeper* II NMS) .

NMS. An abbreviation for Network Management System .

node. 1. One or more BNS-2000 or BNS-2000 VCS cabinets containing a **Control Computer,** one **Clock module**, and one **Switch module**. 2. All backplanes sharing a transmit and a receive bus, connected by **Repeater module**s.

O

operating system. The software that controls and allocates the resources, such as memory, disk storage and the screen display for the computer.

option. An addition to a command to improve or provide an extra enhancement to the command. The option is usually depicted with a minus (-) sign in front of it.

originating group. The type of **group** assigned to devices, such as data terminals, that can initiate calls to other devices.

OS. An abbreviation for operating system.

overhead. All information, such as control, routing, and error-checking characters, that is in addition to user-transmitted data; includes information that carries network status or operational instructions, network routing information, as well as retransmissions of user-data messages.

P

packet. A unit of data transmitted through a network.

packet assembler/disassembler (PAD). A device that disassembles data for transmission and assembles it at data reception. A node performs PAD functions to connect the node to a **PDN** or **X.25 host**.

PAD. An abbreviation for Packet assembler/disassembler .

paddle board. The input/output distribution board at the rear of the node or concentrator cabinet that provides external connections to the interface modules.

parameter. 1. A variable that is given a constant value for a specified application and that may denote the application. 2. A name in a procedure that is used to refer to an argument passed to that procedure.

parity. Addition of non-information bits to data, making the number of ones in each grouping of bits either always odd (for odd parity), or always even (for even parity). This permits detection of a single-bit error in each transmitted or stored character.

parity bit. An extra bit added to a byte, character, or word to ensure that there is always either an even or odd number of bits according to the logic of the system. If, through a hardware failure, a bit should be lost in transmission, its loss can be detected by checking the parity. The same bit pattern remains as long as the contents of the byte, character, or word remain unchanged.

parity error (PE). A signal that flags a parity bit error.

partition. A section of the hard disk used to store an operating system and data files or programs. By dividing the disk into partitions, the space allocated can be used in a more efficient and organized manner.

partitioned user. A *StarKeeper* II NMS user with a login on the system and access the commands specified by the network administrator.

PC. An abbreviation for Personal computer.

PDN. An abbreviation for Public Data Network.

PE. An abbreviation for Parity error.

performance connection. A connection in which performance measurement data is collected from nodes.

Performance Reporter. *StarKeeper* II NMS Graphics application used for routine assurance and long term engineering. Error counts, indicators, and thresholding are provided, as well as performance reports for trunk utilization and connections.

pipelining. The transmission of synchronous data as it arrives at the network interface, without waiting until a frame is filled.

port. An access point for data entry or exit.

PQ (Priority Queuing). *See* **Trunk-PQ**.

PR. An abbreviation for Performance Reporter.

predefined destination (PDD). An administered association of a fixed network destination with an originating end device, resulting in an automatic **call setup** request as soon as the originating device comes on-line. *Compare* **virtual circuit**.

printer sharing. An arrangement in which two or more Systems share the use of a printer by sending files through the wide area network to the **spooling host** that has a direct connection to the printer.

program. See *application*.

Programmer's Interface. A *StarKeeper* II NMS feature that allows the development of custom application programs through the use of scripting tools.

protocol. A formal set of rules governing message exchange between two communicating devices.

PVC. An abbreviation for Permanent virtual circuit.

Q

query. A request for information (displayed on the terminal screen) from the system that requires a response from the user.

queue. A line or list formed by items in a system waiting for service.

R

RAM. An abbreviation for Random access memory.

reboot. To reinitialize the operating system and *StarKeeper* II NMS.

receiving group. The type of group assigned to devices, such as host computers, that can receive calls from other devices connected to the **node.**

remote *StarKeeper* NMS. 1. A pre-R3.0 version acting as a subordinate to a Master Alarm Collector. 2. In a distributed *StarKeeper* II NMS environment, The machine you are administering is viewed as the local machine and any other machine is a remote *StarKeeper* II NMS.

reverse video. A form of highlighting a character, field, or cursor by reversing the color of the character, field, or cursor with its background; for example, changing a red character on a black background to a black character on a red background.

root. The superuser login ID. You must log in as **root** to install software or to perform system administration tasks.

RS-232-C. An EIA standard for data communications, describing the electrical, mechanical, and functional characteristics of the connections between devices exchanging data in serial binary form. RS-232-C connections are those cables and connectors conforming to this standard.

S

SA. An abbreviation for Source address (SMDS); Service Area (X.121).

SAM. An abbreviation for Synchronous/ Asynchronous Multiplexer.

SAMML. A Synchronous/Asynchronous Multiplexer Multiport Link.

SAM Multiport Link. An interface module in a node providing connection to up to 8 **SAM**s.

SAMSL. A Synchronous/Asynchronous Multiplexer Single Link.

SAM16. An abbreviation for Synchronous/ Asynchronous Multiplexer 16-port.

SAM64. An abbreviation for Synchronous/ Asynchronous Multiplexer 64-port.

screen blanking. A feature that causes a screen to go blank if no keyboard or **mouse** input occurs within a specified number of minutes.

SCP. An abbreviation for Seamless Communication Platform.

SCSI. *See* **Small Computer System Interface**.

SDLC. *See* **Synchronous Data Link Control.**

SDLC8. *See* **Synchronous Data Link Control Module, 8-port.**

SDS. An abbreviation for Software Disk Stripping.

SFT. An abbreviation for Standard Fiber Trunk (interface module) .

segment. A protocol data unit of 53 octets.

select. To choose an object or objects on the screen for which an action is intended.

server. A machine in a network that provides a particular service to other machines; for example, a database server manages a large database.

service address. An administered identifier for a destination in the BNS-2000 VCS network.

Session Maintenance. A feature that provides data transport reliability over internodal trunks between ECPU Systems in BNS-2000 and BNS-2000 VCS networks.

setup. 1. In a computer that consists of an assembly of individual computing units, the arrangement of interconnections between the units, and the adjustments needed for the computer to operate. 2. The preparation of the system for normal operation.

shelf. A carrier inside a cabinet that contains a **backplane** and other hardware. It supports the insertion of modules into the backplane.

SIG. An abbreviation for SMDS Interest Group.

Small Computer Systems Interface (SCSI). Pertaining to the ANSI-defined standard for attaching intelligent peripherals to computers.

SMDS. An abbreviation for Switched Multimegabit Data Service.

SNA. An abbreviation for System Network Architecture.

SNI. An abbreviation for Subscriber Network Interface.

SNMP. An abbreviation for Simple Network Management Protocol (Internet/TCP/IP standard).

Software Package System. *StarKeeper* II NMS software that is sent to the customer, who installs it on his or her own hardware.

SP. An abbreviation for Software Package.

speedcall. An administered shortened name or short code for a network destination **address**.

spooling host. The computer with a **direct connection** to the printer when two or more systems share the same printer. In a client-server model, the spooling host is a print server.

SQL. An abbreviation for Structured Query Language.

SR. An abbreviation for Special report (SMDS); Service Region (X.121) .

SS. An abbreviation for Staged System.

Staged System. A *StarKeeper* II NMS system shipped from the factory equipped with specified software and host connection hardware.

Standard Fiber Trunk (SFT). An **interface module** for an optical fiber connection between two **node**s, a node and an **MPC**.

Standard Wire Trunk (SWT). An **interface module** for a wire connection between two **node**s or a node and a **concentrator**.

StarGROUP®. A star network configuration that connects Local Area Networks.

StarGROUP Interface Module–Bridge (SLIM-B). An **interface module** that supports LAN bridging.

StarGROUP Software VCS Access Program. Asynchronous gateway server.

***StarKeeper®* II Network Management System (NMS).** A centralized system used to view an entire network and monitor, control, configure, and diagnose any **node** in the network.

***StarKeeper* II NMS connection.** A connection type in which the transfer of configuration information between StarKeeper II NMS machines is permitted.

Subscriber Network Interface (SNI) The SNI is the interface between a carrier's SMDS network and the subscriber-owned, Customer Premises Equipment (CPE). At this interface, the CPE attaches to an access facility—such as a DS1 digital transmission facility (DTF)—that connects it via a dedicated path to the AI module.

superuser. A user with OS administrative privileges.

supported applications. Applications for which Lucent Technologies provides telephone hot line assistance and client-site software support.

SVC. An abbreviation for Switched virtual circuit; service connection(s) .

SWT. An abbreviation for Standard Wire Trunk (interface module) .

Switched Multimegabit Data Service (SMDS) A high-speed, connectionless, public packet-switched service. SMDS can interconnect local area networks (LANs) through a wide area network (WAN) or across a metropolitan area to form a *metropolitan area network* (MAN) using a network-to-network interface called an Intercarrier Interface (ICI). When using SMDS across a wide area network, multiple carriers and multiple networks are interconnected.

synchronous. Transmission in which the data characters and bits are sent at a fixed rate with the transmitter and receiver synchronized. *Compare* **asynchronous**.

Synchronous Data Link Control (SDLC). A link-layer, bit oriented protocol, similar to HDLC, used primarily by IBM devices.

Synchronous Data Link Control Module, 8-port (SDLC8). An interface module for SNA/SDLC hosts to the network, used in conjunction with the LAN Communications System (LCS100 Network Gate-

way). Multiple LCSs can originate and receive circuit calls through a CPMML to a single SDLC8 port.

syntax. The format of a command line.

T

terminal emulator. An application that makes the host terminal appear to be another type of terminal; this change of appearance is for the benefit of the connecting device, which recognizes the terminal being emulated.

text field. An area in a **window** where text is entered from the keyboard.

toggle. 1. The name given to a switch that changes for every input pulse or, any simple two-position switch. 2. The action of going back and forth between two conditions.

T1. A digital carrier (wire transmission) facility providing 1.544 Mbps of bandwidth (2 Mbps. internationally).

T1 Trunk. A module in the SAM64, SAM504, or VDM-SAM504 that is a counterpart to the **TRUNK-T1** module in the **node**.

Transparent Synchronous Module (TSM8). A transparent synchronous 8-port interface module that supports synchronous or asynchronous communication.

TRK. An abbreviation, on a screen, for trunk.

trm. An abbreviation for terminal emulation software (*StarKeeper* II NMS) .

troubleshooting. The process of finding the cause of a problem in a system and taking actions to fix the problem.

trunk. A **facility** connecting two nodes.

TRKE3S. A Trunk-E3 SMDS interface module to a T1 transmission facility between two nodes.

TRKT3. A Trunk-T3 interface module that supports connection-oriented (CONS) and connectionless traffic between nodes at transmission speeds up to T3.

TRKT3I. A Trunk-T3 Interexchange connection-oriented and connectionless ICI interface module.

TRKT3. A Trunk-T3 Screening connection-oriented and connectionless SMDS interface module.

TRK64. A wire interface module that provides communications between nodes over a Digital Data Service (DDS) line, using one of two I/O boards (AWJ9, AWJ11).

Trunk-DDS. A Digital Data Service (DDS) trunk module consisting of a single-board processor (MC5P033A1) and an SC/DK1 interface board (UN221). The SC/DK1 board is on the left side of the module and contains the module switches and LEDs.

Trunk-HS. A High Speed (HS) fiber interface module that uses the AWJ2 I/O board to provide connections between nodes as well as connections between nodes and SAM504 and SAM64 modules. The counterpart for the Trunk-HS in the SAMs is the HS-Trunk module. Refer to the Synchronous/ Asynchronous Multiplexer Reference for a description of the HS-Trunk module.

Trunk-PQ. A Priority Queuing (PQ) single port wire interface module that provides fair queuing and enhanced buffering for multi-protocol traffic, and enforcement of Committed Information Rate (CIR) for frame relay traffic at up to T1/E1 rates. The AWJ24 I/) board provides a V.35 DTE connection to the external device.

Trunk-SFT. A Standard Fiber Trunk interface module that links nodes over fiber optic cable to other nodes and to MPCs. The maximum cable length for fiber trunks is 2.91 km.

Trunk-SWT. A Standard Wire Trunk interface module for wire trunks between nodes and from nodes to MPCs. A variety of connections can be made by selecting the appropriate I/O board. For more detail, refer to the BNS-2000 VCS Trunk Module Reference Trunk Module Installation.

Trunk-T1. An interface module for wire trunks that provide long-distance, high-speed point-to-point communication over a T1 digital transmission facility between nodes. The Trunk-T1 module is used with an AWJ4 I/O board that provides

TSM8. *See* **Transparent Synchronous Module (TSM8)**.

TSM-T1. A transparent synchronous T1 interface module.

two-way (2-way) group. The type of **group** assigned to devices that can originate and receive calls to and from a node.

turnkey shutdown. The capability to automatically log off of application programs on system shutdown.

TY12. A 12-port asynchronous **interface module**.

U

UAI. An abbreviation for Uniform Alarm Interface (*StarKeeper* II NMS) .

UART. An abbreviation for Universal asynchronous receiver/transmitter (integrated circuit) .

uname. (unique name); the local HP-UX machine name.

UNIX system. A general-purpose, multiuser, interactive, time-sharing operating system used with your computer.

upgrade. The latest release of *StarKeeper* II NMS to be installed on a system running an earlier release.

upload. From the viewpoint of the reference computer or node, the act of sending data to another computer or storage device. *See* **download**.

utilities. A group of programs combined into a package that represent a specific application available with your computer.

USART. An abbreviation for universal synchronous/asynchronous receiver/terminal.

V

validation. The application's verification that the contents of a text field are appropriate to the function.

virtual circuit. A connection between a source and destination in a network that is realized by network addressing through switching elements, as opposed to a direct hardwired connection.

voice/data multiplexer (VDM). A device that allows the sending and receiving of simultaneous voice and data transmissions through existing telephone lines.

W

wide area network (WAN). A communications network that can cover an area with a radius of greater than 3km.

wild card. A method, used in *StarKeeper* II NMS network addressing, to expand the matching criteria when searching for specified records in the database. (*Compare* **anchor**).

Workstation Administration Application. A Graphics System application that allows a Workstation Administrator to oversee administrative tasks.

X

X.25. An interface module that supplies X.25 services, allowing X.28 hosts and asynchronous terminals to connect to a

public data network (PDN) or other X.28 hosts.

X.75. An interface module that supplies X.75 services.

X.121. A CCITT recommendation for an addressing scheme in Public Data Networks. (Part of the **X.25** protocol.)

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