Cisco WAN Modeling Tools User Guide

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Preface

This guide describes how to use the WAN Modeling Tools, a design aid for WANs. It is written for anyone who operates or manages a WAN, has some knowledge of UNIX and/or a PC desktop, and understands the interfaces that devices connected to their WAN use.

The WAN Modeling Tools consist of these software tools:

- Network Modeling Tool (NMT). UNIX and PC versions are available.
- Map Tool to display a graphical model of network topology.
- Configuration Extraction Tool (CET) for retrieving existing topologies from the Cisco Wan Manager (CWM) database
- Conversion plug-ins: the Third-Party Interface (TPI) for sharing NMT information with WANDL and the SpreadSheet Interface (SSI) for exchanging NMT configurations with Microsoft Excel. These tools are integrated into NMT, but are also available as UNIX stand alone commands.
- Cisco Network Designer (CND) tool for importing and storing topologies in a project format.

The guide is organized into these sections:

- Chapter 1, “Overview”
- Chapter 2, “Installing the WAN Modeling Tools”
- Chapter 3, “Using the NMT”
- Chapter 4, “Configuration Tables and Fields”
- Chapter 5, “Using the Configuration Extraction Tool”
- Chapter 6, “Using the TPI”
- Chapter 7, “Using the SpreadSheet Interface”
- Chapter 8, “Cisco Network Designer Importer”

Related Documentation

These documents comprise the CWM documentation set:

- *Release Notes for Cisco WAN Manager, 15.4.00 P1*
- *Cisco WAN Manager Installation Guide, 15.4.00*
- *Cisco WAN Manager User Guide, 15.4.00*
- *Cisco WAN Manager SNMP Service Agent Guide, 15.4.00*

- *Cisco WAN Manager Database Interface Guide, 15.4.00*
- *Cisco WAN Data Extraction and Synchronization Tool User Guide, 2.8*

You can access all CWM documentation at this website:

http://www.cisco.com/en/US/products/sw/netmgtsw/ps2340/tsd_products_support_series_home.html

These documents are also available on Cisco.com:

- *Release Notes for the Cisco WAN Modeling Tools, 15.4.00*
- *Cisco WAN Modeling Tools User Guide, 15.4.00 P1*
- *Release Notes for Cisco Automated Bulk Provisioning, 15.4.00*
- *Cisco Automated Bulk Provisioning Guide, 15.4.00*

The Cisco WAN Modeling tools and Automated Bulk Provisioning tool user guides are also available on their software CDs and are ordered separately.

Refer to the current CWM release notes for information on all the switch products that the CWM supports and that are certified in this release. In addition, a *Guide to Cisco Multiservice Switch Documentation* ships with your product.

You can access the MGX switch documentation at this website. See MGX Switches:

http://www.cisco.com/en/US/products/hw/switches/tsd_products_support_category_home.html

On www.Cisco.com, you can search for any product and topic documentation. On the main page, enter the word or phrase in the Search window and click the Documentation link. For example, you can search for “configuring MGX 8850” or “PXMIE.” On the results page, you can click Advanced Options to refine your search.

Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation and support, providing documentation feedback, security guidelines, recommended aliases, and general Cisco documents, see the monthly *What’s New* in Cisco Product Documentation, which also lists all new and revised Cisco technical documentation, at this URL:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

CHAPTER 1

Overview

This chapter provides an overview of the Cisco WAN Modeling Tools applications and the Cisco products they support.

See these sections:

- Cisco WAN Modeling Tools Overview, page 1-1
- NMT Functionality, page 1-2
- NMT-Supported Cisco Products, page 1-3
- Basic Usage and Charter Functionality, page 1-4
- Limitations, page 1-5
- Data Translation Tools, page 1-6

Cisco WAN Modeling Tools Overview

As the primary application of the Cisco WAN Modeling Tools, the NMT verifies provisioning and predicts network routing behavior. It supports the Cisco MGX, BPX, and IGX series ATM switches. It also enables you to model generic types of ATM switches.

For each major switch software release, the NMT verifies the physical and logical provisioning of the front and back cards that support the topology. It also verifies connection routing and rerouting capabilities of each supported switch.

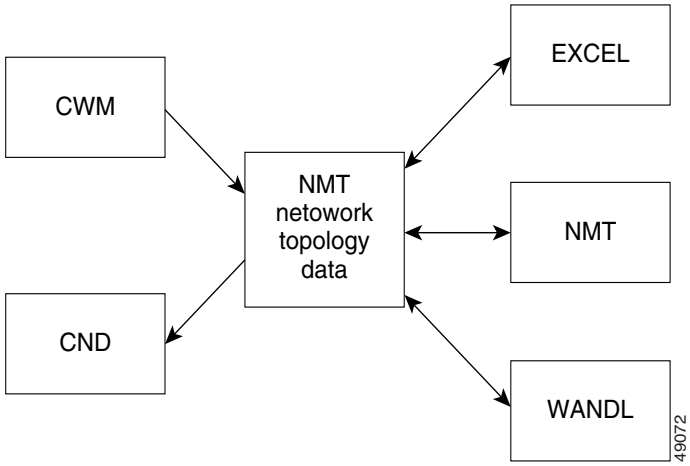
The Cisco WAN Modeling Tools include the following subsystems:

- NMT (Network Modeling Tools)
  - Provisions Cisco WAN products based on topology and permanent virtual circuit (PVC) and soft PVC (SPVC) demand.
  - Verifies connection admission control (CAC)-based quality of service (QoS) and rerouting capabilities for trunk and switch failures.
  - Runs on UNIX or a standalone version for PC without the map.
- CET (Configuration Extraction Tool)
  - Extracts NMT topology data from the Cisco WAN Manager (CWM).
  - Compatible with CWM 9.2 and later.

- TPI (Third-Party Interface)
  - Translates NMT data to and from WANDL network files.
  - Tested with WANDL 3.2.0.
- SSI (SpreadSheet Interface)
  - Translates NMT data to and from Excel spreadsheets, included MS Excel Macro for loading tables into a workbook.

Figure 1-1 shows the relationship among the applications that make up the Cisco WAN Modeling Tools.

Figure 1-1 Relationship between the Cisco WAN Modeling Tools



NMT Functionality

The NMT menu-driven application enables you to model the behavior of both AutoRoute (AR) and PNNI networks. It processes the data that you provide and returns a proposed configuration that you can modify and reconfigure to make changes such as adding redundant links and supporting additional sites.

You can also perform failure analysis of the network model by failing selected links and then evaluating the rerouting capability of the remaining links. The NMT enables you to create an interface to WANDL and other systems to optimize the design.

For the NMT to generate a configuration, you only need to complete several fields. To create the best configuration, you should have extensive knowledge of networks, including ATM and frame-relay networks. In addition, entering precise values for optional fields helps the NMT provide you with a precise parts list that you can use to order Cisco products.

After the NMT processes the data, it provides configuration information in the following form:

- Updated tables—Modifies your configuration tables as necessary to create a working configuration.
- Reports—Provides reports that describe variables such as links, nodes, part numbers, and costs.
- Graphical display—Displays your network design graphically with node icons and maps.
- Import/Export—Displays data that is imported and exported to other systems.

The NMT always selects the newest available parts for a function, based on the software release you specify. You can request older cards from the input tables, although some obsolete parts are not supported.

NMT-Supported Cisco Products

With each new NMT release, functionality is added to support the current capabilities of the following Cisco equipment:

- MGX 8850, 8830, 8880, and 8950 switches—These switches enable a wide range of user services and interfaces supported on MGX multiservice switch platforms. The services that NMT supports include the following:
  - ATM user-network interface (UNI) and network-to-network interface (NNI)
  - Frame relay
  - Circuit emulation
  - *n* x T1/E1 inverse multiplexing (IMA) for ATM ports on all the cards that support the IMA functionality
  - Routing protocol supported: private network-to-network interface (PNNI).
  - Interfaces supported:
    - T1/E1 channelized and unchannelized ports
    - T3/E3 ports
    - OC3, OC12, OC48, and OC192 on MPSM, AXSM, and AXSM-XG cards
    - Channelized paths and ports on MPSM-155 and AXSM-XG cards
    - Virtual interfaces on various VISM, VXSM, and RPM cards
    - 3T3 and OC3 interfaces using the SRM bulk-provisioning modules
- MGX 8220, 8230, and 8250 edge concentrators—Edge concentrators enable a wide range of user services and interfaces for connections to be routed on MGX and BPX switches. Services that the NMT supports include the following:
  - ATM user-to-network interface (UNI)
  - Frame relay
  - Circuit emulation
  - *n* x T1/E1 inverse multiplexing for ATM ports
  - Routing protocol supported: Portable AR for internal connections from service port to uplink.
  - Interfaces supported:
    - T1/E1 channelized and unchannelized ports
    - T3 channelized and T3/E3 unchannelized ports
    - 3T3 interface using the SRM-3T3 module
    - Virtual interfaces on VISM and RPM cards

- BPX switch—This switch is standards-based, high-capacity (9.6 Gb) broadband ATM switch that provides backbone ATM switching and a range of user services. Fully integrated with the IPX and IGX switches, the BPX switch provides broadband ATM services when ASI and BXM cards are used and narrowband services through tiered network configurations that use IPX switches and MGX 8220 feeders.

  The BPX switch supports the high-density Broadband Switch Module (BXM) cards that provide standard interfaces for connecting to cell-based equipment by way of the ATM UNI.

  - BXM DS3/E3 supports E3/DS3 native ATM access and trunk ports
  - BXM 155 supports OC-3/STM-1 native ATM access and trunk ports
  - BXM 622 supports OC-12/STM-4 native ATM access and trunk ports

  BXM cards also support ATM frame-relay networks and services and enable configuration of permanent virtual circuits (PVCs) or switched virtual circuits (SVCs) for these defined service classes:

  - Constant bit rate (CBR)
  - Real-time variable bit rate (rtVBR)
  - Variable bit rate (VBR)
  - Unspecified bit rate (UBR)
  - Available bit rate (ABR)
- SES PNNI Controller—This controller attaches to a BPX switch to provide PNNI signaling and routing for establishing ATM SVCs and soft PVCs (SPVCs) over a BPX 8600 WAN. Features that the NMT supports include PNNI routing, resource partitioning, and shelf provisioning.
- IGX switch—This multiservice ATM networking switch supports ATM technology over subrate, narrowband E1 and T1, and broadband E3 and T3 trunks. It is used as the basis for a leased-line campus, metropolitan area network (MAN), and WAN network. It provides high-speed, public digital services such as ATM, in a hybrid application using both, and as a WAN service switch.
- Generic Node—The NMT enables you to create your own node type for an ATM switch or feeder. Use the node table to provide the high-level specifications for the WAN product.
- Obsolete Equipment—The NMT models obsolete equipment that you may encounter in CWM extracts and need to model for upgrade considerations. These obsolete platforms are modeled: IPX switch, 3810 feeder, FastPad feeder, and Port Concentrator Shelf Feeder.

Basic Usage and Charter Functionality

The NMT models the WAN network using a classic node, link, and demand model. The nodes are the sites listed in the site table, which are provisioned as Cisco MGX, BPX and IGX WAN switches. The links are the interswitch trunks in the link table. The connections are specified in the voice, data, and bursty tables.

The model provisions the network using the latest Cisco equipment, unless otherwise specified. The model verifies that the network can route all connections, or it reports on the resources that have been exceeded.

All connections that the NMT uses are ATM connections, with the exception of some legacy IGX voice and data services.

The NMT tool predicts the behavior of a WAN network that uses the Cisco MGX, BPX and IGX WAN switches as follows:

1. You specify the network site locations, switch types, links, and connections.
2. The NMT uses the AR and PNNI routing algorithms identical to those in the products.
3. Based on the connection admission control (CAC) parameters, the NMT verifies that the links and connections can be provisioned and that the connections can be routed.
4. The WAN network is modeled at the chassis, front-card, and back-card granularity level.

Note the following when using the NMT:

- The NMT provides the primary reason that any connections cannot be provisioned or routed, based on the CAC rules.
- The NMT does not do discrete simulation, and no real-time statistics are involved in the modeling.
- The NMT address these real-time issues only:
  - Delay estimate
  - Requirements specified in the CAC
- The NMT verifies the connections routed in the base state
- The NMT verifies which connections will reroute under any network failure scenario.
- The NMT extracts the network topology and connection parameters from the CWM. The NMT seamlessly handles changes in the CWM database schema. These values are then translated to more usable strings, and the tables are merged so that one table exists per network element (NE) in the NMT.
- The NMT translates topology data to and from Microsoft Excel data. The NMT tables are translated to DBASE3 format, and a Microsoft Excel macro is provided for creating spreadsheets for each table.
- The NMT translates the topology data to and from the WANDL format to be used by the NCAPS tool.
- The PNNI CAC parameters are not as granular as they are in the product. For example, some parameters are network specific.
- A 10-character node naming limitation is imposed. The CWM provides translation for node naming.

Limitations

The NMT does not support these features:

- XPVCs
- Voice-traffic channel mapping entering the network for VISM and VXSM cards
- IP traffic entering the network for RPM cards
- LVC resource support for RPM cards
- Priority bumping in AR
- PPP types of traffic on MPSM-16T1E1 cards
- MFR links and connections on MPSM-T3E3-155 cards

Data Translation Tools

The NMT Data Translation Tools use data exchanged between the NMT and other network design software aides to create a complex network model. These tools allow the NMT to interface with other Cisco products as well as third-party products. Table 1-1 describes the data translation tools.

Table 1-1 Data Translation Tools

Tool	Description
CET	Reads the database of a CWM system and creates an NMT configuration file with all critical topology and connection information. For further description, see Chapter 5, "Using the Configuration Extraction Tool."
TPI	Translates NMT Data into WANDL format. WANDL is a design product that helps you optimize generic networks. TPI also provides translation from WANDL-to-NMT configuration files. for more information, see Chapter 6, "Using the TPI."
SSI	Translates the NMT configuration file tables into standard dBASE-II format (DBF) and Excel XLS-formatted files for use in other systems. It also supports an XLS interface for entering, modifying, and analyzing integer data. Several NMT reports are also available in DBF and XLS. For more information, see Chapter 7, "Using the SpreadSheet Interface."
CND	Loads an NMT into the CND as a project. The CND provides low-level local configuration of each network site and generates graphic displays and a bill of materials (BOM).

CHAPTER 2

Installing the WAN Modeling Tools

This chapter describes how to install the NMT, CET, and the TPI and SSI conversion plug-ins.

See these sections:

- System Requirements, page 2-1
- Installing the Software, page 2-2
- Installing the Excel Macros on the Windows Platform, page 2-4
- Upgrading the NMT Software, page 2-5
- Starting and Removing the NMT, page 2-5
- Installing the CET, TPI, and SSI Subapplications, page 2-6
- Troubleshooting the NMT Installation, page 2-8

For changes to the installation process, review the Cisco WAN Modeling Tools release notes.

System Requirements

The NMT, CET, TPI, and SSI run on Solaris 2.6 or later. Hardware requirements depend on the size of the model that you are creating. A typical setup requires the following:

- A minimum 16 MB of memory
- A 535-MB or larger small computer systems interface (SCSI) disk

The PC version of the NMT runs on Windows 98, 2000, NT, and XP.

Installing the Software

This section describes how to install the Cisco WAN Modeling Tools software and link it to your project directories. The procedure also installs any subapplications (CET, TPI, and SSI) that came with your NMT software. If you want to install only the subapplications, see "Installing the CET, TPI, and SSI Subapplications, page 2-6".

The NMT provides both a UNIX and PC version of the NMT tool:

- Installing the WAN Modeling Tools on a Solaris Platform, page 2-2
- Installing the NMT on a Windows Platform, page 2-3
- Installing the Excel Macros on the Windows Platform, page 2-4

The differences between the NMT UNIX and PC versions are as follows:

- The PC version uses F5 for choice list. The UNIX version uses HELP or F12.
- The PC version has no support to launch the **MAP** command.

Configuration files can be read back and forth between the PC and UNIX versions of NMT.

Installing the WAN Modeling Tools on a Solaris Platform

Use this procedure to install the Cisco WAN Modeling Tools on a Solaris platform and set up the Cisco WAN Modeling Tools workspace.

See these sections:

1. Installing the NMT Software on Solaris, page 2-2
2. Creating a Working Directory, page 2-3

Installing the NMT Software on Solaris

Use this procedure to install the software on a Solaris platform.

Step 1 Log on to the same Solaris platform as the account that will own the software. Move into the directory that will hold all WAN Modeling Tool releases, such as the following:

```
mkdir /usr/users/NMT
cd /usr/users/NMT
```

Step 2 Download or copy the NMT15.4.00.Patch1.tar.Z installation file to the installation directory.

Step 3 Uncompress the installation tar file, as in the following command:

```
uncompress NMT15.4.00.Patch1.tar.Z
```

Step 4 Extract the archived files, as shown in the following command:

```
tar xvpf NMT15.4.00.Patch1.tar
```

This creates the "/usr/users/NMT/154" directory that contains all of the software.

Creating a Working Directory

Use this procedure to create a working directory on the Solaris platform.

You need to perform this procedure only one time. After you create the working directory, you can launch the NMT from it.

Step 1 Log into the account that will be using the WAN Modeling Tools for designing and modeling networks. (This account can be the same account that owns the software directory, or it can be a different account.)

Step 2 Create a working directory and move into it, such as the following:

```
mkdir my_net_plans
cd my_net_plans
```

Step 3 If your terminal window is not running CShell, enter the following command:

```
csh
```

Step 4 Set the NMTHOME environment variable to the software installation directory:

```
setenv NMTHOME /usr/users/NMT/154
```

Step 5 Link the working directory to the software installation directory:

```
$NMTHOME/nmtlink
```

For details on how to run various software components, see the *Cisco WAN Modeling Tools User Guide*.

Installing the NMT on a Windows Platform

Use this procedure to install the NMT on a Windows platform.

Step 1 Download and run the NMT15.4.00.Patch1_PC.exe installation file, which is a self-extracting zip file. The software requires about 20 MB of disk space.

By default, the zip file installs the NMT in the C:\NMT directory, which Cisco recommends that you use.

However, you can change the directory to D:\NMT if you do not have a version of the NMT installed in the C:\NMT directory.

- To install the NMT in a directory other than C:\NMT or D:\NMT (if no version is installed in C:\NMT), go to Step 2.
- If you are using C:\NMT or D:\NMT (if no version is installed in C:\NMT), go to Step 3.

Step 2 If you choose to change an installation directory to one than specified above, you need to set the NMTHOME environment variable, as follows.

For Windows XP or 2000:

a. Double-click **My Computer** on the desktop and then double-click **Control Panel > System**.

b. Click the **Advanced** tab.

c. Click **Environment Variables.**

d. Add the new environment variable, “NMTHOME,” and set it to the NMT installation directory path.

For an earlier version of Windows:

a. For an earlier version of Windows, modify the autoexec.bat file to add a line that sets the drive and directory of NMTHOME to the NMT installation directory, as shown in this example:

```
set NMTHOME=e:\myalternatepath\ciscoproducts\nmt
```

b. Before running the NMT, reboot your machine to enable the environment variables.

Step 3 Install the shortcut:

a. In Windows Explorer, navigate to C:\NMT\install and then to the subdirectory that corresponds to the operating system of your PC.

b. Drag and drop the Cisco WAN Modeling Tools shortcut to your desktop.

If you need to create a shortcut from scratch, do the following:

a. In Windows Explorer, navigate to the C:\NMT\install\nmt.exe file and drag and drop its icon to the desktop.

b. Right-click the shortcut icon and select **Properties**.

c. In the "Start in" field, enter the working directory. For the default directory to store your network configuration files, enter **C:\NMT\data**. You can also enter a different directory path.

d. Click **Change Icon**, and then click **Browse**.

e. Select the file **C:\NMT\bin\nmt_icon.exe** and pick the desired icon.

f. In the Properties window, click the **Layout** tab and set the Screen Buffer and the Width and Window sizes to **100**. This sets the correct width of the NMT GUI window.

g. In the Properties window, click the **Options** tab and uncheck the **Quick Edit** and **Insert Mode** check boxes. This enables mouse navigation in the NMT GUI window.

h. Click **OK**.

Step 4 To start the NMT, click the **Cisco WAN Modeling Tools** icon. You can also start NMT from the command prompt (**Start > Run**) and enter **C:\NMT\bin\nmt.exe**. In this case, you need to make sure the properties of the NMT window are set as described in Steps 3f and 3g.

Installing the Excel Macros on the Windows Platform

If you want to use the Microsoft Excel interface to edit your NMT data (tables or reports), copy the SSI file into your Microsoft Excel macro startup directory. This directory is called "xlstart" and is usually found in the directory path, C:\Program Files\Microsoft Office\Office\exstart." The SSI file is located in the C:\nmt\ssi directory.

After this file is installed, Microsoft Excel has access to these SSI macros:

- NMT_Load
- NMT_Unload
- NMT_PrettySheet

You can access these macros from the Microsoft Excel Tools > Macros > Macros menu.

Upgrading the NMT Software

This section describes how to upgrade the NMT on Solaris and Windows.

Upgrading the NMT on Solaris

Use this procedure to upgrade the NMT on Solaris.

Because NMT releases have unique subdirectory names, you must create or change the working directory when you install a new release.

However, maintenance releases use the same directory that you created when you installed the NMT originally. The working directory automatically uses the upgrade through UNIX links to the software.

Step 1 Log onto the same account that was used to install the major software release and change the directory to the NMT installation directory.

Step 2 Download or copy the NMT15.4.00.Patch1.tar.Z installation file to the same directory where the release was installed initially.

Step 3 Uncompress and untar the installation files, as shown below:

```
uncompress NMT15.4.00.Patch1.tar.Z
tar xvfp NMT15.4.00.Patch1.tar
```

Upgrading the NMT on a PC

Use this procedure to upgrade the NMT on a PC.

Step 1 Download the NMT15.4.00.Patch1_PC.exe installation file, which is a self-extracting zip file, to a temporary location. The software requires about 20 MB of disk space.

Step 2 Run the installation file using the same directory setting that you used when you installed NMT 15.4.00 initially.

Starting and Removing the NMT

Use the following steps to run the NMT and any NMT UNIX commands.

Always enter the commands in the NMT working directory.

Step 1 If you are on the CWM and in the svplus directory, enter the **xhost +** command to grant X Windows permission. (This can be done from the console window or an xterm window.)

```
xhost +
```

Also, you may want to add the **xhost +** command to the svplus.login file.

Step 2 Enter your user name and enter your password to log in to your user home directory, as follows:

```
/usr/users/<user_name>
```

Step 3 Enter the **cd** command to move to one of your project directories:

```
cd <project_name>
```

Step 4 To start the NMT, enter the **nmt** command:

```
nmt
```

If you need to modify system parameters to ranges outside the scope of the current product line, use the **nmt –d** command to start the program. This option adds two selections to the Execute menu:

- Internal Set for Switches/Links
- Network Internal Setting

Step 5 To remove all NMT subcomponents from the program, use the **nmtrel** command.

Installing the CET, TPI, and SSI Subapplications

This section describes how to install the Cisco WAN Modeling Tools subapplications: the CET, TPI, and SSI. The procedures describe how to access and install these subapplications and link them to project directories.

See these sections:

- Installing and Removing a Subapplication on a Solaris Platform, page 2-6
- Installing the SSI on a Windows Platform, page 2-7

This procedure is necessary only if you used the **–NMT** option with NMTlink.

Installing and Removing a Subapplication on a Solaris Platform

Use the following procedure to install a Cisco WAN Modeling Tools subapplication on a Solaris platform.

Step 1 Go to a working directory where you have run nmtlink.

Step 2 Set up a UNIX environment variable for CET, TPI, or SSI.

```
setenv <nmt_path>
```

where nmt_path is the path to the version of the NMT software that you are using.

Step 3 Link the project directory to the NMT release:

```
For CET: $CETHOME/cetlink
For TPI: $TPIHOME/tpilink
For SSI: $SSIHOME/ssilink
```

Step 4 To remove individual applications from your ID, use these commands:

- **cetrel** removes the CET.
- **tpirel** removes the TPI.
- **ssirel** removes the SSI.

Step 5 To remove all applications from your ID, enter the **nmtrel** command.

Installing the SSI on a Windows Platform

Use this procedure to install the SSI on a Windows platform.

You should install the SSI on Windows whether you use the PC or Solaris version of the NMT.

See also Installing the Excel Macros on the Windows Platform, page 2-4.

Step 1 Using binary mode, transfer the following files to your PC:

- SSI—NMT Excel macro file. This macro converts DBF NMT tables to and from a Excel spreadsheet.
- SSIDOSKT.TAR—Archive file of SSI DOS utilities tar.exe; DOS version of the UNIX tar command. These optional utilities support transferring and uncompressing data.

Step 2 Copy the SSI file to your Microsoft Excel macro startup directory, which is called “xlstart” and is usually found in this directory path: C:\Program Files\Microsoft Office\Office\exstart. The SSI file is located in the C:\nmt\ssi directory.

After this file is installed, Microsoft Excel has access to these SSI macros:

- NMT_Load
- NMT_Unload
- NMT_PrettySheet

If you are not going to use the tar file for your NMT data, you do not need to do Steps 3 and 4.

Step 3 If you are going to use the tar file for your NMT data, copy the tar.exe and SSIDOSKT.TAR files to a DOS working directory.

Step 4 To unarchive the data, enter the **tar xvf SSIDOSKT.TAR** command.

Troubleshooting the NMT Installation

The table below describes a common NMT Installation problems and recommended solutions.

Symptom	The **nmt** command fails and returns this message: `xterm not found.`
Probable Causes	UNIX is not configured for xterm.
Solution	Have a UNIX administrator provide xterm support for your account.

Symptom	Cannot write CNF files or reports. Cannot update the map.
Probable Causes	No write permission.
Solution	Make sure your account has write permission to your working directory.

Symptom	NMT fails and displays the following error message: `Error: Cannot open display <IP-ADDRESS:00>`
Probable Causes	No remote display permission. The site is unreachable.
Solution	Check network connectivity. If you are using a dial-up line, remote GUI display may be impossible.

Symptom	NMT displays the following error message:
	`Xlib: Connection to <IP-ADDRESS:00> refused by server.`
	`Xlib: Client is not authorized to connect to server.`
	`ERROR, cannot open display <IP-ADDRESS:00>.`

Probable Causes	You are running the NMT remotely, and the server is not granting you permission.
Solution	Enter the **XHost +** command the console on the displaying platform.

Symptom	NMT displays the following error message: `Xterm X+ error: Can't open display <IP-ADDRESS:00>`
Probable Causes	The IP address cannot be unreached.
Solution	Check the address and network connectivity.

CHAPTER 3

Using the NMT

This chapter describes how to use the NMT interface, presents an overview of the modeling process, and lists NMT commands that update or extract information from NMT configuration files.

See these sections:

- Starting Up the NMT, page 3-1
- NMT Physical Configuration, page 3-2
- Modeling Processes, page 3-9
- Using the Execute Menu Commands, page 3-10
- Viewing Reports, page 3-16
- Using the Map Tool, page 3-21
- Error Checking, page 3-33
- Using NMT Commands, page 3-33
- Troubleshooting the NMT, page 3-35

The NMT models a network based on your input. Using your input about the network you want to model, the NMT helps identify the hardware needed by provisioning the chassis with front cards and back cards. The NMT routes the connections using the same software as the WAN switches, based on the Connection Admission Control (CAC). The NMT is aware of all physical and logical constraints that would prevent a connection or a trunk from being provisioned or routed. NMT is also aware of the different features and constraints in each major switch software release.

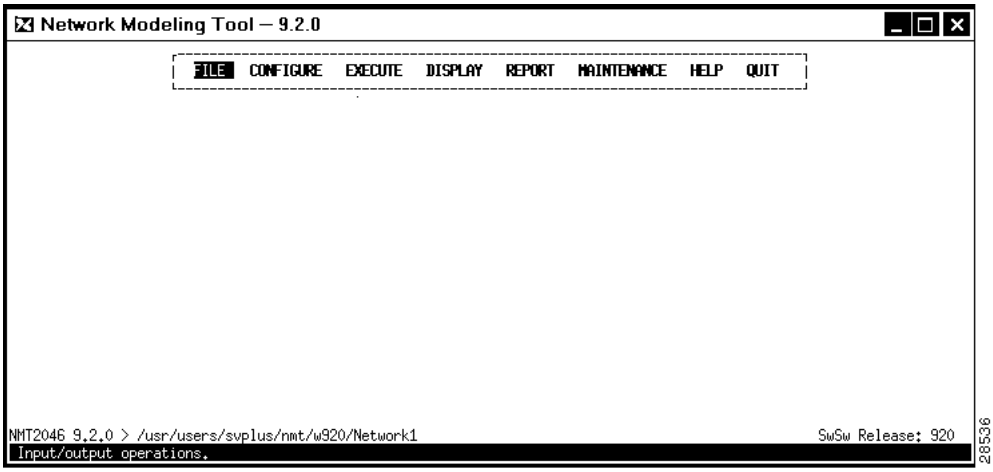
Connection routing can be verified in the network's basic state. The connection re-routing can be verified for any failure scenario. Simulation of failure of all NEs can verify the network's resiliency.

Starting Up the NMT

If you are running NMT on a UNIX platform, start the NMT by entering the **nmt** command. This launches an xterm window for the NMT interface (Figure 3-1).

If you are running NMT on a PC, start the NMT by clicking on the nmt.exe file located in the NMT/bin subdirectory. This launches an xterm window for the NMT interface.

Figure 3-1 NMT Main Window



NMT Physical Configuration

This section describes the physical configuration of the NMT.

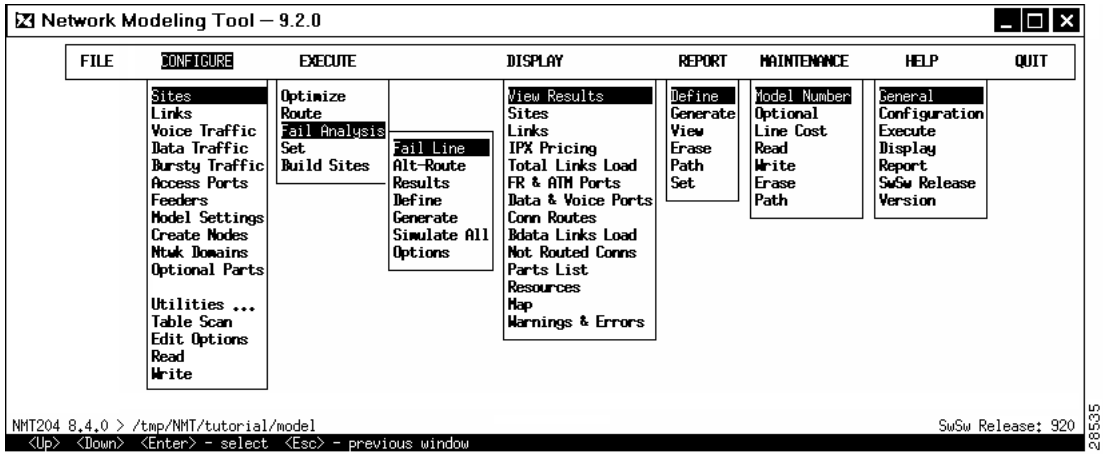
Menu Bar

The menus in the NMT main window contain selections for inputting data, generating optimized configurations, and displaying reports. (See Figure 3-2.) The menus are as follows:

- File Menu, page 3-3—Contains basic file options, such as opening the file. It also provides options for importing and exporting files to other formats, changing paths, and viewing a network summary.
- Configure Menu, page 3-4—Contains choices for describing the network model, including site names, links, and traffic types.
- Execute Menu, page 3-5—Analyzes and optimizes the network model.
- Display Menu, page 3-6—Shows predefined reports. Includes a map tool selection.
- Report Menu, page 3-6—Generates, defines, and displays reports.
- Maintenance Menu, page 3-7—Modifies prices and part names and specifies line costs.
- Help Menu, page 3-7—Describes how to use the program and the NMT menus.
- Quit—Exits the NMT.

When you highlight a menu item, a one-line description of the selection is displayed beneath the menu. The NMT Design menus are further described in the sections that follow.

Figure 3-2 NMT Design Menu (All Menu Options Displayed)



File Menu

Through the File menu in the Network Design Tools window, you perform the standard file-management tasks: New, Open, Save, Save As, and Delete. See also the following:

- Import—Reads configuration data from other formats and imports it into the current file:
  - DBF—Imports topology from DBF tables and the SSI MS Excel Interface.
  - WANDL—Reads the topology from the set of WANDL files specified by their SPEC file.
  - MAP—Reads any changes made with the Map interface back into the CNF file.
  - Save changes in the map interface before importing that Map interface into the CNF file.
- Export—Writes the configuration data to other formats.
  - DBF—Output table in DBF format for SSI Microsoft Excel interface.
  - WANDL—Output topology in WANDL format for further optimization and analysis.
  - CSV—Output tables in CSVs.
- Read 2nd CNF—Merges tables of one CNF file into another file, which enables you to perform certain operations on two separate CNF topologies. For example, updating the fields in one CNF table automatically updates the same fields in other CNF tables. You can also use this option to compare two CNF files.
- Change Path—Changes the current directory path.
- View Summary—Shows a summary of the current topology.
- Report Site—Shows a summary of a specific site.

You can save a configuration file from the File menu. Select **Save**, enter a name in the Enter Name field, and press **Enter**.

Configure Menu

From the Configure menu, you can select options to view these tables: Sites, Links, Voice, Data, and Bursty. For details about these tables, see Chapter 4, "Configuration Tables and Fields."

To create your own defaults for any tables, create a CNF file and call it DEFAULTS. Save it to your working directory. Any new records you create for a field in any table will have the values of the first entry in that table. To use an existing file for your defaults, select it in the edit options window. This option does not apply to the site names field in any table.

Through the Configure menu, you can also access the following:

- Interfaces—Customer port assignment, configuration, and partitioning information.
- Feeders—Customer access feeders configuration for feeders not specified in the Sites table.
- Cards—Optional table for card slot assignment.
- Groups and Networks—PNNI domain names, parameters, hierarchy, and network domain names.
- Nodes—User defined node types and restraints.
- Parameters—Global network settings and model options.
- Utilities—Makes global modifications to the configuration file. Use the Utilities in the Config menu to make bulk changes to the CNF file:
  - Expand Quantities—For records with a quantity field of greater than one, changes the quantity to one and duplicates the record by the number of times that appeared in the quantity field.
  - Table Conn Merge—Merges connections with identical parameters into one table record, which increases the quantity. You can also average traffic values to reduce the table record count.
  - Order Table Data—Sorts CNF tables by site name.
  - Rename or Merge Site and Group Rename or Merge—Modifies site and group names.
  - Adjust %Util—Modifies the %util fields in the connection tables.
  - Mesh Data—Adds new records so that link or connection tables are fully meshed. Options determine how the mesh is to be done. The weight field in the site table can be used in several ways to affect the outcome of the mesh.
  - VH Coordinates—Creates VH coordinates for the map display.
  - Path Expansion—Updates paths with complete slot/port information.
  - Diff Pref Route vs. Cur—Compares all preferred routes to the existing routes in the CNF file.
  - Clear Data—Resets or blanks out various fields in the CNF file.
  - Upgrade Implicit—After running Route or Execute command, has the NMT insert any multiple switches at one site as separate entries into the Sites table.
  - Feeder MGX8220s — After running Route or Execute command, has the NMT insert any implicit MGX8220s at one site as separate entries into the Sites table.
  - Store Model Data — After running Route or Execute command, has the NMT store various data back into the CNF file.
  - Table Scan—Scans all loaded configuration tables for errors.

- Edit Options—Modifies the preferences:

  Strict UI Checking—Controls validation of some of the fields like link type, link front card, connection interface, etc. Note, that all the data will be checked in any cases during Execute operation.

  Default CNF file—Defines the name of CNF file that is used as a templates for edit tables. The first entry for each table in this file is used as default values when adding new table entries.

  Correct Table Data—Controls writing back corrections that makes NMT back to the user data. If set to Y (default), the NMT writes back to the CNF all the corrections it makes internally. If set to N, the user data remains in the state that the user sees them in the edit tables.

  Check Route Paths—Enables/disables route checking.

  Suppress Duplicate Messages—After five similar messages appear in the log, suppresses all additional messages of that type and provides the count of suppressed messages. If set to N (default), the UI l skip route checking, so the route is checked during Execute operation. If set to Y, you can check routes in the UI and correct them if necessary.

- Read—Opens a previously saved file (same as Open in the File menu).
- Write—Saves the current configuration under a new name (same as Save as in the File menu).

The configuration tables define all NEs necessary for the model and its parameters. Parameters not specified default to the latest part available, or the maximum or standard setting. Many NEs can be defined in tables. If they cannot be defined, the NMT automatically generates implicit NEs.

You can either input or import a configuration:

- To input a configuration, enter data into tables accessed from the Configure menu.
- To import data from the CWM, see Chapter 5, “Using the Configuration Extraction Tool.”
- To import or export WANDL files, see Chapter 6, “Using the TPI.”
- To import or export Microsoft Excel files, see Chapter 7, “Using the SpreadSheet Interface.”

The NMT assumes that the switch software version that you are using is the same as the NMT software version. If this is not the case, select **Model Settings** from the Configure menu and enter the switch software release number next to Network Parameter Switch software release. Individual platforms can have unique switch software releases specified in the Sites table.

Execute Menu

You can access the following commands from the File menu in the Network Design Tools window:

- Route—Routes traffic over specified links
- Fail Analysis—Performs failure analysis on the lines and forces the NMT to create alternate routes.
- Build Sites—Provisions the nodes without routing.
- Optimize—Uses selected links to create a least cost topology.

Display Menu

You can access the following commands from the File menu in the Network Design Tools window:

- Sites—Displays customer site information.
- Links—Displays a list of links in the current network.
- Network Summary—Displays summaries of the current network costs and routing status.
- Total Links Load—Displays static load estimates by traffic type for each link in the network.
- ATM & Fr Ports—Site name, connection type (for example, FRM-V35), slot and port numbers, port speed (cells or packets per second), SUM MIN (port load).
- Data & Voice Ports—Site name, connection type (for example, SDP-V35), slot number, port number, port speed.
- Connection Routes—Connection to/from, number of connections, connection type (for example, FR, 56), path number of hops, delay time in ms for voice and NTS connections.
- Failed Connections—Displays failed connections and connections that have not been routed.
- Parts List—Listed by site, including part number, description, quantity, cost per site.
- Resources—Graphical display of each node's card cage showing front cards and back cards.
- PNNI Topology—Displays PNNI logical links.
- User Message—View or clear the message log. You can also view the message log by entering **<Ctrl> W**.
- Map—Network topology map.

Report Menu

Use the Report menu to define, generate, display, and save reports. The menu contains the these options.

Define	Selects which tables to include in a report. In the Define Report window, you can specify the contents of the report and also add a report header: • **Y** includes a report in a report file and N does not include it. • **X** does not generate a report (saves execution time).
Generate	Names and generates a report.
View	Selects a report to display.
Erase	Deletes a report from the current directory.

Path	Sets the directory path.
Set Options	Specifies these report variables: • Price Option—Enter **0** for normal pricing or **1** through **5** for the number of years in lease. • Detail Reports—**Y** generates Bursty Link Load reports. **N** excludes them. • Output DBF Reports— Enter **Y** to create a report in DBF and text format. Enter **N** to create report only in text format. • Output Pref Rte —Sets Preferred routes. **Y** to output a file of preferred routes that can be inserted into switch CLI commands to create those routes. • Bundle Connections—**Y** keeps connections bundled by routing properties in the reports to reduce the size. **N** expands reports for each connection. • Output Map Info—**Y** writes the information from a NMT command to be input into the MAP graphical display. **N** does not to reduce the execution time. • Map Site Feeders—**Y** displays all feeder sites and their links on the map. **N** displays only routing nodes and links. • Map MultiNode Sites—**Y** displays each switch in the case where the NMT generated addition switches at a site. **N** displays only one marker for site table entry.

Maintenance Menu

Use the Maintenance menu to revise product costs, add optional equipment (for reference purposes), and provide information about line costs. This menu also enables you to read, write, erase, and set the path for maintenance files. The menu contains the following options:

- Parts List—Displays a list of Cisco WAN part model numbers.
- Line Cost—Displays line cost information.
- Read, Write, and Erase—Loads, saves, and deletes a previously saved maintenance file.
- Change Path—Changes the current directory path.

Help Menu

The NMT has several kinds of online help. The **Help** menu provides information about how to use the program and describes many of the menus and menu items in the NMT.

Keyboard Commands

To select a top-level menu item in the NMT design window, use the left and right arrow keys. Press **Enter** to access a submenu. Select submenu entries with the up or down arrow key or by typing the first letter of the submenu entry. To exit from a table or menu, press **Escape**.

The NMT has many keyboard commands to help you create and revise configuration tables and reports. Table 3-1 lists the Sun workstation key assignments used for editing data in the NMT.

Table 3-1 Sun Key Assignments

Key	Function	Description
F1	Field help	Text description of the current field.
F2	Window help	Displays a list of key definitions for data entry and editing.
F3	Copy line	Copies the current line. The Repeat Line command then can be used to repeat it one or more times.
F4	Repeat line	Inserts a previously copied line below the current line.
F5	Choice List	Displays a list of key definitions for data entry and editing (same as F2). This command is only available on the PC version of NMT.
F6	Clear end-of-field	Clears one field in a table.
F7	Delete line	Removes the current line. The line deleted will be saved in a buffer from which it can be recalled by using the Undelete command.
F8	Insert line	Inserts a table entry below cursor.
F9	Undelete line	Inserts the last deleted line above the current line. If the command is repeated, the last deleted line that has not been undeleted (if any) will be inserted above the current line. A maximum of 50 lines can be undeleted.
F10	Cancel/abort table	Exits a table without checking data. If the Exit command has been previously issued, the command will delete all lines in the table that contain illegal data.
Up Arrow	Previous line	—
Down Arrow	Next line/Add row	Inserts default field values for new rows.
Left Arrow	Previous Field	—
Right Arrow	Next Field	—
Page Up	Previous Page	—
Page Down	Next Page	—
Home	First Page, first row	—
End	Last page, last line	—
Help, F12	Choices	Lists choices for the selected field. Lists of choices are available for most fields that accept three or more non-numeric values. In the site field, you choose a site by pressing Help (or F12) and then using the up or down arrows to scroll through the site names; press enter to select a site.
Esc	Exit	Exits a table or menu and, in some cases, checks the data in the table.
Ctrl-f	Find site	Prompts you for site name, and then finds the next table entry using that site name.
Ctrl-g	Go to line/display line	Reports line number of current table entry. Entering a number enables you to go to that specific table entry.

Table 3-1 Sun Key Assignments (continued)

Key	Function	Description
Ctrl-h	First Field	Moves cursor to the first field in the row.
Ctrl-j	Last Field	Moves cursor to the last field in the line.
Ctrl-k	Left One Space	Moves cursor left one character (within a selected field). If the cursor is on the first character in the field, this command moves the cursor to the previous field.
Ctrl-l	Right One Space	Moves cursor right one character (within a selected field). If the cursor is on the last character in the field, this command moves the cursor to the next field.

Help and Message Keys

You can get help using keyboard commands as follows:

- When your cursor is over a table field, pressing the F1 key displays a help screen that lists and describes field options.
- When a table is selected, pressing the F2 key describes the function keys.
- If you enter an unacceptable value (for example, IXG instead of IGX) in an NMT field, the system beeps and an explanation is displayed at the bottom of the window.
- Pressing the Help or F12 key (or F5 on a PC) displays a “Choice List.” You can scroll through the list to select a valid entry for the field. Not all fields have a choice list.

To view messages from your working session, enter **Ctrl-w** from anywhere in the NMT.

Modeling Processes

The NMT models your configuration when you select one of the options under the Execute menu.

If there is any problem with your configuration, a message box displays the following message:

```
New warning messages generated.
```

To check your warning messages, enter **Ctrl-w**.

The NMT generates three types of messages:

- L—Log messages are generally displayed when the NMT records the command the user requested.
- I—Informational messages generally indicate that site or link parameters have been modified to comply with user entered data.
- W—Warning messages are generally displayed when the NMT modifies connection data.
- E—Error messages are generally displayed when the NMT cannot create a topology because of incorrect data.

The message box also keeps a log of the commands executed. The message box always scrolls to the last viewed message.

Using the Execute Menu Commands

This section describes how to use the NMT modeling commands found in the Execute menu.

See these subsections:

- Using the Route Command, page 3-10
- Using AutoRoute, page 3-10
- AR Least-Cost Routing, page 3-11
- PNNI Routing, page 3-12
- Fail Analysis Command, page 3-13
- Build Sites Command, page 3-13
- Optimize Command, page 3-13

Using the Route Command

Selecting **Route** from the Execute menu finds routes by using the same Automatic Routing Management (ARM) and PNNI algorithms that are used in the switches. Only the links that have a Links table Keep field value of 1 or more are used in the topology. (The Keep field in the Links table tells the system which links must be part of the final topology, even if they have no traffic passing through them.)

This selection performs two processes: it builds sites and routes connections.

Using AutoRoute

When modeling an AR network, perform these steps in the CNF tables:

1. In the Routing Algorithm (RA) field of the Sites table, specify the type of AR algorithm that each site uses:
   - **H** for minimum hoops
   - **C** for least cost
   - **CD** for least cost with delay
2. In the AR field of the Links table, enter **Y** to enable AutoRoute on the links.
3. In the Bursty Connection table, set the RT_Metrics field to AutoRoute.

The Model setting delay parameters can be adjusted as needed.

AR Least-Cost Routing

The Least-Cost Routing feature adds the cost-based routing option to the interface. See Table 3-2.

Table 3-2 Least-Cost Routing Configuration

Required Settings	Comments
Sites table, RA (Routing Algorithm) field: • C = least cost • CD = least cost with delay as a cost	Any site can have a least cost or least hops routing rule.
Links table, Cost field: Enter a value between 1 and 50.	The weight of the trunk to be used in the routing algorithm.
Voice, Data, and Bursty Traffic tables, Cost field: Enter a value between 1 and 100.	The maximum allowable cost of the route for this connection.

In regard to preferred and directed routes, the NMT enables you to provide any connection with a preferred route through the network:

- If the preferred route is available, the NMT follows it for that connection.
- If the preferred route is not available, the NMT routes the connection however it can. The NMT also models a directed route—a special case of a preferred route in which a connection must take its preferred route, or not be routed.

To create a preferred route, enter a route in the Preferred_Route field in the Traffic tables. The route is a series of cross-connects (Xcon), separated by equal signs (=), such as Xcon1[=Xcon2]...[=XconN].

A cross-connect consists of an optional In-trunk Port ID (slot/port identifier) followed by a forward slash (/), a mandatory site name, and an optional forward slash followed by an Out-trunk Port ID. Represent the cross-connect as follows: [In-trunkPortID/]SiteName[/Out-trunkPortID].

When you specify either of the Port IDs in an cross-connect, you specify a unique trunk. If the NMT has a choice of trunks between two nodes, specify the one that the NMT should use. You do not have to specify each cross-connect to the same level of detail: one may have no Por tID, the next both Port ID, etc.

For a connection from Denver to Paris, the following are all valid preferred routes.

```
Paris
3.1/Paris
Denver=Paris
Denver/4.1=Paris
Denver/4.1=3.1/Paris
Denver=Paris
4.1/Denver=Paris
4.1/Denver=4.1/Paris
4.1/Denver/3.1=4.1/Paris
Denver/3.1=4.1/Boston/3.1=4.1/Paris
```

See Table 3-2.

The NMT helps you enter preferred routes. When you press the Help key while in the preferred route field, the NMT shows all the valid trunks between nodes. Press Return to select the one you want. When you press the Help key again, the NMT shows all the valid trunks to other nodes. A suggestion is to model your network first without preferred routes. Then open the map. Now go back to configure your connections for preferred routes. You will be able to see which trunk to pick based on the map.

Table 3-3 Preferred and Directed Route Configuration

Required Settings	Comments
Voice, Data, and Bursty Traffic tables, DR field: Enter **Y** if the connection has the directed routing feature, and **N** otherwise. Preferred_Route field: Enter a series of node cross-connects, separated by equal signs (=).	If the Preferred_Route field is left blank or is invalid, this field is ignored. All site names must be in the Sites table, and each consecutive pair of sites must have a trunk in the Links table. The originating and terminating sites are optional.

The NMT has an Actual Route field with the same format as Preferred Routes. Configuration Extraction Tool (CET) extractions fill in the Actual Route, which is the tree route of the connection at that time. The Used Preferred Routes option in Execute Settings determines which set of routes to use with the route command. Preferred routes are always used in failure analysis commands.

PNNI Routing

When modeling a PNNI Network, the following must be done in the CNF tables:

- Enter **Y** in the PNNI field of the Sites table to enable PNNI at each site.
- If the PNNI network is a multi group, specify the peer group each site belongs to in the PNNI_PG field. For multi-level peer group networks, each peer group must be entered in the PNNI domains table, with its level and parent defined.
- If you want a specific site to be a peer group leader, enter **Y** in the PGL field for that site. If none are selected, NMT will select a leader for you.
- Enter **Y** in the PNNI field of the Links table to enable PNNI on the links.
- Set the RT_Metrics field in the Bursty Connection table to one of the three types of PNNI routing algorithms. The choices are **AW** for administrative weight, **CTD** for Cell Transfer Delay, or **CDV** for Cell Delay Variance.

The Model-setting PNNI parameters can be adjusted.

If the modeled network has AR and PNNI connections, use the steps listed in AR Least-Cost Routing, page 3-11 and PNNI Routing, page 3-12 to configure each portion of the network. If any links are partitioned, the partitions are defined in the Interface table. The link Port IDs cross reference the interface table entries. If no partitions are specified, the NMT will optimize the partition based on the connection demand.

MPLS partitions can also be specified. However, the NMT model does not consider traffic based on MPLS partitions.

Fail Analysis Command

Selecting **Fail Analysis** from the **Execute** menu enables you to create a situation where one or more lines fail. You can also generate a situation where the lines are failed one at a time (see the **Simulate All** menu choice). By failing a line, you can force the NMT to create alternative routes; the NMT does this by using the Automatic Routing Management algorithm.

Using this algorithm, the NMT can reveal whether network links have enough extra bandwidth, according to values in the configuration, to support extra traffic if one or several links go down. To conduct a fail analysis, you must first select **Route** or **Optimize** from the **Execute** menu.

The Fail Analysis submenu has the following choices:

- Fail: Fails one or more connections in the network. A location can be a node, card, or port. Failing a port will fail the link using that port.

  In this case, the HELP key is useful guide. Enter HELP once to select the site. Enter Help a second time to select a port.
- Alternate Route—Attempts to reroute the connections after failing the network locations specified above. Its output results to the following tables in the Display menu: Total Links Load, Routes, and No Routes.
- Results—Displays reports that summarizes the alternative routes from the above reroute.
- Generate—Generate a file with the reports from above.
- Simulate All—Automatically fails each link, card, site, or port, and produces a report. When you select Simulate All, you are asked to enter a name for the report; the NMT fails each element one at a time, and you can display the report by selecting View from the Report menu.
- View—View any failure analysis report from a disk.
- Options—Enables you to specify whether the system should ignore IMATM trunks or virtual trunks when performing a fail analysis.

If all connections do not reroute as a result of link failure or a set of link failures, add additional capacity to the links by increasing the size of existing links, the link count, or adding new links. You can use TPI and WANDL to help design a resilient topology.

Build Sites Command

Selecting **Build Sites** from the **Execute** menu enables you to provision the sites without routing the connections. You have the option of building all sites or one specific site. If all links and connections are not provisioned, the command will display link and connection ends that could not be built.

Optimize Command

The NMT provides several tools for optimizing network models that allow you to create a least-cost topology with selected links. When you select **Optimize** from the Execute menu, the NMT processes your configuration to design a least-facilities-cost network. The **Optimize** command eliminates unused links (links that are not used for routing traffic) from the topology. Although the unused links are eliminated from the topology, they remain in the links table for possible later use. The process works as follows:

1. The system calculates all possible topologies and selects the one in which all traffic is routed at the lowest possible cost. During this process, the Optimizing Topology message box displays a running tally of the number of topologies tried, the last two most recent costs, and the least cost so far If a connection fails, the router breaks the routing loop.

   Initial Topology is the starting point for building all other topologies that the optimizer can generate and analyze. It is generated from your specified data, including all sites, links that have positive values in the 'Keep' field and links specified in the preferred routes for the connections.

2. The connections are routed and the complete path is verified. During this process the Routing Connections message box displays the total number of network connections and maintains a running tally of the number of connections successfully routed.

3. The program generates several reports. These include informatory messages which describe the algorithm used to generate the resulting topology (initial, connection based, minimum span tree, or Links table).

   If the optimizer fails to find a topology based on initial topology and the minimum span tree algorithm, it will build a topology based on the Links table. All links marked as removable will be removed by the optimizer; otherwise, they will be used for connections.

You can stop the optimize process by pressing **Escape**. If you press **Escape** during the first step when the system is calculating all the possible topologies, you are given the option to cancel all processes or continue with the second process using the best topology found so far.

If the NMT approach to optimization is insufficient, consider using the TPI to translate your network into WANDL format. WANDL offers several different optimization methods. (See Chapter 12, "Third-Party Interface.")

Optimize will write up an informatory message describing which algorithm it used to obtain optimal topology.

Optimize is not supported for PNNI networks.

Table 3-4 Optimize Informatory Messages

Message	Meaning
Initial Topology	Existing Facilities were sufficient to route all connections. No new links were added.
Connection Based	Actual/preferred route information was used to obtain starting topology.
Minimum Span Tree	Minimum span tree algorithm was used to generate an initial tree topology.
Link Based	Links were sorted.

NMT Command Results

Table 3-5 lists the possible reasons connections are not being routed over links with the **route** command.

Table 3-5 Possible Causes for Connections not Routed Over Links

Cause	Solution
Link has a zero in the keep field. This indicates the link is a candidate for the optimize command to add to the network, but it does not exist in the network and will not be considered by the route command.	Set the keep field to one or higher.
Link is not enabled for the routing protocol required by the connection, in either AutoRoute or PNNI.	Set the PNNI or AR flag to Y in the link table. To check what protocol the connection requires, check the RT_Metrics field in the connection table.
For AutoRoute Least Cost Routing or PNNI, the Cost field in the Connection table has too low a maximum value for a route to be found with that cost or lower.	Raise the value in the cost field of the connection table, or set it to zero to remove the restriction.
Link is constrained by either the Receive Rate field, or the VT_Rate field if the link is a Virtual Trunk.	Raise the values in these fields, or set them to 0 to remove the restriction.
With AutoRoute, the stat reserve is excluding too much bandwidth	Reduce the stat reserve fields.
Link is unavailable for this type of connection because of a restricted media (Satellite, for example) or the trunk has not been configured for a specific type of traffic	For AutoRoute, check the Ad field in the Connection table to see if that connection must avoid any link media types. Set this field to blank for no restrictions. Check the Traffic field in the Links table to see what traffic types can travel on that link. If it is blank, all types are allowed.

The following tables describe how to troubleshoot problems with Execute commands.

Symptom	IGX Links are using more bandwidth than expected for voice and data calls.
Probable causes	Voice and Data (TS and NTS) connections on the IGX are translated into fast packets (FPs). When these 24 byte packets with 20 bytes of payload are inserted into cells, the packet header is not removed, and either one or two packets are inserted into the cell. The static administration load assumes either one or two packets, based on the combine time-out value for the particular type of connection.
Solution	Combine time-outs are network global parameters that can be configured under Configure/Model Settings menu. The parameters are specified in the units of 0.125 usec. Set the combine time outs to the largest value possible to optimize bandwidth usage in the model.

Symptom	Changing the Least Cost Weights does not effect the routes of the connections.
Probable causes	CNF file may have preferred routes, or (if it was a CET extraction) it may have actual routes. These route fields are checked first. If there is a route in that field, the model will use it before running AutoRoute.
Solution	Remove the actual route, or the preferred route by using F6 in that field for each connection. Or you can remove all routes in the Config > Utilities > Clear Data menu. Also check the setting of Use Preferred Routes in the Execute/Set menu. If this flag is **Y**, preferred routes will be tried first. If the flag is set to **N**, actual routes will be used first.

Symptom	Links have an unbalanced load when routed with AutoRoute.
Probable causes	The site table has a bundle field that routes a specified number of connections at the same time in a bundle. the default number of connections per bundle is 24.
Solution	Set the bundle field in the Sites table to 1.

Viewing Reports

This section describes the reports that the NMT generates. NMT ASCII reports are generated with each run of the **Route** or **Optimize** commands. Some reports can be viewed from the Display menu, and all can be written to disk from the Report menu.

The Define Input Screen determines which reports to include in the output file, and Generate creates and names the output file.

Some reports are also output in DBF format and are included in the SSI interface to Excel. These reports can be translated to comma-separated-value (CSV) format using the dbf2csv command line utility.

For a more detailed description of the NMT reports, see the Help/Display menu in the NMT application.

See these sections:

- Site Report, page 3-17
- Link Report, page 3-17
- Network Summary Report, page 3-17
- Link Load Report, page 3-17
- ATM & FR Ports Report (or Bursty Data Ports Report), page 3-18
- Data & Voice Ports Report (or Voice & Data Ports Report), page 3-19
- Connection Routes Report, page 3-19
- Failed Connections Report, page 3-19
- Parts List Report, page 3-20
- Resource Report/Card Statistics Report, page 3-20
- PNNI Topology Report, page 3-21
- View Summary Report, page 3-21
- Using the Map Tool, page 3-21

Site Report

The Site report displays summary information of the provisioning and cost of each site. If the Node Num field is greater than one, the NMT provisioned multiple switches at that site location.

Link Report

The Link report displays basic provisioning and cost information about the links.

Network Summary Report

The Network Summary report contains the total network costs and global statistics about the routing of connections in the network. The routing summary includes average hop count and histogram data of the hop counts.

In selecting reports in the Report/Define menu, the Network Summary report has two parts: Network Price and Routing Summary.

Link Load Report

The Link Load report displays the load resources on each link in the network, based on the static load model.

In the example below, den-sea is a cell-based link in which the bandwidth is 92% utilized. This link contains 80,000 cells for CBR ATM traffic and 7,515 cells of frame relay and has a statistical reserve of 600, which is not included in the total. There are 55 PVCs on the first link.

The second link, nyd-pit, uses only 6% of the bandwidth but has reached the maximum number of PVCs allowed on the link. Note that this is a packet-based trunk, as the units are pps.

The third link, (lax-pit) is a T3 cell-based trunk on a BTM card. The units displayed are packets because the constraint on this link is the number of packets that can be received by the IGX bus.

The fourth link, (lax-nyd) is also a cell based trunk. For this link, both the packet load and the cell load are listed because in this case the cell load is the constraint. This is because the combine time outs are set low so most voice and data cells contain only one packet. If the link is partitioned for both AutoRoute and PNNI, the usage of each is displayed.

Note The link load report has a DBF output format.

```
------------------------------- Link Load ----------------------------------

    Trunk Span                  Load      Used            Maximum      Load   Max
    Site1          Site2        Type      load             load        units  %Ld
    -------------- ------------ -----    -> / <-         -> / <-     -> / <- ---

    den            sea          Total  87515/  87515   96000/  96000 cps/cps  92
     (1.1)          (1.1)       CBR    80000/  80000
                                BData   7515/   7515
                                RES      600/    600
                                PVC       55/     55    1771/   1771 pvc/pvc

    nyd            pit          Total    426/    426    8000/   8000 pps/pps   6
     (3.1)          (3.1)       Voice    426/    426
                                RES      600/    600
                                PVC      213/    213     213/    213 pvc/pvc

    lax            pit          Total   2904/   6824   80000/  80000 pps/pps   9
     (5.1)          (4.1)       NTS      630/    630
                                Voice    994/    994
                                BData   1280/   5200
                                RES      600/    600
                                PVC      237/    237    1771/   1771 pvc/pvc

    lax            nyd          Total   2824/   2824   10666/  10666 pps/pps
     (3.1)          (4.1)       NTS      630/    630
                                Voice    994/    994
                                BData   1200/   1200
                                RES      600/    600

                                Total   2164/   2164    4830/   4830 cps/cps  51
                                NTS      630/    630
                                Voice    994/    994
                                BData    540/    540
                                RES      600/    600

                                PVC      227/    227    1771/   1771 pvc/pvc
```

ATM & FR Ports Report (or Bursty Data Ports Report)

The ATM and FR Ports report lists all ports for each site that supports a connection found in the Bursty Connection table. This report is output in the DBF format.

Data & Voice Ports Report (or Voice & Data Ports Report)

The Data and Voice Ports Report lists all ports for each site that supports a connection found in the Voice Connection and the Data Connection tables.

Connection Routes Report

The Connection Report displays all routed connections and their complete routes.

Because this is a long report, use the **X** option in the Report/Define menu to prevent generating this report if you do not need to see the routed connections. This improves performance.

Failed Connections Report

The Failed Connections Report displays all the connections that could not be routed and the reason. Possible reasons a connection failed are listed in Table 3-6.

Table 3-6 Failed Connection Reasons

Reason String	Meaning
Too Many Hops	Hop Count required to route the connection was too large. For AR, the hop count maximum is 10.
No Path	No connectivity in the topology to route this connection.
No Direct Path	No direct route specified in the preferred/actual connection route.
Out of Capacity	Not enough bandwidth capacity on the lines.
Out of Space	Not enough index resources, usually VC count on a link is exceeded.
Out of Bus	Not enough bandwidth on a bus of one or more switches required to route the connection.
No Fdr Link Cap	Not enough bandwidth capacity on a feeder link.
Too Big Cost	Connection cannot be routed without exceeding the maximum cost specified (pertains to AutoRoute networks.)
Too Big AW	Connection cannot be routed without exceeding the maximum Administrative Weight (This pertains to PNNI networks.)
Too Big CTD	Connection cannot be routed without exceeding the maximum Cell Transfer Delay (pertains to PNNI networks.)
Too Big CDV	Connection cannot be routed without exceeding the maximum Cell Delay Variance (pertains to PNNI networks.)
Too Big CLR 0	Connection cannot be routed without exceeding the maximum Cell Loss Ratio of the first phase of policing (leaky bucket). (This pertains to PNNI networks.)
Too Big CLR 0+1	Connection cannot be routed without exceeding the maximum Cell Loss Ratio of the second phase of policing (leaky bucket). (This pertains to PNNI networks.)
Too Big Delay	Connection cannot be routed without exceeding the maximum delay. (This pertains to AutoRoute networks.)
No CellBase Path	Connection cannot be routed without being converted to FastPackets on older equipment, but the connection is not permitted to be converted to FastPackets.

Table 3-6 Failed Connection Reasons (continued)

Reason String	Meaning
No ATM Path	ATM connection cannot be routed without using trunks that do not support ATM types of load (on older Fastpacket equipment).
No COS Path	No path to support Class of Service connections. (This pertains to PNNI networks.)
Transit Rstr	No path that would not have via nodes configured as transit restricted. (This pertains to PNNI networks.)
Media Restricted	Connection can only be routed using a restricted media (for instance, a satellite link).

Parts List Report

The parts list report lists parts required to provision the modeled network. The parts included are the chassis, front cards, back cards, and special shelves and units. Cables and optional parts are usually not included in the parts list report. Bundles are used if applicable.

The Parts List Report is output in DBF format.

Resource Report/Card Statistics Report

The Resource Report/Card Statistics Report displays the card cage for each system unit, and a brief listing of used and available ports. The card statistics report is the second part of the resource report. Release 15 of the Cisco WAN Modeling Tools models the UXM card, and has a new card statistics report for tracking the UBU usage of this and other cards. Below is a card statistics report for a two IGX networks with 295 ATF = FR interworking connections between the nodes, each MIR=64K, PIR=256K.

```
------------------------ Card Statistics ----------------------------

    Node: ATM_Side  Type: IGX-8  Bus Used: 40 UBUs out of 584

    Slot Front Back      Type  PVCs  Port  UBU/PS         Card Specific
    Stat                             Used  Allc/Used/Max
    1  A NPM                               2    2    2
    2  S NPM
    3  A UXM   3T3       Trunk 295   1     25   13   184  FPL=8%, GWL=2%
    4  A UXM   3T3       Line  295   1     13   13   184  FPL=8%, GWL=2%

    Legends:
     FPL - Fast Packet Load :    Percent of FP bus load / Total bus load.
     GWL - Gateway Module Load : Percent of FP bus load / Max FP bus load.

    ======================================================================

    Node: FR_Side  Type: IGX-8  Bus Used: 118 UBUs out of 584

    Slot Front Back      Type  PVCs  Port  UBU/PS         Card Specific
    Stat                             Used  Allc/Used/Max
    1  A NPM                               2    2    2
    2  S NPM
    3  A UXM   3T3       Trunk 295   1     60   60   184  FPL=100%, GWL=100%
    4  A UFMC  T1              192   48    32   32   59
    5  A UFMC  T1              103   26    24   24   59

    Legends:
```

```
 FPL - Fast Packet Load :    Percent of FP bus load / Total bus load.
 GWL - Gateway Module Load : Percent of FP bus load / Max FP bus load.

=====================================================================
```

This report tells the following:

- The IGX switch with the ATM end is using 40 of its 584 UBUs, whereas the IGX switch with the FR end is using 118 UBUs.
- Looking to the UXM trunk card on slot 3 for both switches, the UXM trunk card at the ATM end is configured to reserve 25 UBUs of the bus, with the current traffic load requiring 13. The maximum setting for this value for a UXM card is 235.
- The FPL percentage means that only 8% of the traffic on this card is in Fast Packets (FP), and the GWL percentage means that only 2% of the maximum Fast Packets are being used by the card.
- Note that the FP traffic here is internally signaling between the card and switch. At the FR end, the FPL is 100%, as all traffic on this card is FP. The GWL is also%100 because this card can take no more FP traffic. It can take more ATM traffic.

Note The Card Statistics output is in DBF format.

PNNI Topology Report

The PNNI Topology Report lists all the virtual links in the PNNI Topology.

View Summary Report

The View Summary Report is generated from the FILE/VIEW SUMMARY menu. This report gives you an overview of the input plan CNF file. You can run this report without running the **ROUTE** or **OPTIMIZE** execute command.

The output of the View Summary can also be displayed with the **sniffcnf** command from the UNIX CLI.

The utility command has options for displaying summary information for all or specific site locations See the “Utility Commands” section for more information.

Using the Map Tool

The NMT Network Display Tool, also known as the Network Design Topology Map or NMT Map, enables you to visualize your network model. The map tool provides these features:

- A graphical display of your topology
- Aid in visualizing of traffic levels.
- Helps you see the effects of node or link failures in your network.
- Aid in visualizing a PNNI Peer Group hierarchy of logical nodes and logical links.
- Assists in the design of multiple peer group PNNI networks by enabling you to form logical groups of nodes and to easily change the groupings.

The Map tool is only available in the NMT running on UNIX (Solaris) operating systems. The NMT for Windows does not contain the Map tool.

Start the map after running an NMT command (for example, **route**, **optimize**, or **failure analysis**). If you rerun an NMT command, select **Update** on the map to view the new results.

See these sections:

- NMT Map Main Menu, page 3-22
- Figure 3-2Starting Up the NMT Map, page 3-23
- Navigating Though a Network View, page 3-24
- Displaying Links, page 3-27
- Zooming and Panning the Map, page 3-28
- Controlling Map Displays in the NMT, page 3-29
- Using the Map, page 3-29
- Creating a Graphical Display, page 3-32

To enlarge a region of the map, hold down the left mouse button and select the region of the map you want to enlarge. To move a map, hold down the middle mouse button and drag the map within the window. To reduce an enlarged map, click one or more times on the right mouse button with your cursor in the map window. To return a map to its default size, reselect the map from the Map menu.

The map tool uses color coding to help you recognize important aspects of your network topology. The color coding is described in Table 3-7.

Table 3-7 Network Topology Map Color Coding

Color	Node	Link
Green	Node is functioning normally (all connections have been routed).	Link traffic is below the warning threshold.
Yellow	Node is a hub node, and some of its feeders are not shown.	Link traffic is above the warning threshold but below the critical threshold.
Red	Not all connections at this node could route.	Link traffic exceeds the critical threshold, or link has failed.

The colors of the logical nodes (groups of nodes) and the links displayed with thick lines (multiple links) are determined by the worst condition of the individual nodes or links that make up the set.

NMT Map Main Menu

The NMT Map menu bar can contain up to eight pull-down menus for controlling map configuration:

- File—Contains choices for exiting the map and saving your work.
- Access—Contains choices for adding and deleting access feeder nodes to the map display.
- Groups—contains choices for viewing networks having groups, adding or deleting groups, and changing the nodes contained in a group.
- Background—Contains choices for selecting and displaying background images.
- Topology—Contains choices for updating and clearing the map.
- Options—Contains selections for coloring the Map display.

- Messages—Allows viewing of error messages

  This menu appears only when there are error or status messages to view.
- Help—Contains choices for obtaining information about the map and how to use it.

Select Map Tool menus by using the left mouse button, except where noted.

Starting Up the NMT Map

After running the Route or Optimize commands from the NMT Execute menu, start the map by selecting MAP from the NMT Display Menu. It may take several seconds for the MAP window to display.

Once the NMT Map is on screen, you can drag it to a suitable location and size it appropriately.

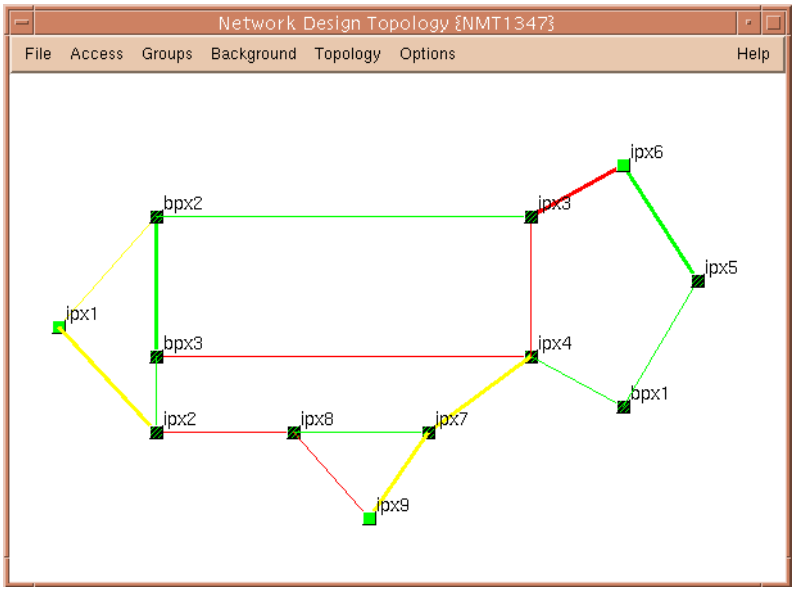
A PNNI network introduces the concept of a peer group, which is a collection of physical nodes. A group is represented by a logical node, which the NMT displays as a colored circle. PNNI networks allow a hierarchy of groups, with higher level groups being collections of logical nodes. The NMT Map supports the grouping of physical nodes into a logical node for any network.

For a network which has groups defined, the map only shows the highest level logical nodes when it is first opened. If all nodes have been assigned to peer groups, no actual nodes will be shown. If some nodes have not been assigned to peer groups, those nodes will also be shown. Nodes that have no map coordinates will show up in the upper left corner. You must drag them to their proper place on the map.

Note Most networks that have been obtained using the CET, whether or not they are on PNNI networks, will be part of one logical group consisting of the entire network. When the map is invoked on such a network, it usually displays a single isolated group.

If multiple groups are defined and a link has ends in two different groups, the nodes at each end are called *border nodes*. The NMT Map highlights border nodes by displaying them as striped squares. The NMT Map also displays links in two-line thickness. A thin line indicates that only one trunk exists between the end points; a thick line indicates multiple trunks.

Figure 3-3 Network View Showing Physical Nodes

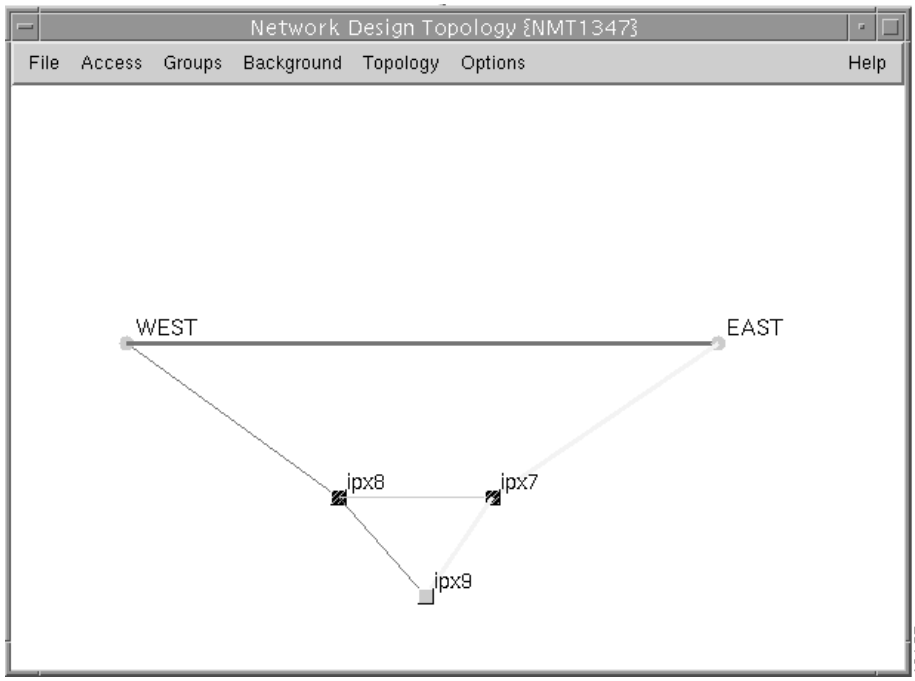


Navigating Though a Network View

To display a physical network (such in Figure 3-3), click the group icons. The physical nodes are shown as squares and the links between them as lines.

To move down the hierarchy, left click an icon. The map now displays all the nodes and links in that icon's peer group. Border nodes are shown with cross-hatches on the node icon. See Figure 3-4.

Figure 3-4 Two-Level Hierarchy



Note Nodes that do not have map coordinates appear clumped together in the upper left corner. You must drag them to their proper place on the map.

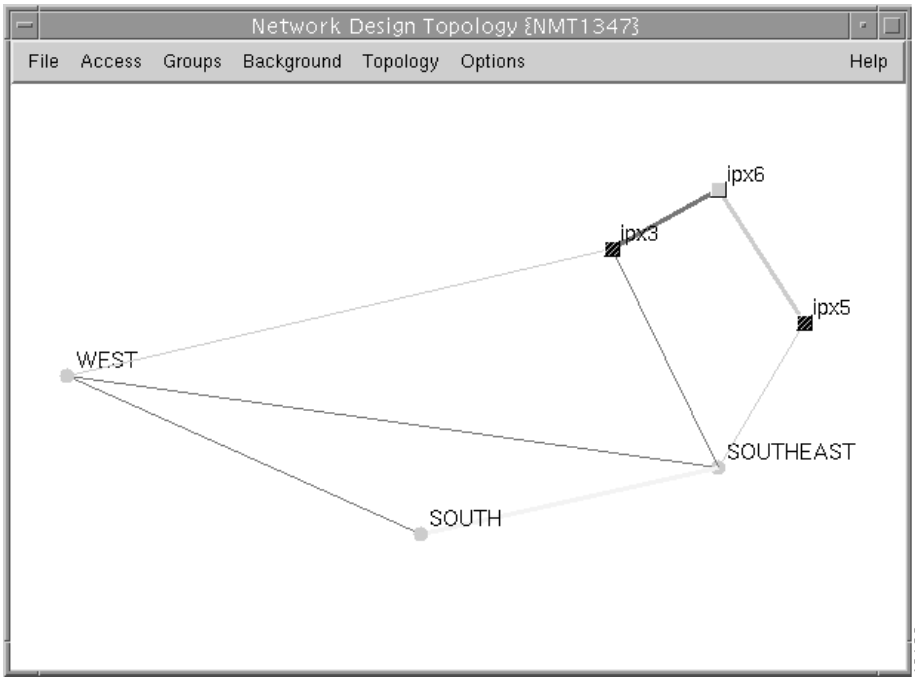
In a multiple-level hierarchy, left-clicking the highest level group icon exposes the next level of logical nodes. Logical nodes are represented by circles. (See Figure 3-5.) To move up the hierarchy, right-click an icon.

To see the entire network, click on all the logical node icons.

To view the physical network, select Explode from the Groups menu.

To view the logical network, select Groups.

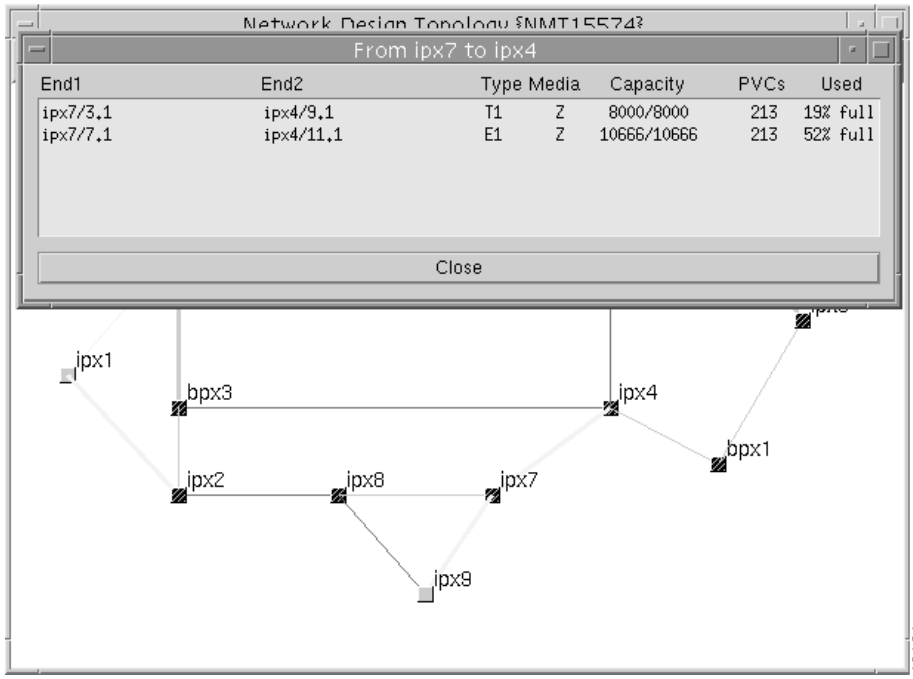
Figure 3-5 Three Level Hierarchy—Third Leve



Displaying Links

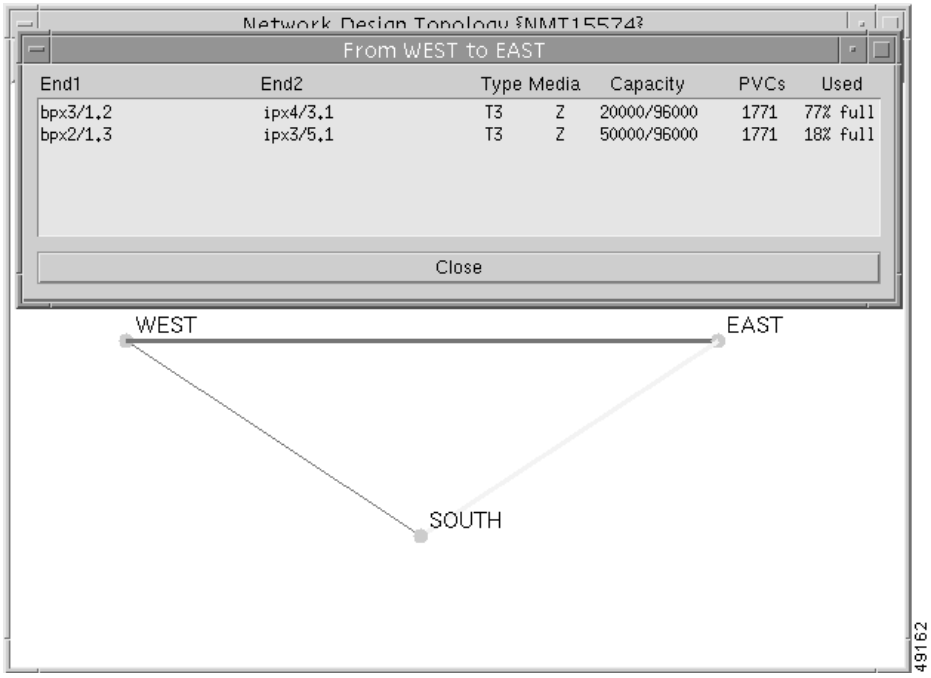
Click the link between two physical nodes to display all of the links between them. See Figure 3-6.

Figure 3-6 Link Display for Physical Links



Click the logical link between two logical nodes to display all of the physical links between them. All the links are displayed, regardless of how many different node pairs are involved. (Figure 3-7).

Figure 3-7 Link Display for Logical Links



Zooming and Panning the Map

Use these steps to zoom in on an area of the map and pan the map.

Step 1 To zoom in on an area of them, do the following:

a. Move the cursor to a blank spot on the map above and to the left of the area you wish to enlarge.

b. Hold down the left mouse button while dragging the cursor down and to the right. A dotted box appears on the screen.

c. Continue moving the cursor until the dotted box surrounds the area you wish to enlarge.

d. Release the left mouse button. The enlarged area now appears in the display.

To return to a map that has been zoomed to its original size, right-click a blank spot on the map. The map zooms out, displaying more of the original map area. Continue right-clicking until the map returns to original size.

Alternatively, selecting a map from the Background menu will also return the display to normal.

Step 2 To move a map to a different position on the screen, do the following:

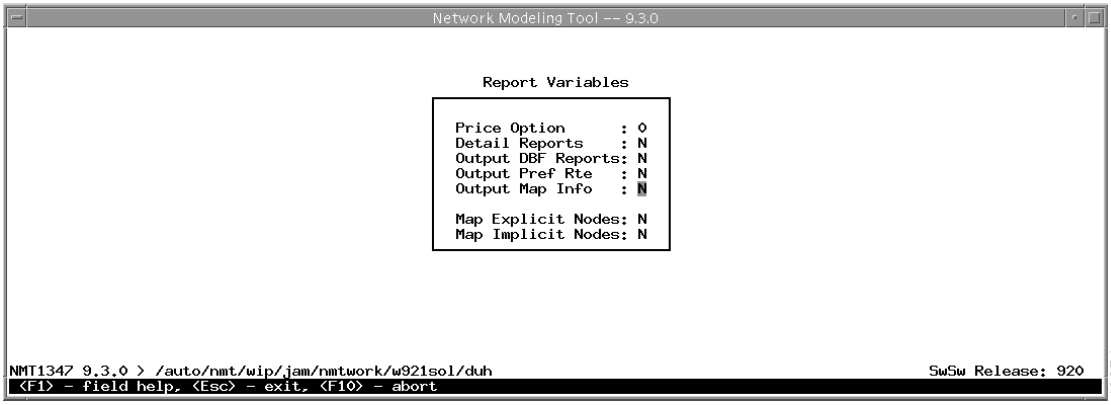
a. Move the cursor to a blank spot on the screen. Hold down the middle mouse button while dragging the cursor in the direction you want the map to move. When you release the mouse button, the nodes, links, and background map shift in that direction on screen.

b. To return to the map to its original position, move the cursor to a blank spot on the map and click the right mouse button.

Controlling Map Displays in the NMT

Map displays are controlled through the Report menu in the NMT main menu. The Set Options screen contains variables to control map output. See Figure 3-8.

Figure 3-8 NMT Report Menu - Set Options Screen



Using the Map

This section describes how to manage groups, nodes, and map data.

Step 1 To add a new group, do the following:

a. Select **Groups** from the Main Menu.

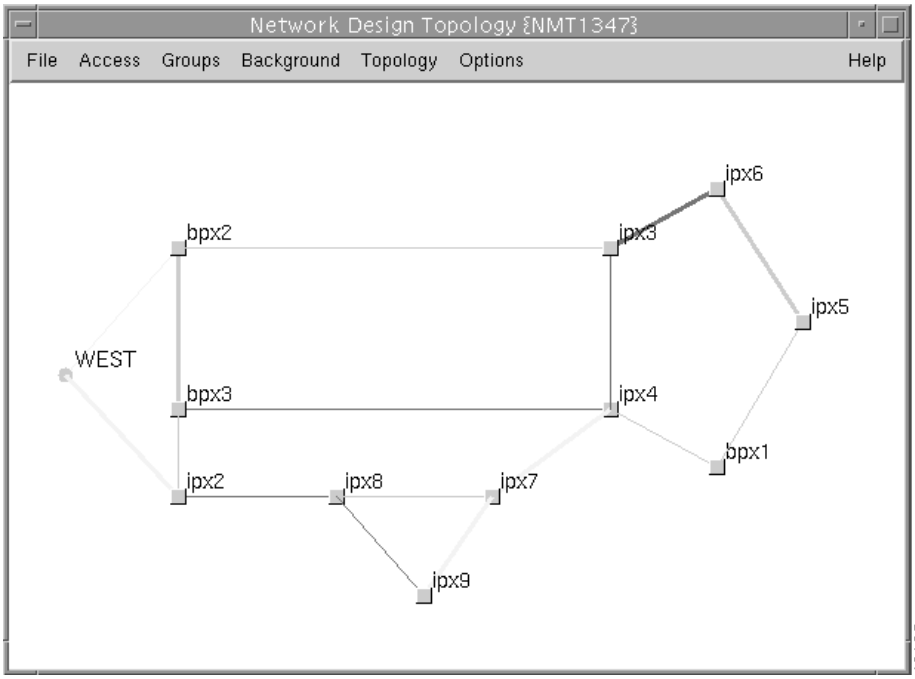
b. Select **Add new** from the Groups Menu. The cursor changes to a black dot resembling a group icon.

c. Select a node that will be in the new group. Center the cursor over the node, and click the left or right mouse buttons. The Add Group dialog box appears.

d. Enter the group name and click **OK**.

The node name is replaced by the group name, and the node icon is replaced by a group icon (a circle) See Figure 3-9.

Figure 3-9 Map Display After Adding a Group



Step 2 To add a node to existing groups, perform the following steps:

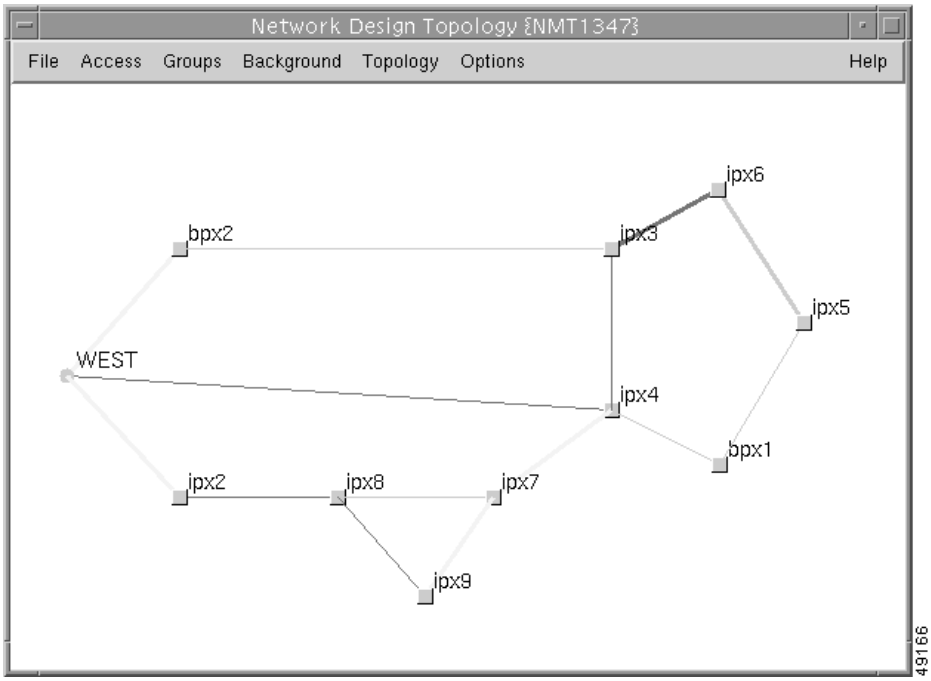
a. Select **Groups** from the Main Menu.

b. Select **Add** to from the Groups Menu. The cursor changes to a ring, resembling a group icon with a hole in it.

c. Select the group to which you want to add a node. Center the cursor over the group icon, and click the left or right mouse buttons. The cursor changes to a square with a dot inside, resembling a node icon.

d. Select the first node which you wish to add. Center the cursor over the node icon, and click the left or right mouse buttons. The node disappears, and any links to it terminate at the group icon. See Figure 3-10. Continue adding the rest of the nodes to the group in the same manner.

Figure 3-10 Map Display After Adding a Node to a Group



When you have finished adding all the nodes, shut off this feature by clicking the left or right mouse button on a blank spot on the map, or on the group you are adding to. This shuts off the Add to feature, makes an audible beep, and restores the cursor to an arrow.

Note Before performing additional tasks, you must shut off the Add To feature.

If groups were not defined in NMT, but added in the Map User Interface, only border nodes will only show up on the display when **Update Map** is selected from the Topology Menu.

Step 3 To delete a group, do the following:

a. Select **Groups** from the Main Menu.

b. Select **Delete** from the Groups Menu. The cursor will change to a skull and crossbones.

c. Select the group you want to delete and click the left or right mouse buttons. A confirmation dialog box appears. Click **OK**.

On the map display, the group icon and name disappear, and all the original nodes and links are restored.

Step 4 To delete a node or groups from existing groups, do the following:

a. Select **Groups** from the Main Menu.

b. Select **Delete** from the Groups Menu. The cursor will change to a skull and crossbones.

c. Select the group you want to delete and click the left or right mouse buttons. A confirmation dialog box appears. Click **OK**.

On the map display, nothing appears to happen. However, when you click the right mouse button on a group to navigate up the hierarchy, you hear an audible beep. When you click the right mouse button on other nodes in that group, the map closes the group and displays the next highest logical node. The node you deleted is also displayed because it is no longer a part of the group.

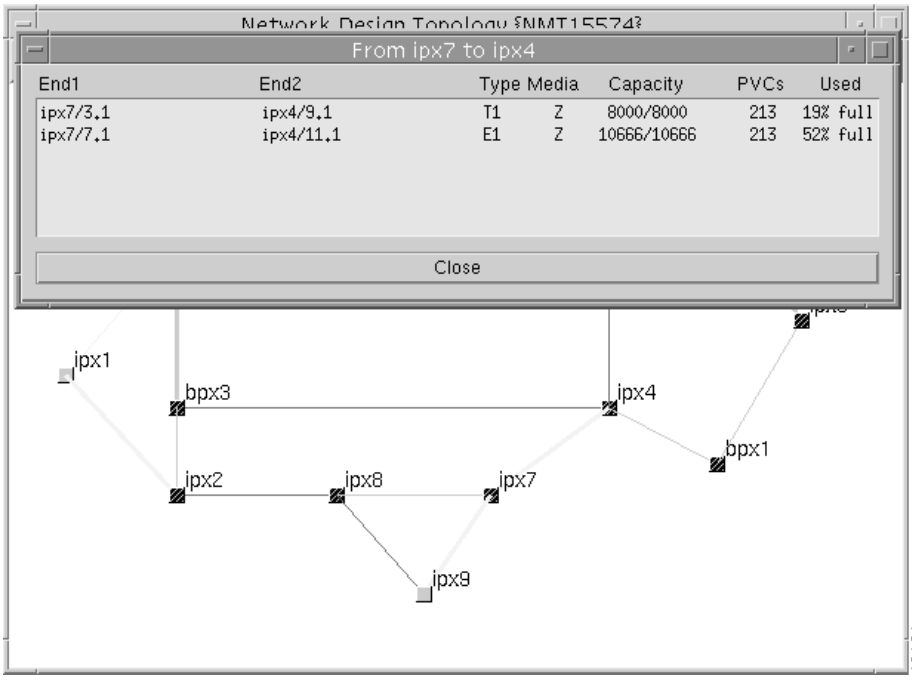
Step 5 To save your map changes, do one of the following:

- Select **Utility** from the Main Menu; then select Save from the Utility Menu.
- Select Main Menu > Utility > **Quit**. A confirmation dialog box appears. Click **Save & Quit**.

When you save your work, the NMT map writes the group names and map coordinates into the NMT local config directory.

Step 6 To import data into the NMT after the map data has been saved, select Import > **Map Data** from the NMT File Menu (Figure 3-11).

Figure 3-11 NMT File Menu (Import Map Data Screen



Step 7 To view map changes after failure analysis, click **Update** in the map window menu bar, and select **Update Map**. Any site that did not reroute a connection for any of the link failures turns red.

Step 8 To analyze traffic levels, do the following:

a. Click the Options menu and select **Thresholds**. The Thresholds dialog box contains two sliding bars (Critical and Warning) that enable you to define critical and warning as a percent of total bandwidth.

b. Slidethe bar to establish the threshold level for traffic: critical or warning. The NMT displays excessive traffic in red, close to excessive traffic in yellow, and all other traffic in green.

Creating a Graphical Display

Use this procedure to create a graphical display of the new configuration.

Step 1 Choose **Topology** from the menu bar and click on **Update Map** to import the most recent configuration.

Step 2 Choose **Background** from the menu bar in the Network Design Topology window and click on **Select** to choose a map appropriate to your configuration.

Step 3 Drag each node to its approximate location on the map. The node icons (colored squares) are stacked in the upper left corner of the window. Place your cursor over a node, hold down the left mouse button, and drag the node into place. Repeat this step for each node.

Step 4 To save your map, choose **File** from the menu bar and select **Save**.

Error Checking

The NMT does automatic error checking in these circumstances:

- When you exit a data entry screen, the NMT automatically checks the data in your table.
- When you exit the Configure menu, the NMT checks your data again and, in many cases, makes corrections. If the NMT makes any changes or finds any errors, it generates messages as needed. When this happens, you are instructed to select **Warnings & Errors** from the Display menu.

  If you are working with a large configuration, you may want to exit the data entry screen without having the NMT perform a line-by-line check. To do this, press the F10 key instead of the Escape key.
- When you select **Route**, **Optimize**, or **Build Sites** from the Execute menu, the NMT checks your data and may make corrections. If the NMT makes any changes or finds any errors, it generates messages as needed. When this happens, you are instructed to select **Warnings & Errors** from the Display menu.

To thoroughly check and correct all configuration tables in Vi mode, select **Table Scan** from the Configure menu.

Using NMT Commands

The NMT provides commands for modifying and summarizing data in the NMT configuration (CNF) files. Most NMT functionality can be executed in the command line interface (CLI). You can use this feature to write scripts and batch commands.

Enter all commands on a UNIX command line in the working directory. Most commands use the following form:

```
command <cnffile> [options]
```

where cnffile is the name of the NMT configuration file.

Several of the commands require additional input, such as names of output files. Before you use one of these commands, enter **`command -h`** at the UNIX prompt. This calls up help text.

Table 3-8 lists the NMT CLI commands.

Table 3-8 NMT Command Line Commands

Command	Description
NMT_Route *cnffile*	Runs the NMT **Route** command, generating all reports.
NMT_Optimize *cnffile*	Runs the NMT **Optimize** command, generating all reports.
NMT_Failure *cnffile*	Runs the NMT **Simulate All** command.

Table 3-8 NMT Command Line Commands (continued)

Command	Description
sniffcnf *cnffile*	Reads a CNF file and prints a short summary of the network characteristics. Use this command to review old CNF databases, summarize a file you received from another user, or check a CET extraction.
dbf2csv *dbffile*	Converts a dbf file to a CSV (common-separated value) file.
sniffdbf *dbffile*	Gives a brief summary of the contents of a DBF (SSI) file.
rensite *cnffile1 cnffile2 osite nsite*	Renames a specific site in all tables and write the resulting file.
cnftrep *cnffile1 cnffile2 cnffile3*	Reads two CNF files, take the Links table from one file, and all other tables from the other, and write the resulting network as a third file. An option allows the command to replace any table except for the Sites table.
cnfupdat *cnffile1 cnffile2*	Updates the CNF file to the latest format and performs all logical changes, such as updating hub IDs to new format, changing ATF to FTA where appropriate, and applying relevant information from previous NMT upgrades.
cnfecho *cnffile1 cnffile2*	Updates the CNF file to the latest format, but perform no logical changes. Also has options to modify the data.
cnfexpn *cnffile1 cnffile2*	Updates the CNF file, duplicating all connections where the quantity field is greater than 1. Default is bursty only, though any or all connection tables can be specified. This command is necessary if you want to do grouping and have quantity fields in the bursty table with values greater than 0.
onesite *cnffile1 cnffile2 site*	Specifies one site and extracts a CNF file with only the connections and links that belong to that site. Useful for analyzing a subsection of a network.
adj2nmt <*cnfn*> <*cnfref*> <*cnfout*>	Automates the changes made in the cnfref file to the cnfin file, and writes the results to the cnfout file. Designed to help you modify a CET extraction regarding data not in the CWM database. Use the –repdiff option to output a detailed report of the differences between these two files.
cnfdiff <*cnf1*> <*cnf2*>	Compares two CNF files. Records are matched by unique key, regardless of the order in the file. Nonunique records are excluded from comparison.
map2cnf <*cnfn*> <*cnfref*> <*cnfout*>	Loads the saved map coordinates into a saved cnf topology file.
cnf2map <*cnfn*> <*cnfref*> <*cnfout*>	Loads the map coordinates from a saved CNF file into the NMT nodes config file.

Troubleshooting the NMT

The table below describes a common NMT problem and the recommended solution.

Symptom	Your mouse does not work on the PC version of the NMT. The mouse is not supported in the UNIX version of the NMT.
Probable cause	The Quick Edit Mode option is checked in the Console window's Properties > Options menu.
Solution	Open the **Properties** menu and ensure that Quick Edit Mode is not checked in the Options tab. If it is checked, click on the box next to Quick Edit Mode to uncheck it and then click **OK**.

CHAPTER 4

Configuration Tables and Fields

This chapter describes the tables that you can access from the Configure menu. They describe such parameters as sites, links, and traffic types. You can create and edit this data with the NMT or import it from other systems.

Sets of tables define network topologies. Each table entry defines an NE, and each field defines an NE characteristic.

The Sites table, which defines the switch locations, is the only mandatory table. In the other tables, you usually only need to define the site name field. You can use the NMT default values in almost all cases to become familiar with the modeling process.

There are no requirements for the order of these tables. Use the Config/Utility to sort the table entries automatically.

See these sections:

- Table Overview, page 4-2
- Sites Table, page 4-2
- Links Table, page 4-7
- Link Special Cases, page 4-11
- Voice Table, page 4-12
- Data Table, page 4-15
- Bursty Table, page 4-18
- Interface Table, page 4-24
- Feeder Table, page 4-26
- Card Table, page 4-26
- Groups and Network Table, page 4-27
- Nodes Table, page 4-28
- Network Settings, page 4-28
- Model Options, page 4-30
- Feeders, page 4-31
- Obsolete Products, page 4-35
- FastPAD, page 4-38
- Port Concentrator, page 4-41
- Tiered Networks, page 4-42

Table Overview

The following legend refers to the Notes column in the tables that follow. Refer to this legend when deciding whether to edit an NMT default value:

- M—Mandatory. If you are revising this table, you must revise this field.
- E—Evaluate. If you are revising this table, you should consider revising this field. For instance, this field may require modification if you are working with a tiered network, an ISP, a network that requires highly regulated bandwidth, or one in which cost factors must be highly regulated.
- O—Optional. If you are revising this table, you need not revise this field. Defaults are generally suitable.
- P—Parts. Required for generating an accurate parts list.
- H—Help. Press F12 or the Help key to call up a list of choices.
- X—Entries generated by the NMT that cannot be edited.

The DBF column lists the DBF field name, and any additional translation information. There are also columns for the CET (CWM) and TPI (WANDL) translations.

An asterisk in the CET or TPI columns indicates that the CET or the TPI supports a field. For instance, the CET extracts site names from the CWM database, so there is an asterisk in the site row of the CET column in Table 4-1. The asterisk indicates that the field is translated as described in the legend above. If the translation is more complex, it is described in the CET or TPI column.

Sites Table

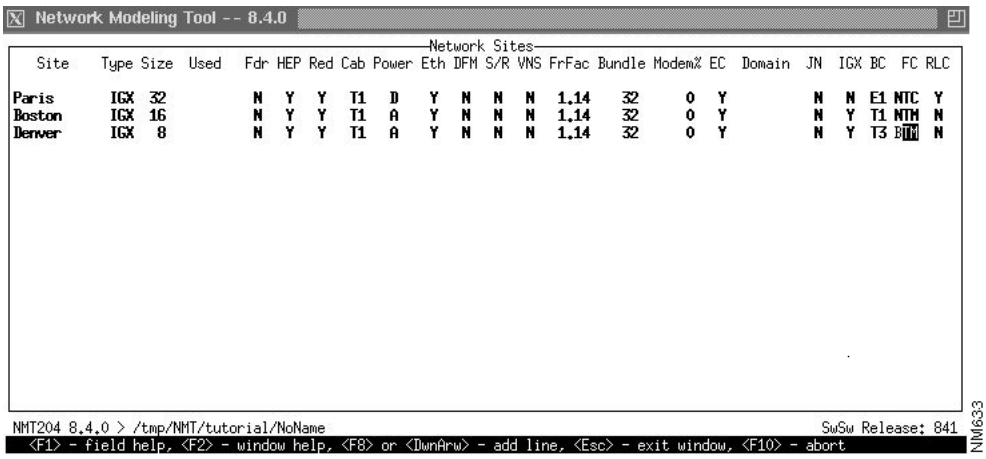
The Sites table contains information about network sites having one or more WAN switches, controllers, and/or feeders. All other tables using the sites field rely on this table data. To display the sites table, select **Site** from the Configure menu.

The two most important fields of the site table are the site name and the node type field:

- The site name field defines the label string of the site, and must be valid and unique.
- The node type field defines what kind of switch is at this location.

Use the NMT Sites table to specify all feeder equipment in the MGX, BPX, and IPX switches. You can also provision feeders and additional routing IGX shelves as required by the connection.

Figure 4-1 NMT Network Sites Table



The primary CWM data source for the site table is the node table. The primary WANDL data source and target for the site table is the MUXLOC file.The Sites table fields are described in Table 4-1

Table 4-1 .Sites Table

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site	–	M/H	Site name (up to 10 characters). Names are case sensitive. Keep the names short and easy to remember. This field must be revised before you revise any other fields or tables.	NAME	* Reduced to unique 10-char name if longer than 10 characters.	Translated to both Short name and Long name*
Node Type	IGX	M/H	Type of product (IGX, BPX, MGX, IPX).	TYPE	* Limitations: IGX not recognized until Release 8.2.	nodeparam file
Type Used	–	X	Protected field that shows the size of the node after the NMT builds a network.	n/a		
Site Type	Switch	M/H	Function of platform at the site. Can be a switch, feeder, controller or a stand alone unit.	STYPE	*	Restrictions imposed on links
SwRel		O	Software release of the switch(es) at this site. If blank, this field defaults to the global value defined in the Model Settings.	SW_REL	*	

Table 4-1 .Sites Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
PC	Blank	P	Processor card. If Blank, use the latest.	NPC	* From card table. Default value used until Release 9.1.	
Red	Y	P	Redundancy. Y—site has redundant components. N—site does not have redundant components.	RED		
Cab	T1	P	Cabinet. Specifies cabinet type (T1—American or Far Eastern; E1—European).	CABINET		
Power	A	P/H	Power supply.	AC_DC		
DFM	N	O	Data Frame Multiplexing. Y—site uses DFM. N—site does not use DFM. If a data connection terminating at this site has a DFM setting of Y, it takes precedence over the site setting.	DFM		
S/R	P	O	Save/Restore. Y—site uses save/restore configuration software. N—site does not use save/restore configuration software.	S_R		
FrFac	1.14	O	Frame Relay Factor. Multiplier to account for frame overhead on the IPX Mux Bus. (The 1.14 default is an IPX legacy setting.)	FR_FAC		
Bundle	24	O	Maximum number of connections that can be routed simultaneously. Default is 32; choose between 1 and 29.	BUNDLE		
Modem%	0	E	Percentage of modem traffic on voice connections originating at this site.	MODEM_PCT		
IGX	Y	E	Type of feeder node. Y—feeder nodes should be IGX. N—feeder nodes should be IPX. Applies only if the NMT needs to add a feeder node.	IGX		
TF	N	E	Tiered Feeder Flag. *Y*- for feeder; *N*- for router. Applies only to added feeder nodes.	TF		
BC	T1	E/H	Back card. Feeder link back card. Applies only to added feeder nodes.	BC		
FC	NTM	E/H	Front card. Feeder link front card. Applies only to added feeder nodes.	FC		
RLC	N	E	Redundant link card. Specifies whether link is redundant. Applies only to added feeder nodes.	RDL		

Table 4-1 .Sites Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
NPA			NPA of the site location. Not used in the NMT but carried for reference and used in WANDL.	NPA		*
NXX			NXX of the site location. Not used in the NMT but carried for reference and used in WANDL.	NXX		*
LON			Longitude of site location. Not used in the NMT but carried for reference and used in WANDL. Several different formats are available in the string field.	LON		F: muxloc
LAT			Latitude of site location. Not used in the NMT but carried for reference and used in WANDL. Several different formats are available in the string field.	LAT		F: muxloc
RA	H	0	Routing algorithm version of AR. Use "H" for minimum hops, "C" for Least Cost, and "CD" for least cost with delays.	RM		
PNNI	Blank	0	Y/N flag indicating whether the node is capable of PNNI routing or not.	PNNI	*	
PNNI_PG	N	0	Name of the PNNI group, as defined in the PNNI Domains table. If the name in this table is not in the PNNI Domains table, it just represents a logical grouping that the user can define any way they wish.	PNNI_PG		
PGL_PR	0	0	The Peer Group Leader Election Priority is a numeric value determining which site will be the peer group leader. The highest value in the peer group will be the leader.	PGL_PRI	*	*
Xrstr	N	0	**Y**/**N** flag for transit restriction. If **Y**, the PNNI node cannot be used for transit calls (via connections).	XR		
MAPV			Map vertical coordinate. Can be loaded and unloaded from the NMT map process.	VER	* Only available if CWM or SV+ map has been configured.	* If no NMT longitude/ latitude fields, use this to create latitude in table muxloc Also written to graphcoord file.

Table 4-1 .Sites Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
MAPH			Map horizontal coordinate. Can be loaded and unloaded from the NMT map process.	HOR	* Only available if CWM or SV+ map has been configured.	* If no NMT longitude/latitude fields, use this to create longitude in table muxloc Also written to graphcoord file.
CT	Blank	0	Country code. A two digit country code carried but not used by NMT. Used in WANDL for tariff lookups.	CT		*
Weight	0	0	User defined weight that can be used for generating links and/or connections using the MESH commands in the CONFIG/UTILITIES menu.	WEIGHT		nodeweight file
Network		0	The network domain name this site is assigned to.	NET_NAME		* DOMAIN in the muxloc file.

Example of Configuring Sites

This section provides an example for configuring Sites.

Step 1 Enter the information shown in Table 4-2 into the Sites table. Except where noted in this table, each node uses default values.

Table 4-2 Field Changes for the Sites Table

Site	Type	Power	IGX	BC (Back Card)	FC (Front Card)	RLC (Redundant Link Card)
Paris	IGX	D	N	E1	NTC	Y
Boston	IGX	A	Y	T1	NTM	N
Denver	IGX	A	Y	T3	BTM	N

Step 2 Highlight **Configure** and press **Enter**.

Step 3 Select **Sites** and press **Enter**. A new sites table appears. Navigate to menu items as desired.

Step 4 Highlight the Site field and type **Paris**. A new site has been created.

Step 5 To modify the NMT default site values, enter data that applies to the Paris site in either of these ways:

1. Press the **Help** key to see a list of choices. These are available for most fields that accept three or more nonnumeric values. Make a selection and press **Enter**.
2. Type directly in the field. Press the **Delete** key if you make a mistake.

Step 6 Press the down arrow to insert a new line in the table.

Step 7 Repeat Steps 4 and 5 for Boston and for Denver. The Sites table should look like the one shown in Figure 4-1.

Step 8 To accept th entries, press **Escape** and return to the Configure menu.

Links Table

The Links Table contains topological and cost information about existing network links or possible links considered for the network design.

For existing links, the Keep field should be set to the number of existing links, with the characteristics described in the record. The **Links** command displays existing links and possible links considered for the network design. The key fields in the link table are the site ends, the trunk type, and the keep field.

The primary CWM data source for links data is the NMT Links table.

The WANDL translation for the link table is the bblink file. When translating from NMT to WANDL, a fixlink file identical to the bblink file is created.

The Links table fields are described in Table 4-3.

Table 4-3 Links Table

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site 1	–	M/H	Name of site at one end of the link using a name from Sites table.	SITE1	*	*
Port ID 1	0	E	Logical slot/port number at Site 1 for the connection. Enter 0 and NMT assigns. Enter n.m to specify port.slot.	HUBID1	*	*
Site 2	–	M/H	Name of site at other end of the link using a name from Sites table.	SITE2	*	*
Port ID 2	0	E	Logical slot/port number at Site 2 for the connection. Enter 0 and NMT assigns. Enter n.m to specify port.slot.	HUBID2	*	*
M	Z	O/H	Media. Media type of trunk.	M		*

Table 4-3 Links Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
IF1	T3	O/H	Trunk type and capacity. The Trunk type is the interface used on the trunk and defines the backcard. An optional line size can be prepended.	TRUNK	* Y1 trunks shown as T1, and T2 trunks shown as T3. Until Rel. 9.1, broadband trunks were determined heuristically, based on port speed and card type.	*
IF2	blank	O/H	IF2 trunk type is used only if different from the first, in the case of virtual trunks.	TRUNK2	*	*
DS0	0	O/H	DS0 field is the number of sub-units for a DS1 line. 4 through 24 are valid for T1, and 4 through 30 are valid for E1. If the trunk is not a DS1 type, this field is ignored.	TRNK_CAP	*	*
Trnk_Cd		O/P/H	Trunk card. The front cards for this link.	TRNK_CARD1/ TRNK_CARD2	*/*	
Keep	1	E	Number of existing links. If the Keep field is 0, the link will be ignored in the **route** command and considered for the **optimize** commands.	KEEP	* Since slot, port are included, this field is always set to 1.	*
Used	0	X	Shows the size of the node after the NMT builds a network using the optimize command.	n/a		
Reserve	600/600	O	Trunk reserve. Estimate of the overhead on each link needed for collecting network statistics and other administrative overhead. The reserve size is subtracted from the total link capacity before calculating routes. The units of statistical reserve can be in ATM cells (CPs) or Fastpackets (pps).	RESERVE1 / RESERVE2	*/* Defaults applied to links between BPX switches and tiered network feeders.	*/*

Table 4-3 Links Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Rcv_Rate	0/0	O	Receive rate. Largest number of pps or cps that the node at site 1 can receive over a link from site 2. The second field is the largest number of pps or cps that the node at site 2 can receive over a link from site 1. Only used for broadband links (T3/E3) at IGX/IPX sites, or BXM links. The units are pps or cps respectively. If you enter 0 here, the default, NMT will set this field to the highest value possible for the card. Rcv_Rate supported on the AIT, ALM, BTM, and BXM card.	BB_MAX1 / BB_MAX2	*/*	*/*
Red	N	P	Redundancy. Specifies whether site has redundant components. Y—site has redundant components. N—sites does not have redundant components.	RED		
VT_Rate& Type	0	O	Virtual Trunk Rate. Bandwidth of the trunk in cells per second. (VTs must have VT in media field.)	VT_RATE	*	*
Traffic	Blank	0	Types of traffic allowed on this link. If blank, all types are allowed.	TRAFFIC		
LRd	N	O	Link redundancy. Y—spare trunk is used on redundant link (for BPX to IBX/IPX links only). N—spare trunk is not used on redundant link.	BACKUP		
Dist	0	E	Distance between sites in miles or kilometers. Must be consistent with the Line Cost table in the Maintenance menu.	DIST		
$/Mo	0	E	Cost per month of trunk from Site 1 to Site 2. If blank, NMT calculates cost using the Dist field and the data in the Line Cost Table (in the Maintenance menu). If you enter a value here, use zero in the Distance field.	COST_MO		
Instl	0	O	Installation cost of a trunk.	INSTALL		
Fdr1ID	0	E	Feeder 1 ID. Part ID for the IMATM trunk on an MGX 8220 edge concentrator.	FDR1ID		
Fdr2ID	0	E	Feeder 2 ID. Part ID for the IMATM trunk on an MGX 8220 edge concentrator.	FDR2ID		

Table 4-3 Links Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
IMA_RD	0	O	IMATM resiliency degree. Number of T1/E1 lines of AIMUX port that are allowed to fail before the AIMATM trunk goes down.	IMA_RES		
NTS_Q	0/0	O	Queue Depth in Transmit/Receive direction for Non Time Stamped connection loads. When the entry is 0, NMT will assume the default queue depth.	NTS_QDS/ NTD_QDR		
Voice_Q	0/0	O	Queue Depth in Transmit/Receive direction for Voice connection loads. When the entry is 0, NMT will assume the default queue depth.	DSI_QDS/ DSI_QDR		
Cost	10	O	The Least Cost Routing (LCR) weight.	WT		*
AR	Y	O	Y/N flag indicating if the link is AR enabled.	AR		
PNNI	N	O	Y/N flag indicating if the link is PNNI enabled.	PNNI	Heuristic used for BPX nodes	
AggToken	0	O	The value used in the PNNI link aggregation algorithm. At least one link with a unique aggregation token will always be known in the PNNI logical topology.	AGG_TOK		
Comment		0	Comment field used in NMT only.	COMMENT		
AW	5040	O	Administrative weight used for least cost in the PNNI routing algorithm.	AW		
Comment			A free field comment field. Translates to the WANDL link label field if present.	COMMENT	Not available until sv+ Rel. 9.0.	The comment field is used as the link label in the bblink file. If this field is blank, a link label will be generated only if it is required to uniquely determine the link in WANDL.

Link Special Cases

This section describes link table configuration for the following special cases:

- ATM Trunks
- Virtual Trunks

IMATM Trunks

An IMATM trunk is an ATM link of one to eight DS1 lines. Each IMATM trunk card uses a slot of an AXIS shelf, and is connected to the BPX switch by means of a T3/E3 port on a BNI card. The trunk can be configured so it fails only if more than *n* DS1 lines fail. The NMT does not model IMATM trunk resiliency during failure analysis.

Table 4-4 IMATM Trunk Configuration

Topic	Required Settings	Comments
Specifying an IMATM Trunk	Links table Trunk (type) field: Specify a trunk of T1 or E1. Prepend the number of DS1s for the trunk, for example 5:T1 or 8:E1. Trunk (capacity) field: For E1 links, specify number of DS0 in the line: 30 for CCS signalling or 32 for Clear Channel signalling. Trunk card field: Specify IMA for both trunk front cards. IMA_RD field: enter the resiliency degree.	Both sites must be BPX. The IMA_RD field is on the second screen of the Links table.

Virtual Trunks

The virtual trunking feature defines multiple trunks within a single trunk port interface. It provides connectivity for a hybrid network consisting of Cisco ATM switches through a public ATM cloud.

NMT models the virtual trunks on the BNI, BXM, BTM, and AIT ports. See Table 4-5.

Table 4-5 Virtual Trunk Configuration

Topic	Required Settings	Comments
Specifying a Virtual Trunk	**Links Table** M (Media) field: Enter VT Trnk_Cd field: Both ends must be specified. The ends can be different. VTRate field: Specify the VT rate in cells per second. ...&Type field: Define the ATM type of link (ABR, CBR, UBR, VBR, or leave blank if the links support all types of traffic).	If the back cards are different, the maximum size of VT is the minimum of the two protocols.

Voice Table

The Voice table contains topological information about network IGX voice connections and T1/E1 emulation configurations.

The important fields in the voice table are the site ends, the type, and the BackCard field:

- The type defines the voice compression protocol.
- The backcard defines the connection type at the customer's premise.

The primary CWM source of the voice table is the USER_CONN table.

The WANDL file for translation is the demand file.

See Table 4-6.

Table 4-6 Voice Table

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site 1	–	M/H	Site name of owner of a connection.	SITE1	*	*
Port ID 1	0	O	Logical slot/port number at Site 1 for the connection. Enter 0 and NMT assigns. Enter n.m to specify port.slot.	ID1	*	
Site 2	–	M/H	Site name of remote end of a connection.	SITE2	*	*
Port ID 2	0	O	Logical slot/port number at Site 2 for the connection. Enter 0 and NMT assigns. Enter n.m to specify port.slot.	ID2	*	
Qty	1	M	Quantity. Number of connections of the specified type.	CONNS	* Since slot and port are included, this field is always set to 1.	*
Type	C32	M/H	Type of voice connection.	TYPE	* Derived heuristically before Rel. 8.5. T connections shown as P; FastPAD CELP8 and CELP48 conns shown as ATC16.	*

Table 4-6 Voice Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
E2E_TYPE	SPVC	M	The end to end type of the connection. PVC, SPVC, XPVC, Hybred and 1Ended are all valid.	E2E Coded: C - PVC S- SPVC H- Hybred X - XPVC E - Single ended		
Sig	CAS	O	Signalling type: channel associated signalling (CAS), or common channel signalling (CCS), or clear (CLR).	SIG		
PR	0	O	Rerouting priority—0 to 15, with 0 the highest rerouting priority.	COS	Defaults used before Rel. 8.5.	*
Ad	–	O/H	Restriction type. Ad is short for Avoid. Specify the media types that should be avoided when the connection is routed.	AVD		
Red	N	P	Redundancy. Specifies whether connections are going to be redundant. Applies to CDP redundancy.	RED		
%Util	40/40	E	Trunk utilization, based on minimum information rate (MIR) percentage. (Default is 40% because studies have shown that during conversations, one end of the line is unused 60% of the time.)	PCT_UTIL1 / PCT_UTIL2	Defaults used before Rel. 8.5 and for FastPAD. The data may be unreliable if it changed after adding a connection.	*/*
BC	T1/T1	E/H	Back card type (CDP Set). Use workstation Help or F12 key for choice list.	BC1 / BC2	*/* Until Rel. 9.1, field was determined heuristically, based on the observed ports used.	
Fdr1ID	0	E	Feeder 1 ID. Logical port number for the connection at a 3810 or FastPAD feeder at the local site (not used).	FDR_ID	* MC 3810 feeders are not supported.	

Table 4-6 Voice Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Fdr2ID	0	E	Feeder 2 ID. Logical port number for the connection at a 3810 or FastPAD feeder at the remote site (not used).	FDR_ID2	* MC 3810 feeders are not supported.	
FdrBc	/	O/H	Feeder back card voice card type.	FDR_INT1 / FDR_INT2	*/*	
Index	0	O	SNMP Connection Index for CWM reference for this connection.	SNMP_INDEX	*	
Rt_Metrics	AW	M	How the connection is routed.	RT_MET		
Cost	0	O	Maximum cost allowed for the least cost routing path for this connection.	MAX_COST		
DR	N	O	Direct routing. Indicates that the connection must use the preferred route provided. If it cannot use the preferred route, the connection should not be routed.	DR		
Preferred_ Route		O	The preferred route of the connection. The first and last routing site are optional and all feeder sites are optional. An equal sign separates the site names. Specific links are specified by the slot.port for the incoming and/or outgoing port.	Route is stored in 19 fields: PR_SITE2, PR_SITE3, PR_SITE4... PR_SITE20	* Available starting with Rel. 7.2. Specific Trunk not available until Rel. 8.4. Routes are not available on PNNI networks.	*
Current_ Route		O	The current route, from CET extractions.	Route is stored in 19 fields: CR_SITE2, CR_SITE3, CR_SITE4... CR_SITE20	* Available starting with Rel. 7.2. Specific Trunk not available until Rel. 8.4. Routes are not available on PNNI networks.	
Comments	–	O	Comment field, maximum of 20 characters.	CIRCUIT_ID	Not available before Rel. 7.2, nor for SV+ Rel. 8.4.	Comment field used as the connection label. If no comment field, a connection label is generated for WANDL demand file.

Data Table

The Data table contains topological information about network data connections.

The important fields in the data table are the site ends, the type, and the BackCard field:

- The type defines the voice compression protocol.
- The backcard defines the connection type at the customer premise.
- The primary CWM source of the Data table is the USER_CONN table.
- The WANDL file for translation is the demand file.
- See Table 4-7.

Table 4-7 Data Table

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site 1	–	M/H	Site name of the owner of a connection.	SITE1	* Master node unavailable until Rel. 8.1; assumed to be Site 1.	*
Port ID 1	0	E	Logical slot/port number at Site 1 for the connection. (You can assign or NMT will assign.)	ID1		
Site 2	–	M/H	Site name of the remote end of a connection.	SITE2	*	
Port ID 2	0	E	Logical slot/port number at the remote site for the connection. (You can assign or NMT will assign.)	ID2		
Qty	1	M	Quantity. Number of data connections.	CONNS	* Since slot and port are included, this field is always set to 1.	*
Type	56	E/H	Data rate such as 19.2, or 19.2f for fast EIA (for example, interleaved data and event bytes).	TYPE	* Derived heuristically. Modifier F not available until Rel. 8.1; nx64, nx56 shown as the resulting product starting with Rel. 9.1.	*

Table 4-7 Data Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
E2E_TYPE	SPVC	M	The end to end type of the connection. PVC, SPVC, XPVC, Hybred and 1Ended are all valid.	E2E Coded: C - PVC S- SPVC H- Hybred X - XPVC E - Single ended		
EIA	2/2	O	Maximum signalling sampling rate, 0 to 20 times per second.	EIA1 / EIA2		
Cd	8	O	Encoding format. 7 for 7/8 coded data and 8 for 8/8 coded data. Connections of 1.344 Mbps or higher require 8/8.	CODE	* Defaults used until Rel. 7.2.	
PR	0	O	Rerouting priority. 0 to 15, with 0 the highest rerouting priority.	COS	Defaults used before Rel. 8.5.	*
Ad	–	O/H	Restriction type.	AVD		
Red	N	P	Redundancy. Specifies whether data connections are going to be redundant. Applies to CDP, SDP, and LDP Y-cable redundancy.	RED		
DFM	N	O	Data Frame Multiplexing. Y—connection requires DFM. When connections have DFM, the site value is ignored. N—connection does not use DFM.	DFM	* Default used until Rel.7.2.	
%Util.	60/60	E	Connection utilization percentage for DFM connections; not used if DFM column is N.	PCT_UTIL1 / PCT_UTIL2	Defaults used before Rel. 8.5 and for FastPAD. The data may be unreliable if it changed after adding a connection.	*
BC	V/V	E/H	Back card type (L4, L8, D, R, V, S, E1, T1 and J1). Use workstation Help or F12 key for choice list.	BC1 / BC2	*/* Heuristic, based on observed number of ports used until Rel. 9.1.	
Fdr1ID	0	E	Feeder 1 ID. Logical port number for the connection at a 3810 or FastPAD feeder at the local site (not used).	FDR_ID1	* MC3810 feeders not supported.	

Table 4-7 Data Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Fdr2ID	0	E	Feeder 2 ID. Logical port number for the connection at a 3810 or FastPAD feeder at the remote site (not used).	FDR_ID2	* MC3810 feeders not supported.	
FdrBc	/	E/H	Feeder back card. The line interface type at the feeder.	FDR_INT1		
Index	0	O	SNMP Connection Index for CWM reference for this connection.	SNMP_INDEX	*	
Rt_Metrics	AW	M	How the connection is routed.	RT_MET		
Cost	0	O	Maximum cost allowed for the AR least-cost routing path for this connection.	FDR_INT2		
DR	N	O	Direct routing. Indicates that the connection must use the preferred route provided. If it cannot use the preferred route, the connection should not be routed.	DR		
Preferred_Route		O	The preferred route of the connection. The first and last routing site are optional and all feeder sites are optional. An equal sign separates the site names. Specific links are specified by the slot.port for the incoming and/or outgoing port.	Route is stored in 19 fields: PR_SITE2, PR_SITE3, PR_SITE4... PR_SITE20	* Available starting with Rel. 7.2. Specific Trunk not available until Rel. 8.4. Routes are not available on PNNI networks.	*
Current_Route		O	The current route, from CET extractions.	Route is stored in 19 fields: CR_SITE2, CR_SITE3, CR_SITE4 ... CR_SITE20	* Available starting with Rel. 7.2. Specific Trunk not available until Rel. 8.4. Routes are not available on PNNI networks.	
Comments	–	O	Comment field, maximum of 20 characters.	CIRCUIT_ID	Not available before Rel. 7.2, nor for SV+ Rel. 8.4.	Comment field used as the connection label. If no comment field, a connection label is generated for WANDL demand file.

Bursty Table

The Bursty table contains topological information about network FR, ATM, and circuit-emulation connections.

The important fields in the bursty table are the site ends, the type, and the BackCard field:

- The type defines the type of connection (FR, ATM, circuit emulation, or multisegment).
- The backcard defines the connection type at the customer's premise.
- The MCR and PCR fields define the load parameters of the connection and are key to estimating the bandwidth utilization and port speeds.

The primary CWM source of the Bursty table is the USER_CONN table.

The WANDL file for translation is the demand file.

See Table 4-8.

Table 4-8 Bursty Table

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site 1	–	M/H	Site name of the owner of a connection.	SITE1	* Master node unavailable until Rel. 8.1; assumed to be Site 1.	*
Port 1	0	E	Logical slot/port number at Site 1. (You can assign, or let NMT automatically assign.) For multiport channelized cards, the format is slot.line.port.	ID1	*	
Site 2	–	M/H	Site name of the remote end of a connection.	SITE2	*	*
Port 2	0	E	Logical slot/port number at Site 2. (You can assign, or let NMT automatically assign.) For multiport channelized cards, the format is slot.line.port.	ID2	*	
Qty	1	M	Quantity. Number of data connections.	CONNS	* Since slot, port, dlci (a VP1, VC1) are included, quantity is always set at 1.	*

Table 4-8 Bursty Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Type	VBR	M/H	Type of connection. Select FR for FR, AMT=FR for ATM to Frame, FR=ATM for FR to ATM, or select ABR, CBR, or VBR for ATM connection.	TYPE	* Until Rel. 8.2, heuristic analysis determined whether ATM connections were ABR, CBR, or VBR.	*
E2E_ TYPE	SPVC	M	The end to end type of the connection. PVC, SPVC, XPVC, Hybred and 1Ended are all valid.	E2E Coded: C - PVC S- SPVC H- Hybred X - XPVC E - Single ended		
FS	Y	O	Y/N flag indicating if the connection has ForeSight implemented or not. Foresight only applies to FR and ABR connections, or FR ATM multi segment connections.	FS		
MIR (SCR/MCR)	64.0/64.0	M	Minimum Information Rate that is guaranteed (in kbps for FR or ATF), or Minimum Cell Rate for VBR/ABR (Ignored for CBR/UBR).	MIR1 / MIR2		*/*
PIR (PCR)	256.0/256.0	M	Peak Information Rate (burst rate) that is allowed (in Kbps for FR or ATF, or in cps for ATM).	PIR1 / PIR2	*/*	*/*
MBS	1000/1000	0	Maximum Burst Size for ATM VBR connections. The maximum number of cells that are allowed to burst over a period of time at a rate higher than the SCR.	MBS1 / MBS1		
%Util.	100/100	E	Statistical estimate of the percentage of time that a FR connection may actually be transmitting at the minimum information rate.	PCT_UTIL1 / PCT_UTIL2	*/* Defaults used for FastPAD. The data may be unreliable if it changed after adding a connection.	*/*

Table 4-8 Bursty Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
BC	V/V	M/H	Back card. Type of back card. See Help or F12 key for choice list.	BC1 / BC2	*/* SL back cards are shown as SM; number of lines on FRM back card is determined heuristically based on ports used and port speeds. Until Rel. 9.1, heuristic was based on ports used, connection type, and port speeds.	
FrontCard		O	Front card. In some cases, multiple front cards can support a service on a platform. In those cases, you can specify the front card you want.	FC1 / FC2	Only filled in for FRSM-HS cards.	
Application	blank	O	Only required for VISM connections. Describes if the connection is a Bearer or a Signalling connection	APP Values are blank, B (Bearer) or S (signaling)		
Fdr1ID	0	E	Feeder 1 hub ID. The slot port address on the MGX 8220, 3810, or FastPAD at Site 2, if any. Slot represents both the slot and line. Enter 0 for NMT to assign.	FDR_ID1	* FastPAD and MC 3810 feeders not supported	
Fdr2ID	0	E	Feeder 2 hub ID. The slot port address on the MGX 8220, 3810, or FastPAD at Site 2, if any.	FDR_ID2	* FastPAD and MC 3810 feeders not supported	
FdrBC	/	E/H	Feeder back card—the line interface type at the feeder.	FDR_INT1 / FDR_INT2	Only MGX 8220 feeders supported	
FdrFC	/	E/H	Feeder frontcard—the line interface type at the feeder. In some cases, multiple front cards can support a service on a platform. In those cases, you can specify the front card you want.	FDRFC1 / FDRFC2		
Red	N	P	Enter Y for FR cards that are to be redundant.	RED		

Table 4-8 Bursty Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Pr	0	O	Rerouting priority—0 to 15, with 0 the highest rerouting priority.	COS	Defaults used until Rel. 8.1 (8.2 for ATM)	
Ad	–	O/H	Restriction type. Link media types that this connection should avoid.	AVD	Defaults used until Rel. 8.1 (8.2 for ATM).	
CBRT	N	O	Cell based routing flag. If set to 'Y', the connection can be routed only on the cell base routing cards. The traffic will never be permitted to be converted into packets.	CB		
Endpoint Address			The ID of the connection. DLCI for FR, VPC/VCI for ATM. These addresses are the IDs of the connection as it enters and exits the ATM WAN cloud.	ADDRESS1 / ADDRESS2	*	*
Routing Address			The ID of the connection's primary routing segment.	RT_ADDRESS1/ RT_ADDRESS2		
Index	0	O	SNMP connection index for StrataView+ data base. This is the numeric identifier required for the administration of a connection created by the Connection Manager in CWM.	SNMP_INDX		
Rt_Metrics	AutoRoute	M	How the connection is routed. Use AutoRoute for AR. The type of AR used will be determined by the AR field in the site table for end one. Use AW, CTD or CDV for PNNI routing. AW routes strictly based on administrative weights, CTD considers delays, and CDV considers delay variance.	RT_MET A - Autoroute, W - PNNI Least Cost, D - PNNI Delay, E - PNNI Delay with variance	AW assumed for MGX 8850, Rel. 2.	
Cost	100	O	Maximum cost allowed for the AR least-cost routing path for this connection.	MAX_COST		

Table 4-8 Bursty Table (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
DR	N	O	Direct routing. Indicates that the connection must use the preferred route provided. If it cannot use the preferred route, the connection should not be routed.	DR		
Preferred_ Route		O	The preferred route of the connection. The first and last routing site are optional and all feeder sites are optional. An equal sign separates the site names. Specific links are specified by the slot.port for the incoming and/or outgoing port.	Route is stored in 19 fields... PR_SITE2, PR_SITE3, PR_SITE4... PR_SITE20	Not available until Rel. 7.2. Specific Trunk not 8.1. Current route not available for SV+ Rel. 8.1 or 8.2. Routes are not available on PNNI networks.	
Current_ Route		O	The current route, from CET extractions.	Route is stored in 19 fields: CR_SITE2, CR_SITE3, CR_SITE4... CR_SITE20	Not available until Rel. 7.2. Specific Trunk not available until Rel. 8.1. Current route not available for SV+ Rel. 8.1 or 8.2. Routes are not available on PNNI networks.	
Comments	–	O	Comment field. Maximum of 20 characters.	CIRCUIT_ID	Not available before Rel. 7.2, nor for SV+ Rel. 8.4.	Comment field used as the connection label. If no comment field, a connection label is generated for WANDL demand file.

Bursty Table Special Cases

The Bursty Traffic table configuration information is different for ATM and two-segment connections. The configuration for these types of connections is described in the sections that follow.

- ATM connections—For information on modeling ATM connections, use the NMT to model ATM connections in the Bursty Traffic table. See also Table 3-7 .

Table 4-9 ATM Connection Configuration

Topic	Required Settings	Comments
Modeling ATM Connections	Bursty Traffic table Site 1, Site 2 fields: Enter the connection end-point sites. Quantity: Enter the number of connections. Type field: Enter ABR, CBR, VBR, or UBR. MCR fields: Enter minimum cell rate (or Committed Information Rate or Sustainable Cell Rate for UBR). PCR Fields: Enter peak cell rate.	The ATM sites must be in the Sites table and must support ATM traffic types (such as an MGX 8850, a BPX, an MGX 8230 or 8250, or an IGX switch with 8.2.5 functionality). All traffic values (MCR, PCR, QIR, CIR) are given in cells per second for ATM traffic.

- Two-segment connections—Use the NMT to model ATM-to-FR interworking connections (Table 4-10) and ATM-to-Circuit Emulation connections (Table 4-11).

Table 4-10 ATM-to-FR Interworking Connection Configuration

Topic	Required Settings	Comments
Modeling ATM to FR	Bursty Traffic table Type field: Enter ATM=FR or FR=ATM.	Use ATM=FR when the ATM interface at Site1 interworks to an FR interface at Site2. Use FR=ATM when a FR interface at Site1 to interworks to an ATM interface at Site2. The ATM end must support the specified traffic type (i.e., must be a BPX or an IGX with 8.2.5 functionality). All traffic values (MIR, PIR, FR=ATM) are given in kbps for ATM traffic

Table 4-11 ATM-to-Circuit Emulation Connection Configuration

Topic	Required Settings	Comments
Modeling ATM to CE	Bursty Traffic table Type field: Enter ATM=CE or CE=ATM.	Use ATM=CE when the ATM interface at Site1 interworks to a Circuit Emulation interface at Site2. Use CE=ATM when the ATM end is at Site 2 and CE is at Site 1. All values (MIR,PIR) are in Kbps and the circuit should be configured as a CBR where MIR equals PIR.

Interface Table

The Interface table contains topological and partition information about ports in the network. See Table 4-12.

The primary CWM source for the interface table is the PORT table. For the WANDL translation, the Interface table is translated into optional parameters in either the BBLINK file or the DEMAND file, which cross reference the NMT link or connection record based on the slot/port string.

(The Interface table is called the Port table in the MS Excel and DBF interface.)

Table 4-12 Interface Table (Port Specific Parameters)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
Site	–	M/H	Site name.	SITE	*	*
PortID	0	O	Slot/port address used for linking the NMTs Bursty traffic table to the port table. Also used for bundling.	HUBID	*	
FeederPort_ID	0	E	Slot/port address (cross reference) in the port table. Also used for bundling.	FDR_ID	*	
Speed	0	O/H	Clock speed of the access port. Values range from 56 to 2048 kbps for FR 3622 to 38336 for ATM on an AUSM on an MGX 8220 edge concentrator. 80000, 96000, or 353208 for ATM on a BPX, depending on the type of port A port speed of 0 has no effect on the speed of the specified port.	SPEED	* Limitation: Older devices, the MC3810 and FastPAD are not supported.	*
Iftype	0	O	Interface Type. Applies to MPSM connections only.	IF	*	
Lines	0	O	Number of T1/E1 lines in IMA port.	IMA_L	*	
Frame		O	Number of ATM cells in IMA Frame.	IMA_F	*	
Partition		0	Specification of the partition that most of the remaining fields in this table apply to. Blank entry refers to the whole port. AutoRoute, PNNI, or MPLS can be specified. If multiple MPLS partitions, MPLS2 can be used for the 2nd MPLS partition.	PART		Partition

Table 4-12 Interface Table (Port Specific Parameters) (continued)

Field	Defaults	Notes	Description and Comments	DBF	CET	TPI
CoS		Values are: CBR RT-VBR VBR (nrtVBR) ABR UBR	Defines class of service (CoS) for the PNNI interface, for which the rest of parameters (bandwidth, LCN, AW, and BF) are applied. A blank value refers to the entire partition. It must immediately follow the PNNI partition information.			CoS
IngMinBw	0	0	Minimum bandwidth in cps in the ingress (receive) direction reserved for this partition. Zero value means no specification	ING_MIN_BW		IngMinBw
IngMaxBw	0	0	Maximum bandwidth in cps in the ingress (receive) direction reserved for this partition. Zero value means no specification.	ING_MAX_BW		IngMaxBw
EngMinBw	0	O	Minimum Cell Rate in egress (transmit) direction for the partition. Zero value means no partitioning.	EGR_MIN_BW		
EngMaxBw	0	O	Maximum Cell rate in egress (transmit) direction for the partition. Zero value means no partitioning.	EGR_MAX_BW		
MinLCN	0	O	Minimum number of channels in the PNNI partition. Zero value means no partitioning.	MIN_LCN		
MaxLCN	0	O	Maximum number of channels in the PNNI partition. Zero value means no partitioning.	MAX_LCN		
BF	0	O	Booking Factor used to calculate committed cell rate that contributes to the interface load. Ranges are from 1% to 200%. If 0 is specified, the globally assigned value is used for this connection. This applies to PNNI connections only, and is similar to %Util for AR connections.	BF		
AW	0	0	Administrative weight for PNNI. Overrides the AW value specified in the link table. A value of 0 is ignored. The field only applies to PNNI.	AW		

Feeder Table

The Feeder table contains topological information about feeder connections in the network.

Table 4-13 Feeder Table

Field	Defaults	Notes	Description and Comments	DBF	CET
Site	—	M/H	Site name.	SITE	*
Port_ID	0	E	Slot/port ID used for linking the NMT's Bursty traffic table to the port table. Also used for bundling.	HUB_ID	*
Name	—	O	Feeder name. Can be left blank.	NAME	MC3810 not supported until Rel. 9.1.
Type		O/H	Choice of 38-1, 38-3, 38-8 for 3810 1-, 3-, or 8-slot chassis respectively; FP-4 or FP-8 for FastPAD 4-port or 8-slot units, respectively; p11 or p44 for 1- or 4-shelf port concentrators, or MGX 8220 for an MGX 8220 edge concentrator. Generic choices of 3810, FP, and PC are provided. When these are chosen, NMT will select the least cost unit.	TYPE	MC3810 not supported until Rel. 9.1.
Speed	64	O/H	Clock speed of the port to which the feeder is connected. MGX 8220 speeds are fixed based on interface type. Speeds for the other feeders can range from 19.2 to 2048 kbps depending on the feeder and the interface.	SPEED	MC3810 not supported until Rel. 9.1.

Card Table

The Card table is an optional table that specifies the cards that populate the chassis. Links and connections may use these cards.

Table 4-14 Card Table

Field	Notes	Description and Comments	DBF	CET
Node	M/H	Site name of the chassis being specified.	SITE	*
Slot	M/H	Slot that the remainder of the fields in this table applies to.	SLOT	*
Status	M/H	Status of the card. For manually entering data, consider ACTIVE, REDUNDANT, STANDBY, RESERVE. For CWM extracted data, the actual state of the card will be listed.	STAT	*
Frontcard	M/H	Front card residing at this site and slot. Note that the NMT reserves the slot for cards that the model does not yet support. (VISM for example)	FTYPE	*
RedSlot	M/H	Slot supporting redundancy. For active cards, defines the slot of the standby or redundant card for 1:N redundancy. For standby or redundant cards, it specifies the active card.	RSLOT	*
Backcard	M/H	Back card associated with the front card.	BTYPE	*
Backcard2	M/H	Secondary back card associated with the front card, if applicable. Double height MGX cards can have secondary back cards.	BTYPE2	*

Table 4-14 Card Table (continued)

Field	Notes	Description and Comments	DBF	CET
FwRev	M/H	Frmware revision of the front card. Extracted from CWM, not used by NMT.	FFW	*
HwRev	M/H	Hardware revision of the front card. Extracted from CWM, not used by NMT.	FHW	*
FC_Serial	M/H	Serial number of the front card. Extracted from CWM, not used by NMT.	FSERIAL	*
BC_HwRev	M/H	Hardware revision of the back card. Extracted from CWM, not used by NMT.	BHW	*
BC_Serial	M/H	Serial number of the back card. Extracted from CWM, not used by NMT.	BSERIAL	*
BC2_HwRev	M/H	The hardware revision of the secondary back card. Extracted from CWM, not used by NMT.	BHW2	*
BC2_Serial	M/H	The serial number of the secondary back card. Extracted from CWM, not used by NMT.	BSERIAL2	*

Groups and Network Table

The Groups and Network table defense the PNNI Peer groups, their parameters, and their relationships. In WANDL, this data is translated to the HPNNI file.

(In the MS Excel and DBF interface, this table is called Groups.)

Table 4-15 Groups and Network Table

Field	Defaults	Notes	Description and Comments	DBF
PG_Name	Blank	M	PNNI Peer Group name. NMT requires this name have the same format as a site table name.	NAME
Parent_PG	Blank	O	Peer Group name of the parent group. Leave blank if the group has no parent. Note that parents must be defined earlier in the table than their children.	PARENT
PNNI	Y	M	A Y/N flag, indicating if this groups is a PNNI group or just a logical group. If Y, for PNNI group, then this label should appear in the site table for PNNI groups, and all data fields apply. If N, for a logical group, then this group should appear in the network field in the site table, and only the mapX and mapY fields are relevant.	
Level	0	O	Peer Group Level: The level of the PNNI network hierarchy this peer group belongs too. A parent must always have a smaller numeric value than their children.	LEVEL
Complex	N	O	Enter **Y** if the peer group has to be aggregated in the next higher level of hierarchy using complex node representation algorithm. Enter **N** for simple node representation.	CMPLX
PGL_PR	N	O	The Peer Group Leader Election Priority is a numeric value determining which site will be the peer group leader. The highest value in the peer group will be the leader.	PGL_PRI
Xrstr	N	O	Enter **Y** if the peer group cannot be used for transit (via) calls.	RSTR
mapX	0	O	Horizontal coordinate on the NMT map for this Peer group location.	HOR
mapY	0	O	Vertical coordinate on the NMT map for this Peer group location.	VER

Nodes Table

The Nodes table defines node types the NMT does not support. Future switches, other Cisco WAN or feeder platforms, or other vendor switches can be defined in this table.

The Nodes table is not translated from CWM or to WANDL.

Table 4-16 Nodes Table

Field	Defaults	Notes	Description and Comments	DBF
NodeType	Blank	M	Name of the node type.	NAME
BaseType	GENERIC	M	If the NodeType is closely based on an existing type supported by NMT, enter that type here. Otherwise, enter **GENERIC**.	TYPE
Size	32	M	Number of slots in this type of node.	SIZE
CTL	64	M	Number of circuit lines allowed on the node.	CTLS
PTL	30	M	Number of packet lines (trunks) allowed on the node.	PTLS
PTLConns	4000	M	Number of connections allows in each PTL connected to this node type.	PTL_CONNS
NodeConns	3500	M	Maximum number of connections that can terminate on this type of node.	TERM_CONNS
VIA_conns	—	M/H	Number of connections that can pass through the node type without termination.	VIA_CONNS
PNNI_Conns	—	M/H	Number of PNNI connections that can terminate or pass through (via) at this node type.	PNNI_CONNS
Bus_Load	—	M/H	Maximum bus load of this node type, in Mbits/sec.	BUS_CAP
IFC	--	M/H	Maximum PNNI Interfaces on this PLATFORM.	IFCS

Network Settings

The model settings page contains global parameters used in defining settings in the network. See Table 4-17.

Table 4-17 Model Setting Configuration

Parameter	Modeling Effect
BPX/IGX SwSw Release	The switch software release to assign to all BPX and IGX switches in the network. Specific sites can override this global value if they have an entry in the swrel field in the site table.
MGX SwSw Release	The switch software release to assign to all MGX switches in the network. Specific sites can override this global value if they have an entry in the swrel field in the site table.
V Delay Limit	Maximum delay (in ms) that can be sustained for this connection type, if applicable.
C Delay Limit	Maximum delay (in ms) that can be sustained for this connection type, if applicable.
P Delay Limit	Maximum delay (in ms) that can be sustained for this connection type.
A Delay Limit	Maximum delay (in ms) that can be sustained for this connection type, if applicable.
NTS Delay Limit	Maximum delay (in ms) that can be sustained for this connection type, if applicable.

Table 4-17 Model Setting Configuration (continued)

Parameter	Modeling Effect
CVM-CVM Delay Limit	Maximum delay (in ms) that can be sustained for this connection type, if applicable.
Voice Combine Timeout	Timeout (units * 0.125 ms) to combine fast packets to cell for voice connections. The range is 0 to 255.
TS Data Combine Timeout	Timeout (units * 0.125 ms) to combine fast packets to cell for time stamped data connections. The range is 0 to 255.
NTS Data Combine Timeout	Timeout (units * 0.125 ms) to combine fast packets to cell for non time stamped data connections. The range is 0 to 255.
Link Booking Factor	For PNNI, the global booking factor to be applied to all PNNI link ports. The range is 1 to 200. Individual ports can be specified using the Interface Table.
Line Booking Factor	For PNNI, the global booking factor to be applied to all PNNI line ports. The range is f 1 to 200. Individual ports can be specified using the Interface Table.
CAC Algorithm	For PNNI, which Connection Admission Control Algorithm to use.
CTD for CBR	Cell Transfer Delay for CBR class of service in microseconds.
CTD for VBR	Cell Transfer Delay for VBR class of service, both real time and non real time, in microseconds.
CDV for CBR	Cell Delay Variation for CBR class of service in microseconds.
CDV for VBR	Cell Delay Variation for VBR class of service in microseconds.
CLR for CBR	Cell Loss Ratio for CBR class of service. Enter integer N, where N is an exponent of 10**(–N). The range is 6 through 10.
CLR for VBR	Cell Loss Ratio for VBR class of service. Enter integer N, where N is an exponent of 10**(–N). The range is 6 through 10.
AvCR Prop. Multiplier	For PNNI, used in the algorithm to determine significant change of link AvCR. Expressed as a percentage, range is 1–99
AvCR Minimum Threshold	For PNNI, used in the algorithm to determine significant change of link AvCR. Expressed as a percentage, the range is 1 to 99.
CTD Prop. Multiplier	For PNNI, this proportional multiplier is used to determine significant change of link cell transfer delay. Expressed as a percentage, range is 1-99
CDV Prop. Multiplier	For PNNI, this proportional multiplier is used to determine significant change of link cell delay variation. Expressed as a percentage, range is 1-99
Equal Path Epsilon	The connection can only be routed using a restricted media. A satellite link, for instance.
Load Balancing Rule	For PNNI, used if an alternate path exists for a given connection
On-Demand Routing Rule	For PNNI, defines the algorithm of calculating route for on-demand route request
Link Selection Rule	For PNNI, defines the sorting order of horizontal parallel links between two nodes from the same peer group.
Maximum Crankbacks	For PNNI, maximum number of crankbacks allowed on the routing node. The range is 1 to 5.

Model Options

Selecting **Model options** from the **Config > Global** menu enables you to specify the model parameter settings listed in Table 4-17.

Table 4-18 Execute Menu Model Parameter Settings

Setting	Defaults	Description
Optimize LDI Ports	Y	**Y**—The NMT tries to optimize the cost of the LDP cards by using lower cost LDP-4 cards instead of LDP-8 cards. If no, the NMT only uses LDP-8 cards. You can still explicitly call for an LDP card with a specific line count.
Group Bursty Conns	Y	**Y**—The NMT groups connections when their number exceeds the maximum number of LCONS. An LCON is a resource required for each network route with similar properties. The grouping of connections allows more routed connections in a network. If no, the NMT does not group connections and fails to build a site when a grouping is required.
Distribute Groups	Y	**Y**—The NMT optimizes the grouping of connections to smooth network loading. If no, the NMT does not optimize grouping.
Use SRM-3T3 on MGX 8220	N	**Y**—The NMT provisions an SRM-3T3 service redundant module on all MGX 8220 shelves. If no, the NMT provisions an SRM-3T3 service redundant module only if the case connection interface requires it.
Bundle Voice with CCS	Y	**Y**—The NMT bundles voice connections with CCS signalling and create a transparent connection (type **T**) to carry line signalling. If No, the NMT will not bundle voice connections; it is your responsibility to specify the channel for CCS signalling.
Use Preferred Route	Y	**Y**—Route the connection with the preferred route if one exists. If no, use the current route. This does not apply to failure analysis. CET Extractions will set this field to “N.”
Use Port ID	Y	**Y**— The NMT assigns slots and ports based on hub and feeder IDs. If no, the NMT treats all ID fields as though they were zero filled, and provisions links and connections using its own algorithms.
Port ID Over Redundancy	N	Y—The system eliminates the redundant card if another card has requested the hub ID of the backup card. If no, the system gives backup cards precedence over another card that was assigned the same port. In this case, the NMT overrides the hub ID and moves one of the connections to a different location.
New Share with Port ID	N	Y—The NMT allows connections IDs of zero to share ports with connections having IDs other than zero. If no, the NMT does not allow this.
Share Redundancy	Y	Y—Non-redundant connections can share cards that are used on redundant connections, essentially getting redundancy for free. If no, non-redundant connections cannot share these cards, and are provisioned by a separate non-redundant service module.
Reserve pkt/swt	N	Y—Holds a packet switch in reserve for the VDP background test of standby cards.
Adavtive VAD	N	Y—All voice connections will be treated as they are in the PROTECT state.
Use Time Stamp Queue	Y	Y—Then low speed data connections on LDP and SDP cards will be used

Table 4-18 Execute Menu Model Parameter Settings

Setting	Defaults	Description
Bundle Parts	Y	Y—Provisions bundled parts when possible in the parts list.
FR Route Choice	Y	Y—Routes FR connections for optimal bandwidth usage. If N, route FR connections for optimal performance.
Priority Bumping	N	Y—Use the priority bumping algorithm for re-routing of connections. Connections with higher COS can bump lower priority connections in order to reroute.
Model PNNI RCC & SSC	Y	Y—Automatically create and provision the PNNI signalling connections; the PNNI Hello Protocol (RCC) and the PNNI Signalling Protocol (SSC).
Special Settings Menu	N	Add two new menus which enable you to alter internal parameters of basic Cisco products.

Feeders

Specify all feeder equipment in the MGX, IGX, and IPX products explicitly in the Sites table. You can also use the NMT to provision feeders as required by the connection demand. You can even provision additional routing IGXs.

Implicit and explicit feeder generation is discussed in the following sections:

- Modeling Implicit Feeders
- Modeling Explicit Feeders

Modeling Implicit Feeders

To allow the NMT to generate implicit feeders, enter the following information into the Sites table:

- Hub site
- Link connecting the hub to the feeder

Enter information about both the hub and feeder interfaces in the Traffic tables. For implicit feeders, connection endpoints are the hub nodes. The actual feeder ends cannot be referenced directly. IGX, IPX, and MGX8820 feeder nodes can be implicitly generated by the NMT. The MGX 8850, if used as a feeder, must be an explicit feeder.It can not be an implicit feeder.

Implicit IGX and IPX feeders are generated when a BPX is used as the hub node for Voice or Data Traffic. They are also generated when a BPX is used as the hub node for FR traffic not designated for an MGX 8220.

Implicit IGX and IPX feeders can be generated when an IGX is used as the hub, but only when the traffic demands on the IGX exceed the resources of one node. Therefore, if the hub is an IGX, and you want to design IGX or IPX feeders, it is better to make the feeders explicit.

Implicit MGX 8820 feeders are generated when a BPX is used as a hub node, and the Bursty Traffic table contains connections designated for MGX 8220.

Refer to Table 4-19 for information on modeling an implicit feeder tiered network with the NMT.

Table 4-19 Tiered Network Configurations with Implicit Feeders

Topic	Required Settings	Comments
IPX/IGX Feeders	Sites table Site field: Enter the name of the hub node Type field: Enter BPX or IGX. Tiered feeder flag: Enter **Y** if implicit IPX should be a tiered feeder. IGX field: Enter **N** for IPX and **Y** for IGX. BC field: Enter T3 or E3. FC field: Enter AIT. RLC field: Enter **Y** for trunk card redundancy.	Only IGX and BPX can be used as hubs. An IGX hub will only generate implicit feeders when the resources required exceed those allowed by an IGX. Specify type of feeder for BPX/IGX type of site in the Sites table; specify the type of the link between hub and feeder. The redundancy of feeder links is determined by the RLC field in the Sites table.
	Voice, Data, or Bursty Traffic tables Site fields: Enter the name of the hub node Type field: Enter any valid IGX or IPX Voice, Data, or FR connection type (that is not supported on BPX.) BC field: Enter T1, E1, V, X, or other valid voice or data back cards. Fdr BC field: Leave blank or enter line interface for access feeder such as Port Concentrator, MC3810, or FastPAD.	Voice and data connections on IPX or IGX tiered network feeders may only terminate on another IPX or IGX feeder. Hub IDs and feeder IDs are not defined for implicit IPX/IGX feeders. To specify the physical location of feeder trunks and lines, you must make the feeder node explicit by having it appear in the Sites table. In the Bursty Traffic table, verify that the connection originates or terminates on the IPX feeder as a FR connection.
MGX 8220 Feeders: general instructions	Bursty Traffic table Site field: Enter the site name. Must be BPX site. Type field: any from the list of choices. BC (Back Card) field: Enter the back card that connects the BPX to the BNM card on the MGX 8220 edge concentrator. Fdr BC (Feeder Back Card) field: Enter the customer interface on the MGX 8220 service module.	MGX 8220 edge concentrators are provisioned from the BC and Fdr BC fields in the Bursty Traffic table. If the back card specified can support MGX 8220 and the feeder back card can support the traffic type with an MGX 8220 service module, the NMT will provision an MGX 8220 edge concentrators. The Fdr BC field determines the connection interface to the MGX 8220 feeder. The NMT determines the front card (FRSM, AUSM or CESM), based on the feeder back card selected. If T3 is selected as the feeder back card, the NMT assigns as SRM-3T3 service module. If connection type implies AUSM card, the PCR value determines the port speed and whether more than one T1/E1 is required.

Table 4-19 Tiered Network Configurations with Implicit Feeders (continued)

Topic	Required Settings	Comments
MGX 8220 Feeders: Port to Multiport	Bursty Traffic table Fdr I/D fields (Feeder identification fields): ID values must be assigned. ID values can be Slot.Port for AUSM and CESM cards (e.g., 5.3); this format can be used also for FRSM cards to specify physical port (line) without specifying logical port. Slot.Line.Port for FRSM card (e.g., 5.2.6). Zero, indicating no unique port constraint.	By assigning IDs to the ports of the MGX 8220 service module cards, you can put the connection on a particular port. Feeder IDs can also control port-to-multiport connections.
MGX 8220 Feeders: Multiple Feeders at a Site	Bursty Traffic table Hub ID field All connections associated with a specific MGX 8220 should have the same hub ID throughout the Bursty Traffic table. It is not necessary to use the HUB ID field for the site at the other end of the connection. Hub ID values can be Slot.Port (e.g., 12.2) Zero, indicating no unique port constraint	You need to configure a site with multiple MGX 8220 feeders only if you require connections between the feeders or if you need to associate specific connections with specific feeders (e.g., if the feeders are at different locations). Assign hub IDs to identify the port of the BNI/BXM card on the BPX switch that connects to the specific MGX 8220 edge concentrator.

Modeling Explicit Feeders

To allow the NMT to model explicit feeders, enter the following information about the feeder site into the Sites table:

- Link connecting the hub and feeder in the Links table
- Connection interfaces in the Traffic tables (as if the node were not a feeder).

For explicit feeders, connection endpoints are the feeder nodes.

IGX and IPX nodes can be modeled as either hub or feeder nodes. The MGX 8820 can only be modeled as a feeder. Beginning with NMT 9.2, the MGX 8820 can be an explicit feeder as well as an implicit feeder.

The MGX 8850 is also modeled in NMT 9.2. As a feeder node, the MGX connects to the BPX. If modeled as a feeder, The MGX 8850 node must be explicit.

Refer to Table 4-20 for information on modeling an explicit feeder tiered network with the NMT.

Table 4-20 Tiered Network Configurations with Explicit Feeders

Topic	Required Settings	Comments
Explicit Feeders: general instructions	Model Settings table: Make sure that the value of Switch Software Release is set to the release that is to be modeled.	—
	Sites table: Node Type field: Enter IGX, IPX, BPX, MGX8220, MGX8850, or any other valid Node Type. Fdr field: Enter Y. PC field: Leave blank, for all nodes except Popeye 2; if you are configuring a Popeye 2, enter PXM45.	—
	Links table: Site1/Site2 fields: Enter the hub site name and the feeder site name. Trunk fields: Enter the appropriate T1, E1, T3, E3, OC3, or OC12 interface that connects the hub and feeder nodes. Trunk Card fields: Enter the front cards at the hub and the feeder nodes for the trunk that connects them.	You must enter the trunk between the hub and the feeder manually. The NMT will not automatically generate it. Only IGX and BPX nodes may be hubs. IGX nodes may have only IGX or IPX feeders. BPX nodes can have MGX8220 and MGX8850 feeders as well.
	Voice, Data, or Bursty Traffic tables: Site field: Enter the explicit feeder site name. Must be a site that has Y in the Fdr field in the Sites table. Type field: any from the list of choices. BC (Back Card) fields: Enter the customer interface on the feeder node.	Only IGX and IPX feeders support Voice and Data Traffic. You must enter a feeder site name for the NMT to put the connection on the feeder node. Even though you are referencing a feeder node, use the BC fields, and not the FdrBC fields.
Explicit Feeders: Port to Multiport	Bursty Traffic table: Hub I/D fields: ID values must be assigned. ID values can be Slot.Line.Port (e.g., 5.2.6) for multi-port channelized card (e.g., FRSM, UFMC). Slot.Port (e.g., 5.3) for single-port channelized cards (e.g., FRM-E1) and for multi-port unchannelized card (e.g., FRM-4V, AUSM);this format can be used also for multi-port channelized cards to specify physical port (line) without specifying logical port. Zero, indicating no unique port constraint.	By assigning Hub IDs to the connection endpoints, you can put the connection on a particular port. Hub IDs can also control port-to-multiport connections.

Obsolete Products

The sections that follow discuss obsolete products and configurations. These sections are included to describe CWM extraction data and migration planning.

Networks with Access Feeders or Access Concentrators

IPX and IGX switches can include devices that do the following tasks:

- Concentrate small connections into large ones
- Convert normal voice or legacy data connections into FR connections.

The NMT supports three access feeders that concentrate or convert data: the MC3810, the FastPAD, and the Port Concentrator. One IGX or IPX node can support up to 64 of these devices. Using the NMT to model connections that terminate on these access feeders is similar to modeling MGX 8220 feeders for a tiered network.

MC3810

The NMT supports the MC3810 configured as a feeder to an IGX switch. The MC3810 concentrates voice and data connections into FR connections. The NMT configures as many MC3810s as are required to support the traffic. The NMT generally sets the feeder trunk speed to the minimum speed that can carry the traffic.

The NMT designs MC3810s automatically when MC3810 connections are added to the Voice Traffic, Data Traffic, or Bursty Traffic tables, and the model is based on switch software Rel. 8.2.5 to 8.3.9, or 8.5.0 and later.

See Table 4-21.

Table 4-21 MC3810 Configuration

Topic	Required Settings	Comments
Setting MC3810 Release	Model Settings table Make sure that the value of Switch Software Release is set to the release that is to be modeled. If that value is one that defaults to MC3810 (825 to 839, or 850 and later), the NMT will design MC3810s for any non-voice feeder connections. All other values default to FastPAD for non-voice feeder connections.	If the NMT default value (920) is used, the NMT will automatically design MC3810s for all feeder connections, except for voice connection types that are exclusively for FastPad.
Adding MC3810 data connections	**Data Traffic table** Type field: Enter the data traffic speed. If the speed exceeds 512 Kbps, do not use the Data Traffic table; use the Bursty Traffic table instead. BC (Back Card) field: For each end of the connection, enter the back card of the FTC/ FTM card that links the hub IPX/IGX switch to the MC3810 (T1, E1, V, or X). Fdr BC (Feeder Back Card) field: Enter the connection interface on the line side of the MC3810.	Each MC3810 data connection must originate and terminate on a MC3810. If the switch software release does not support the MC3810, the NMT designs FastPADs. The minimum speed for synch data is 19.2 kbps. For legacy data like HDLC, use the Bursty Traffic table.

Table 4-21 MC3810 Configuration (continued)

Topic	Required Settings	Comments
Adding MC3810 dedicated voice connections	Voice Traffic table Type field: Enter C32, A32, G729, G729V, G729A, or G729AV. The types refer to compression algorithms; all G types are 8 kbps. BC (Back Card) field: For the MC3810 end of the connection, enter the back card of the FTC/FTM card that links the hub IPX/IGX switch to the MC3810 (T1, E1, V, or X). Fdr BC (Feeder Back Card) field: For each end of the connection having a MC3810, enter V for analog voice, or T1 or E1 for digital voice.	MC3810 dedicated voice connections can have one end at a MC3810 and the other at a CDP, CVM, or UVM card at an IPX or IGX switch. For each feeder back card entry, the NMT establishes a dedicated virtual circuit that connects one voice port on a MC3810 to one voice port on another MC3810 or on an IPX/IGX switch.
Adding MC3810 bursty data connections	Bursty Traffic table Type field: Enter FR. BC (Back Card) field: On the connection side that uses a MC3810, enter the back card of the FTC card that links the hub IPX/IGX switch to the MC3810 (T1, E1, V, or X). On the other side of the connection, enter the back card of the FRP/FRM (also T1, E1, V, or X). Fdr BC (Feeder Back Card) field: For the connection side with a MC3810, enter the connection interface on the line side of the MC3810. MIR field: Specify the bandwidth requirements on the feeder trunk and the network backbone. PIR field: Specify the port and bus bandwidth requirements	A MC3810 data connection can have one end at a MC3810 and the other at an IPX/IGX FRP/FRM card. At least one end of the connection must have an entry in the Fdr BC field in order for a MC3810 to be designed. If the switch software release does not support the MC3810, the NMT designs FastPADs. Remember to set the connection bandwidth by adjusting the MIR and PIR fields.

Table 4-21 MC3810 Configuration (continued)

Topic	Required Settings	Comments
Setting up switched voice connections	Voice Traffic table • Quantity field: Set the number of connections between a pair of MC3810s to the estimated peak number of simultaneous calls between the two destinations. • Type field: Enter Session. • BC (Back Card) field: Select valid FTC back card (V, X, T1, E1). • Fdr BC (Feeder Back Card) field: Leave blank. Create dummy MC3810 connections: • Site 1, Site 2. Connect each site entered above to itself, e.g., Boston, Boston. • Hub ID fields: Optional. Hub 1 ID and Hub 2 ID can be used to specify the slot port of each end of the connection. Connect a site entered above to itself, e.g., 8.1.8.1. This connection is intrasite, intracard, and intraport. • Quantity field: The number of dummy connections should equal one half the peak number of simultaneous calls expected between the MC3810 and all other switched voice destinations. • Type field: Enter the voice traffic speed type. • Fdr BC (Feeder Back Card) field: Enter V for the voice.	To add MC3810 switched voice connections, i.e., voice connections between at least one voice port on a MC3810 connected to at least one voice port on many MC3810s, you must perform a two-step process: connect the MC3810s and add dummy MC3810 connections.
Setting up multiple MC3810s at the same site	Data Traffic table, Voice Traffic table, Bursty Traffic table • Hub ID field: The ID is given to the port of the FTC/FTM card on the IPX/IGX that connects to the specific MC3810. ID values can be as follows: – 0, indicating no unique port constraint. – Slot and port: mm.nn where mm = 1 to 32 and nn = 1 to 31	For connections between multiple MC3810s at a site or to associate specific connections with specific MC3810s, use the Hub ID field for all MC3810 connections that originate or terminate at that site. All connections associated with one specific MC3810 should have the same Hub ID throughout the three traffic tables.
Changing Default Parameters	Feeders table • Hub ID field: Enter Slot Port (e.g., 6.4). • Type field: Enter 3810 for any MC3810. • Speed field: Enter the speed you want. Data Traffic table, Voice Traffic table, Bursty Traffic table • Hub 1 ID field: Enter the Hub ID value entered in the Feeders table (e.g., 6.4). • Hub 2 ID field: Enter the appropriate Hub ID value.	You can specify the maximum speed of the feeder trunk, for example, 64 kbps, 128 kbps, or 256 kbps. If you specify a speed of 0, the NMT chooses the best one.

FastPAD

A FastPAD connection is a connection where at least one end terminates on a FastPAD. FastPADs always connect to the network on a FR composite link to an FTM or FTC card. FastPAD enables you to concentrate voice and data connection types as a FR connection joined to an FTC or FRM card.

The NMT designs FastPADs automatically when FastPAD connections are added to the Bursty Traffic, Data Traffic, or Voice Traffic table and the model is based on switch software release versions less than 8.2.5, or 8.4.0 to 8.4.9. The NMT also designs FastPADs when FastPADs are specifically called for in the Feeders table and connection hub IDs match Feeders table hub IDs.

The FastPAD comes in two sizes, one with eight slots and one with four slots, called the FastPAD micro. By default NMT

- Configures as many FastPADs as required to support the traffic
- Chooses an 8-slot FastPAD unless no more than four slots and one low-speed data port are needed, in which case the NMT chooses the FastPAD micro
- Acts on the assumption that the speed of the composite link is limited by the maximum speed supported by the FTC card (512 kbps)

Table 4-22 provides information on modeling a network that uses FastPADs.

Table 4-22 FastPAD Configuration

Topic	Required Settings	Comments
Setting Switch Software Release	Model Settings table Make sure that the value of Switch Software Release is set to the release that is to be modeled. If that value is one that defaults to FastPAD (817 to 824, or 840 to 849), the NMT will design FastPADs for any non-voice feeder connections. All other values default to MC3810 for non-voice feeder connections.	FastPADs will not be designed for non-voice connections under the default switch software release (920). To force the NMT to use FastPADs, the Feeder Table must be used; see Changing Default Parameters below.
Adding FastPAD Data Connections	Data Traffic table Type field: Enter the data traffic speed. BC (Back Card) field: For each end of the connection, enter the back card of the FTC/FTM card that links the hub IPX/IGX switch to the FastPAD (T1, E1, V, or X). Fdr BC (Feeder Back Card) field: Enter the connection interface on the line side of the FastPAD (S, R, V, V1, or V6).	FastPAD data connections must originate and terminate on a FastPAD. If the switch software release supports the MC3810, the NMT will design MC3810s, not FastPADs, unless the hub ID fields and the Feeder table are used. For each feeder back card entry, the NMT establishes a dedicated virtual circuit that connects one data port on one FastPAD to one data port on another FastPAD.

Table 4-22 FastPAD Configuration (continued)

Topic	Required Settings	Comments
Adding FastPAD Dedicated Voice Connections	Voice Traffic table: • Type field: Enter ATC8, ATC12, ATC16, CELP8, or CELP48. The numbers refer to kbps. • BC (Back Card) field: For each end of the connection, enter the back card of the FTC/FTM card that links the hub IPX/IGX switch to the FastPAD (T1, E1, V, or X). • Fdr BC (Feeder Back Card) field: For each end of the connection, enter V for the VFC-03 card.	FastPAD dedicated voice connections must originate and terminate on a FastPAD. For each back card field entry, the NMT establishes a dedicated virtual circuit that connects one voice card on one FastPAD to one voice card on another FastPAD.
Adding FastPAD Bursty Data Connections	Bursty Traffic table: • Type field: Enter FR. • BC (Back Card) field: If the end has a FastPAD, enter the back card of the FTC that links the hub IPX/IGX switch to the FastPAD (T1, E1, V, or X). If the end is not a MC3810, enter the back card of the FRP/FRM at that end (also T1, E1, V, or X). • Fdr BC (Feeder Back Card) field: If the end has a FastPAD, enter the connection interface on the line side of the FastPAD (S, R, V, V1, or V6). If the end does not have a FastPAD, leave this field blank.	A FastPAD bursty data connection may have one end at a FastPAD and the other at an IPX/IGX FRP/FRM card. At least one end of the connection must have an entry in the Fdr BC.
Setting Up Switched Voice Connections	Voice Traffic table: • Connect the FastPADs: • Quantity field: Set the number of connections between a pair of FastPADs to the estimated peak number of simultaneous calls between the two destinations. • Type field: Enter Session. • BC (Back Card) field: Select valid FTC back card (V, X, T1, or E1). • Fdr BC (Feeder Back Card) field: Leave blank. Create dummy FastPAD connections: • Site 1, Site 2 fields. Connect a site entered above to itself, e.g., Boston, Boston • Hub ID fields. Optional. Hub 1 ID and Hub 2 ID can be used to specify the slot port of each end of the connection. Connect a site entered above to itself, e.g., 8.1, 8.1. This connection is intersect, intracard, and interport. • Quantity field: The number of dummy connections should equal one half the peak number of simultaneous calls expected between the FastPAD and all other switched voice destinations. • Type field: Enter the voice traffic speed type. • Fdr BC (Feeder Back Card) field: Enter V for the VFC-03 card.	To add FastPAD switched voice connections, i.e., voice connections between at least one voice card on a FastPAD connected to at least one voice card on many FastPADs, you must perform a two-step process: connect the FastPADs and add dummy FastPAD connections.

Table 4-22 FastPAD Configuration (continued)

Topic	Required Settings	Comments
Setting Up Multiple FastPADs at the Same Site	Data Traffic table, Voice Traffic table, Bursty Traffic table: • Hub ID field: The ID is given to the port of the FTC/FTM card on the IPX/IGX switch that connects to the specific FastPAD. ID values can be • Port only: 0 • Slot and port: mm.nn, where mm = 1 to 32 and nn = 1 to 31	For connections between multiple FastPADs at a site or to associate specific connections with specific FastPADs, use the Hub ID field for all FastPAD connections that originate or terminate at that site. All connections associated with one specific FastPAD should have the same Hub ID throughout the three traffic tables.
Changing Default Parameters	Feeders table: • Hub ID field: Enter Slot.Port (e.g., 6.4). • Type field: Enter FP-4 for a FastPAD Micro, FP-8 for a regular FastPAD, or FP to have the NMT determine which one to use. • Speed field: Enter the speed you want. Data Traffic table, Voice Traffic table, Bursty Traffic table: • Hub1 ID field: Enter the Hub ID value entered in the Feeders table (e.g., 6.4). • Hub 2 ID field: Enter the Hub ID for the appropriate site.	You can specify a FastPAD or FastPAD micro unit and can specify the maximum speed of the composite link, i.e., 64 kbps, 128, kbps, or 256 kbps. If you specify FP (a generic FastPAD), the NMT chooses the best one. If you specify 0 as the speed, the NMT picks the best one.

Port Concentrator

The Port Concentrator provides a method for concentrating voice and data connection types as a FR connection extending to an FTC or FRM card. The NMT models and provisions Port Concentrators so that they support FR connections. The card is modeled as a 44-port FRP card, with the PC interface being optional but defaulting to V35.

Refer to Table 4-23 for information on modeling a network that uses port concentrators.

Table 4-23 Port Concentrator Configuration Notes

Topic	Required Settings	Comments
Instructing the NMT to Design Port Concentrators	Bursty table: • Type field: Select FR, ATM=FR, or FR=ATM. • BC (back card) field: To specify a PC termination, enter PC in the BC field of the site that has the PC. The NMT rejects PC if the connection type is incorrect. • Fdr BC (feeder back card) field: Each PC termination can also specify which PC interface is required. Enter V (for V.35), V1 (for V.11) or V2 (for V.28) in the corresponding Fdr I/F field. If you leave the field blank, the interface defaults to V.35. • Hub ID (for Site 1 and Site 2) fields • The port ID is the slot.port ID for an FRP-PC card and is a virtual port. The virtual port range is from 1 to 44, where ports 1 to 11 are on physical port 1, 12 to 22 are on physical port 2, 23 to 33 are on port 3, and 34 to 44 are on port 4. • Hub IDs can be used to model over-subscription, port-to-multiport connections, and multiple PCs. • A hub ID of 0 allows the NMT to do design. • FdrID (Feeder ID) field: Not used Access Ports table: • Hub ID field: Slot is the PC slot and port is the virtual port (1 to 44). Do not use feeder slot or feeder port column. • Speed field: Enter the port speed. If not supported, it will be rounded up to the nearest supported speed. Speeds 9, 14, 19, and 38 will be respectively interpreted as 9.6, 14.4, 19.2, and 38.4. If you have an Access Port table entry for a PC port, the port speed is determined by the connections assigned to it.	The NMT designs port concentrators if, and only if, you enter connections that have port concentrator terminations. Geis bundling format is not supported for FRP-PC.

Tiered Networks

Tiered networks are a special network configuration of Cisco WAN switches. A tiered network consists of a BPX or IGX hub node linked to a maximum of 16 IPX/IGX nodes or MGX 8220/ MGX 8850 edge concentrators designated as feeder nodes. A feeder node provides the following features:

It expands the port capacity of the BPX/IGX switch

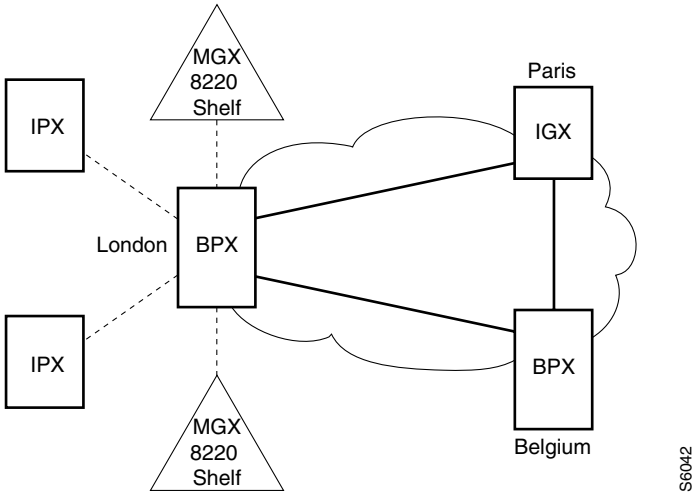
- It has no routing capabilities, so it is not counted against the maximum number of switches allowed in the network.

Use a feeder node under the following circumstances:

- When a BPX switch does not support a required line interface, such as T1/E1/V35/X21
- When a BPX switch does not provide required network services, such as FR or circuit emulation.

In a tiered network, each feeder has only one link to the hub node. In the NMT, tiered network generation is driven by the type and the line interface of the connection for creating IPX/IGX feeders and MGX 8220/MGX 8850 edge concentrators. Figure 4-2 shows an example of a tiered network.

Figure 4-2 Example of a Tiered Network



If an IPX/IGX/MGX8220 feeder is not in the Sites table, but is generated by the NMT, it is called an implicit feeder. When the node is in the Sites table, it is called an explicit feeder. The requirements for modeling implicit and explicit feeders differ.

CHAPTER 5

Using the Configuration Extraction Tool

This chapter describes how to use the Configuration Extraction Tool (CET), which extracts data from the Informix database that the CWM uses. The CET then formats the data into a standard CNF file that the NMT can read. The CET works with CWM 9.2 or later and is included in the UNIX installation of the NMT.

For instructions on installing the CET, see Chapter 2, "Installing the WAN Modeling Tools."

In this chapter, see these sections:

- Fields Addressed by CET, page 5-1
- Using the CET, page 5-2
- Other CET Commands, page 5-4
- Troubleshooting CET, page 5-5
- Remote CET Extracts, page 5-8

Fields Addressed by CET

A configuration file generated by the CET consists of data extracted from your network. The source is the CWM Informix database. When that data is not available, the NMT default values are used. For descriptions of the fields that are extracted from the CWM data, see Chapter 4, "Configuration Tables and Fields."

The CET provides the added functionality of translating all coded value fields in Informix into easy-to-use strings. For some fields, the CET checks second data sources if problems exist with the CWM collection process. For CWM 9.1 or earlier, the CET fills in some fields heuristically.

Using the CET

To extract data from CWM and generate an NMT-compatible CNF file, perform the following steps.

Step 1 For the best data consistency, make sure the network is not running any administration activities that add or delete network elements. Also, make sure you are in the correct working directory, and that the CET has been installed there.

Step 2 The **svp2cet** command extracts selected data from the SQL database and writes them in the subdirectory *netw_name*. If the command fails or generates warning messages, view the <ntwk-name>/svp2cet.con file for a log of SQL extraction.

To extract the configuration from CWM, enter this command:

```
svp2cet <netw_name> [options]
```

where,

- netw_name = Name of the directory that the command creates. The directory contains data files that are used as inputs for the command shown in the next step, which builds a .cnf file. You will use this directory name again in the next step.
- swt_rev = Switch software revision you are using. You may need to use this option only if the CWM release is more recent than the switch software release.

It may take a long time for the extraction process to run. There is no on-screen indication that the process is running. A message appears announcing when the process is complete or another message appears if the process fails. If the process fails, delete the *netw_name* directory before running the command again.

Step 3 Enter the following command to format the above extracted data into a .cnf file named `netw_name.cnf`, which you can read into NMT. If the command fails or generates warning messages, view the file *netw-name*/cet2nmt.con for a summary of the data analysis problems:

cet2nmt <The **cet2nmt** `> [ options]`

netw_name is the name of the directory you created.

The **cet2nmt** has an option to extract a single domain or several domains from the CWM DB. If your CWM is monitoring multiple AutoRoute networks, or multiple PNNI peer groups, you may extract a single or multiple domains using the -network option. The syntax is as follows:

```
cet2nmt <netw_name> –network <domain_name>
```

Multiple domain names can also be specified, as shown in the following example:

```
cet2nmt <netw_name> -network <domain_name1> [,<domain_name2>]...
```

The **cet2nmt** has an option to create the .cnf file with different then *netw_name* plan name. That option can be very usefull when user creates several plans with dufferent options. The syntax is as follows:

```
cet2nmt <netw_name> -o <myplan>
```

In this case the utility produces the myplan.cnf file.

Step 4 This step is optional.

If manual corrections are required on the output CNF file, you can make them once, and then automatically make them again with the 'adj2nmt' command. The command only updates fields that are missing from CWM or are not that reliable. The site names, and slot port information is used to match links and connections. Messages are generated for every change.

`adj2nmt <in-file> <reference-file> <out-file> {[options]}`

`in-file` is the most recent extraction file.

`reference-file` is the extraction with the manual changes applied

`out-file` in the input file with the same parameters changed on the output file.

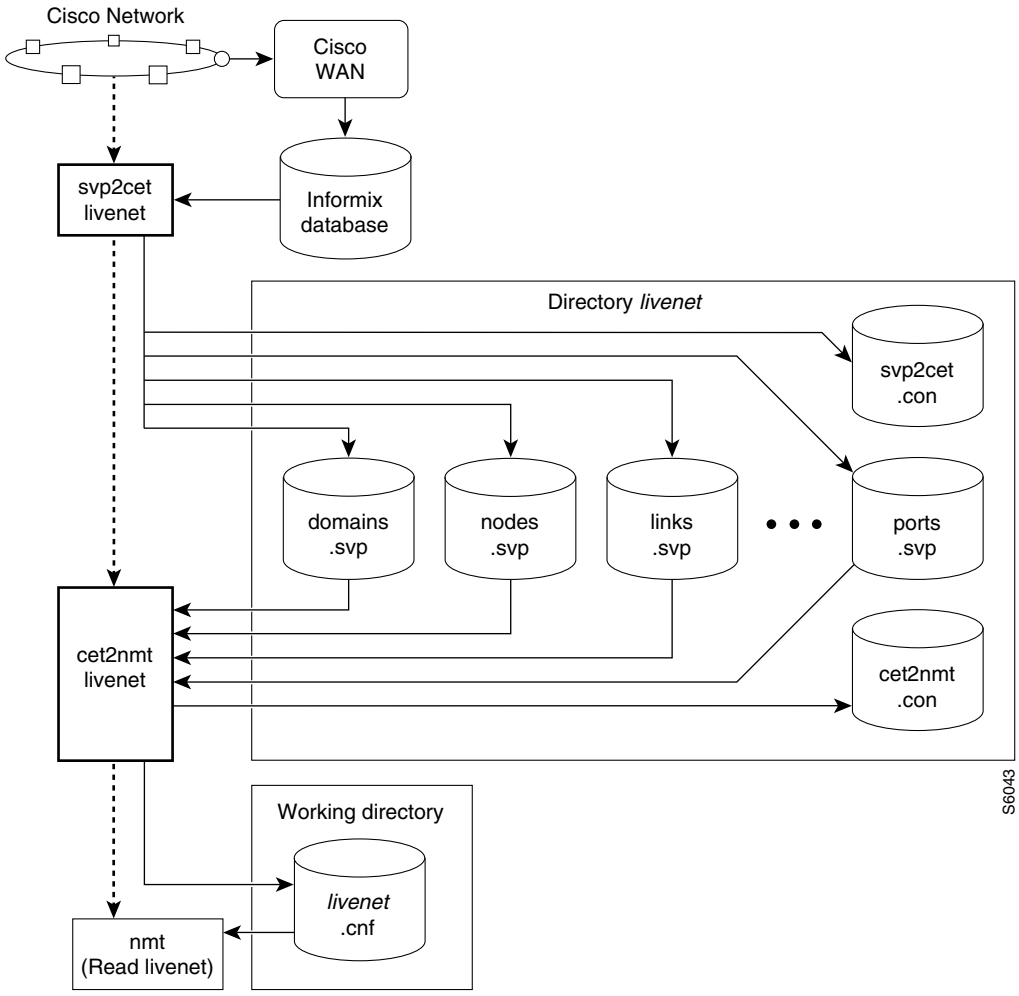
Options:

- *`-add`*—Add links and connections that are in the reference file but missing from the input file.
- *`-diffrep`*—Write no output file, but generate a report about the differences of the two files.

Note The field update functionality and the topology compare functionality can now be called directly from the NMT menu under Files/Read 2nd CNF.

This process is illustrated in Figure 5-1.

Figure 5-1 CET Schematic Overview



Other CET Commands

There are several other CET commands that may help you more effectively use the software:

- **svp_dmp.** Use this command to if the CET generates a defective CNF file. This command should be run immediately after you run the **svp2cet** command. This command dumps the data from CWM tables into a series of DMP files. These files can be analyzed by your Cisco customer support representative. Enter this command as in the following example:

  ```
  svp_dmp <netw_name>
  ```

  where nwt_name = Name of the network

- **svp_rev**—Use this command to find out the CWM revision level.
- **swt_rev**—Use this command to find out the software revision level of your switches.

- **adj2nmt**—Use this command to recreate manual changes on previous extractions to current extractions.
- **sniffcnf**< ntwk_name>—Use this command to obtain an on-screen summary of the network topology. This is useful for a high-level check that the data extraction was successful.

The following CET installation commands are not required to run unless the NMT was installed as a standalone:

- **cetlink**— Use this command to copy the necessary CET files to your project directory. You can invoke it by running the command **$CETHOME/cetlink**
- **cetrel**—Use this command to remove the CET software from your project directory.

To obtain help about any of the CET commands, enter the command followed by –h, such as **cet2nmt -h**.

AIX Platform Support

If you have the CWM installed on an AIX platform, run the **svp2cet** command on that platform and run the rest of the process on a support UNIX platform. Install the NMT on both the CWM AIX platform and a standard platform. After running the **svp2cet** command, copy the entire subdirectory with the plan name you entered to your working directory on the standard platform. Then, run the **cet2nmt** command to complete the extraction process.

To move the entire sub directory, use the UNIX tar command, then transfer the tar command in binary mode and untar it on the standard platform.

Troubleshooting CET

Occasionally, CET will execute successfully, but the resulting extract will be incomplete. If CET fails during the **svp2cet** command, look at the earliest error in the svp2cet.con file. The table below lists some common problems, and what to do about them.

Symptom	Links are missing
Probable causes	Incomplete data in SV+ database.
Solution	View the file named “maybe_links.sv.” This file contains possible links based on incomplete data. If the missing links are in this file, add them to the “links.svp” file, and rerun **cet2nmt.**

Symptom	Connections are missing.
Probable causes	Incomplete data in SV+ database.
Solution	CWM 9.2 or later: View the files that begin with the word *extra*. These contain connection segments that are in the data base, but which were not collected because they were not part of an end-to-end connection. SV+ 7.0 - SV+ 9.1: View the files maybe.voice.svp, *maybe_data.svp*, *maybe_frame.svp*, and *maybe_atm.svp*. If you find the connections, try rerunning **svp2cet** and **cet2nmt**. If this doesn't succeed, contact WAN Manager support.

Symptom	Informix Error 862 (cannot open file for run)
Probable causes	**cetlink** has not been run. User is executing CET from a subdirectory CET installation did not execute properly.
Solution	Make sure this directory contains cetbin: `ls-1 cetbin` if cetbin is not there, run **cetlink** See if all required subdirectories and programs are in cetbin. If they are not there, you must reinstall CET.

Symptom	Informix Error 529 (Cannot attach to shared memory) Informix Error 123 (ISAM error: No shared memory)
Probable causes	Informix DB is not on line.
Solution	Become the Superuser INFORMIX Type **cd** Type **tbmonitor**, or **bin/tbmonitor** In *tbmonitor*, select **mode**. This will confirm that the database is off-line. Select **start-up**. The database is brought from off-line to quiescent. Select **on-line.** This brings the database on-line Select **exit** to exit *mode*. Select **exit** to exit *tb monitor* Exit informix

Symptom	Informix Error 217 (Column [name of column] not found in any table in the query)
Probable causes	CWM release and the Informix Database are incompatible. In other words, a new sv+ has been installed, but is not in use
Solution	Use the *swt_rev* option on the **svp2cet** command.

Symptom	Informix Error 564 (cannot sort rows) and/or Informix Error 407 (Error number 0 received from *sql_exec* process) The above error(s) are also combined with a unix *error: /:write failed,* file system is full
Probable causes	There is not enough empty space in the /tmp partition, where informix does its sorting work
Solution	If there are files called *textnnn.0,* then space can be recovered by closing the shell tools. If this still does not work, space can be cleared by copying info and files to other partitions (then erasing them from */tmp*)

Symptom	Informix Error 229 (Cannot open or create a temporary file) and/or Informix Error 162 (ISAM error: BLOB space does not exist)
Probable causes	The Informix database is full or almost full, or the temporary space directory is not writable or full
Solution	Check that the directory defined by the DBTEMP environment variable is writable by this account. If DBTEMP is not defined, check the /tmp directory. The problem could also be that there is no more free disk space in the temporary directory. If you have error 162, have TAC increase the user's Informix database size.

Symptom	REXX Error 48: Failure in System Service
Probable causes	Not enough memory available. This usually refers to swap-space. (To see how much swap space is available, use the pstat **–s** or swap **–s** command. To see how much memory is available, use the dmesg | grep **avail mem** command
Solution	Close all other applications that use a lot of memory, such as Sun's file manager or Netscape.

Symptom	REXX Error 41: Bad Arithmetic Conversion
Probable causes	The input data contained a blank rather than a digit.
Solution	No workaround. Contact Network Modeling for help.

Symptom	The following error message is displayed: `DB not found.` Console file from the **svp2cet** command shows some queries and then SQL error 802.
Probable causes	The CWM is a newer version than the NMT and has tables or fields that the NMT does not recognize.
Solution	Upgrade the NMT to a later version that supports that CWM version.

Symptom	The **cet2nmt** command displays the following error: `REXX:  Service not available`
Probable causes	The command ran out of memory.
Solution	Reconfigure your system to use more swap space on disk.

Symptom	The %UTIL values extracted are bad.
Probable causes	You are using CWM 9.2.09 and do not have patch 10 applied.
Solution	Apply patch 10 to CWM.

Symptom	The CET installation says that CWM is not installed, and you know that it is installed.
Probable causes	The NMT version is too old for the CWM version, or the CWM is installed in a non standard way with a different database name.
Solution	Upgrade NMT to a later version that supports that version of CWM.

Remote CET Extracts

If you wish to obtain a CET extract from a CWM or SV+ Informix database located on another workstation, you may not need to install NMT or CET on the remote platform. You may be able to issue the **svp2cet** command on your workstation and return the data from the remote platform to your workstation.

A remote CET extract is possible only in the following circumstances:

- You must know the hostname of the remote host. You may need to know the IP address of the remote host.
- Your local host workstation must be able to access the remote host. That is, you must be able to successfully ping the remote host, either by hostname or by IP address, from your local host.

- Informix 7.2 or later must be installed on both your local host and the remote host. (If the CWM is installed on either host, you have met the requirement for that host.
- You must know the password to the svplus user ID at the remote host.

You cannot obtain a remote CET extract from a PC.

To configure the workstations for remote data extraction, follow these steps:

Step 1 Set the environment variable INFORMIXSERVER to the hostname of the remote host. That is, issue the following Unix command: setenv INFORMIXSERVER <remotehostname>

Step 2 Setup your local host with an Informix sqlhosts entry for the remote host.

a. Edit your /usr/users/informix72/etc/sqlhosts file.

b. Add a new entry of the following form (filling in the blanks): <remotehostname> ontlitcp <remotehostaddr> informix_istar

where remotehostaddr = IP address of the remote host; but, if you can ping the remote host by name, you can alternatively use the hostname of the remote host. Whichever you choose, use the same remotehostaddr in the two steps below.

Step 3 Setup your local host for “friendly” ftp access to the remote host’s svplus userid.

a. Edit (or create) the .netrc file in your home directory.

b. Add a new entry of the following form (filling in the blanks): machine <remotehostaddr> login svplus password <password>.

<password> is the password to the svplus account at the remote host. Therefore, your .netrc file should not allow others to read it. You can use the Unix command, chmod 600 ~/.netrc

Step 4 Setup the svplus userid on the remote host to allow remote shell access from your local host:

a. Remotely log on to the remote host as user svplus:

rlogin <remotehostaddr> -l svplus

b. Edit (or create) the .rhosts file in the svplus home directory.

c. Add a new entry of the following form:

<localhostname> <yourlocaluserID>

<localhostname> must be the official name of your host, not one of its nicknames. If you do not know it, execute the command, “who am i”, after you have logged on to the remote host. Your official host name will appear within parentheses ().

To check whether your setup is correct, run the **svp-rev** and **swt-rev** commands. If both commands work correctly, your setup is correct.

Troubleshooting

Symptom	A command returns Informix error 23101: `Unable to load locale categories.`
Probable causes	The INFORMIXDIR environment variable is not set correctly
Solution	Either issue the command, unsetenv INFORMIXDIR, or the command, setenv INFORMIXDIR /usr/users/informix.

Symptom	A command returns Informix error 930: `Cannot connect to database server <remotehostname>`
Probable causes	Either Informix is not installed on the remote host, or the INFORMIXSERVER environment variable has been set incorrectly.
Solution	If Informix is installed, perform Step 1 of the setup procedure.

Symptom	A command returns Informix error 25596: `The INFORMIXSERVER value is not listed in the sqlhosts file or the Registry.`
Probable causes	Informix sqlhosts file has not been updated.
Solution	Perform Step 2 in the setup procedure.

Symptom	A command returns Informix error 951: `Incorrect password or user <yourlocaluserID> is not known on the database server.`
Probable causes	The local host doesn't have "friendly" access to the remote host.
Solution	Perform Step 2 of the setup procedure, making sure that the <remotehostaddr> used is the same as that used in the sqlhosts file of Step 3 the setup procedure.

Symptom	A command returns the message: `Cisco Wan Manager (StrataView Plus) on host <hostname> is either not installed or not accessible`
Probable causes	The remote host does not allow remote shell access.
Solution	Perform Step 4 the setup procedure.

Symptom	Command returns Informix error 908
Probable causes	The remote CWM site is not up and running.
Solution	Verify the remote CWM site is running and can be pinged from your site.

CHAPTER 6

Using the TPI

This chapter describes how to use the Third-Party Interface (TPI) Conversion Plug-in.

See these sections:

- Translating Between NMT and WANDL Formats, page 6-1
- Converting NMT Configuration Files into WANDL Files, page 6-2
- Converting WANDL Files into NMT CNF Files, page 6-4

The TPI translates NMT configuration (CNF) files to and from WANDL files. Figure 6-1 provides a high-level illustration of this process. If the design begins in NMT, all parameter values are preserved during the return from the WANDL design. If the design begins in WANDL, the **tpi2nmt** command assumes defaults and NMT catches unsupported settings.

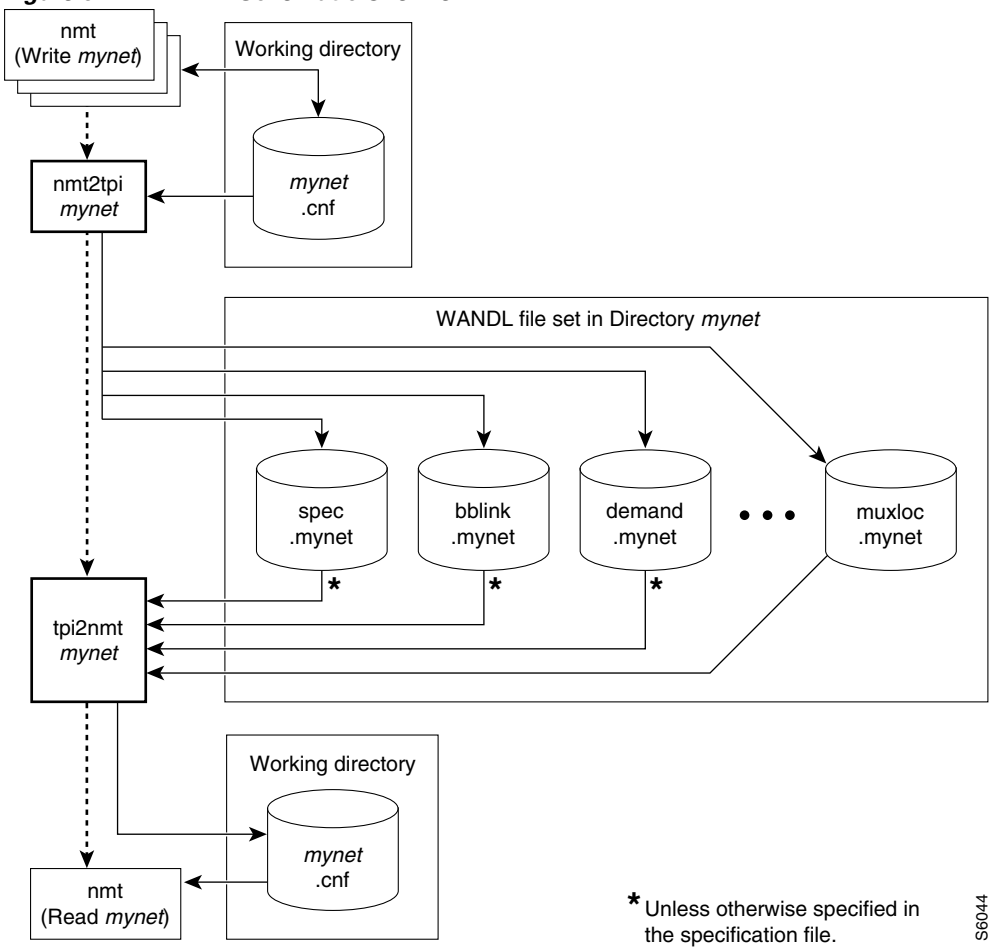
The WANDL design program, bbdsgn, can further optimize the network transmission requirements and costs. For more information on WANDL design tools, contact their customer service or visit the WANDL website at the following URL:

http://www.wandl.com/html/index.cfm

Translating Between NMT and WANDL Formats

This section describes how to translate between NMT and WANDL network design formats on your Sun workstation. The NMT WANDL file translation can be done in NMT or from the UNIX CLI.

Figure 6-1 TPI Schematic Overview



Converting NMT Configuration Files into WANDL Files

Use the **Import** and **Export** selections in the **File** menu to read and write WANDL files. To write to a subdirectory, specify the subdirectory and a plan name. To read a file, select that file's plan name.

Note To read and write WANDL files in the UNIX CLI, use the **nmt2tpi** and **tpi2nmt** commands.

Use the following procedure to convert NMT configuration (.cnf) files into files that can be read by WANDL software using the UNIX CLI.

Step 1 Start the NMT and verify that you have a readable configuration file.

Step 2 Run the TPI command that creates a directory that holds a set of WANDL network design files and specify the extension for these files:

nmt2tpi *infile* [-NT][-NIM][-id *input_dir*]-il *loc_filename*[-of *WANDL_ext_name*][-D][-H]

- –id *input_dir* —Specify a different directory than the current directory as the source of the .cnf file.
- –il *loc_filename*—Specify a specific filename for an .loc file.
- –of *WANDL_ext_name*—Specify a specific WANDL file extension plan name.\
- –od *WANDL.dir.name*—Specify the sub directory for the WANDL files extension plan name.
- *infile* is the name of any CNF file in the current directory. This name is used as the name of the destination directory for the files extracted from the .cnf file.These files are readable by the WANDL bbdsgn program.
- –NT—The program should not preserve the NMT parameters.
- –NIM—The program should not display informational messages, only warnings, error, and those messages that may require user action.
- –D—Display steps and debugging information.
- –over—Overwrites existing output
- –distd—Use the link distance as the WANDL Distance (default in cost).
- –distm—Use the link distance as the WANDL Distance (default in monthly cost).
- –disti—Use the link distance as the WANDL Distance (default in install cost).
- –H—Display help.

Step 3 You can start the WANDL design session with the **nmt2tpi** output files by using the following commands:

cd *dir_name*

bbdsgn spec.*extension*

dir_name is the name of the .cnf file specified in the previous step.

spec.extension is the WANDL specification file, specifying a set of files to be run together.

Converting WANDL Files into NMT CNF Files

This procedure is for the conversion of WANDL files into files that can be read by the NMT. This procedure processes files specified in the WANDL specification file.

Step 1 Return to the parent directory.

```
cd ..
```

Step 2 Convert the WANDL files into an NMT .cnf format by entering

```
tpi2nmt <WANDL_directory> [-BPXT3 card][-NA][-NIM][-od output_directory]
[-if cnf][-of cnf][-D][-H]
```

- WANDL_directory— The name of the directory containing the WANDL data files (as well as the extension used by the WANDL data files, typically the network name). This name is assigned to the output CNF file and LOC file. The LOC file has system coordinates.
- NOUXM—New links will not use the UXM card.
- –NIM—The program should not display informational messages, only warnings, errors, and those messages that may require user action.
- –id *output_directory*—Specify a directory different from the default as the destination of the CNF file.
- –if *cnf*—Specify a specific WANDL file extension name for input.
- –of *cnf*—Specify a specific name for the CNF output.
- –ol *loc*—Specify a specific name for the LOC output file.
- –over—Overwrites output files.
- –distd—Use the link distance as the WANDL Distance (default in cost).
- –distm—Use the link distance as the WANDL Distance (default in monthly cost).
- –disti—Use the link distance as the WANDL Distance (default in installation cost).
- –D—Display steps and debugging information.
- –H—Display help.

CHAPTER 7

Using the SpreadSheet Interface

This chapter describes the SpreadSheet Interface (SSI) conversion plug-in, which translates network design information between NMT and a Microsoft Excel-compatible format. SSI requires that you use Microsoft Excel Version 6.2 or later.

The SSI plug-in converts the CNF file into its component tables and saves them as DBF files. The SSI then tars (archives) the file for easy transfer to a PC or Macintosh platform. The SSI provides a PC toolkit to translate the spreadsheet files back into the .cnf file format readable by NMT. See Figure 7-1 for a schematic overview of the SSI process.

The MS Excel translation can be done from within the NMT or from the UNIX CLI.

See these sections:

- NMT to Microsoft Excel, page 7-1
- Microsoft Excel to NMT, page 7-4

NMT to Microsoft Excel

To write to the spread sheet interface directly from NMT, go to the FILES/EXPORT menu and select DBF Files.

To write to the spread sheet interface from the UNIX CLI, use the **nmt2tar** and **tar2nmt** commands. If you are on the UNIX version, you will be prompted if you wish to have a tar file made of all the DBF files for easier transport to PC.

This section is for the UNIX Command Line Version of SSI on a UNIX OS. For a PC version of NMT, use the File > Import/Export menu to read and write to DBF files. Copy the SSI Macro to the XLStart directory for the load and unload commands.

The following procedure is for the conversion of an NMT .cnf file to .dbf, a Microsoft Excel compatible format, and archiving the .dbf output so that it can be moved from a UNIX workstation to a PC. This section also explains how to unarchive the file once it is on the PC.

Step 1 To convert a .cnf file to .dbf format and archive it as a .tar file, use the following command:

```
nmt2tar <cnf_name> [parts_file]
```

where,

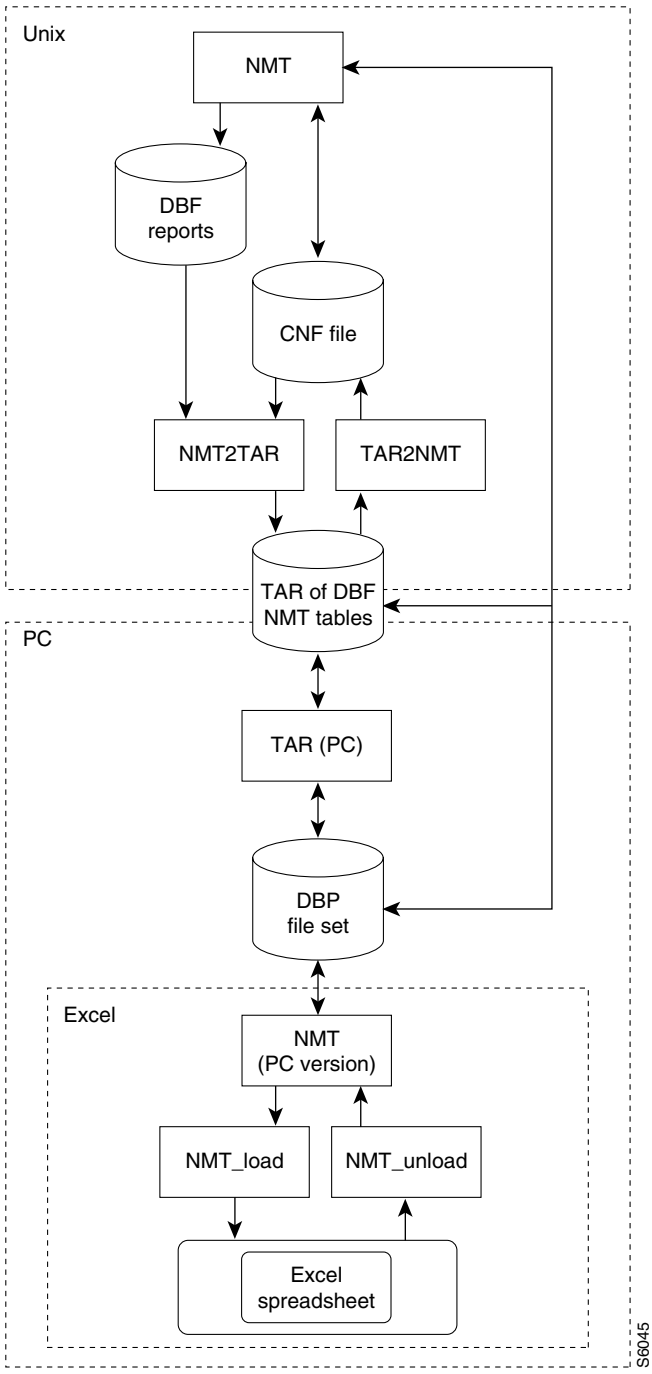
- cnf_name = Name of any .cnf file in the current directory.
- parts_file = Name of the file that lists the components. You should specify a parts file only if you are using a file other than the default.

Step 2 FTP the cnf_name.tar file to a computer that has Microsoft Excel installed.

Alternatively, copy the file to a PC- or Macintosh-compatible diskette by using the **mcopy** command. For example, **mcopy** cnf_name a: copies the file cnf_name to the diskette in the A: drive of the UNIX workstation.

If the destination PC has not been used for reading archived .cnf files, you should copy the following files from the NMT directory to the PC: SSIDOSKT.TAR (containing DOS BAT files for tarring and untarring the NMT SSI .dbf data files), the tar.exe program, and the Microsoft Excel macro SSI. Also, you should read the file SSI.readme.

Figure 7-1 SSI Schematic Overview



Step 3 xe for PCs and StuffIt Deluxe for Macintoshes.

The unarchived file consists of several files, one file for each NMT configuration table. Each file has a .dbf extension and can be opened and edited in Microsoft Excel.

Step 4 Start Microsoft Excel, and edit the data. You can read and write a multi-spreadsheet workbook by using the SSILoad and SSIUnload macros. Alternatively, you can treat each file individually.

Microsoft Excel to NMT

The following procedure is for the archiving of Microsoft Excel files so they can be easily moved from a PC to a UNIX workstation and for converting the Microsoft Excel files into NMT .cnf file format:

Step 1 To archive an Microsoft Excel file, use a program like tar.exe for PCs or StuffIt Deluxe for Macintoshes.

Note If the destination PC has not been used for reading archived .cnf files, you should copy the following files from the NMT directory to the PC: SSIDOSKT.TAR (containing DOS .bat files for tarring and untarring the NMT SSI .dbf data files), the tar.exe program, and the Microsoft Excel macro SSI. Also, you should read the file SSI.readme.

Step 2 The archived file should have a filename with a .tar extension.

Step 3 FTP the archived file to a workstation that has a directory linked to the NMT.

Alternatively, copy the file to a PC- or Macintosh-compatible disk. To copy from a PC or Macintosh disk to a UNIX workstation, use the **mcopy** command. For example, **mcopy** *a:\filename* copies the file "filename" to the UNIX workstation directory from which the command was issued.

Step 4 To read the DBF or tar file from NMT, go to the FILE/IMPORT menu, and select DBF Files. If you are on the unix side, you will be prompted if you want to open a tar file, or read directly from a DBF file set.

To perform this same functionality in UNIX command mode, perform command 4 alt.

Step 5 To unarchive the file, enter the following command:

```
tar2nmt filename
```

where filename = name of any .tar file in the current directory.

Step 6 The unarchived file will have a CNF extension and can be opened and edited in the NMT.

Usage Review

After creating a CNF file using NMT, CET, or TPI, use SSI tools to translate the CNF file to a Microsoft Excel workbook. In the UNIX environment, do the following.

Step 1 Run the command **nmt2tar**. This creates both the DBF files, and a tar file containing them.

Step 2 Transfer the output tar file to you PC environment. Make sure you use binary mode.

Step 3 Untar the file using the DOS command 'tar2dir'. Start EXCEL, and select **file/macroNMT_Load**, and **click run**.

Step 4 When prompted for an input file, select any of the DBF files for your run. NMT_Load convert NMT table files in DBF format to Excel spreadsheets, where each sheet is a table and each column is a file.

Step 5 When completed, select **tools/macro>t NMT_Unload**, and click **run**. Write in same directory, or another sub directory in your PC environment. NMT_Unload converts an excel spreadsheet to NMT DBF files.

The sheets that are NMT table names will be written.

In DOS a Dos environment, do the following.

Step 1 run **dir2tar** to create tar file of modified outputs.

Step 2 Transfer the tar file back to UNIX environment. Make sure you use binary mode. Run **tar2nm**t to create the CNF file.

Note You may create a CNF file starting in Microsoft Excel, provided you use the same sheet names and field names that NMT expects. Only site table and site fields are required, other fields will be set to default values by SSI and NMT. Additional sheets and tables will be ignored.

The **tar2nmt** command will convert a tar version of these files to a NMT cnf file. The DBF columns that match NMT fields will be used. All fields not provided will be set to the NMT default value. Key fields, such as site names, are mandatory.

The file **ssidoskt.tar** contains bat files that can assist you in untarring and tarring the dbf files on the PC. Copy this file to the PC, and then untar it in the directory where you will be working on NMT DBF files.

All system and data files are in binary format.

Note Enter the **–h** command to display online help about a command's optional parameters.

SSI TroubleShooting

The table below describes a common SSI problem and what can be done about it.

Symptom	Network data gets rounded incorrectly when converting from Excel to NMT''s CNF file.

Probable Causes	The SSI user enters new connections or links in Excel using the SSI macros. The user then runs NMT_Unload macro, and transfers the tarred DBF file back to Unix. The user then enters the following commands:
	`run tar2nmt`
	`run nmt`
	and then discovers that the hub IDs and data conn types have been converted to integers.
	For example, a HUB id:
	`4.3 -> 4`
	or a data connection type:
	`19.2 -> 19`

Solution	To avoid this corruption, make sure that one of the following is true for your link connection tables: The first line (not the column header's but the first data line) originally came from NMT and has not been modified in Excel. All fields in the first line (again, first data line not field name line) with this potential corruption (data conn type, all hub IDS and Feeder IDs) have a single quote prepended to them. For example: `19.2 --> '19.2` This forces the DBF translation to treat these columns as strings, so truncation is avoided. This is only necessary in the first data line.

CHAPTER 8

Cisco Network Designer Importer

The Cisco Network Designer (CND) is a PC-configuration system for pre-sales.

See these sections:

- CND PC Import Utilities, page 8-1
- Installing the NMT2CND File, page 8-2
- Nmt2Cnd Operating Instructions, page 8-2
- Installing The DBF2Cnd Utility, page 8-2
- DBF2Cnd Operating Instructions, page 8-3

CND PC Import Utilities

The NMT provides two PC utilities for loading the CNF into the CND, where the data is stored as a project. Table 8-1describes these utilities.

Table 8-1 PC Utilities for the CND

Utility	Description
NMT2CND	Proprietary CNF file that the NMT uses to provision a network considering QoS, minimizing costs, and failure recovery. This file describes WAN topologies using the BPX, MGX, and IGX switches. These configurations can be loaded directly into the CND for graphic display, BOMs and other reports, configuration checking, and LAN and other network additions.
DBF2CND	Uses the NMT SSI to load data from Microsoft Excel workbooks into the CND. This data can be any Cisco product that the CND supports. Data must still be verified within the CND to confirm the validity of the design.

Installing the NMT2CND File

After the NMT PC version is installed, the NMT2Cnd and DBF2CND files are located the in the nmt\bin directory on your hard drive.

Install the NMT2CND on a high-powered PC with the CND and NMT installed, although technically the NMT does not have to be installed to run the NMT2CND utility. If you plan only to use the DBF2CND utility, you need to install only the CND and Microsoft Excel.

Nmt2Cnd Operating Instructions

Use this procedure to operate the NMT2CND.

Step 1 Shut down CND if it is running.

Step 2 Launch nmt2cnd by clicking on the icon. You should see an MFC menu with the following three selections: **File**, **Export**, and **Help**.

Select **File** from the menu. Then select **open NMT cnf**. Navigate to find and open your CNF file. nmt2cnd will read the cnf file, and look for a partlist.dbf file in a sub directory with the same name as the cnf file. To create the partlist.dbf file, run the **Execute** command**.** Use the NMT to run the **Route**, **Optimize** or **Build Sites** commands.

Step 3 A pop up window appears, listing sites, links, and part candidate counts. Click on **OK**.

Step 4 Select **Load** from the menu. Then select **Import into CND**.

Step 5 CND will launch, and the project loads. No messages are displayed in CND unless the project name already exists, in which case you will see a message that your project has been renamed to Project<n>.

Step 6 Bring the nmt2cnd window to the foreground while you wait for a message box displaying the status of the load. This message will tell you how many parts were accepted and rejected from the load.

This step could take 5 minutes or more for large networks and there is no feedback as to the status yet.

Step 7 Click **OK**. You can now use CND to explore what you have loaded. Before modifying the project further, close NMT2CND.

Do not close CND directly, and do not close the project or open other ones. When you are done working on the CND, close nmt2cnd, which will close CND. You can then reopen CND and work normally.

Installing the DBF2Cnd Utility

The DBF2CND utility is located in the nmt\bin directory on your hard drive. Before starting the DBF2CND utility, move the SSI macro from the c:\nmt\ssi directory to the C:\Program Files\Microsoft Office\Office\XLStart directory. If Microsoft Excel is running, shut it down and restart it.

DBF2Cnd Operating Instructions

To run the DBF2Cnd utility, follow these steps:

Step 1 Click the SSI macro to start Microsoft Excel.

Step 2 Create an Excel workbook with these files:

1. A sites sheet, which must have two columns:
   - Name—Site name, up to 10 characters,
   - Type—Chassis Part type, up to 19 characters.

   The Hor and Ver columns are optional. Use them to position sites on the CND drawing. 0,0 is the upper left coordinate. The positions will be stretched to scale. All sites but one must have at least one non-zero coordinate for the coordinates to be used. Otherwise an auto-position algorithm is used.
2. an options links sheet—The Link sheet must have two columns:
   - Site1—Site name for end one of the link.
   - Site2—Site name for end two of the link.
3. a Parts List sheet—The Parts List sheet must have two columns:
   - Site—Site name for the part
   - Model_No—The part to add QTY is an optional column, Use this if you want to enter more than one part per line.

Note There is a template example of these files in c:\nmt\data\excel

Step 3 In the Tools menu, go to macro<macros<SSI!NMT_Unload', and click **run**.

Step 4 Navigate to the directory where you wish to store the DBF files, and click **save**.

Note Ignore the message about other missing NMT files.

Step 5 Shut down CND if it is running.

Step 6 Click the dbf2cnd icon to launch the dbf2cnd utility. An MFC menu appears.

Step 7 In the MFC menu, select File<**open** and navigate to the directory containing your DBF.

Step 8 Open any file in the DBF directory. A pop up window displays sites, links, and part candidate counts.

Step 9 Click **OK**.

Step 10 Select Load<**Import** into the CND. The CND launches and loads the project.

Be sure your project name is unique. If another project exists under the same name, an error message will appear and your project will be renamed to Project<n>.

Step 11 Bring the dbf2cnd window to the foreground while the project is loading. A message box displays the status of the load, and how many parts were accepted and rejected from the load. Click **OK**.

This step could take 5 minutes or more for large networks.

CND PC Utilities

You can now use the CND to explore your loaded project. When you are finished, close dbf2cnd before you close the CND. You will have to reopen the CND to work normally; otherwise, it may hang up.

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