

DMS-100 NetWare Telephony Services
Network Manager's
Guide

DMS-100 NTS Driver NLM Release 1

NORTEL
A World of Networks

TABLE OF CONTENTS

ABOUT THIS GUIDE	<u>3</u>
<i>Related reading</i>	<u>3</u>
Related reading for a DMS-100 systems administrator.....	<u>3</u>
Related reading for a DMS-100 systems engineer.....	<u>4</u>
ECMA Documents.....	<u>4</u>
INTRODUCTION.....	<u>6</u>
DMS-100 NTS OVERVIEW	<u>6</u>
<i>System Architecture</i>	<u>6</u>
<i>NetWare Telephony Server</i>	<u>7</u>
Server Architecture.....	<u>8</u>
Client Architecture.....	<u>8</u>
DMS-100 NTS Driver NLM.....	<u>8</u>
<i>Feature Interactions</i>	<u>9</u>
INSTALLATION & CONFIGURATION.....	<u>10</u>
INSTALLING & CONFIGURING DMS-100 NETWARE TELEPHONY SERVICES	<u>10</u>
<i>Installation Summary</i>	<u>10</u>
<i>Pre-Installation Checklist</i>	<u>10</u>
<i>NetWare Server Installation and Configuration</i>	<u>11</u>
Software Installation.....	<u>11</u>
X.25 Configuration.....	<u>11</u>
<i>Installing and Loading the DMS-100 NTS Driver NLM</i>	<u>17</u>
Installing the DMS-100 NTS Driver.....	<u>17</u>
Configuring the DMS-100 NTS Driver.....	<u>18</u>
Loading the DMS-100 Driver.....	<u>19</u>
<i>Administering Telephony Services</i>	<u>19</u>
Advertised Names.....	<u>19</u>
Devices.....	<u>19</u>
Device Groups.....	<u>19</u>
Users.....	<u>20</u>
TROUBLESHOOTING AND ERRORS	<u>21</u>
TROUBLESHOOTING.....	<u>21</u>
<i>Testing the Connection from the Tserver to the CompuCALL Link</i>	<u>21</u>
Problem Descriptions.....	<u>21</u>
Useful Tips.....	<u>22</u>
DMS-100 NTS DRIVER NLM ERROR MESSAGES.....	<u>22</u>
APPENDIX A: DMS-100 TRACING FUNCTION.....	<u>24</u>
<i>Overview</i>	<u>24</u>
<i>Trace Levels and Activation's</i>	<u>24</u>
<i>Trace File Location</i>	<u>25</u>
<i>Trace File Closing</i>	<u>25</u>
<i>Message Formats</i>	<u>25</u>
<i>Call State</i>	<u>26</u>
<i>Performance Messages</i>	<u>26</u>
LIST OF TERMS.....	<u>27</u>

ABOUT THIS GUIDE

The *Network Manager's Guide* describes how to install and maintain the DMS-100 NetWare Telephony Services (NTS) Driver NetWare Loadable Module (NLM) software on a Novell Telephony Server. Information in this document is intended for use by telephony server administrators.

Exercise caution while performing tasks that may disrupt service.

These tasks include taking the CompuCALL Link off-line, resetting the CompuCALL Link, reloading the DMS-100 NTS Driver NLM, and changing initialization parameters.

This guide contains the following chapters:

- Introduction — Describes the NTS architecture and summarizes features supported by the DMS-100 NTS Driver NLM.
- Installing and configuring the DMS-100 NetWare Telephony Services — Describes how to install and configure NetWare Telephony Services for DMS-100.
- Troubleshooting — Describes actions to take when the DMS-100 NTS Driver NLM is not functioning properly.
- Appendix A: Tracing Function for the DMS-100 NTS Driver NLM.

Related reading

Related reading for a DMS-100 systems administrator

This guide provides DMS-100-specific information for NTS and is written as a companion to Novell's *Telephony Services Application Programming Interface (TSAPI)*. For this reason, specific TSAPI chapters are listed below according to audience needs. Also listed are documents containing DMS-100-specific information and documents containing Computer Telephony Integration (CTI) standards information.

The *Telephony Services Application Programming Interface* is published by Novell Inc. This document details the interface specification for the NetWare Telephony Server (Tserver) architecture on the NTS platform. It also describes the CSTA-based API for call control, call/device monitoring and query, call routing, and device/system maintenance capabilities. This document is required reading for developers designing CSTA applications, and for Switch customers and Switch vendors supporting CSTA applications for DMS-100.

Below is a list of relevant TSAPI chapter titles and their content:

- Chapter 1 "Abstract" provides a general overview of server-based technology and its benefits.

- Chapter 2 "Introduction" describes TSAPI's purpose and its architecture. Hardware and software components for Telephony Services are listed and defined.
- Chapter 3 "Function Call Model" gives the ECMA CSTA standard concepts for TSAPI application programming.
- Chapter 4 "Control Services" describes Application Programming Interface (API) Control Services (ACS) associated with the call control capabilities (CSTA-based services) supported by NTS.
- Chapter 5 "Switching Function Services" describes telephony services that operate on calls and activate switch related features that are associated with the user desktop telephone or any other device defined by the switching domain. Switch Function Services are divided into Basic Call Control Services and Telephony Supplementary Services.
- Chapter 6 "Status Reporting Services" describes the status reporting services that are available from the API. Function calls and events associated with unsolicited event messages are also addressed.
- Chapter 8 "CSTA Computing Functions" describes those functions where the switching domain is the client (service requester) and the computing domain is the server. Presently, Application Call Routing is the only CSTA Computing Function.
- Chapter 11 "CSTA Data Types" describes the data types (CSTA Data Type and Interface Data Types) used by the functions and messages defined for the TSAPI.

Other useful documents include the following:

- *Novell Netware Telephony Services*, Release 2.1 PBX Driver Interface Specification.
- *Telephony Server Application Programming Interface (TSAPI)*, Release 2.1, Novell Inc.
- *DMS-100 NTS Programmer's Guide* (no reference number available).
- *DMS-100 CompuCALL/SL-100 Meridian SCAI Interface Specification*, NTP NIS-Q218-1.
- *DMS-100 CompuCALL Product Guide*, NTP 297-1001-018.
- *DMS-100 CompuCALL Translations Guide*, NTP 297-1001-358.
- *Racal-Airtech XIPLUS X.25 Documentation*.

Related reading for a DMS-100 systems engineer

Systems engineers should be familiar with telephony and with the operation and architecture of telephony services for DMS-100. Refer to chapters 1, 2, and 3 of this guide for basic information about CSTA and telephony services for DMS-100.

ECMA Documents

ECMA standards do not provide information on the platforms supporting the programming interfaces and telecommunication integrations described in these documents. Novell's *Telephony Services Application Programming Interface (TSAPI)*, Release 2.1, provides the necessary platform and API specifications that are not supplied by the CSTA standard. Also, some services or parameters defined in the CSTA Standards are not meaningful to the DMS-

DMS-100 Network Manager's Guide

100 Switch Communications System environment. However, some service requests described in the ECMA documents have corresponding CSTA service functions defined in *Telephony Services Application Programming Interface*. Each definition specifies the generic CSTA application program syntax and interface for NTS. In this context, the term "generic" means applicable to all switch vendors.

- *STANDARD ECMA-179 Services For Computer-Supported Telecommunications Applications (CSTA)*, European Computer Manufacturers Association (June 1992), defines services for CSTA for the OSI Layer 7 communication between a computing network and a telecommunications network. This standard, plus its companion, Standard ECMA-180, reflects agreements of ECMA member companies on the first phase of standards for CSTA.
- *STANDARD ECMA-180 Protocol For Computer-Supported Telecommunications Applications (CSTA)*, European Computer Manufacturers Association (June 1992), defines a protocol for CSTA for the OSI Layer 7 communication between a computing network and a telecommunications network.
- *Computer-Supported Telecommunications Applications ECMA TR/52*, European Computer Manufacturers Association defines the foundation for the OSI Layer 7 service Protocol Message Interface communication between computing applications and switching applications.

To obtain a copy of these documents, write to

European Computer Manufacturers Association
114 rue du Rhone
CH-1204 Geneva
Switzerland
Telephone: 41 22 735 36 34

INTRODUCTION

DMS-100 NTS Overview

A DMS-100 NTS Configuration (shown in Figure 1) consists of three parts:

- a DMS-100 central office switch or MSL-100 PBX with CompuCALL software
- Novell NetWare LAN with at least one NetWare Telephony Server and at least one PC-based client workstation. The client workstation contains an application (such as VISIT FastCall/NTS) that uses call control and call monitoring functions
- a dedicated connection using the X.25 protocol between the DMS-100 and the Novell server

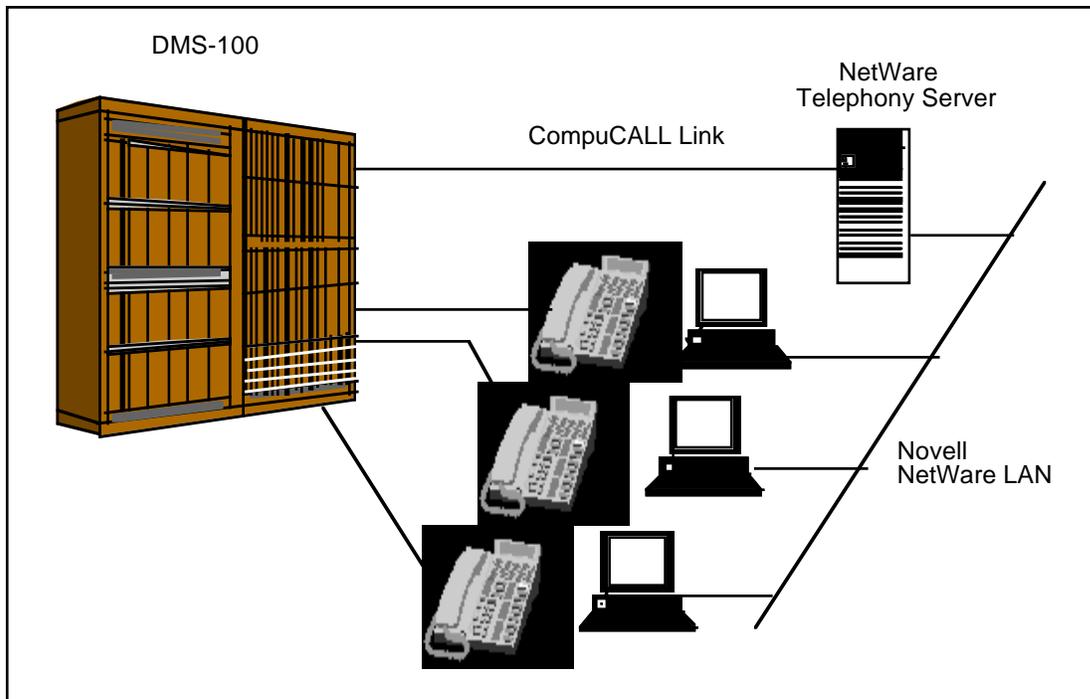


Figure 1-1: DMS-100 NTS Configuration

A DMS-100 centrex set connected to a DMS-100 Meridian Digital Centrex line card is associated with each PC client. These telephones are referred to as "associated sets."

System Architecture

DMS-100 NetWare Telephony Services (NTS) is a distributed client/server environment that logically integrates the telephone on a user's desktop with client and/or server-based applications. The telephone is physically connected to the switch and is not physically connected to the PC. Users'

desktops do not require any special telephones, connectors, PC circuit packs, or new wiring.

DMS-100 NTS consists of software that runs on a NetWare server and software that supports a Telephony Services Application Programming Interface (TSAPI) on a Windows client. A PC application, acting on behalf of a user, can use the API to monitor and control calls at a device associated with the user. TSAPI is based on the European Computer Manufacturers Association (ECMA) standard for Computer-Supported Telecommunications Application (CSTA). TSAPI is provided by a set of C-language routines that support telephony control capabilities for a generic switch environment.

NetWare Telephony Server

The Telephony Server supports client requests over the CompuCALL Link to provide computer switch integration. It consists of the following components:

- Telephony Services NLM (TServer)
- DMS-100 NTS Driver NLM
- X.25 Transport Module NLM (X25TERM)
- The optional Telephony Services Library which supports the Telephony Services Application Programming Interface (TSLIB)

TSAPI TSLIB allows server based applications to use the Telephony Services Library. The telephony server software supports the exchange of TSAPI messages between a client and the TServer over the Novell network.

The Telephony Services NLM routes messages to and from the client application workstations on the network, as well as to the DMS-100 NTS Driver NLM.

Figure 2 shows the NTS architecture.

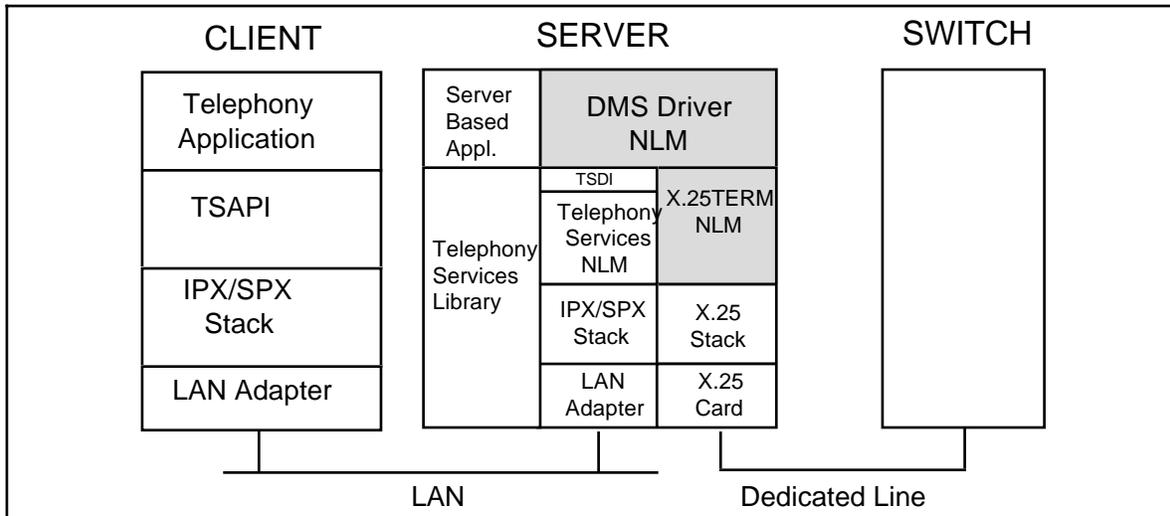


Figure 2.2: NTS Architecture

The DMS-100 NTS Driver NLM (switch driver) converts TSAPI messages into corresponding CompuCALL Link messages and CompuCALL Link messages into TSAPI messages.

The DMS-100 NTS Driver NLM and the X.25 Transport Module NLM are switch-dependent; all other components are switch-independent. Nortel supplies the DMS-100 NTS Driver NLM and the X.25 Transport Module NLM.

The Telephony Services NLM manages requests from clients and confirms that each client is administered for the requested service. It responds directly to some client requests and routes others to the DMS-100 NTS Driver. The Telephony Services Driver Interface (TSDI) is the interface between the Telephony Services NLM and the DMS-100 NTS Driver NLM.

Server Architecture

In a typical NetWare Telephony Services environment, the Telephony Server is connected to one or more switches through the switch drivers using CTI links. The telephony server communicates to the clients in a Novell NetWare Local Area Network (LAN) through the Telephony Services NetWare Loadable Module (TServer NLM). The Tserver NLM is a switch-independent module, while a switch driver is a switch-specific NLM.

The application could use Btrieve or other NetWare-supported database services to retrieve call event information and then use the information to instruct Telephony Services on how best to route the call.

Client Architecture

A library known as Telephony Services Library (TSLIB) for Windows provides TSAPI in the client environment. The TSLIB for Windows is the primary software module which allows the development of client applications and supports TSAPI in the client. The TSLIB for Windows resides below telephony client applications and on top of Windows and NetWare client software. When a client application issues a TSAPI request, the library formats the request into a CSTA message and send the request to the server through the network using the standard Novell communications protocol IPX/SPX.

Nortel's CompuCALL Link product enables an application in a host computer to use the call control and call monitoring functions of a DMS-100 system. NetWare Telephony Services (NTS) extends the CompuCALL Link to a client application in a Novell NetWare client-server local area network (LAN).

DMS-100 NTS Driver NLM

The DMS-100 NTS Driver NLM is responsible for

- communicating with the CompuCALL Link application over an X.25 protocol
- translating CompuCALL Link messages to TSAPI commands
- translating TSAPI commands to the corresponding CompuCALL Link messages

The DMS-100 NTS Driver NLM initiates and maintains the connection for the telephony server to the DMS-100 via the CompuCALL Link. The DMS-100 NTS Driver NLM first uses the Telephony Services Driver Interface (TSDI) routine `tdiDriverRegister` to establish a connection between itself and the Tserver. Next, it uses the X.25 Transport Module NLM to establish the X.25 based connection to the CompuCALL link software on the DMS-100. Once this connection is established, the DMS-100 NTS Driver NLM logs onto the DMS-100 using the parameters in the LOGON.CFG file. Once it has logged on, the DMS-100 NTS Driver NLM sends the CompuCALL DN Associate requests from the ASSOC.CFG file to identify the ACD groups using TSAPI applications to the switch.

After the DMS-100 NTS Driver NLM registers with the Tserver, the Tserver allocates resources to the TSDI. The Tserver then establishes a connection for CSTA services and when it is ready to handle TSAPI requests, the Tserver broadcasts a message over the network. The driver will not accept any TSAPI requests from the TServer until the switch is connected.

TSAPI commands from all client or server applications that communicate with the DMS-100 funnel through the DMS-100 NTS Driver NLM.

Before exiting (unloading), the DMS-100 NTS Driver NLM communicates with the Tserver, which then stops broadcasting the availability of driver services and frees all resources allocated to the TSDI. The DMS-100 NTS Driver NLM logs off from the DMS-100, releases internal resources and terminates.

Feature Interactions

Users of TSAPI-compliant applications running in a DMS-100 NTS environment must be aware of the results of some specific feature interactions. These are documented in Volume 4 of the CompuCALL specification.

1. Three way call sequences can be initiated either from the telephone or through TSAPI. Once a specific three way call sequence is started either from TSAPI or through the telephone, it should be completed using the same mechanism.
2. In addition
 - DMS-100 NTS does not support Multiple Appearance Directory Numbers (MADNs)
 - DMS-100 NTS does not report information on calls initiated from the telephone set unless the destination is DN Associated with the CompuCALL link.
 - DMS-100 NTS cannot outpulse digits after establishing a call
 - DMS-100 NTS does not support speed dial feature access codes
 - DMS-100 NTS may not recognize callers that hang up during a supervised transfer or conference call feature
 - DMS-100 NTS supports only ACD group and ACD position devices

INSTALLATION & CONFIGURATION

Installing & Configuring DMS-100 NetWare Telephony Services

Installation Summary

This section summarizes the steps required to install DMS-100 NetWare Telephony Services. It is important to follow the list of procedures in the order in which they appear.

1. Verify that a Novell Server is installed and running NetWare 3.12, the NetWare Multi-Protocol Router (3.0) and NetWare Telephony Services Release 2.1; that all user IDs and passwords are configured properly and that users can log in to the Novell server.
2. Install the X.25 Interface Board, that is, ODI, NDIS, ASI, or package driver compatible (for connection to CompuCALL Link) in the Novell Server. The recommended X.25 card is the Racal-Airtech XIPLUS

For installation instructions, refer to your X.25 Interface documentation.

3. Install and configure X.25 software on the Novell Server
Refer to your X.25 Interface documentation.
4. Install the NetWare Telephony Services software on each client PC.
Refer to the section on "Installing Telephony Services Software on a Client Workstation" in the Novell NetWare Telephony Services Installation Guide.
5. Use the NetWare Telephony Services Administration program to administer Telephony Services.
Refer to the section on "How to Use the Tserver Administrator Client Application" in the Novell NetWare Telephony Services Network Manager's Guide.
6. Install, configure and load the DMS-100 NTS Driver

Pre-Installation Checklist

To ensure the successful installation and operation of the Telephony Server and DMS-100 NTS Driver NLM, verify that

- the server is an Intel 486 or Pentium-based computer
- the server has at least 24 megabytes of installed memory
- NetWare 3.12 is installed on the server

Before you start the installation, ensure that you have the following information:

- X.25 destination network address for the DMS-100 (SVCDNA from DMS-100 table MPCLINK)
- X.25 version for the DMS-100 (from DMS-100 table MPCLINK)
- DMS-100 name to be used as call destination
- X.25 destination network address for the Tserver (REMDNA from DMS-100 table SCAICOMS).
- User Data for the X.25 connection request (PROTOCOL from DMS-100 table SCAICOMS)
- networkNodeID for the DMS-100 Driver LOGON.CFG file (IDNETNODID from DMS-100 table SCAIGRP)
- businessGroupID for the DMS-100 Driver LOGON.CFG file (GRPNUM from DMS-100 table BGDATA)
- Password for the DMS-100 Driver LOGON.CFG file (PASSWORD from DMS-100 table SCAIGRP)
- Service Id for the DMS-100 Driver LOGON.CFG file (SERVICE_ID from DMS-100 table SCAIPROF)
- Primary ACDDN's for the DMS-100 Driver ASSOC.CFG file (for each ACD group that the driver will be monitoring).

NetWare Server Installation and Configuration

The following instructions outline the installation procedures for the following NetWare Server product options:

- Multi Protocol Router Software
- X.25 Driver Software
- NetWare Telephony Services

Software Installation

Installation of these software products must be performed using the NetWare Install NLM (instructions for INSTALL.NLM can be found in the NetWare Systems Supervisor Guide). **NOTE** Requires NetWare 3.12 Operating System to be installed and configured.

- Install the NetWare Multi Protocol Router software (release 3.0) using the media and associated installation instructions provided with the product option..
- Install XPORT/X.25 for NetWare (V2.0.3) X.25 driver software using the media and installation instructions provided with the product.. **NOTE:** the interface board supported at this time is the Racal-Airtech XIPLUS. The X.25 configuration settings are described below.
- Install the NetWare Telephony Services software (release 2.1 or later) using the media and associated installation instructions (NTS Supervisor Guide) provided with the product option.
- Configure the Telephony Server access and profile information using TSRVOAM.EXE (Note: must be performed at a client workstation).

X.25 Configuration

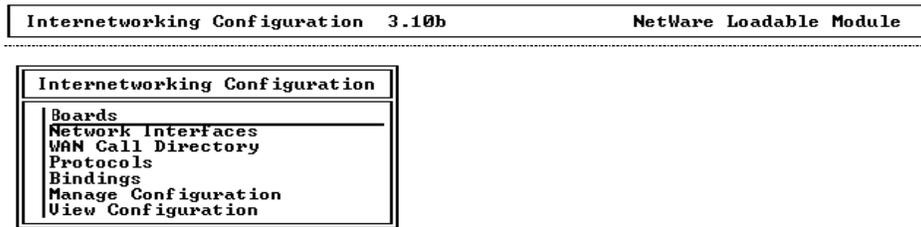
The INETCFG utility is used to establish X.25 driver configuration (note: may be invoked within INSTALL.NLM by selecting the X.25 Driver Software and

Installation & Configuration

pressing enter). After the configuration settings have been modified, save the settings and return to the operating system prompt. The new X.25 configuration will take effect after the server has been downed and restarted.

The following screen snapshots illustrate an example configuration and are annotated to show key information that must match the DMS-100 configuration.

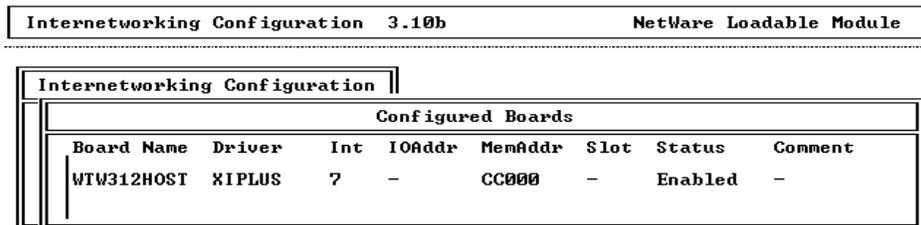
Board Configuration



Add, delete, and configure interface boards.
 ENTER=Select ESC=Exit Menu

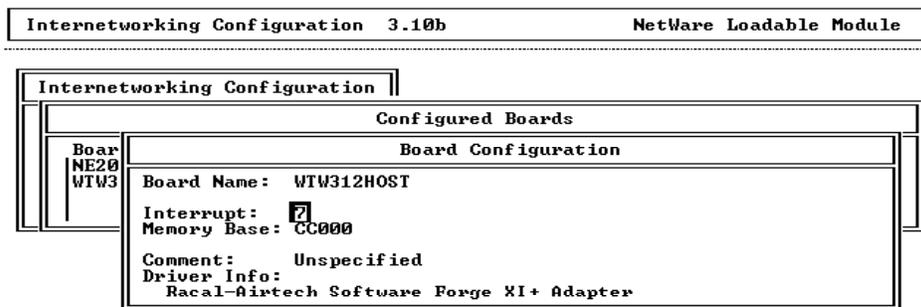
F1=Help

Figure 3.3: Internetworking Configuration Menu



Choose from the list of configured network interface boards.
 ENTER=Select INS=Insert DEL=Delete TAB=Toggle Status ESC=Previous Menu F1=Help

Figure 4.4: Configured Boards

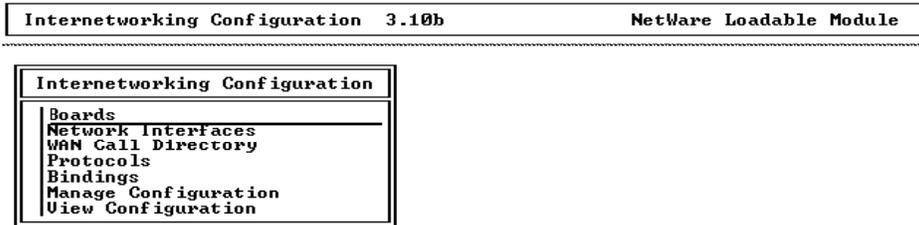


Select the interrupt level matching the setting on the interface board.
 ENTER=Select ESC=Previous Menu

F1=Help

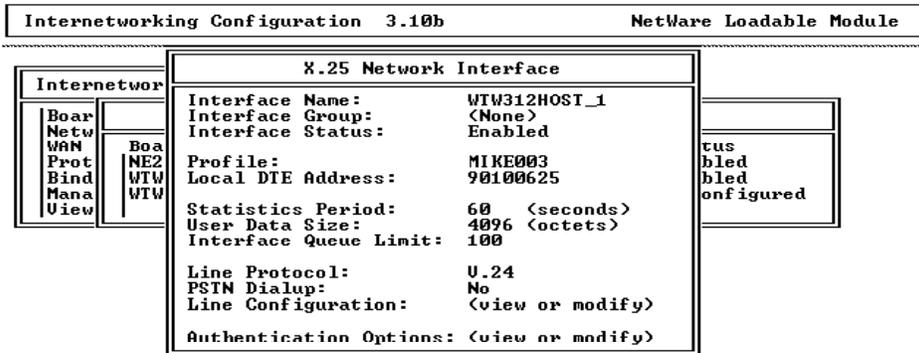
Figure 5.5: Board Configuration

Network Interface Configuration



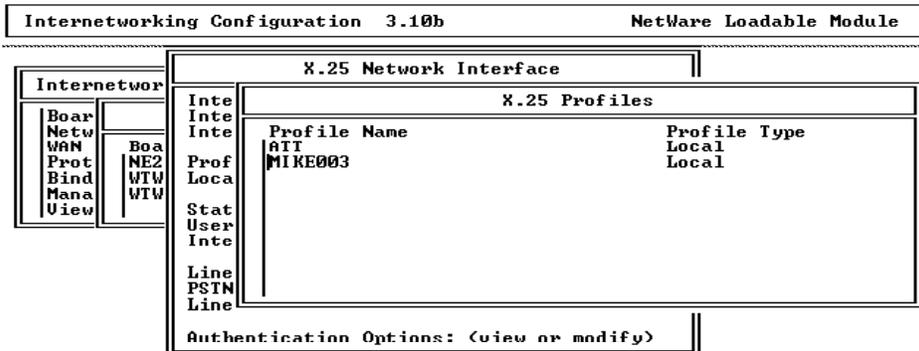
Add, delete, and configure interface boards.
 ENTER=Select ESC=Exit Menu F1=Help

Figure 6.6: Internetworking Configuration Menu



Name of the profile associated with the port.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 7.7: X.25 Network Interface



Select an entry from the list of X.25 profiles.
 ENTER=Select INS=Insert DEL=Delete F2=Copy F3=Edit ESC=Exit F1=Help

Figure 8.8: X.25 Profiles

Internetworking Configuration 3.10b		NetWare Loadable Module
X.25 Profile Configuration		
Profile:	Local	
Profile Type:	Local	
Frame Level Parameters:	<view or modify>	
Packet Level Parameters:	<view or modify>	
Virtual Circuit Setup:	<view or modify>	
User Facility Setup:	<view or modify>	
Frame Node Type:	DTE	<view only>
Frame Window Size:	7	<view only>
Packet Size <Def/Max>:	128/128	<view only>
Packet Window Size <Def/Max>:	2/2	<view only>
Number of UCs <PUC/In/Two-Way/Out>:	0/0/8/0	<view only>
Authentication Options: <view or modify>		

Name of the profile associated with the port.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 9: X.25 Profile Configuration

Internetworking Configuration 3.10b		NetWare Loadable Module
X.25 Profile Configuration		
Prof Prof	X.25 Frame Level Parameters	
Fram Pack Uirt User	Profile: Frame Node Type: DTE Connection Mode: Active	>>>
Fram Fram Pack Pack	Frame Sequencing Modulo: 8 Frame Window Size <K>: 7 Retry Count <N2>: 20 Retry Timeout <T1>: 2 <seconds>	<view only> <view only> <view only> <view only>
	Number of UCs <PUC/In/Two-Way/Out>:	0/0/8/0 <view only>
Authentication Options: <view or modify>		

Select the logical link interface type to be used.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 10: Frame Level Parameters

Internetworking Configuration 3.10b		NetWare Loadable Module
X.25 Profile Configuration		
Prof Prof	X.25 Packet Level Parameters	
Fram Pack Uirt User	Profile: X.25 Version: 1984 Default Packet Size: 128 <octets>	>>>
Fram Fram Pack Pack Numb	Packet Sequencing Modulo: 8 Default Window Size: 2 Restart Response Timer <T20>: 180 <seconds> Call Response Timer <T21>: 200 <seconds> Reset Response Timer <T22>: 180 <seconds> Clear Response Timer <T23>: 180 <seconds>	<view only> <view only> <view only> <view only>

Select the specific conformance year for the X.25 specification being used.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 11: Packet Level Parameters

Internetworking Configuration 3.10b		NetWare Loadable Module																				
X.25 Profile Configuration																						
Prof Prof Fram Pack Uirt User Fram Fram Pack Pack Numb	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">X.25 Virtual Circuit Setup</th> </tr> <tr> <td colspan="2">Profile:</td> </tr> <tr> <td>Lowest PUC LCN:</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Number of PUC LCNs:</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Lowest Inbound-Only SUC LCN:</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Number of Inbound-Only LCNs:</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Lowest Two-Way SUC LCN:</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Number of Two-Way SUC LCNs:</td> <td style="text-align: center;">8</td> </tr> <tr> <td>Lowest Outbound-Only SUC LCN:</td> <td style="text-align: center;">9</td> </tr> <tr> <td>Number of Outbound-Only LCNs:</td> <td style="text-align: center;">0</td> </tr> </table>	X.25 Virtual Circuit Setup		Profile:		Lowest PUC LCN:	0	Number of PUC LCNs:	0	Lowest Inbound-Only SUC LCN:	1	Number of Inbound-Only LCNs:	0	Lowest Two-Way SUC LCN:	1	Number of Two-Way SUC LCNs:	8	Lowest Outbound-Only SUC LCN:	9	Number of Outbound-Only LCNs:	0	<view only> <view only> <view only> <view only> <view only>
X.25 Virtual Circuit Setup																						
Profile:																						
Lowest PUC LCN:	0																					
Number of PUC LCNs:	0																					
Lowest Inbound-Only SUC LCN:	1																					
Number of Inbound-Only LCNs:	0																					
Lowest Two-Way SUC LCN:	1																					
Number of Two-Way SUC LCNs:	8																					
Lowest Outbound-Only SUC LCN:	9																					
Number of Outbound-Only LCNs:	0																					

Specify the lowest LCN that can be used for a permanent virtual circuit (PUC).
 ENTER=Select ESC=Previous Menu F1=Help

Figure 12-12: Virtual Circuit Setup

Internetworking Configuration 3.10b		NetWare Loadable Module																		
X.25 Profile Configuration																				
Prof Prof Fram Pack Uirt User Fram Fram Pack Pack Numb	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">X.25 User Facility Setup</th> </tr> <tr> <td colspan="2">Profile:</td> </tr> <tr> <td>Allow Flow Control Negotiation:</td> <td></td> </tr> <tr> <td>Maximum Packet Size:</td> <td style="text-align: center;">128 <octets></td> </tr> <tr> <td>Maximum Window Size:</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Allow Incoming Reverse Charge Calls:</td> <td style="text-align: center;">Yes</td> </tr> <tr> <td>Packet Size (Def/Max):</td> <td style="text-align: center;">128/128</td> </tr> <tr> <td>Packet Window Size (Def/Max):</td> <td style="text-align: center;">2/2</td> </tr> <tr> <td>Number of UCs (PUC/In/Two-Way/Out):</td> <td style="text-align: center;">0/0/8/0</td> </tr> </table>	X.25 User Facility Setup		Profile:		Allow Flow Control Negotiation:		Maximum Packet Size:	128 <octets>	Maximum Window Size:	2	Allow Incoming Reverse Charge Calls:	Yes	Packet Size (Def/Max):	128/128	Packet Window Size (Def/Max):	2/2	Number of UCs (PUC/In/Two-Way/Out):	0/0/8/0	<view only> <view only> <view only> <view only> <view only>
X.25 User Facility Setup																				
Profile:																				
Allow Flow Control Negotiation:																				
Maximum Packet Size:	128 <octets>																			
Maximum Window Size:	2																			
Allow Incoming Reverse Charge Calls:	Yes																			
Packet Size (Def/Max):	128/128																			
Packet Window Size (Def/Max):	2/2																			
Number of UCs (PUC/In/Two-Way/Out):	0/0/8/0																			
Authentication Options: <view or modify>																				

Select YES to allow Flow Control Negotiation.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 13-13: User Facility Setup

Internetworking Configuration 3.10b		NetWare Loadable Module																				
X.25 Network Interface																						
Internetworking Board Network WAN Protocol Bind Manager View	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="text-align: center;">U.24 Line Configuration Options</th> </tr> <tr> <td>Interface Name:</td> <td style="text-align: center;">WTW312HOST_1</td> </tr> <tr> <td>Physical Channel:</td> <td style="text-align: center;">[B]</td> </tr> <tr> <td>Clocking:</td> <td style="text-align: center;">External</td> </tr> <tr> <td>Line Speed:</td> <td style="text-align: center;">9600</td> </tr> <tr> <td>Setup Delay:</td> <td style="text-align: center;">5 <seconds></td> </tr> <tr> <td>Line Protocol:</td> <td style="text-align: center;">U.24</td> </tr> <tr> <td>PSTN Dialup:</td> <td style="text-align: center;">No</td> </tr> <tr> <td>Line Configuration:</td> <td style="text-align: center;"><view or modify></td> </tr> <tr> <td colspan="2">Authentication Options: <view or modify></td> </tr> </table>	U.24 Line Configuration Options		Interface Name:	WTW312HOST_1	Physical Channel:	[B]	Clocking:	External	Line Speed:	9600	Setup Delay:	5 <seconds>	Line Protocol:	U.24	PSTN Dialup:	No	Line Configuration:	<view or modify>	Authentication Options: <view or modify>		Not Configured
U.24 Line Configuration Options																						
Interface Name:	WTW312HOST_1																					
Physical Channel:	[B]																					
Clocking:	External																					
Line Speed:	9600																					
Setup Delay:	5 <seconds>																					
Line Protocol:	U.24																					
PSTN Dialup:	No																					
Line Configuration:	<view or modify>																					
Authentication Options: <view or modify>																						

Select the physical channel to be used for this port.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 14-14: Line Configuration Options

Internetworking Configuration 3.10b		NetWare Loadable Module																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Boar</td></tr> <tr><td>Netw</td></tr> <tr><td>WAN</td></tr> <tr><td>Prot</td></tr> <tr><td>Bind</td></tr> <tr><td>Mana</td></tr> <tr><td>View</td></tr> </table>	Boar	Netw	WAN	Prot	Bind	Mana	View	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Boa</td></tr> <tr><td>NE2</td></tr> <tr><td>WTW</td></tr> </table>	Boa	NE2	WTW	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">X.25 Network Interface</td></tr> <tr><td>Inte</td><td style="text-align: center;">X.25 Authentication Options</td></tr> <tr><td>Inte</td><td>Interface Name: WTW312HOST_1</td></tr> <tr><td>Inte</td><td>Inbound Authentication: Disabled</td></tr> <tr><td>Prof</td><td>Authentication Database Name: X25-AUTH</td></tr> <tr><td>Loca</td><td>Authentication Database: <view or modify></td></tr> <tr><td>Stat</td><td>User Data Size: 4096 (octets)</td></tr> <tr><td></td><td>Interface Queue Limit: 100</td></tr> <tr><td></td><td>Line Protocol: U.24</td></tr> <tr><td></td><td>PSIN Dialup: No</td></tr> <tr><td></td><td>Line Configuration: <view or modify></td></tr> <tr><td></td><td>Authentication Options: <view or modify></td></tr> </table>	X.25 Network Interface		Inte	X.25 Authentication Options	Inte	Interface Name: WTW312HOST_1	Inte	Inbound Authentication: Disabled	Prof	Authentication Database Name: X25-AUTH	Loca	Authentication Database: <view or modify>	Stat	User Data Size: 4096 (octets)		Interface Queue Limit: 100		Line Protocol: U.24		PSIN Dialup: No		Line Configuration: <view or modify>		Authentication Options: <view or modify>
Boar																																				
Netw																																				
WAN																																				
Prot																																				
Bind																																				
Mana																																				
View																																				
Boa																																				
NE2																																				
WTW																																				
X.25 Network Interface																																				
Inte	X.25 Authentication Options																																			
Inte	Interface Name: WTW312HOST_1																																			
Inte	Inbound Authentication: Disabled																																			
Prof	Authentication Database Name: X25-AUTH																																			
Loca	Authentication Database: <view or modify>																																			
Stat	User Data Size: 4096 (octets)																																			
	Interface Queue Limit: 100																																			
	Line Protocol: U.24																																			
	PSIN Dialup: No																																			
	Line Configuration: <view or modify>																																			
	Authentication Options: <view or modify>																																			

Select "Enabled" to enable authentication of inbound calls.
 ENTER>Select ESC=Previous Menu F1=Help

Figure 15-15: Authentication Options

WAN Call Directory

Internetworking Configuration 3.10b		NetWare Loadable Module								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">Internetworking Configuration</td></tr> <tr><td>Network Interfaces</td></tr> <tr><td>WAN Call Directory</td></tr> <tr><td>Protocols</td></tr> <tr><td>Bindings</td></tr> <tr><td>Manage Configuration</td></tr> <tr><td>View Configuration</td></tr> </table>			Internetworking Configuration		Network Interfaces	WAN Call Directory	Protocols	Bindings	Manage Configuration	View Configuration
Internetworking Configuration										
Network Interfaces										
WAN Call Directory										
Protocols										
Bindings										
Manage Configuration										
View Configuration										

Add, delete, and configure interface boards.
 ENTER>Select ESC=Exit Menu F1=Help

Figure 16-16: Internetworking Configuration Menu

Internetworking Configuration 3.10b		NetWare Loadable Module																	
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="text-align: center;">Internetworking Configuration</td></tr> <tr><td colspan="3" style="text-align: center;">Configured WAN Call Destinations</td></tr> <tr> <th style="text-align: left;">Call Destination</th> <th style="text-align: left;">Media</th> <th style="text-align: left;">Interface</th> <th style="text-align: left;">Interface Group</th> </tr> <tr> <td>NTLAB001</td> <td>X.25</td> <td>WTW312HOST_1</td> <td></td> </tr> <tr> <td>UU001</td> <td>X.25</td> <td>WTW312HOST_1</td> <td></td> </tr> </table>			Internetworking Configuration		Configured WAN Call Destinations			Call Destination	Media	Interface	Interface Group	NTLAB001	X.25	WTW312HOST_1		UU001	X.25	WTW312HOST_1	
Internetworking Configuration																			
Configured WAN Call Destinations																			
Call Destination	Media	Interface	Interface Group																
NTLAB001	X.25	WTW312HOST_1																	
UU001	X.25	WTW312HOST_1																	

Choose from the list of configured Call Destinations.
 ENTER>Select INS=Insert DEL=Delete ESC=Previous Menu F1=Help

Figure 17-17: Configured WAN Call Destinations

Internetworking Configuration 3.10b	NetWare Loadable Module
X.25 Call Destination Configuration	
Call Destination Name:	NILAB001
Call Type:	Permanent <active continuously>
Interface Group:	
Interface Name:	WTW312HOST_1
Circuit Type:	Switched Virtual Circuit
PUC Number:	
Destination DTE Address:	00000252
Retry Mode:	Retry Self-Correcting Failures
Retry Limit Handling:	Continuous At Limit
Retry Interval Limit:	00:10:00 <HH:MM:SS>
Idle Line Timeout:	
Remote System ID:	NILAB001
Expert Call Configuration:	<Select for Expert Configuration>

Specify the call type, Permanent or On Demand.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 18-18: Call Destination Configuration

Internetworking Configuration 3.10b	NetWare Loadable Module
X.25 Expert Call Configuration	
Call Destination Name:	NILAB001
Data Compression:	<input type="checkbox"/> No
Request Reverse Charging:	No
Window Size:	0
Packet Size:	Not Selected
Throughput Class:	Not Selected
CUG Facility:	Not Selected
CUG Number <hex>:	
Fast Select:	No
With Restriction:	
Call User Data <hex>:	00000000
Generic CCITT Facilities Entry	<Select To Configure>
Generic National Facilities Entry	<Select To Configure>

Specify whether data compression should be used for this call.
 ENTER=Select ESC=Previous Menu F1=Help

Figure 19-19: Expert Call Configuration

Installing and Loading the DMS-100 NTS Driver NLM

The DMS-100 NTS Driver and associated software should be installed on the NetWare Server from a client workstation.

Installing the DMS-100 NTS Driver

The components of the DMS-100 Driver are listed below, together with the target directory names where they must reside on the NetWare Server. They are contained in an archive file on the DMS-100 Driver distribution diskette and should be extracted and copied to the appropriate directory.

System Directory

- DMS100.NLM (Driver)
- X25TERM.NLM (Racal X.25 Interface)

ASNI Directory (new directory under root)

- LOGON.CFG (Command to log driver onto DMS-100 Switch)

- ASSOC.CFG (Commands to associate Directory Numbers with the driver)
- LICENSE.WTW (Holds license number)

Configuring the DMS-100 NTS Driver

License

Call the DMS-100 Driver support provider and specify the NetWare Server name. The support provider will respond with a license number which must be used in LICENCE.WTW (example follows).

```
# license number obtained from WTW & Associates, Inc.  
# call (919) 941-0081 for updates.  
12345678 [license number]
```

Logon Configuration

LOGON.CFG must be edited to include the parameters for the user supplied data items (example and explanation follows).

```
# file: logon.cfg  
# purpose: Specify DMS100 logon parameters.  
  
# This file contains the parameters used in the CompuCALL DV-APPL-LOGON  
# message. Most of them need to be customized to match the values expected  
# by the DMS-100. The following describes each of the logon parameters  
and  
# which DMS field's value must be matched. SCAIGRP, SCAIPROF, and  
# BGDATA are DMS-100 tables.  
#  
# parameters:  
# sequence Not required (LOGON) // do not change  
# invokeID logon invokeID (=33) // do not change  
# operation logon operation (1) // do not change  
# networkNodeID logon networkNode, must be IDNETNODID in DMS SCAIGRP  
table  
# serviceID logon serviceID, must be SERVICE_ID in DMS  
SCAIPROF table  
# serviceVersion Not required // do not change  
# businessGroupID logon businessGroupID, must be GRPNUM in BGDATA  
table  
# applicationID Not required  
# password logon password, must be PASSWORD in SCAIGRP table  
# val1 Not required  
# val2 Not required  
# val3 Not required  
LOGON,33,1,23,3,36,8,1,GENTAF,1,1,1 [example logon command]
```

Associations Configuration

ASSOC.CFG must be edited to include an entry for the primary ACDDN for each ACD group that the DMS-100 Driver will be monitoring.

```
# file: assoc.cfg
# purpose: Specify DMS100 DV-DN-ASSOCIATE parameters.
#
# parameters:
# sequence                Not required
# invokeID                Not required autogenerated DMS100 associate invokeID
# operation                DMS100 associate operation (2)
# associatedDN             DMS100 DN, char[25]
# dnOperation             DMS100 associate DN operation
#                          values: 0 = add, 1 = delete(default), 2 = define
# val1                    Not required
# val2                    Not required
#
ASSOCADD,44,2,9025496010,0,1,1      [associate command]
ASSOCADD,45,2,9025496020,0,1,1
ASSOCADD,47,2,9025496200,0,1,1
ASSOCADD,48,2,9025498500,0,1,1
ASSOCADD,49,2,9025498600,0,1,1
ASSOCADD,50,2,9025496600,0,1,1
ASSOCADD,51,2,9025496650,0,1,1
```

Loading the DMS-100 Driver

The DMS100 driver and X25TERM should be loaded as follows:

- LOAD X25TERM NTLAB001 [WAN Call Destination Name from INETCFG]
- LOAD DMS100

Administering Telephony Services

The procedure for administering Telephony Services is described in "How to Use the Tserver Administrator Client Application" in the *Novell NetWare Telephony Services Network Manager's Guide*. Follow the steps in the guide to administer switches and Worktops. However, when administering Advertised Names, Devices, Device Groups, and Users, refer to the following information which is unique to the DMS-100 NTS.

Advertised Names

When creating an Advertised Name, assign NTI to the vendor field, CSTASERV to the Link Name field, click CTI Link, and type the name of the Tserver in the Tserver field.

The name of the Tserver can be found in the Autoexec.NCF file on the NetWare server.

Devices

Installation & Configuration

A device can be a position ID associated with the In-Calls key on an ACD agent associated set, or the position ID associated with an ACD agent's analog set. Multiple Appearance Directory Numbers (MADNs) are not supported devices. For the device type, choose "phone". These stipulations apply to each device being configured for the TSAPI application.

Device Groups

When creating Device Groups, assign both devices to the group.

Users

If a Device Group has been configured, assign the device group name to the Worktop Name/Primary Device ID field in the User Information screen.

Click the Options button in the User Information screen and assign the device group name to all access groups.

Note : *The Tserver uses a security database to authenticate the user privileges that exist on various devices for different telephony services such as call control, monitoring, query, and routing. Part of the security check involves verifying that the user requesting a connection to the Tserver has an administered login and has been assigned the appropriate access rights. The security database is what prevents one user's applications from affecting another's phone.*

TROUBLESHOOTING and ERRORS

Troubleshooting

Testing the Connection from the Tserver to the CompuCALL Link

You can display messages from the Tserver to the CompuCALL Link on the Tserver console. The displayed messages are interpretations of the messages that are on the CompuCALL Link console after executing the CompuCALL Link trace commands.

Problem Descriptions

- Problem:** DMS Driver NLM cannot find license file.
Explanation: Either the ASN1 subdirectory is missing on the server's SYS: volume or the LICENSE.WTW file does not exist in the ASN1 subdirectory.
Action: Verify installation steps to create the ASN1 subdirectory and copy the LICENSE.WTW file.
- Problem:** DMS Driver NLM rejects the license number.
Explanation: An incorrect license number has been provided for the NetWare server.
Action: Follow installation instructions to obtain a license number from WTW.
- Problem:** DMS Driver/X25TERM NLM(s) cannot connect the X.25 link.
Explanation: The logical X.25 connection cannot be established to the switch.
Action: Follow installation instructions to setup X.25 link. Use the XPTADMIN NLM to verify that frames flow between the server and the switch and for general diagnostics. Ensure that the X.25 modem has an active session to the switch.
- Problem:** DMS Driver NLM cannot logon to the switch.
Explanation: A logon to the switch cannot be obtained.
Action: Check the "SYS:\ASN1\LOGON.CFG" file for correct values. Verify that DMS and X25TERM NLMs have connected to the switch.
- Problem:** DMS Driver cannot associate to the switch.
Explanation: Associates to the switch are failing.
Action: Check the "SYS:\ASN1\ASSOC.CFG" for correct values.
- Problem:** DMS Driver NLM will not load because required symbols are not available.
Explanation: DMS Driver NLM relies on symbols exported by the X25TERM NLM.

- Action:** Follow installation instructions and load the X25TERM NLM before the DMS Driver NLM.
- Problem:** DMS Driver NLM cannot load because of insufficient server memory.
- Explanation:** The NetWare server has insufficient memory to load the DMS Driver NLM.
- Action:** Ensure that the NetWare server fulfills the minimum system requirements.
- Problem:** Client applications cannot open an ACS stream to the DMS Driver NLM.
- Explanation:** Client applications cannot establish a TSAPI connection to the DMS Driver NLM.
- Action:** Ensure that all required NLMs are loaded on the NetWare server. Ensure that TSAPI services are correctly configured and loaded on the client workstation. Examine the TServer error logs (ERRLOGA.TXT & ERRLOGB.TXT in /SYSTEM/TSRV directory) for troubleshooting.

Useful Tips

- Several trace facilities and logs exist to assist troubleshooting problems. The DMS Driver NLM trace is controlled via function keys on the X25TERM NLM screen. The Tserver maintains a separate trace and several application tools provide their own tracing facilities.
- The XPTADMIN NLM provides diagnostic tools to trace activity on an X.25 connection. Various levels such as frame and packet tracing existing that allow a system administrator to determine whether information is flowing on the X.25 link.
- Although tracing is important during setup and installation, each trace facility degrades the performance of the file server. Tracing is intended for problem determination and should not normally be used in a production environment.

DMS-100 NTS Driver NLM Error Messages

Each error message shown below represents a class of error. Additional error information may be determined from trace data as defined in the DMS-100 Tracing Function (*see Appendix A*).

ERROR MESSAGE	EXPLANATION	ACTION
BADLY_STRUCTURED_APDU_REJECTION	The message sent to the switch resulted in a return-error from the switch	Most likely caused by invalid input from the application. Check to see that correct callID and DeviceID were provided.

Troubleshooting & Errors

GENERIC_STATE_INCOMPATIBILITY	A request could not be honored because of existing conditions. For example, an Agent login request was sent, but the agent is already logged in.	Verify input and retry if necessary.
GENERIC_SUBSCRIBED_RESOURCE_AVAILABILITY	The switch detected an error in the driver/switch configuration	Verify that account codes, authorizaiton codes and subscribed services are configured correctly.
GENERIC_SYSTEM_RESOURCE_AVAILABILITY	A threshold has been reached, and the request fails.	Wait for activity to subside and retry.
GENERIC_UNSPECIFIED	An error ocured for which there is no immediate explanation	Retry the operation.
INVALID_CSTA_IDENTIFIER	The combination of callID and DeviceID was not usable by the driver.	Verify the input is correct.
INVALID_DESTINATION	The application provided a number to be called that was rejected by the switch	Check the number and try again.
INVALID_OBJECT_STATE	A state violation was detected, e.g., a makecall was made to an agent who was not logged in.	Verify the correct sequence of operations and retry the operation.
INVALID_OBJECT_TYPE	The switch returned an error indicating a missing call-type	Report to support personnel. Trace data will be required.
NON_STANDARD	The switch detected a supervisor override on a set feature request.	Correct the situation and retry if necessary.
REQUEST_INCOMPATIBLE_WITH_OBJECT	The switch detected an invalid line configuration on a set-feature request	Correct the configuration and retry.
REQUEST_TIMEOUT_REJECTION	A request timed out waiting for a response.	Retry the operation
RESOURCE_BUSY	An attempt to do a make call was made using a device that was already busy.	Verify that the device is ready to initiate a call.
UNSPECIFIED_SECURITY_ERROR	The switch reported a password mismatch to an agent login request.	Correct the password and retry.

APPENDIX A: DMS-100 TRACING FUNCTION

Overview

A trace facility to record the overall activity of the DMS driver is provided for network managers and application developers to receive real-time information regarding the internal workings of the DMS driver. The information contained in trace messages is subject to change in fixes and future releases of the DMS Driver.

Trace Levels and Activation's

The trace is activated from the X25TERM NLM screen on the NetWare server console. The X25TERM NLM screen includes function keys to activate or inactivate different forms of tracing.

Tracing will be active or inactive for specialized activities.

The following activities will be traceable:

- ASN.1 messages sent to the switch and received from the switch.
- TSAPI messages sent to Tserver and received from Tserver.
- Internal Call State tracing.
- Internal Performance tracing.

The X25TERM NLM's screen has function keys that will allow the user to turn each form of tracing ON or OFF. In effect the function keys will toggle each trace ON or OFF and inform the user of the new setting. The tracing level will be in effect immediately upon selection.

An example X25TERM NLM screen, shown below, illustrates the Function Key menu as well as the current values of the Function Keys.

```
> Target: NTLAB001
> Calling NTLAB001
ConnectX25: X25 Connecting NTLAB001 ...
connectX25: connect(64), log(16), associate(16), continuity(16)
```

```
F2=X25[on] F6=ExamSem
F7=TrSwitch[on] F8=TrTSAPI[on] F9=TrPerf[on] F10=TrCallSt[on]
```

Function key mappings for tracing:

- F7 toggles tracing of switch messages.
- F8 toggles tracing of TSAPI messages.
- F9 toggles the performance trace.
- F10 toggles the Call State trace.

Appendix A: DMS-100 Driver Tracing Functions

In addition to the tracing function keys, the following function keys are defined:

- F2 attempts a "manual" X.25 logon.
- F6 examines the semaphores within the X25TERM NLM.

The F2 and F6 function keys are intended for problem diagnosis/installation and have limited value for the customer.

Trace File Location

The trace file is located on the NetWare file server on the SYSTEM volume in the following file specification(s) "SYS:\ASN1\DMSTRC_A.TXT" or "SYS:\ASN1\DMSTRC_B.TXT". The trace facility toggles between the A and B files.

When tracing is activated, the DMS NLM will issue a message to the NetWare Console to indicate the name of the trace file and the trace settings. In the event of an error, a Console message will be generated to indicate the failure.

Trace File Closing

The trace file will be closed as part of the DMS NLM termination process. A trace file remains open until all trace functions are turned off or the DMS NLM terminates.

Message Formats

Several different messages will be generated to the trace file. Messages will have a format such that post-processing activities may remove unwanted information or extract specific messages.

All messages have the following general format: *Date & Time, Action, Data*

An example of each message type is included here.

Trace OPEN and CLOSE messages:

```
02/27/96 10:12:21 OPEN: DMS Trace File Open
02/27/96 10:10:45 CLOSE: DMS Trace File Close
```

ASN.1 Message To Switch

The ASN.1 Messages to the Switch will contain the decoded request followed by a dump of the decoded PDU information. See the CompuCALL Interface specification for a detailed description of each message.

```
03/13/96 14:34:19 TO_SWITCH: INVOKE DV-APPL-LOGON
03/13/96 14:34:22 TO_SWITCH: INVOKE DV-APPL-ASSOCIATE
03/13/96 14:37:01 TO_SWITCH:PDU DV_CONFERENCE_PARTY_Invoke_PDU
{ -- SEQUENCE --
  invokeID 8,
```

Appendix A: DMS-100 Driver Tracing Functions

```
operation 15,  
argument { -- SEQUENCE --  
    origAddress positionID 5113  
}  
}
```

ASN.1 Message From Switch

The ASN.1 Message from the Switch will contain the decoded request followed by a dump of the decoded PDU information.

```
04/08/96 15:57:04 FROM_SWITCH: RETURN-RESULT Unknown  
04/08/96 15:57:04 FROM_SWITCH: PDU Generic_RR_PDU  
{ -- SEQUENCE --  
    invokeID 0  
}
```

TSAPI Message from Tserver

The TSAPI requests arriving from the TSERVER NLM will contain the decoded request with the Invoke ID of the operation.

```
03/13/96 14:37:00 FROM_TSERVER: TServer Request CSTAREQUEST CSTA_CONFERENCE_CALL  
InvokeID=129
```

TSAPI Message to TSERVER

Not currently traced by the driver.

Call State

In the Call State trace, the following information will be included:

- Call XID (and whether the XID is active)
- Device ID
- Call ID of the Switch
- Call ID of the Tserver
- Calling Device ID
- Called Device ID
- Transferring Device ID
- Invoke ID
- The Linked Call XIDs

Information in the Call State trace is generally considered an internal with respect to NLM processing and will have limited value for external customers.

```
03/08/96 12:22:19 CALLSTATE: Transfer Request (recvTransferCallFromTserver) - Held  
Call State  
Followed by internal call state messages.
```

Performance Messages

Appendix A: DMS-100 Driver Tracing Functions

Performance messages measure internal activity of the DMS Driver.

04/08/96 15:56:52 *PERFORM: QUEUE SIZE: Tserver=-1 Event=-1 Switch=0 Trace=-1*

NOTE : Information in the call state trace is internal to the NLM processing and is intended for use by Nortel support personnel.

LIST OF TERMS

The following telephony services terms are used throughout this guide:

CompuCALL Link

The communications link between the DMS-100 switch and the Telephony Server.

Computer Telephony Integration (CTI) Link

A physical and logical connection between a switch and computing system.

CSTA

Computer-Supported Telecommunications Applications. The CSTA standard is a technical agreement reached by an open, multi-vendor consortium of major European switch and computer vendors.

ECMA

European Computer Manufacturers Association.

DMS-100

The telephone switch that controls the station sets associated with the Telephony Services™ client.

DMS-100 NTS Driver NLM

The DMS-100 NTS Driver initiates and maintains the CompuCALL Link connection between the telephony server and the DMS-100.

NetWare Telephony Server

Appears to the DMS-100 as a single-host machine. Supports client requests over the CompuCALL Link to provide switch integration. It has three components: the Telephony Services Application Programming Interface (TSAPI), the Telephony Services NLM, and the DMS-100 NTS Driver NLM.

Telephony Services NLM

NetWare Loadable Module and component of the NetWare Telephony Server. Manages requests from clients over the NetWare LAN, confirms that each client is administered for the requested service, responds to some CSTA requests, and routes other requests to the DMS-100 NTS Driver NLM.

Telephony Services Application Programming Interface (TSAPI)

Allows client applications to use the Telephony Services Library. Provides application control services, CSTA control services, CSTA security services, CSTA call control services, CSTA status reporting services, and CSTA call event reports.

Telephony Services Driver Interface (TSDI)

Interface between the Telephony Services NLM and the DMS-100 NTS Driver NLM. Used to pass messages (in C-structure format) that represent requests and responses between the client application and the DMS-100 NTS Driver.

Telephony Services Library

Novell software library provided by the Telephony Server.

LIST OF TERMS

DMS100
NetWare Telephony Services

Network Manager's Guide

