ADTRAN

NxIQ

Nx56/64 Module
with
Frame-Relay Performance Monitoring

1200.255L1

USER MANUAL

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SunNet Manager is a registered trademark of Sun Microsystems, Inc.
Netview is a registered trademark of IBM.
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ABOUT THIS MANUAL

This manual is arranged so you can quickly and easily find the information you need. The following is an overview of the contents of this manual:

- Chapter 1, Introduction, familiarizes you with frame relay networks and NxIQ highlights.
- Chapter 2, Installation, describes the NxIQ connectors (pin assignments are given in Appendix A) and provides an installation diagram.
- Chapter 3, Operation, explains how to operate your NxIQ using either the front panel or a terminal interface.
- Chapter 4, Management Applications, provides examples of some common NxIQ applications. This chapter includes network diagrams as well as configuration examples.
- Chapter 5, Configuration Overview, explains how to access the NxIQ configuration menu and provides menu trees for both the front panel and the terminal interface.
- Chapters 6 through 8 provide brief explanations for selections made in the Configuration menus. These chapters are based on the first level menu branches of the Configuration menu: DTE Port, Network Port, and System Configuration.
- Chapter 9, Statistics, describes how to access statistical information from the NxIQ.
- Chapter 10, Diagnostics, explains how to access the NxIQ diagnostic features, including PVC loopback and ping tests.
- Chapter 11, Utility Menu, describes the utility menu for front panel operation.
- Appendix A, Pinouts, provides pinouts for the NxIQ connectors.
- Appendix B, Specifications Summary, contains product specifications.

NOTE *Notes provide additional useful information.*

CAUTION *Cautions signify information that could prevent service interruption.*

WARNING *Warnings provide information that could prevent damage to the equipment or endangerment to human life.*

**FEDERAL COMMUNICATIONS COMMISSION
RADIO FREQUENCY INTERFERENCE STATEMENT:**

This equipment has been tested and found to comply with the
limits for a Class A digital device, pursuant to Part 15 of the FCC
Rules. These limits are designed to provide reasonable protection
against harmful interference when the equipment is operated in a
commercial environment. This equipment generates, uses, and
can radiate radio frequency energy and, if not installed and used
in accordance with the instruction manual, may cause harmful in-
terference to radio frequencies. Operation of this equipment in a
residential area is likely to cause harmful interference in which
case the user will be required to correct the interference at his own
expense.

Shielded cables must be used with this unit to ensure compliance
with Class A FCC limits.

WARNING   *Change or modifications to this unit not expressly
approved by the party responsible for compliance
could void the user's authority to operate the equip-
ment.*

CANADIAN EMISSIONS REQUIREMENTS

This digital apparatus does not exceed the Class A limits for radio
noise emissions from digital apparatus as set out in the interfer-
ence-causing equipment standard entitled "Digital Apparatus,"
ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelec-
triques applicables aux appareils numeriques de Class A pre-
scrites dans la norme sur le materiel brouilleur: "Appareils
Numeriques," NMB-003 edictee par le ministre des Communica-
tions.

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Chapter 1
Introduction

PRODUCT OVERVIEW

The ADTRAN NxIQ option module installs in the option slot of the TSU muliplexer family of products and provides a synchronous V.35 interface for frame-relay applications.

The NxIQ provides the visibility and control needed for both the physical and logical connections made in frame-relay networks. The NxIQ provides logical layer monitoring and management for frame relay. Each permanent virtual circuit (PVC) accessed through an NxIQ is managed end-to-end as if it were a leased line connection. Real time statistics on throughput, bandwidth utilization, availability, bursting, congestion, and network delay are collected and stored in the Frame IQ MIB (management information base). This information can then be gathered by management systems and used to monitor network health and to perform long-term network planning.

The unit's embedded SNMP (simple network management protocol) agent provides complete SNMP access to the unit. SNMP access is available through the DTE or network port or through an integral SLIP (serial line internet protocol) or PPP (point-to-point protocol) async port. When used in the "e" series of TSU products, an Ethernet interface is available for SNMP access.

The following are features of the NxIQ:

- Complete and comprehensive frame relay monitoring
- Real-time measurement of bandwidth utilization, committed information rates (CIRs), and excess burst rates on each PVC
- True non-intrusive, inband transmission of statistics
- Embedded SNMP and TELNET through the DTE, Network, or SLIP/PPP port (or through the ethernet and SLIP ports on the "e" series TSU products)
- Control port provides SLIP and async PPP access to SNMP or VT 100 terminal configuration
- End-to-end network round trip delay measurements for network optimization
- Frame IQ MIB is standard ANSI (American National Standards Institute) format compatible with popular enterprise reporting systems
- Optional IQ View™ software system provides a cost-effective, easy-to-use GUI (graphical user interface) for performance management
- Standard DTE (data terminal equipment) interfaces

Understanding Frame Relay

Frame relay is a wide area network (WAN) service designed to minimize physical connections. This is accomplished by using virtual connections within the frame relay cloud and accessing these virtual circuits with, normally, one physical connection at each location to the frame relay service. Virtual circuits are addressed using header information at the beginning of each frame. These frames are formatted by the user's customer premise equipment (CPE) such as the ADTRAN NxIQ.

ANSI standards describe how each frame must be constructed to provide interoperability between CPE equipment and frame relay switching equipment. Each frame must contain a header, at least one byte of information data, two bytes of CRC16, and a trailing flag 0x7E.

This header information contains a virtual circuit address known as a DLCI (data link connection identifier). The header information also contains bits used for network congestion control.

Frame-relay virtual circuits may be defined as permanent (PVC) or switched (SVC). PVCs have the same DLCI for a given path each time a user protocol session is established. The network service provider assigns these DLCIs at subscription time. SVCs, on the other hand, have DLCIs dynamically assigned each time a user protocol session is established. The CPE equipment must request a call and the DLCI is assigned by the network-switching equipment. This DLCI is valid until the call is disconnected and may be assigned a different value each time a call is requested.

SNMP Management

SNMP management capability is provided inband with support for RFC 1315 (frame relay DTE MIB), RFC 1213 (MIB II), RFC 1406 (DS1/E1 MIB), and ADTRAN Enterprise MIB. MIB files are available from ADTRAN in the support section of the ADTRAN Web page at www.adtran.com. TELNET capability is also supported. For non-SNMP environments, VT 100 and front panel operation are supported.

The NxIQ's embedded SNMP feature allows the unit to be accessed and controlled by a network manager inband at the DTE or network interface, out-of-band at the control port via SLIP or async PPP, or using a LAN connection, available in the "e" series TSU products.

The term SNMP broadly refers to the message protocols used to exchange information between the network and the managed devices, as well as to the structure of network management databases. The three basic components of SNMP follow:

Network Manager
Control program that collects, controls, and presents data pertinent to the operation of the network devices. It resides on a network management station.

Agent
Control program that resides in each connected network device. This program responds to queries and commands from the network manager and returns requested information or invokes configuration changes initiated by the manager.

MIB
Index to the organized data within a network device. It defines the operation parameters that can be controlled or monitored.

TELNET

TELNET provides a password-protected, remote login facility to the NxIQ. TELNET allows a user on a network manager to control the NxIQ through the terminal menus.

Warranty and Customer Service

ADTRAN will replace or repair this product within five years from the date of shipment if it does not meet its published specifications or fails while in service. For detailed warranty, repair, and return information refer to the ADTRAN Equipment Warranty and Repair and Return Policy Procedure.

Return Material Authorization (RMA) is required prior to returning equipment to ADTRAN.

For service, RMA requests, or further information, contact one of the numbers listed on the inside back cover of this manual.

Chapter 2
Installation

UNPACK, INSPECT, POWER UP

Receipt Inspection

Carefully inspect the option module for any shipping damage. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Customer and Product Service (CAPS). If possible, keep the original shipping container for use in shipping the NxIQ for repair or for verification of damage during shipment.

ADTRAN Shipments Include

The following items are included in ADTRAN shipments of the NxIQ:

- NxIQ option module
- The user manual
- V.35 DTE cable
- An 8-position modular to 8-position modular cable and a modular to female DB-25 adapter for access to the Control/SLIP/PPP port

NOTE *The ADTRAN NxIQ MIB is available from ADTRAN in the support section of the ADTRAN Web page at www.adtran.com.*

Customer Provides

> For SNMP management not accessed through the DTE
> or network port, the customer must provide access to
> the NxIQ either through a SLIP port, Async PPP port
> (requires a male 25-pin D-type connector), or a 10baseT
> Ethernet port (requires an "e" series TSU product). See
> *Appendix A: Pinouts* for the pin assignments of the con-
> trol port (for SLIP and Async PPP).

INSTALLATION

Placement of the Option Module

> *Figure 2-1* shows the proper placement of the option
> module. Perform the following steps to install the op-
> tion module.

1. Remove the cover plate from the TSU/TDU unit rear panel.
2. Slide the option module into the rear panel of the TSU/TDU unit until it is positioned firmly against the front of the unit.
3. Fasten the thumbscrews at both edges of the option module.
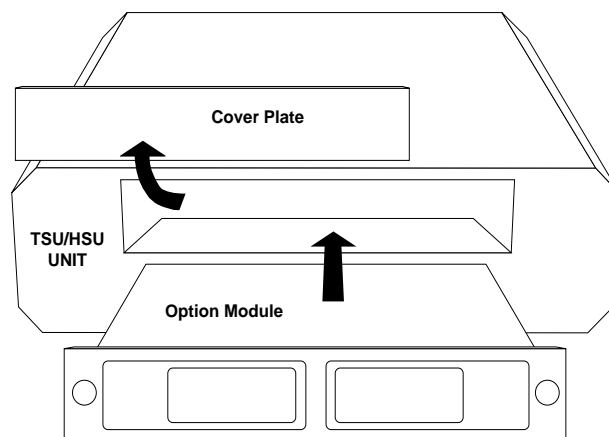
Figure 2-1
Installing the Option Module

Power Connection

Each option module derives power from the base TSU/ TDU unit. Power to the TSU/TDU is supplied by a captive eight-foot power cord.

Attaching the Plug-On Board

Figure 2-2 shows the proper attachment of a plug-on board to the option module. Perform the following steps to install the plug-on board:

1. Hold the plug-on board above the option module.
2. Using a downward and right-to-left motion, slip the V.35 Connector plug into the opening in the option module back panel.
3. Moving the plug-on board downward, secure the connection of the header pins at the front of the boards.
4. Install the two 4-40 screws at both edges of the option module.
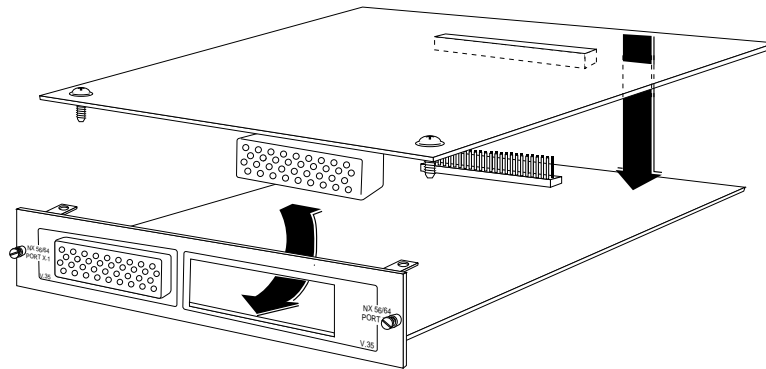
Figure 2-2
Attaching the Plug-On Board

WARNING

The connection of the header pins between the option module and the plug-on board must be visually verified. Severe damage to the equipment can result from an improper connection.

Rear Panel

The rear panel contains a DTE connector which pro-
vides the primary channel V.35. A second V.35 port is
provided for Dial Backup applications. A control port is
also provided for terminal or SLIP/PPP access. Pin as-
signments for these connectors are listed in *Appendix A:
Pinouts.* The NxIQ rear panel is shown in *Figure 2-3.*
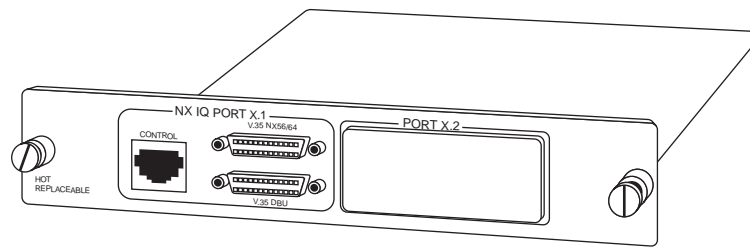
Figure 2-3
NxIQ Rear Panel

Control Port

The NxIQ has an 8-pin modular jack labeled CON-
TROL. The control port provides connection to a
VT 100 EIA-232 compatible interface, a device running
SLIP protocol, or a device running Async PPP protocol.
An 8-foot cable with adapter connector provides a stan-
dard DB-25 EIA-232 interface. See *Appendix A: Pinouts*
for the control port's pin assignments. A description of
the operation of this port is covered in *Chapter 3: Opera-
tion.*

V.35 Connector: DTE Data Connection

The DTE should be connected to the V.35 connector (labeled V.35 Nx56/64). The pin assignments for this connector are listed in *Appendix A: Pinouts.*

CAUTION *To prevent possible radio frequency interference emissions, a shielded cable is required.*

V.35 Connector: Dial Backup (DBU) Connector

The dial backup device should be connected to this V.35 interface. The pin assignments for this connector are listed in *Appendix A: Pinouts.*

Chapter 3
Operation

FRONT PANEL

Refer to the *TSU Product Manual* for a description of front panel operation.

Vt 100 Terminal Connection And Operation

To control the NxIQ using a VT 100 terminal, follow this procedure:

1. Set the NxIQ baud rate to match the terminal through the front panel (maximum rate is 38.4K).

2. Using the ADTRAN-provided VT 100 terminal adapter, connect the COM port of a VT 100 compatible terminal or equivalent to the 8-pin modular jack labeled **CONTROL** on the rear of the NxIQ. This connection is used for both local and remote configuration. (In the "e" series TSU products, the terminal can be connected to the **Control In** port of the chassis.)

3. Open the connection and press **Enter** repeatedly until the Login Menu appears (See *Figure 3-1* on page 14).

4. Select Local Login to configure the NxIQ unit connected to the terminal. Select **Remote Login** to configure a remotely located NxIQ unit. For remote applications, at the remote DLCI prompt, enter the outgoing DLCI (see the following note) by pressing **1**, then **Enter**, entering the DLCI number,

and pressing **Enter** again. Next select **Begin Re-mote Session** by pressing **2** and **Enter**.

NOTE *When entering the DLCI for a remote application, enter the DLCI associated with the local unit that you are logged in to (not the far end DLCI).*

NOTE *If the wrong DLCI is entered or a network problem exists, the screen freezes at the **Press any key to continue** prompt. Press **CNTL + L** twice to return the unit to the Login screen.*

```
                        ADTRAN  NXIQ LOGIN MENU                    LOCAL

  1 LOCAL LOGIN
  2 REMOTE LOGIN




 _____


 _____
 ESC TO EXIT   ENTER SELECTION :_
```
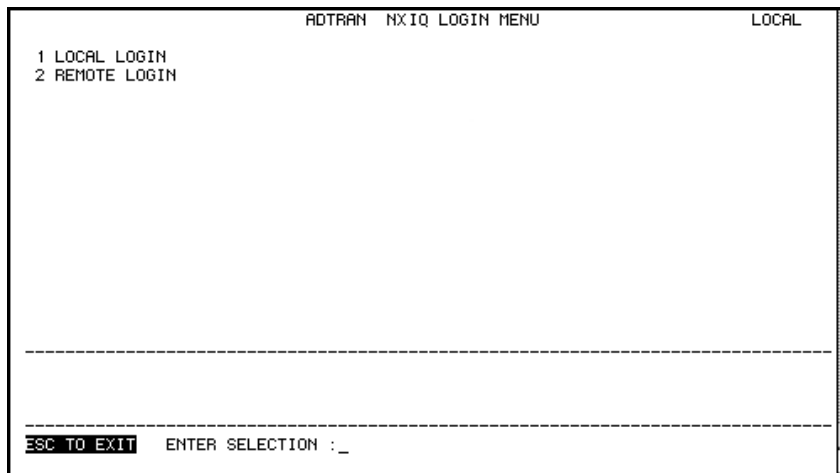
Figure 3-1
Terminal Login Menu

5. Enter the password. The factory default password is **adtran**. The Main menu will appear (See *Figure 3-2*).

6. Make selections by entering the number corresponding to the chosen parameter. Press **ESC** to return to the previous screen.

NOTE *In the upper right-hand corner of the VT 100 screen, LOCAL or REMOTE is displayed, indicating the unit the current screen represents. See Figure 3-2.*

```
                      ADTRAN  NXIQ MAIN MENU                    LOCAL

 1 CONFIGURATION
 2 VIEW STATISTICS
 3 DIAGNOSTICS
 4 LOGOUT




 _____

 _____
 ESC TO EXIT   ENTER SELECTION :_
```
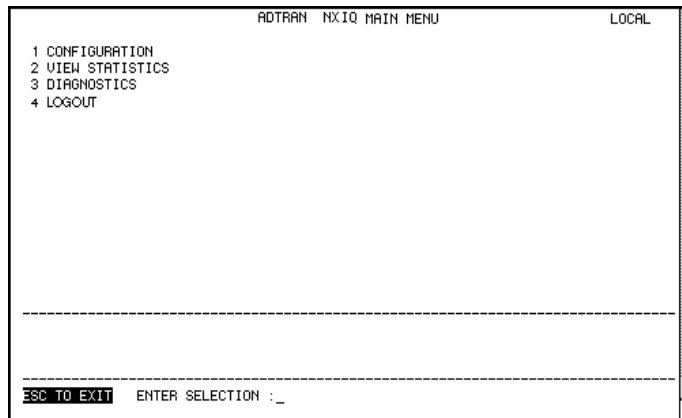
Figure 3-2
Terminal Main Menu

NXIQ MENU STRUCTURE

The opening menu is the access point to all other operations. The Main menu branches are Configuration, View Statistics, Diagnostics, and Logout as shown in *Figure 3-2.* Each Main menu item has several functions and submenus to identify and access specific parameters.

NOTE *The Logout selection is available on the terminal interface only.*

NOTE *In this chapter, the terminal selections are listed first, followed by the Front Panel selections (if the names differ). See Figure 3-3 on page 17.*

Main Menu

Definitions for the branches of the Main menu follow:

Configuration (CONFIG)
Configuration is used to select network, DTE, and system operating parameters. For more information on configuration options, see the following chapters: *Chapter 5: Configuration Overview, Chapter 6: DTE Port Configuration, Chapter 7: Configuring the Network Port,* and *Chapter 8: System Configuration.*

View Statistics (STATUS)
This selection displays statistical information for the DTE port, the network port, and the system. See *Chapter 9: Statistics* for more information.

Diagnostics (TEST)
Diagnostic options allow you to perform PVC loopback tests. See *Chapter 10: Diagnostics* for more information.

Logout (terminal menu only)
This parameter logs out of the system.

STATUS	1) DTE
	2) NET
	3) RESET STATS

CONFIG	1) DTE PORT
	2) NETWORK PORT
	3) CONTROL PORT
	4) SYSTEM

| UTIL | 1) SW REVISION |
| | 2) CMD MODE |

| TEST | 1) PVC LOOPBACK |
| | 2) LOCAL LOOPBACK |

Figure 3-3
NxIQ Front Panel Menu Structure

Chapter 4
Management Applications

One of the main advantages of the NxIQ is management flexibility. The TSU front panel interface provides configuration capabilities and viewing of key frame relay statistics information. Other management options described in this chapter provide configuration and diagnostics capabilities as well as all-inclusive statistics information.

This chapter provides examples of some common NxIQ management options. The examples include VT 100 management, out-of-band SNMP/TELNET management, and inband PVC SNMP/TELNET management. Descriptions and configuration tips for these management options are provided in the sections that follow.

NOTE *The application drawings in this chapter show routers as the frame relay device. The frame relay device could be any device with frame relay capabilities. However, to use inband management, the management DLCI must be RFC 1490 encapsulated IP traffic.*

LOCAL VT 100 TERMINAL MANAGEMENT

Connect a VT 100 terminal to the NxIQ CONTROL port (or to the control port on the chassis of an "e" series TSU product). This interface provides full-screen configuration and all-inclusive statistics access. VT 100 management also allows for remote configuration. Through this port, a remotely located NxIQ is fully accessible for configuration, diagnostics, and statistics viewing. *Figure 4-1* shows an example of VT 100 application.

NOTE

VT 100 remote mode is proprietary and non-intrusive. Therefore, you can perform all VT 100 management functions without disrupting the flow of data.
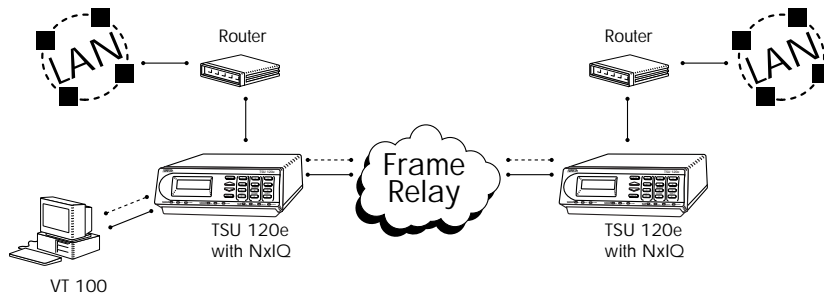
Figure 4-1
VT 100 Management Application Example

Minimum Configuration Requirements for VT 100 Management

The following options are the minimum configuration requirements for establishing VT 100 management access.

Baud Rate
Set the baud rate to match the VT 100 terminal rate. This is accessible from the front panel only (select CONTROL PORT from the CONFIG menu).

Control Port Mode
Set the Control Port Mode for TERMINAL. This selection is found in the SYSTEM CONFIGURATION portion of the CONFIG menu.

OUT-OF-BAND MANAGEMENT

This management option (shown in *Figure 4-2* on page 22) is commonly used in situations where the customer is trying to reduce the amount of management traffic flowing through the frame relay device. The NxIQ can be managed though an established TELNET session or an SNMP-based network manager like HP OpenView®, IBM Netview®, or SunNet Manager®.

NOTE *The ADTRAN NxIQ MIB is available in the support section of the ADTRAN Web page at www.adtran.com.*

SNMP and TELNET management is provided by one of the following interfaces:

- A device (e.g., a router) running SLIP protocol. Connection is made through the NxIQ's control port (or the chassis control port on an "e" series TSU product).

- A device (e.g., a router) running async PPP protocol (or the chassis control port on an "e" series TSU product).

- A LAN. Connection is made through the Ethernet interface on the chassis of an "e" series TSU product.
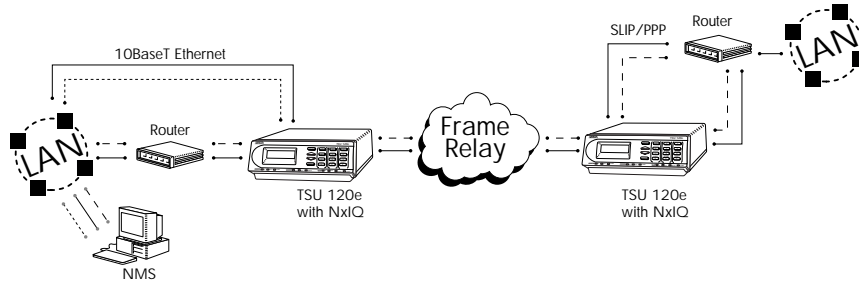
Figure 4-2
Out-of-Band Management Application Example

Minimum Configuration Requirements for Out-of-Band Management

The following options (all found in the SYSTEM CONFIGURATION menu) are the minimum configuration requirements for establishing out-of-band SNMP or TELNET access. Once these options are configured, the unit may be accessed using SNMP/TELNET.

Control Port Mode
If necessary, select SLIP or PPP as the NxIQ control port mode. If the control or Ethernet interfaces on the "e" series TSU are used, refer to the *TSU User Manual* for setup.

IP Address
Enter the NxIQ IP address.

The next five settings are applicable for SNMP access only:

Read Community Name
Set the Read Community Name to match the NMS (network management system) settings.

Write Community Name
Set the Write Community Name to match the NMS set-
tings.

Trap Manger DLCI
Identify the virtual circuit used for all traps generated
by the NxIQ.

Trap Manager IP
Enter the IP address of the SNMP manager to which the
NxIQ sends traps.

Trap Manger Port
Enter the NxIQ port used to transmit traps to the SNMP
manager.

INBAND MANAGEMENT

The ADTRAN NxIQ supports three modes of inband
management using the frame relay structure of PVCs.
These modes are *local* (see *Figure 4-3* on page 24), *shared*
(see *Figure 4-4* on page 26), and *dedicated PVC manage-
ment* (see *Figure 4-5* on page 28). All three types support
complete SNMP management as well as TELNET capa-
bilities.

NOTE *All PVC-based inband management traffic must be noncom-
pressed IP and use RFC 1490 encapsulation.*

Local PVC Management

Local PVC management refers to a PVC created be-
tween the NxIQ and the frame relay router on the DTE
interface of the NxIQ. This type of management is ideal
when local management is needed but an Ethernet con-
nection is not available. To support this type of man-
agement, all traffic on the selected PVC must be RFC
1490 encapsulated, noncompressed IP traffic.

The local PVC is sent out of the WAN serial port of the
router as normal WAN traffic and is terminated in the
NxIQ. Since the NxIQ responds to Inverse ARP, it is

not necessary to set up a static route in the router. The router will discover the IP address automatically; however, it will be necessary to set up a local PVC between the router and the NxIQ. Accomplish this by setting a value (between 16 and 1007) for the DTE management DLCI on the NxIQ to a value not used by the frame relay network.

Local PVC management can be used at any location that has a router. Therefore, remote sites can be accessed through the remote router. One consideration when using local PVC management is that if the remote router goes down, then access to the remote TSU is lost.
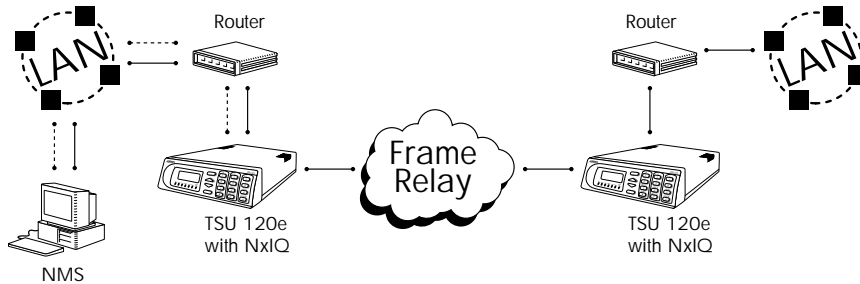
Figure 4-3
Local PVC Management Application

Minimum Configuration Requirements for Local PVC Management

The following options are the minimum configuration requirements for establishing inband local PVC management. Once these options are configured, the unit may be accessed using SNMP/TELNET. All options (with the exception of the Management DLCI option) are found in the SYSTEM CONFIGURATION menu.

IP Address
Enter the NxIQ IP address.

Management DLCI
Enter a DLCI number (between 16 and 1007) that is not used by the frame relay service. This option is found in the DTE Port Configuration menu.

The next five settings are applicable for SNMP access only:

Read Community Name
Set the Read Community Name to match the NMS settings.

Write Community Name
Set the Write Community Name to match the NMS settings.

Trap Manger DLCI
Identify the virtual circuit used for all traps generated by the NxIQ.

Trap Manager IP
Enter the IP address of the SNMP manager to which the NxIQ sends traps.

Trap Manger Port
Enter the NxIQ port used to transmit traps to the SNMP manager.

Shared PVC Management

Shared PVC management refers to a PVC that is used for normal data traffic between locations. The NxIQ monitors this PVC for packets that contain its IP address. When the NxIQ detects a packet containing a destination IP address that matches the NxIQ IP address, the unit intercepts the packet and processes its TCP/IP information. To support this type of management, all traffic on the selected PVC must be RFC 1490 encapsulated, noncompressed IP traffic.

Shared PVC management is used to manage remote NxIQs without being dependent on services from the remote router. This usually requires a static route at the host location.

> **NOTE**
>
> *By setting a local PVC management and a shared PVC management on the remote NxIQ, its IP address can be found through Inverse ARP. Since the unit is set up for shared PVC management, all management traffic will be intercepted prior to reaching the remote router.*
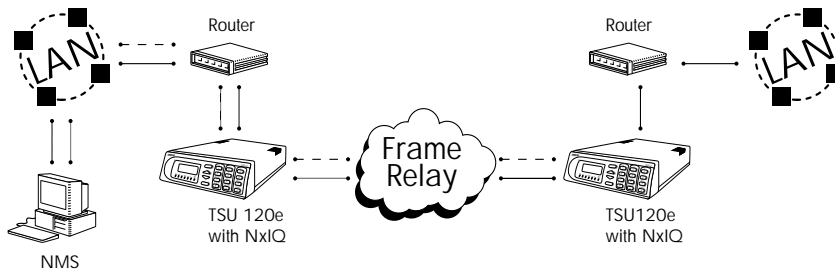
Figure 4-4
Shared PVC Management Application

Minimum Configuration Requirements for Shared PVC Management

The following options are the minimum configuration requirements for establishing inband shared PVC management. Once these options are configured, the unit may be accessed using SNMP/TELNET. All options (with the exception of the Management DLCI options) are found in the SYSTEM CONFIGURATION menu.

IP Address
Enter the NxIQ IP address.

Management DLCI 1 and/or DLCI 2
Enter the management DLCI(s) used to carry management traffic to and from the network. This option is found in the Network Port Configuration menu.

Management DLCI 1 and/or DLCI 2 Mode
Set to DEDICATED if the management DLCI is used only to manage the NxIQ (and not used to carry customer traffic). If set to DEDICATED, the router is not notified of that DLCI. Set to SHARED if the DLCI is used to carry customer traffic as well as management data. This option is found in the Network Port Configuration menu.

NOTE *The NxIQ unit supports management from two network DLCIs either shared or dedicated.*

The next five settings are applicable for SNMP access only:

Read Community Name
Set the Read Community Name to match the NMS settings.

Write Community Name
Set the Write Community Name to match the NMS settings.

Trap Manger DLCI
Identify the virtual circuit used for all traps generated by the NxIQ.

Trap Manager IP
Enter the IP address of the SNMP manager to which the NxIQ sends traps.

Trap Manger Port
Enter the NxIQ port used to transmit traps to the SNMP manager.

Dedicated PVC Management

Dedicated PVC management refers to the ability to have a PVC originated from the network and terminated in the NxIQ. This is an ideal configuration for third-party management. It isolates the customer's data traffic from network management traffic, and it also acts as a firewall that restricts management data to the TSU. Dedicated PVC management is also ideal when the user wants to guarantee access to a remote TSU regardless of the state of the remote LAN.
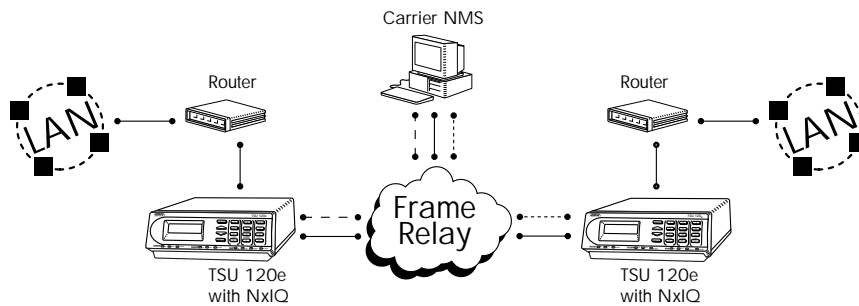
Figure 4-5
Dedicated PVC Management Application

Minimum Configuration Requirements for Dedicated PVC Management

The configuration requirements for dedicated PVC management are identical to those listed for shared PVC management. See the previous section, *Minimum Configuration Requirements for Shared PVC Management*, on page 26 for more information.

Chapter 5
Configuration Overview

LOCAL AND REMOTE CONFIGURATION

The NxIQ can be configured locally or communications can be established so that a local NxIQ can configure a remote NxIQ using a VT 100 interface. See *Chapter 3: Operation* for information on selecting **Local** or **Remote** operation.

The Configuration menu consists of the following sub-menus relating to specific interfaces or functions of the NxIQ requiring setup:

DTE Port
Network Port
Control Port (front panel only)
System Configuration

The terminal configuration menu is shown in *Figure 5-1* on page 30.

To access module configuration:

Press 2 (Config Menu tree, and
Enter 7 (Port Config)

```
                    ADTRAN  NXIQ CONFIG MENU                  LOCAL

 1 DTE PORT
 2 NETWORK PORT
 3 SYSTEM CONFIG




 _____


 _____

 ESC TO EXIT   ENTER SELECTION :_
```
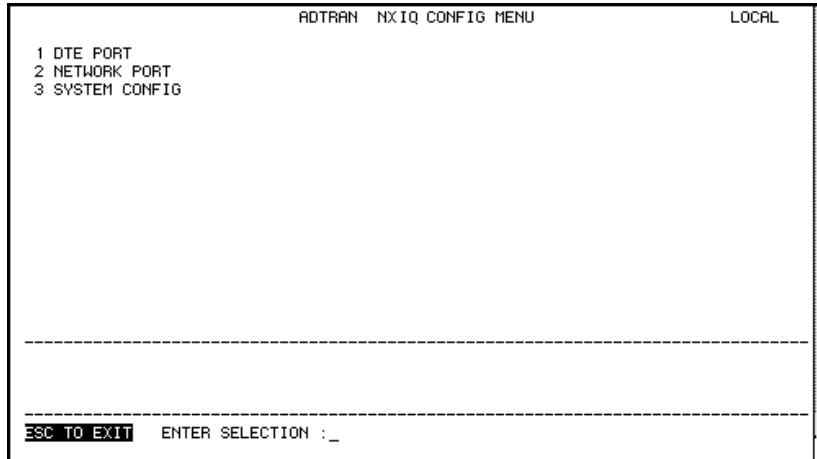
Figure 5-1
Terminal Configuration Menu

For detailed information on configuration, see *Chapter 6: DTE Port Configuration, Chapter 7: Configuring the Network Port,* and *Chapter 8: System Configuration.*

Configuration menu trees are shown in *Figure 5-2* on page 31 (for the terminal) and *Figure 5-3* on page 32 (for the front panel interface).

1)CONFIG

1) DTE PORT

1) PHYSICAL LAYER OPTIONS
- 1) CTS OPTION
  - 1) FORCED ON
  - 2) FOLLOW RTS
- 2) DSR OPTION
  - 1) FORCED ON
- 3) CD OPTION
  - 2) NORMAL

2) FRAME RELAY OPTIONS
- 1) T392
- 2) N392
- 3) N393
- 4) MANAGEMENT DLCI

2)NETWORKPORT

1)INTERFACE TYPE
2) PHYSICAL LAYER OPTIONS — CHANNEL RATE

3) FRAME RELAY OPTONS
- 1) SIGNALING TYPE
  - 1) NONE
  - 2) LMI
  - 3)ANSIT1.617-D
  - 4)ITU-TQ.933-A
  - 5) AUTO
- 2) T391
- 3) N391
- 4) N392
- 5) N393

4) MANAGEMENT DLCI 1
5) MANAGEMENT DLCI 2

6) MANAGEMENT DLCI 1 MODE — 1) SHARED
7) MANAGEMENT DLCI 2 MODE — 2) DEDICATED

8) PVC COUNT
9) HISTORY INTERVAL COUNT
10) PVC OPTIONS
- 1) DLCI
- 2) CIR (Kbps)
- 3)SEQNUMCHECKING
  - 1) DISABLED
  - 2) ENABLED
- 4)DELAMEASUREMENT
- 5 EDIT NEXT ENTRY
- 6)EDIT PREVIOUS ENTRY
- 7)DELETE THIS ENTRY
- 8) ADD NEW ENTRY

3)SYSTEMCONFIG

1) CHANGE PASSWORD
2) IP ADDRESS
3) SUBNET MASK
4) GATEWAY IP ADDRESS
5) CONTROL PORT MODE
- 1) TERMINAL
- 2) SLIP PROTOCOL
- 3) PPP PROTOCOL
6) READ COMMUNITY NAME
7) WRITE COMMUNITY NAME
8) TRAP MANAGER DLCI
9)TRAPMANAGERIPADDRESS
10) TRAP MANAGER PORT
- 1) NONE
- 2) DTE PORT
- 3) NETWORK PORT
- 4) CONTROL PORT

11) HISTORY INTERVAL SIZE — 5 to 30 MINUTES
- 1) 5 MINUTES
- 2) 10 MINUTES
- 3) 15 MINUTES
- 4) 20 MINUTES
- 5) 30 MINUTES

Figure 5-2
Terminal Configuration Menu Tree

Figure 5-3
Front Panel Interface Menu Tree

Chapter 6
DTE Port Configuration

Configure the physical layer and frame relay protocol options for the DTE port located on the rear of the NxIQ by selecting DTE PORT from the Configuration menu. *Figure 6-1* illustrates the terminal Configuration menu for the DTE Port. The menu tree in *Figure 6-2* on page 34 shows the choices available in this menu.

```
DTE PORT                ADTRAN  NXIQ PORT CONFIG MENU              LOCAL

 1 PHYSICAL LAYER OPTIONS
 2 FRAME RELAY OPTIONS










  -------------------------------------------------------------------------



  -------------------------------------------------------------------------
 ESC TO EXIT   ENTER SELECTION :_
```

Figure 6-1
Terminal DTE Port Configuration Menu

In this chapter, the terminal selections are listed first followed by the Front Panel selections in parenthesis (if the names differ).

		1) PHYSICAL LAYER OPTIONS	1) CTS OPTION	1) FORCED ON
				2) FOLLOW RTS
1) CONFIG	1) DTE PORT		2) DSR OPTION	1) FORCED ON
			3) CD OPTION	2) NORMAL	1) INVERTED
			4) TC CLOCK OPT		2) NORMAL
		2) FRAME RELAY OPTIONS	1) T392	
			2) N392	
			3) N393	
			4) MANAGEMENT DLCI	
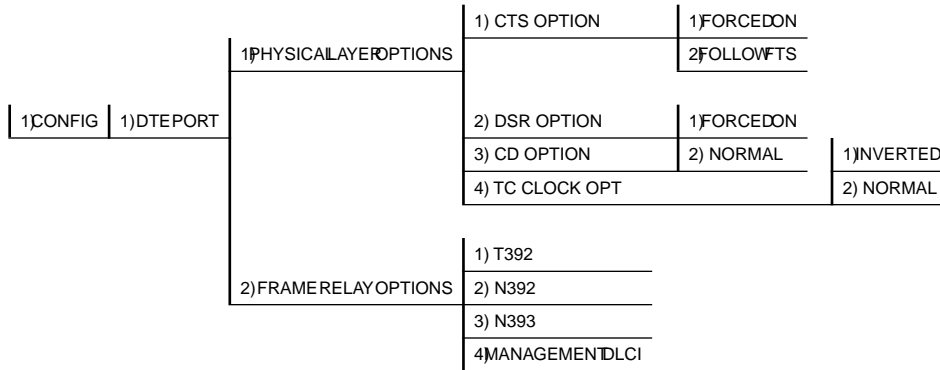
Figure 6-2
DTE Port Menu Tree

Physical Layer Options (PHYS LYR OPT)

CTS Option

Set the CTS lead to FORCED ON or FOLLOW RTS.

Forced On
The CTS lead is always on and the RTS lead is ignored.

Follow RTS
The CTS lead is on when the RTS lead is on (and off when the RTS lead is off).

DSR Option

Set the DSR lead to Forced On or Normal.

Forced On
The DSR lead is always on.

Normal
The DSR lead is off when the NxIQ is in a DSU loopback test or an alarm state.

CD Option

Set the CD lead to **Forced On** or **Normal**.

Forced On
The CD lead is always on.

Normal
The CD lead is off when the NxIQ is in alarm state.

TC Clock Option

Set the transmit clock to **Normal** or **Inverted**.

Frame Relay Options (FR OPT)

The frame relay protocol is a synchronous protocol used to concentrate two different devices into a common frame relay link to the network. The NxIQ accepts frame relay frames from a router or a FRAD (frame relay access device) and routes to/from the network port based on the DLCI address.

T392

Set the timeout (in seconds) between polling intervals. This parameter needs to be a few seconds longer than the T391 setting of the attached frame relay device.

N392 and N393

N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.

These parameters define the error threshold for the UNI (user to network interface) formed by the NxIQ DTE port and the attached frame relay device. If the error threshold is met, the signaling state status is changed to down, which indicates a service-affecting condition. This condition is cleared once N393 consecutive error-free events are received.

For example:
If N392=3 and N393=4, then if three errors occur within any four events the interface is determined inactive. The status of the connection can be viewed in the Status menu under DTE Port Signaling State. The status returns to active once the threshold is no longer exceeded.

Management DLCI (MNG DLCI)

To use local PVC management, enter the management data link connection identifier. The management DLCI is a special DLCI used between the attached DTE device and the NxIQ to carry SNMP and TELNET packets to/from the NxIQ on the DTE port.

Guidelines for Configuring Management DLCI
If the attached router or FRAD is used to route SNMP/TELNET frames to the NxIQ, set the Management DLCI to a unique value (between 16 and 1007) that identifies the virtual circuit between the router/FRAD and the NxIQ. The router/FRAD must also be configured to route the NxIQ IP address to this DLCI. The IP address and subnet mask for the DTE port must also be set in the System Configuration menu.

Chapter 7
Configuring the Network Port

NETWORK PORT

Access the network port menus by selecting **Network Port** from the Configuration menu. Full menu trees for the Network Configuration selections are shown in *Figure 5-2 ,Terminal Configuration Menu Tree*, on page 31 and *Figure 5-3, Front Panel Configuration Menu Tree*, on page 32 in this manual.

The network port terminates the user end of the frame-relay UNI interface. The NxIQ supports three standard PVC signaling formats: LMI (gang of four), ANSI T1.617-D (Annex D), and ITU Q.933-A (Annex A). The selected signaling format is used to poll the network end of the UNI interface and retrieve virtual circuit information. Optionally the polling process can be disabled.

When configuring from a terminal, the screen in *Figure 7-1* on page 38 appears when **Network Port** is selected.

NOTE *In this chapter, the terminal selections are listed first, followed by the Front Panel selections in parenthesis (if the names differ).*

```
                    ADTRAN  NXIQ NETWORK PORT CONFIG MENU          LOCAL

   1 PHYSICAL LAYER OPTIONS
   2 FRAME RELAY OPTIONS
   3 MANAGEMENT DLCI 1=1006
   4 MANAGEMENT DLCI 2=1005
   5 MGMT DLCI 1 MODE=SHARED
   6 MGMT DLCI 2 MODE=SHARED
   7 PVC COUNT=20
   8 HISTORY INTERVAL COUNT=220
   9 PVC OPTIONS




   _____


   _____
  ESC TO EXIT   ENTER SELECTION :_
```

Figure 7-1
Terminal Network Port Configuration Menu

Physical Layer Option (PHYS LYR OPT)

The following section describes the physical layer option available for the Network Port:

Channel Bandwidth (CHANNEL RATE)

Set the channel bandwidth for 56 or 64 Kbps.

Frame Relay Options (FR OPT)

The terminal screen in *Figure 7-2* appears when Frame Relay Options is selected from the Network Port Configuration Menu.

```
        ADTRAN  NXIQ NETWORK PORT FRAME RELAY OPTIONS        LOCAL

 1 SIGNALING TYPE=ANSI T1.617-D
 2 T391=10
 3 N391=6
 4 N392=3
 5 N393=4




 _____


 _____
ESC TO EXIT   ENTER SELECTION :_
```

Figure 7-2
Terminal Network Port Frame Relay Options Menu

Signaling Type (SIGNAL)

Set the signaling type option to match the network signaling type. Choices are none, LMI (gang of four), ANSI T1.617-D (Annex D), ITU-T Q.933-A (Annex A), or Auto. Auto mode forces the NxIQ to use the same signaling type as the attached frame relay DTE. If AUTO is selected and there is no DTE device attached, the NxIQ uses ANSI T1.617-D signaling type.

T391

Set the time (in seconds) between polls to the frame relay network.

N391

Determine how many link integrity polls occur in between full status polls.

N392 and N393

> N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.
>
> These parameters define the error threshold for the UNI formed by the NxIQ network port and the frame-relay switch. If the error threshold is met, the signaling state status is changed to down, which indicates a service-affecting condition. This condition is cleared once N393 consecutive error-free events are received.
>
> **For example:**
> If N392=3 and N393= 4, then if three errors occur within any four events the interface is determined inactive.
>
> The status of the connection can be viewed in the Statistics menu under Network Port Signaling State. The status returns to active, once the threshold is no longer exceeded.

NOTE *The network service provider should recommend the values entered into the T391, N391, N392, and N393 fields.*

Management DLCI 1 and 2 (DLCI 1 and 2)

> Enter the management data link connection identifiers (DLCIs). These DLCIs are used to carry management traffic to and from the network.

Management DLCI 1 and 2 Mode (DLCI 1 and 2 MODE)

> Set to **Dedicated** if the management DLCI is used only to manage the NxIQ (and not used to carry customer traffic). If set to **Dedicated**, the router is not notified of that DLCI. Set to **Shared** if the management DLCI is used for carrying customer traffic and management data.

PVC Count

Sets the maximum number of PVCs that the NxIQ will monitor for statistical information. This value determines the amount of history intervals available for storage. To get the maximum amount of statistical history storage, set this value equal to the number of PVCs assigned to the frame-relay port. A smaller value increases history interval count but puts some of the PVC statistics into the unknown category.

History Interval Count (HIST INT COUNT)

Sets the number of history intervals to store for statistics. History intervals are displayed in the View Option Menu by Interval portions of the Statistics menus. These views provide data which is divided into columns and grouped by the interval of time selected in the History Interval Size field (see the chapter System Configuration for more information). The History Interval Count field determines how many intervals can be stored at a time. The maximum value allowed is affected by the previously mentioned PVC Count selection.

PVC Options (not available through front panel)

The information in this menu must be entered for each PVC. DLCI numbers and their corresponding CIRs are provided by the service provider.

DLCI

Enter the Network DLCI.

CIR (Kbps)

Enter the CIR (committed information rate) in Kbps for the corresponding DLCI. The information is provided by your service provider and must be entered for each PVC.

Sequence Number Checking

Set to ENABLE only if there are NxIQs on both ends of the PVC. When enabled, the NxIQ tags each frame with a sequence number which is then used by the remote NxIQ to detect lost packets. Lost packet counts are given in the Statistics menus.

Delay Measurement

Set to ENABLE only if there are NxIQs on both ends of the PVC. When enabled, the NxIQ periodically transmits a loopback frame to the remote NxIQ which is then returned to measure round trip delay of each PVC. Minimum, maximum, and average delay measurements are given in the Statistics menus.

Edit Next Entry

Edit the next entry in the PVC Options table.

Edit Previous Entry

Edit the previous entry in the PVC Options table.

Delete This Entry

Delete the current entry in the PVC Options table.

Add New Entry

Add a new entry to the PVC Options table.

Chapter 8
System Configuration

SYSTEM CONFIG

Access System Configuration selections by first choosing CONFIGURATION from the Main menu. Then choose SYSTEM CONFIG from the Configuration Menu.

Full menu trees for the System Configuration selections are shown in *Figure 5-2, Terminal Configuration Menu Tree,* on page 31 and *Figure 5-3, Front Panel Configuration Menu Tree,* on page 32. *The Terminal System Configuration Menu* is shown in *Figure 8-1* on page 44.

Change Password (not available on front panel)

Enter a new password of nine characters or less. The default password is **adtran**.

IP Address

Enter the NxIQ IP (internet protocol) address.

```
                     ADTRAN  NXIQ SYSTEM CONFIG MENU              LOCAL

 1 CHANGE PASSWORD
 2 IP ADDRESS=0.0.0.0
 3 SUBNET MASK=0.0.0.0
 4 GATEWAY IP ADDRESS=0.0.0.0
 5 CONTROL PORT MODE=TERMINAL
 6 READ COMMUNITY NAME=public
 7 WRITE COMMUNITY NAME=private
 8 TRAP MANAGER DLCI=0
 9 TRAP MANAGER IP ADDRESS=0.0.0.0
10 TRAP MANAGER PORT=NONE
11 SET HOUR=8
12 SET MINUTE=5
13 SET DAY=13
14 SET MONTH=1
15 SET YEAR=0
16 HISTORY INTERVAL SIZE=5 MINUTES
-------------------------------------------------------------------------------



-------------------------------------------------------------------------------
ESC TO EXIT   ENTER SELECTION :_
```

Figure 8-1
System Configuration Menu

Control Port Mode (CNTL PORT MODE)

Set the Control port for terminal, SLIP protocol, or PPP protocol mode. Set for SLIP or PPP when using the Control port for an SNMP/TELNET path.

Read Community Name
(not available through front panel)

Enter the authentication strings used for SNMP management. Match the NxIQ to the SNMP manager for read privileges.

Write Community Name
(not available through front panel)

Enter the authentication strings used for SNMP management. Match the NxIQ to the SNMP manager for write privileges.

Trap Manager DLCI (TRAP DLCI)

If the trap manager port is set for Network or DTE, this parameter identifies the virtual circuit used for all traps generated by the NxIQ.

Trap Manager IP Address (TRAP IP ADDR)

Enter the IP address of the SNMP manager to which the NxIQ sends traps.

Trap Manager Port (TRAP PRT)

Enter the NxIQ port used to transmit traps to the SNMP manager. Choices are none, DTE port, network port, and control port.

History Interval Size (HIS INT SIZE)

The time entered in this field affects the Interval View in the Statistics menus. The Interval View provides historical data for the current day. The data is divided into columns grouped by the interval of time (5, 10, 15, 20, 25, or 30 minutes) selected in this field. The NxIQ stores up to 157 intervals. Once the maximum is reached, new information overwrites existing information, beginning with the least current.

NOTE *If data is not retrieved before the Total Time Stored is exceeded, it is overwritten and cannot be restored. Total Time Stored = History Interval Size x History Interval Count.*

Chapter 9
Statistics

For descriptions of the terminal statistics menus see the following section, *Viewing Statistical Information (Terminal Interface).* For front panel menu descriptions, see the section *Viewing Statistical Information (Front Panel Interface)* on page 67.

VIEWING STATISTICAL INFORMATION (TERMINAL INTERFACE)

Select View Statistics from the Main menu to access the View Statistics Menu shown in *Figure 9-1.* From this menu, select **DTE Port** or **Network Port** to view statistics for the ports, **DLCI List** to view all available DLCIs, or **System** to view the system. Select **Reset Statistics** to clear all current information.


```
                    ADTRAN  NXIQ VIEW STATISTICS MENU              LOCAL

1 DTE PORT
2 NETWORK PORT
3 DLCI LIST
4 SYSTEM
5 RESET STATISTICS




_____


_____
ESC TO EXIT   ENTER SELECTION :_
```
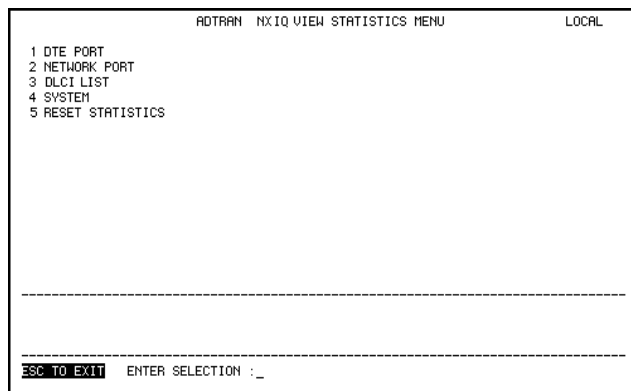
Figure 9-1
View Statistics Menu

Terminal Statistics Display Options

DTE port, network port, and DLCI statistics are given in two formats: View by Interval and View by Day.

View by Interval
In this view, the first column is a running total for the current day. All other columns are grouped into user-configured time frames with the most recent information displayed on the left. The first column's header displays the current date, and the interval columns display the time the intervals began. In order to categorize the interval columns by date also, the midnight time stamp is replaced with the date. Note that this column still represents the timed interval (not a day's worth of information).

To configure the interval time frame, go to the System Configuration menu under History Interval Size and select the time you want the history interval to be set for (from 5 to 30 minutes, in five minute intervals). The NxIQ gathers and displays the information according to the time selected.

NOTE *The NxIQ cuts short the first gathering session in order to begin falling on the selected time boundary. For example: If the unit or the statistics information was last reset at 12:03 and the History Interval is set for five minutes, then the first interval session will only last two minutes. Therefore, the first interval column (i.e., the column farthest to the right if no columns have been deleted yet) normally represents a time shorter than the other columns.*

View by Day
This view provides historical information for the last seven days (not including the current day). The most recent information is displayed on the left.

NOTE *The first day's column (i.e., the column farthest to the right) does not represent a full day's worth of information (unless the unit or the statistics information was reset at exactly 12 AM).*

Hot Keys

Once you have entered one of the statistics menus, hot keys are displayed across the bottom of the screen, allowing you to quickly access other menus or navigate within the current menu. These keys vary depending on the menu currently displayed.

ESC=Menu
Press the ESC key to return to the main View Statistics menu (shown in *Figure 9-1* on page 47).

D=DLCI
When viewing Network port statistics, press **D** to view the DLCI Statistics menu, shown in *Figure 9-6* on page 60.

Page (+, -)
Press the + and - keys to scroll through statistics menu pages.

NOTE *The **Shift** key must be used with the + key to advance a menu page.*

Scroll (<, >)
Press the < and > keys to scroll left and right on a statistics menu page.

NOTE *The **Shift** key must be used with the < and > keys to scroll a menu page.*

V=View by Day/View by Interval
Press V to change the view format.

The following sections describe the information given on the DTE port, Network port, DLCI, and System Statistics menus.

DTE Port Statistics

Information given is for the DTE port since the last re-set. See *Figure 9-2*, below, and *Figure 9-3* on page 51 for the two DTE Port Statistics screen formats.

Leads On
If a lead has become active on the selected port since the last screen reset, it is listed in the View Statistics menu as shown in *Figure 9-2*, below. The following is a list of DTE control leads that appear in the **Leads On** field.

RTS   Request to send
DTR   Data terminal ready
CTS   Clear to send
DSR   Data set ready
DCD   Data carrier detect

```
 DTE PORT               ADTRAN  NXIQ VIEW STATISTICS            LOCAL

        Leads On  -->  CTS  DSR  DCD          Interval Remaining   170
        Signaling State --> DOWN

                 DEC  3    22:55   22:50   22:45   22:39   0:00    0:00
 Loc PVC Rx Fr     0       0       0       0       0       0       0
 Loc PVC Rx Bt     0       0       0       0       0       0       0
 Loc PVC Tx Fr     0       0       0       0       0       0       0
 Loc PVC Tx Bt     0       0       0       0       0       0       0
 Sig Down Time   976     130     299     301     246       0       0
 Signal Error      0       0       0       0       0       0       0
 Signal T/O       62       8      18      19      17       0       0
 Sig State Chg     1       0       0       1       0       0
 Rx Full Stat      0       0       0       0       0       0       0
 Rx LI Only        0       0       0       0       0       0       0
 Discard Frame     0       0       0       0       0       0       0
 Aborts            0       0       0       0       0       0       0
 CRC Error         0       0       0       0       0       0       0
 Octet Align       0       0       0       0       0       0       0
 Length Error      0       0       0       0       0       0       0

 _     ESC = Menu    -,+ = Page    >,< = Scroll    V = View By Day
```

Figure 9-2
DTE Port Statistics (View by Interval)

```
DTE PORT DAYS           ADTRAN  NXIQ VIEW STATISTICS              LOCAL


      Leads On  -->  CTS  DSR  DCD           Interval Remaining    54
      Signaling State --> DOWN

                   NA      NA      NA      NA      NA      NA      NA
Loc PVC Rx Fr       0       0       0       0       0       0       0
Loc PVC Rx Bt       0       0       0       0       0       0       0
Loc PVC Tx Fr       0       0       0       0       0       0       0
Loc PVC Tx Bt       0       0       0       0       0       0       0
Sig Down Time       0       0       0       0       0       0       0
Signal Error        0       0       0       0       0       0       0
Signal T/O          0       0       0       0       0       0       0
Sig State Chg       0       0       0       0       0       0       0
Rx Full Stat        0       0       0       0       0       0       0
Rx LI Only          0       0       0       0       0       0       0
Discard Frame       0       0       0       0       0       0       0
Aborts              0       0       0       0       0       0       0
CRC Error           0       0       0       0       0       0       0
Octet Align         0       0       0       0       0       0       0
Length Error        0       0       0       0       0       0       0

   ESC = Menu     D = DLCI      -,+ = Page     V = View Intervals
```

Figure 9-3
DTE Port Statistics (View by Day)

Interval Remaining
Number of seconds remaining in the current timed interval.

Signaling State
Indicates if the frame-relay signaling state is currently up or down.

Local PVC Rx Frames
Total frames received by the DTE port across the local management PVC.

Local PVC Rx Bytes
Total bytes received by the DTE port across the local management PVC.

Local PVC Tx Frames
Total frames transmitted by the DTE port across the local management PVC.

Local PVC Tx Bytes
Total bytes transmitted by the DTE port across the local
management PVC.

Signal Down Time
Time in seconds the signaling state is down.

Signal Error
Number of signal frames received with PVC signaling
protocol violations.

Signal Timeouts
Number of T392 timeouts that have occurred.

Signal State Change
Number of changes in the signaling protocol state.

Rx Full Status
Number of full status polls received on the DTE side.

Rx LI Only
Number of link integrity (LI) only polls received on the
DTE side.

NOTE *On the DTE side, transmit and receive counts for full status
and link integrity polls would be identical. Therefore, only
receive counts are given.*

Discard Frame
Number of frames discarded by the NxIQ due to bad IP
frames received on the management DLCI, transmis-
sion errors, or link violations. This count includes
aborts, CRC errors, octet align, and length errors.

Aborts
Number of frames received without a closing flag. This
transmission error is also reflected in the Discard Frame
field.

CRC Errors
Number of frames received with CRC violations. This
transmission error is also reflected in the Discard Frame
field.

Octet Align
Number of frames received with a bit count that does not fall on 8-bit boundaries. This transmission error is also reflected in the Discard Frame field.

Length Error
Number of frames received with fewer than 5 octets or greater than 4500 octets. This link violation is also reflected in the Discard Frame field.

EA Violation
Number of frames received with an error in the extended address (EA) bit field of the frame-relay header.

Encapsulation Error
Number of frames received on the management DLCI that have RFC 1490 errors.

Inactive DLCI
Number of frames received on an inactive DLCI.

Invalid DLCI
Number of frames received on a DLCI that is out of range. The valid DLCI range is 16-1007.

Unrouteable
Number of frames received on the management DLCI with an IP address that does not match the NxIQ IP address.

Network Port Statistics

Information given is for the network port since the last reset. See *Figure 9-4* on page 55 and *Figure 9-5* on page 56 for both formats of the Network Port Statistic screens.

Signaling State
Indicates if the signaling state is currently up or down.

Interval Remaining
Number of seconds remaining in the current timed interval.

Rx Frames
Number of frames received by the network port.

Rx Bytes
Number of bytes received by the network port.

Maximum Rx Throughput
Maximum throughput sample in the receive direction for the given interval. This is displayed in Kbps.

Average Rx Throughput
Average throughput in the receive direction for the given interval. This is displayed in Kbps.

Maximum Rx Utilization
Maximum utilization sample in the receive direction for the given interval. Utilization is displayed as a percentage of network port bandwidth.

Average Rx Utilization
Average utilization sample in the receive direction for the given interval. Utilization is displayed as a percentage of network port bandwidth.

Tx Frames
Number of frames transmitted by the network port.

Tx Bytes
Number of bytes transmitted by the network port.

```
NETWORK PORT           ADTRAN  NXIQ VIEW STATISTICS              LOCAL

        Signaling State --> UP              Interval Remaining   54
        TSU state -->  OPEN LOOP

               DEC  3    22:55   22:50   22:45   22:39   0:00    0:00
Rx Frames          0        0       0       0       0      0       0
Rx Bytes           0        0       0       0       0      0       0
Max Rx Thru        0        0       0       0       0      0       0
Avg Rx Thru        0        0       0       0       0      0       0
Max Rx Util %     0%       0%      0%      0%      0%     0%      0%
Avg Rx Util %     0%       0%      0%      0%      0%     0%      0%
Tx Frames        216      112     104       0       0      0       0
Tx Bytes       23994    12544   11450       0       0      0       0
Max Tx Thru     1000      896       0       0       0      0       0
Avg Tx Thru      184      446     333       0       0      0       0
Max Tx Util %     0%       0%      0%      0%      0%     0%      0%
Avg Tx Util %     0%       0%      0%      0%      0%     0%      0%
Port UA Time    1138      246     299     301     292      0       0
Sig Down Time      0        0       0       0       0      0       0
Signal Error       0        0       0       0       0      0       0

   ESC = Menu    D = DLCI   -,+ = Page   >,< = Scroll   V = View By Day
```

Figure 9-4
Network Port Statistics (View by Interval)

Maximum Tx Throughput
Maximum throughput sample in the transmit direction for the given interval. This is displayed in Kbps.

Average Tx Throughput
Average throughput in the transmit direction for the given interval. This is displayed in Kbps.

Maximum Tx Utilization
Maximum utilization sample in the transmit direction for the given interval. Utilization is displayed as a percentage of network port bandwidth.

Average Tx Utilization
Average utilization sample in the transmit direction for the given interval. Utilization is displayed as a percentage of network port bandwidth.

```
NETWORK PORTS          ADTRAN  NXIQ VIEW STATISTICS              LOCAL


        Signaling State --> UP
        TSU state -->  OPEN LOOP

                  NA        NA        NA        NA        NA        NA        NA
Rx Frames          0         0         0         0         0         0         0
Rx Bytes           0         0         0         0         0         0         0
Max Rx Thru        0         0         0         0         0         0         0
Avg Rx Thru        0         0         0         0         0         0         0
Max Rx Util %     0%        0%        0%        0%        0%        0%        0%
Avg Rx Util %     0%        0%        0%        0%        0%        0%        0%
Tx Frames          0         0         0         0         0         0         0
Tx Bytes           0         0         0         0         0         0         0
Max Tx Thru        0         0         0         0         0         0         0
Avg Tx Thru        0         0         0         0         0         0         0
Max Tx Util %     0%        0%        0%        0%        0%        0%        0%
Avg Tx Util %     0%        0%        0%        0%        0%        0%        0%
Port UA Time       0         0         0         0         0         0         0
Sig Down Time      0         0         0         0         0         0         0
Signal Error       0         0         0         0         0         0         0

 _   ESC = Menu      D = DLCI     -,+ = Page     V = View Intervals
```

Figure 9-5
Network Port Statistics (View by Day)

Port UA Time
Time in seconds the network port is unavailable for
data delivery. This means that the T1 link is down or in
test, or that the frame-relay signaling state is down.

Signal Down Time
Time in seconds the signaling state has been down.

Signal Error
Number of signal frames received with PVC signaling
protocol violations.

Signal Timeouts
Number of T391 timeouts that have occurred.

Signal State Change
Number of changes in the signaling protocol state.

Rx Full Status
Number of full status responses received on the net-work side.

Tx Full Status
Number of full status polls transmitted by the NxIQ.

Rx LI Only
Number of link integrity only responses received on the network side.

Tx LI Only
Number of link integrity polls transmitted by the NxIQ.

Async Status
Number of asynchronous status messages received by the NxIQ.

Discard Frame
Number of frames discarded by the NxIQ due to bad IP frames received on the dedicated management DLCI, transmission errors, or link violations.

Aborts
Number of frames received without a closing flag. This transmission error is also reflected in the Discard Frame field.

CRC Errors
Number of frames received with CRC violations. This transmission error is also reflected in the Discard Frame field.

Octet Align
Number of frames received with a bit count that does not fall on 8-bit boundaries. This transmission error is also reflected in the Discard Frame field.

T1 State Change
Count of state changes for the T1 port.

T1 UA Time
Time in seconds the T1 link is down.

NOTE

*The next five parameters (Signal Loss, Telco Test, AIS Alarm, Red Alarm, and Yellow Alarm) are events with two states: active and inactive. If the event occurs one or more times for the given interval, the field is active and **ALARM** is displayed. The first column of the View by Interval menu represents information for the entire current day. Therefore, once an alarm becomes active, it remains active in the first field for the entire 24-hour period.*

Signal Loss
If ALARM is displayed, a loss of signal occurred one or more times during the given interval.

Telco Test
If ALARM is displayed, a loopback code was received on the T1 interface one or more times during the given interval.

AIS Alarm
If ALARM is displayed, unframed all ones were received on the T1 interface one or more times during the given interval. This indicates that the T1 is out of service.

Red Alarm
If ALARM is displayed, a loss of frame synchronization occurred one or more times during the given interval.

Yellow Alarm
If ALARM is displayed, the telco end of the T1 was out of frame sync one or more times during the given interval.

Path Code
Number of path code violations. Path code violations include frame bit errors for D4 framing and superframes with CRC errors for ESF framing.

Line Code
Number of line code violations. Line code violations include BPVs that are not part of B8ZS code or excess zero violations.

Length Error
Number of frames received with fewer than 5 octets or greater than 4500 octets. This link violation is also reflected in the Discard Frame field.

EA Violation
Number of frames received with an error in the extended address (EA) bit field of the frame-relay header.

Encapsulation Error
Number of frames received on a dedicated management DLCI that have RFC 1490 errors. These errors are also reflected in the Discard Frames field.

NOTE *If both management DLCIs are dedicated, the Encapsulation Error field is not applicable. See the section **Management DLCI 1 and 2 Mode** in Chapter 7: Configuring the Network Port for more information.*

Inactive DLCI
Number of frames received on an inactive DLCI.

Invalid DLCI
Number of frames received on a DLCI that is out of range. The valid DLCI range is 16-1007.

Unrouteable
Number of frames received on a dedicated management DLCI with an IP address that does not match the NxIQ IP address.

NOTE *If both management DLCIs are dedicated, the Unrouteable field is not applicable . For more information, see the **Management DLCI 1 and 2 Mode** section in Chapter 7: Configuring the Network Port.*

DLCI Statistics

Access specific DLCI statistics by pressing **D** from the Network Statistics menu. Enter the DLCI number for information on a specific DLCI (displayed in the View by Interval and Day formats). For a status summary of all available DLCIs, select DLCI LIST from the View Statistic menu shown in *Figure 9-1* on page 47. *Figure 9-6* shows the statistics menu for a specific DLCI.

```
                    ADTRAN  NXIQ VIEW STATISTICS                LOCAL

DLCI 100  A     Throughput:  Tx        0  Rx       0        Remaining  203
                Utilization: Tx       0% Rx      0%

                DEC  3    23:00    22:55    22:50    22:45    22:39    0:00
Rx Frames          0        0        0        0        0        0        0
Rx Bytes           0        0        0        0        0        0        0
Max Rx Thru        0        0        0        0        0        0        0
Avg Rx Thru        0        0        0        0        0        0        0
Max Rx Util %     0%       0%       0%       0%       0%       0%       0%
Avg Rx Util %     0%       0%       0%       0%       0%       0%       0%
Tx Frames        285       44      137      104        0        0        0
Tx Bytes       31722     4928    15344    11450        0        0        0
Max Tx Thru     1000      896
Avg Tx Thru      214      446      447      333        0        0        0
Max Tx Util %     0%       0%       0%       0%       0%       0%       0%
Avg Tx Util %     0%       0%       0%       0%       0%       0%       0%
PVC IA Time        0        0        0        0        0        0        0
Rx FECN            0        0        0        0        0        0        0
Tx FECN            0        0        0        0        0        0        0

       ESC = Menu      -,+ = Page      >,< = Scroll     V = View By Day
```

Figure 9-6
DLCI Statistics for a Specific DLCI (View by Interval)

DLCI Statistics for a Specific DLCI

Throughput (Tx and Rx)
Displays the current throughput sample for this PVC.

Utilization
Displays the current CIR utilization sample for this PVC.

Remaining
Number of seconds remaining in the current timed interval.

Rx Frames
Number of frames received by the network port on the specified DLCI.

Rx Bytes
Number of bytes received by the network port on the specified DLCI.

Maximum Rx Throughput
Maximum throughput sample in the receive direction for the given interval. This is displayed in Kbps.

Average Rx Throughput
Average throughput in the receive direction for the given interval. This is displayed in Kbps.

Maximum Rx Utilization
Maximum utilization sample in the receive direction for the given interval. Utilization is displayed as a percentage of CIR.

Average Rx Utilization
Average utilization in the receive direction for the given interval. Utilization is displayed as a percentage of CIR.

Tx Frames
Number of frames transmitted by the network port on the specified DLCI.

Tx Bytes
Number of bytes transmitted by the network port on the specified DLCI.

Maximum Tx Throughput
Maximum throughput sample in the transmit direction for the given interval. This is displayed in Kbps.

Average Tx Throughput
Average throughput in the transmit direction for the given interval. This is displayed in Kbps.

Maximum Tx Utilization
Maximum utilization sample in the transmit direction for the given interval. Utilization is displayed as a percentage of CIR.

Average Tx Utilization
Average utilization sample in the transmit direction for the given interval. Utilization is displayed as a percentage of CIR.

PVC IA Time
Time in seconds that the PVC is in the inactive state.

Rx FECN
Number of frames received on the network port over the specified DLCI with the FECN bit of the frame-relay header enabled.

Tx FECN
Number of frames transmitted from the network port over the specified DLCI with the FECN bit of the frame-relay header enabled.

Rx BECN
Number of frames received on the network port over the specified DLCI with the BECN bit of the frame-relay header enabled.

Tx BECN
Number of frames transmitted from the network port over the specified DLCI with the BECN bit of the frame-relay header enabled.

Rx DE
Number of frames received on the network port over the specified DLCI with the discard eligibility (DE) bit of the frame-relay header enabled.

Tx DE
Number of frames transmitted from the network port over the specified DLCI with the DE bit of the frame-relay header enabled.

Rx CR
Number of frames received on the network port over the specified DLCI with the CR bit of the frame-relay header enabled.

Tx CR
Number of frames transmitted from the network port over the specified DLCI with the CR bit of the frame-relay header enabled.

Lost Packets
Number of packets lost across the PVC. This field is applicable only if the network port's Sequence Number Checking option (accessed through the Network Port Configuration menu) is ENABLED.

Remote Lost Packets
Number of lost packets reported by the remote NxIQ. This field is applicable only if the network port's Sequence Number Checking option (accessed through the Network Port Configuration menu) is ENABLED.

Rx Burst Seconds
Amount of time (in seconds) that throughput in the receive direction is greater than CIR.

Tx Burst Seconds
Amount of time (in seconds) that throughput in the transmit direction is greater than CIR.

Minimum Rx Frame
Size of smallest frame received across the DLCI.

Maximum Rx Frame
Size of largest frame received across the DLCI.

Average Rx Frame
Average size of frames received across the DLCI.

Minimum Tx Frame
Size of smallest frame transmitted across the DLCI.

Maximum Tx Frame
Size of largest frame transmitted across the DLCI.

Average Tx Frame
Average size of frames transmitted across the DLCI.

Minimum Frame Delay
Minimum round trip delay of the DLCI. This field is applicable only if the network port's PVC Delay Measurement option (accessed through the Network Port Configuration menu) is ENABLED.

Maximum Frame Delay
Maximum round trip delay of the DLCI. This field is applicable only if the network port's PVC Delay Measurement option (accessed through the Network Port Configuration menu) is ENABLED.

Average Frame Delay
Average round trip delay of the DLCI. This field is applicable only if the network port's PVC Delay Measurement option (accessed through the Network Port Configuration menu) is ENABLED.

PVC State Change
Number of changes in the PVC state.

DLCI List

This menu lists all available DLCIs and classifies them as active (A), inactive (I), or unknown (U) as shown in *Figure 9-7.* A byte and frame break out of each DLCI is also provided including an in/out count and a count of how many frames were received with FECN, BECN, or DE enabled.

```
                    ADTRAN  NXIQ VIEW DLCI STATISTICS              LOCAL

               ------------------ Frames ------------------   ------- Bytes ------
DLCI            In      Out       FECN     BECN      DE          In        Out


 100   A        0       307       0        0         0          0         34186
1005   A        0       0         0        0         0          0         0
1006   A        0       0         0        0         0          0         0

UNKNOWN         0       0                                       0         0
INACTIVE        0       0                               _       0         0
SIGNAL          0       0                                       0         0


            ESC = Prev Menu                    +,- = Page
```

Figure 9-7
DLCI Statistics Summary for All Available DLCIs

System Statistics

The system time and date (as set in the System Config-
uration menu) and the software revision are displayed
in this menu. Also, the elapsed time since the unit was
turned on (or since the last restart) is given in seconds.
The buffer information provided in this menu is used
mainly by ADTRAN technical support in troubleshoot-
ing situations. See *Figure 9-8.*

```
                   ADTRAN  NXIQ VIEW SYSTEM STATISTICS              LOCAL

       Buf        Curr           Curr            Curr        High        Avg
       Type       Use            Free            Use Per     Buf Use     Buf Use

        1          15             65              18          15          15
        2           0              5               0           2           0
        3           0              0               0           0           0
        4           2             18              10           1           0
        5          15            108              12          15          15




       System Time ---> 23:02
       System Date ---> WED 12-03-97
       Elapsed Time --> 1253
       S/W Revision --> 315F
```

Figure 9-8
System Statistics Screen

VIEWING STATISTICAL INFORMATION
(FRONT PANEL INTERFACE)

To view statistical information, select **1)STATUS** from the Main menu. Then select **Port Status** and choose **Nx-IQ**. From this menu, choose to view **DTE**, **Network**, or **Statistics** or to reset the statistics. The first Statistics screen appears. Scroll through the remaining screens using the arrow keys. Statistic counts are running totals for the current day (i.e., since 12 AM).
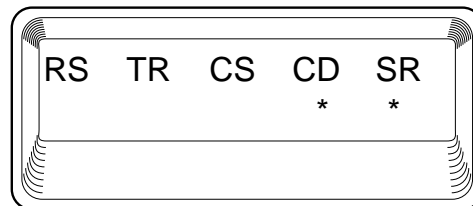
DTE Port Statistics Available on Front Panel

The following information is displayed when the DTE port is selected.

Control Signal Status Screen
An asterisk (*) indicates that the signal is active for the DTE port. See *Figure 9-9.* A list of signals is shown below:

RS request to send
TR data terminal ready
CS clear to send
CD carrier detect
SR data set ready

Figure 9-9
Control Signal Status Screen

Signal State
Current signaling state of DTE port (up or down). See *Figure 9-10.*

```
SIGNAL STATE
DOWN
```
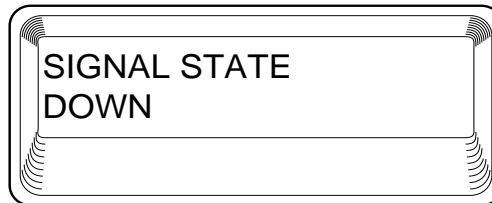
Figure 9-10
Signal State Screen

Signal State Change
Number of changes in the signaling protocol state.

Signal Timeouts (TOS)
Total T392 timeouts that have occurred since the last reset.

Signal Errors
Total signal frames received with PVC signaling protocol violations.

Errored Frames
Total errored frames received since last reset.

CRC Errors
Number of frames received with CRC violations.

Abort Frames
Total frames received without a closing flag.

Octet Align
Number of frames received with a bit count that does not fall on 8-bit boundaries.

Signal Down Time
Time in seconds that signaling state has been down.

Network Port Statistics Available on Front Panel

Signal State
Current state of the network port (up or down).

Signal State Change
Number of changes in the signaling protocol state.

Signal Timeouts (TOS)
Total T391 timeouts that have occurred since the last reset.

Signal Errors
Total signal frames received with PVC signaling protocol violations.

Frames In
Total received frames since last reset.

Frames Out
Total transmitted frames since last reset.

Errored Frames
Total errored frames received since last reset.

CRC Errors
Number of frames received with HDLC CRC violations.

Abort Frames
Total frames received without a closing flag.

Octet Align
Number of frames received with a bit count that does not fall on 8-bit boundaries.

Port UA Time
Time in seconds the network port is unavailable for data delivery. This can mean that the T1 link is down or in test, or that the PVC signaling state is down.

Line Code
Number of line code violations. Line code violations in-clude BPVs that are not part of B8ZS code or excess zero violations.

Path Code
Number of path code violations. Path code violations include frame bit errors for D4 framing and super-frames with CRC errors for ESF framing.

Chapter 10
Diagnostics

DIAGNOSTICS

This menu allows you to perform diagnostics by initiating PVC loopback tests or a local loopback. See *Figure 10-1* for the Terminal Diagnostics menu. See *Figure 10-2* on page 72 for the Front Panel menu tree.


```
          ADTRAN  NXIQ DIAGNOSTICS MENU              LOCAL

  1 PVC LOOPBACK
  2 LOCAL LOOPBACK




  _____


  _____
  ESC TO EXIT   ENTER SELECTION :_
```
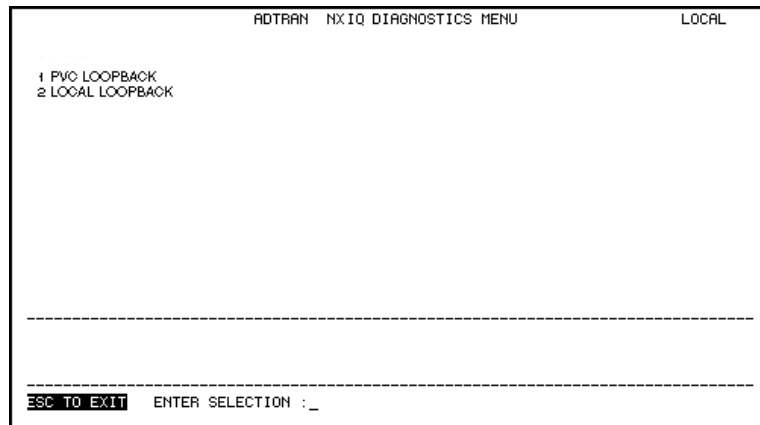
Figure 10-1
Terminal Diagnostics Menu

The front panel menus can be accessed by selecting **4) TEST** at the Main Menu. Next select **3) PORT TEST** and choose the **NxIQ**.

PORT TEST		1) DLCI	1)DIAG FRAMES RX
			2) MIN RSP TIME
	1)PVC LOOPBACK	2)STRT PVC LOOP	3) MAX RSP TIME
		3)VIEW PVC LOOP	4) AVG RSP TIME
			5) LOST FRAMES
			6)RMT LOST FRAMES
	2)LOCAL LOOPBACK	1) OFF	
		2) PORT	
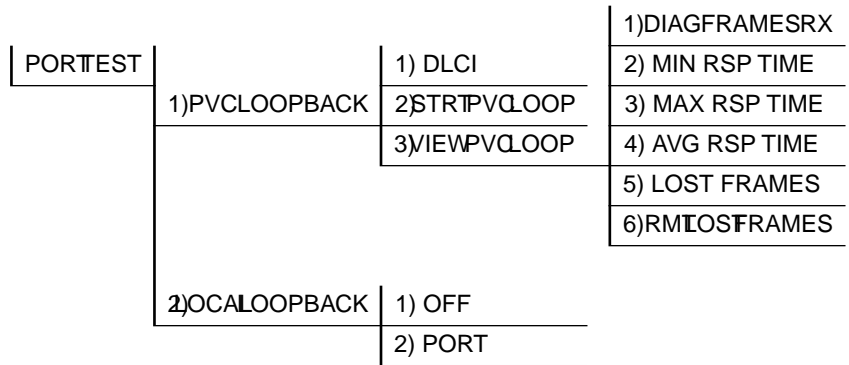
Figure 10-2
Front Panel Diagnostics Menu (with ESP Ethernet Card Installed)

PVC Loopback

A PVC loopback test is a non-intrusive loopback option for each PVC. During this test, the NxIQ periodically sends test frames to the remote NxIQ which are then returned for analysis. The bandwidth required is approximately 1 Kbps for each PVC in test. See *Figure 10-3* for the terminal menu.

```
                    ADTRAN  NXIQ PVC LOOPBACK                    LOCAL

 1 ENTER DLCI OR 0 FOR ALL=0
 2 TEST LEN : MIN <0=UNTIMED>=0
 3 BEGIN TEST
 4 END TEST
 5 VIEW TEST STATS
 6 RESET TEST STATS
 7 VIEW DLCI LIST




 _____


 _____
 ESC TO EXIT    ENTER SELECTION :_
```
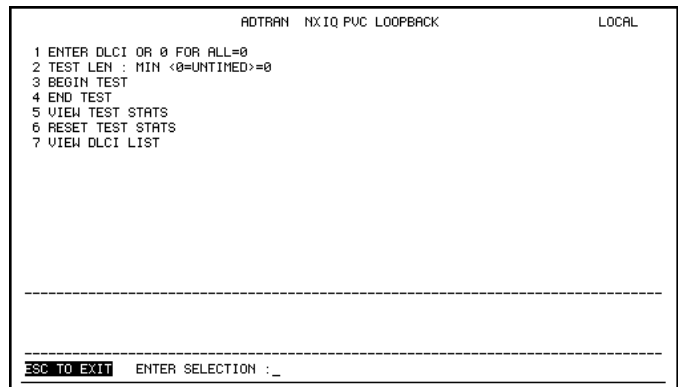
Figure 10-3
PVC Loopback Menu

Enter DLCI or 0 for All (DLCI)

> Enter the DLCI of the PVC to be tested (or enter 0 to test all available PVCs).

Test Length

> Amount of time (in minutes) that you want the test to take place. Enter 0 for a continuous test.

Begin Test

> Starts the test.

End Test

> Ends the test in progress prematurely or terminates a continuous test.

View Test Stats

> Displays the Test Statistics menu shown in *Figure 10-4* on page 74. Descriptions of each field in the Test Statistics menu follow:
>
> **PVC Active/Inactive/Undefined**
> Displays current state of the selected PVC as determined by the switch.
>
> - **Active**: The PVC is currently operational.
> - **Inactive**: There is currently a physical or frame relay layer problem at the remote end of the PVC, or a problem exists inside the frame relay cloud for the selected PVC.
> - **Undefined**: The PVC is undefined for the switch.
>
> **Test Active/No Test Active**
> Displays current testing state of the NxIQ.
>
> **Frames Rx**
> Number of frames received on the selected PVC during the current loopback test.

Frames Tx
Number of frames transmitted across the selected PVC during the current loopback test.

Dropped Packets
Number of packets dropped in the receiving direction (traveling from the remote NxIQ to the local NxIQ).

Remote Dropped Packets
Number of packets dropped in the transmitting direction (traveling from the local NxIQ to the remote NxIQ).

Minimum Loop Response Time
Minimum round-trip time (in seconds) for the current test.

Maximum Loop Response Time
Maximum round-trip time (in seconds) for the current test.

Average Loop Response Time
Average round-trip time (in seconds) for the current test.

```
                    ADTRAN  NXIQ VIEW TEST STATS              LOCAL

  1 ENTER DLCI=21


    PVC ACTIVE

    NO TEST ACTIVE
    FRAMES RX--------->       0        FRAMES TX--------->      20
    DROPPED PKTS------>       0        RMT DROPPED PKTS-->       0
    MIN LOOP RSP TIME->       0        MAX LOOP RSP TIME->       0
    AVG LOOP RSP TIME->       0



  --------------------------------------------------------------------


  --------------------------------------------------------------------
  ESC TO EXIT   ENTER SELECTION :_
```

Figure 10-4
Test Status Screen

Reset Test Stats

Resets the information shown in the Test Statistics menu.

View DLCI List

See the DLCI List section in *Chapter 9: Statistics* on page 65 for a description of this menu.

Local Loopback

Select PORT to enable a bidirectional local loopback.

Chapter 11
Utility Menu

The Utility menu applies to the front panel operation only.

Software Revision

This menu displays the software version and checksum and is shown in *Figure 11-1,* below. The Utility Menu Tree is shown in *Figure 11-2* on page 78. Press **CANCEL** to return to the Util menu.

CMD Mode

Factory use only.

```
VERSION CHKSUM
VER 2.200    17AB
```
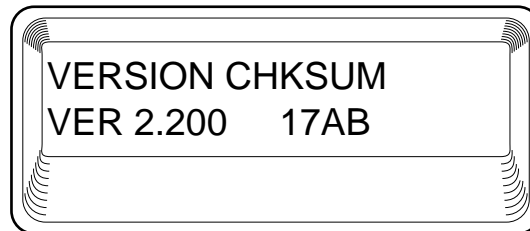
Figure 11-1
System Statistics Screen

PORT UTIL
SW REVISION
CMD MODE
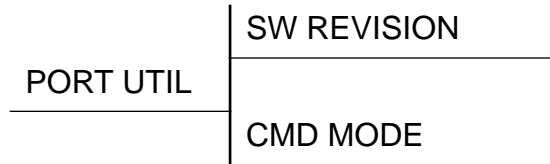
Figure 11-2
Utility Menu Tree

Appendix A
Pinouts

The following table gives the pin assignments for the NxIQ card connectors. For more information on these connectors, see *Chapter 2: Installation.*

Table A-A

Pin Assignments for Control Connector

RJ Pin #	Function	Direction
1	GND	
2	TRS	I
3	TD	I
4	DSR	O
5	RD	O
6	CTS*	O
7	DTR	I
8	DCD	O
*Used for hardware flow control		

Table A-B
V.35 Nx56/64 Interface Pinout
26-Pin Subminiature D

Pin #	Function
1	Protective Ground
4	RTS
5	CTS
6	DSR
7	SIGNAL GROUND
8	DCD
9	TD-A
10	TD-B
11	RD-A
12	RA-B
13	ETC-A
20	DTR
22	TC-A
23	TC-B
24	RC-A
25	RC-B
26	ETC-B

Table A-C
V.35 DBU Connector Pinout

Pin #	Function
1	Protective Ground
4	RTS
5	CTS
6	DSR
7	Signal Ground
8	DCD
9	TD-A
10	TD-B
11	RD-A
12	RA-B
13	ETC-A
17	RI
20	DTR
22	TC-A
23	TC-B
24	RC-A
25	RC-B
26	ETC-B

Appendix B
Specifications Summary

SPECIFICATIONS AND FEATURES

This appendix provides the standard specifications and features of the NxIQ.

Operating Modes
FT1/T1 frame relay

DTE Interfaces
• Subminiature D, 26-pin
• 56K or 64K synchronous DTE rates: 56 to 1.536, Nx56, or Nx64 Kbps (N=1 to 24)
• Control: EIA-232, 8-pin modular connector (DB-25 adapter provided)

Diagnostics
• PVC loopback
• Local port loopback
• 511 Bert test

SNMP
- Embedded SNMP and TELNET inband access through shared or dedicated PVC
- Integrated SLIP/PPP (async) port
- 10baseT interface (TSU "e" series products only)
- RFC 1213 MIB II, RFC 1315 and 1406 compliant
- ADTRAN enterprise MIB for frame monitoring and TSU control

Agency Approvals
- FCC Part 15, Class A
- UL and CUL

Relevant Protocol Standards
- Frame Relay
    ANSI T1.606
    ANSI T1.607
    ANSI T1.617
    ANSI T1.618
    ITU Q.922
    ITU Q.933
    Frame Relay Forum FRF 1.1 and 3.1
    RFC 1490

- SLIP
    RFC 1055

- SNMP MIB
    RFC 1315
    RFC 1213
    RFC 1406

Physical
Operating temperature: 0 to 50 ^{o}C (32 to 122 ^{o}F)

Storage: -20 to 70 ^{o}C (-4 to 158 ^{o}F)
Relative humidity: Up to 95%, non-condensing

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Product Support Information

Presales Inquiries and Applications Support
Please contact your local distributor, ADTRAN Applications Engineering, or ADTRAN Sales:

    Applications Engineering   (800) 615-1176

    Sales   (800) 827-0807

Post-Sale Support
Please contact your local distributor first. If your local distributor cannot help, please contact ADTRAN Technical Support and have the unit serial number available.

    Technical Support   (888) 4ADTRAN

Repair and Return
If ADTRAN Technical Support determines that a repair is needed, Technical Support will coordinate with the Customer and Product Service (CAPS) department to issue an RMA number. For information regarding equipment currently in house or possible fees associated with repair, contact CAPS directly at the following number:

    CAPS Department   (256) 963-8722

Identify the CAPS number clearly on the package (below address), and return to the following address:

ADTRAN, Inc.
CAPS Department
901 Explorer Boulevard
Huntsville, Alabama 35806

RMA # _____