DSU IQ

Data Service Unit with Frame Relay Performance Monitoring

USER MANUAL

DSU IQ Unit	**1200212L1**
ESP Ethernet Card	**1204005L1**
ESP 4-wire SW56 DBU Card	**1204001L1**
ESP V.34 DBU Card	**1204002L1**
ESP ISDN DBU Card	**1204004L1**
ESP External DCE Card	**1204006L1**

61200.212L1-1B
May 1998

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SunNet Manager is a registered trademark of Sun Microsystems, Inc.
Netview is a registered trademark of IBM.
IQ View is a trademark of ADTRAN, Inc.

This product includes software developed by the University of California, Berkeley, and its contributors.

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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 DSU IQ highlights.
- Chapter 2, Installation, describes the DSU IQ connectors (pin assignments are given in Appendix A) and provides an installation diagram.
- Chapter 3, Operation, explains how to operate your DSU IQ using either the front panel or a terminal interface.
- Chapter 4, Applications, provides examples of some common DSU IQ applications. This chapter includes network diagrams as well as configuration examples.
- Chapter 5, Configuration Overview, explains how to access the DSU IQ configuration menu and provides menu trees for both the front panel and the terminal interface.
- Chapters 6 through 9 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, DBU, and System Configuration.
- Chapter 10, Statistics, describes how to access statistical information from the DSU IQ.
- Chapter 11, Testing, explains how to access the DSU IQ diagnostic features, including PVC loopback and ping tests.
- Chapter 12, Activating Dialing Functions, provides information on the dialing options accessed through the Main menu.
- Appendix A provides pinouts for the DSU IQ connectors.
- Appendix B contains product specifications.

Notes provide additional useful information.

Cautions signify information that could prevent service interruption.

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

FCC regulations require that the following information be provided in this manual:

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the equipment housing is a label that shows the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, provide this information to the telephone company.

2. If this equipment causes harm to the telephone network, the telephone company may temporarily discontinue service. If possible, advance notification is given; otherwise, notification is given as soon as possible. The telephone company will advise the customer of the right to file a complaint with the FCC.

3. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the proper operation of this equipment; advance notification and the opportunity to maintain uninterrupted service are given.

4. If experiencing difficulty with this equipment, please contact ADTRAN for repair and warranty information. The telephone company may require this equipment to be disconnected from the network until the problem is corrected, or it is certain the equipment is not malfunctioning.

5. This unit contains no user-serviceable parts.

6. An FCC compliant telephone cord with a modular plug is provided with this equipment. In addition, an FCC compliant cable appropriate for the dial backup option ordered is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using an FCC compatible modular jack, which is Part 68 compliant.

7. The following information may be required when applying to the local telephone company for leased line facilities:

Service Type	Digital Facility Interface Code	Service Order Code	Network Jacks
56 kbps Digital Interface	04DU5-56	6.0F	RJ-48S
64 kbps Digital Interface	04DU5-64	6.0F	RJ-48S

8. The following information may be required when applying to the local telephone company for a dial-up line for the V.34:

Service Type	REN	FIC	USOC
Loop Start (V.34)	0.8B / 0.4A	02LS2	RJ-11C

9. The REN is useful in determining the quantity of devices you may connect to your telephone line and still have all of those devices ring when your number is called. In most areas, the sum of the RENs of all devices should not exceed five. To be certain of the number of devices you may connect to your line as determined by the REN, call your telephone company to determine the maximum REN for your calling area.

10. This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs. (Contact your state public utility commission or corporation commission for information.)

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 interference 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 equipment.*

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 interference-causing equipment standard entitled "Digital Apparatus," ICES-003 of the Department of Communications.

Cet appareil nuerique respecte les limites de bruits radioelectriques applicables aux appareils numeriques de Class A prescrites dans la norme sur le materiel brouilleur: "Appareils Numeriques," NMB-003 edictee par le ministre des Communications.

CANADIAN EQUIPMENT LIMITATIONS

Notice: The Canadian Industry and Science Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or an electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all devices does not exceed 100.

Table of Contents

Chapter 6. DTE Port Configuration

Chapter 7. Configuring the Network Port

List of Tables

List of Figures

Chapter 1
Introduction

PRODUCT OVERVIEW

The ADTRAN DSU IQ provides the visibility and control needed for both the physical and logical connections made in frame relay networks. The DSU IQ provides logical layer monitoring and management for frame relay. Each permanent virtual circuit (PVC) accessed through a DSU IQ 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 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. The DSU IQ's unique modular approach provides optional 10baseT ethernet access for SNMP.

The following are features of the DSU IQ:

- 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, in-band transmission of statistics

- Embedded SNMP and TELNET through the DTE, network, or SLIP / PPP port (or through the optional ethernet interface)
- Dial backup (DBU) available with ESP DBU cards; options include 4-wire Switched 56 (SW56), V.34, and ISDN
- 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
- 10baseT ethernet port available with ESP ethernet card
- Frame IQ MIB is standard ASN.1 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

The ESP 4-wire SW56 DBU card is compatible with AT&T Accunet and Sprint SW56 type services. The V.34 DBU card allows switched backup over the public switched telephone network (PSTN). The ESP ISDN 1B+D card supports a U-interface to the Basic Rate ISDN and is compatible with National ISDN and AT&T DMS.

The DSU IQ provides both V.35 and EIA-232 electrical and physical DTE interfaces to accommodate a variety of applications.

To ensure a reliable connection, the unit features an extended receiver capability which permits operation over long loops (3.4 miles or 5.5 km of 26 AWG at 56 kbps).

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 DSU IQ.

ANSI (American National Standards Institute) 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.

DDS OPERATION

DDS (digital data service) is a nationwide service that allows interconnection and transport of data at speeds up to 64 kbps. The local exchange carriers provide the local loop service to DDS customers and may provide data for routing Inter-LATA to an interexchange carrier. The DSU IQ supports 56 or 64 kbps DDS service rates yielding DTE rates of 56 kbps and 64 kbps.

SNMP MANAGEMENT

SNMP management capability is provided in-band with support for RFC 1315 (frame relay DTE MIB), RFC 1213 (MIB II), 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 is supported.

The DSU IQ's embedded SNMP feature allows the unit to be accessed and controlled by a network manager through the DTE or network port, through a device running SLIP or async PPP protocol (connected to the CONTROL port of the DSU), or through a LAN. LAN connection requires the optional ESP ethernet card (part number 1204005L1). This card provides a 10baseT ethernet interface to the LAN.

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 data bases. SNMP has three basic components:

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 DSU IQ. TELNET allows a user on a network manager to control the DSU IQ through the terminal menus.

DIAL BACKUP OPERATION

The DSU IQ dial backup (DBU) option cards allow frame relay circuit outage recovery for one user-to-network interface (UNI) at a time. The DSU IQ can be configured to originate a call based on physical layer conditions and/or PVC signaling loss. Once the criteria is met, the DSU IQ establishes a call to the configured phone number and the connection is used to carry traffic for the PVC(s) configured for DBU operation.

The DSU IQ's two-port design allows the DSU IQ receiving the call to continue to use the DDS frame relay circuit for PVCs that are not affected by the outage, while using the DBU interface for PVCs that are inactive due to the outage. A DSU IQ with multiple PVCs to multiple sites can also originate a call to one site during an outage and restore connection for PVCs to that destination.

The DSU IQ's unique DBU cards are field-installable by the customer. See the chapter *Installation* for information on installing DBU cards. The DBU cards are compatible with other ADTRAN ESP products supporting DBU. The three backup options are described in the following section, *ESP Card Options*. Contact the local telco provider to determine which services are available in your area. See the chapter *Applications* for more information, including an example of a dial backup application.

ESP CARD OPTIONS

Ethernet Card

This option card connects to an ethernet LAN, providing communication of management traffic between the LAN and the DSU IQ.

4-Wire Switched 56 DBU Card

This dial-up 4-wire SW56 card allows you to pay for data connection only for the time the unit is active. The regional operating companies provide the 4-wire local loop service to SW56 customers.

V.34 DBU Card

This module backs up the leased line application at data rates up to 33.6 kbps over an ordinary telephone network.

ISDN DBU Card

1B+D Basic Rate ISDN service provides a switched 56/64 kbps circuit.

DCE Card

This module connects an external DCE device to the DSU IQ for the purpose of using an external DSU/CSU to support access rates up to 512 kbps. The ESP DCE card is inserted into the DBU card slot, but it is not used for dial backup.

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 DSU IQ for any shipping damage. If damage is suspected, file a claim immediately with the carrier and contact ADTRAN Customer Service. If possible, keep the original shipping container for use in shipping the DSU IQ for repair or for verification of damage during shipment.

ADTRAN Shipments Include

The following items are included in ADTRAN shipments of the DSU IQ:

- DSU IQ unit
- The user manual
- An 8-position modular to 8-position modular 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

The ADTRAN DSU IQ MIB is available from ADTRAN in the support section of the ADTRAN Web page at www.adtran.com.

The following items are included in ADTRAN shipments of ESP DBU cards:

- ESP DBU card
- An 8-position modular to 8-position modular cable for the 4-wire SW56 and ISDN DBU options or an 8-position modular to 4-position modular cable for the V.34 DBU option

Customer Provides

The customer must provide either a male EIA-232 (standard 25-pin, D-type) or a male V.35 interface cable.

For SNMP management not accessed through the DTE or network port, the customer must provide access to the DSU IQ either through a SLIP port, Async PPP port (requires a male 25-pin D-type connector), or a 10baseT ethernet port (requires that an ADTRAN ESP Ethernet card be installed in the DSU IQ). See the appendix *Pinouts* for the pin assignments of the control port (for SLIP and Async PPP) and the ethernet port.

Power Up

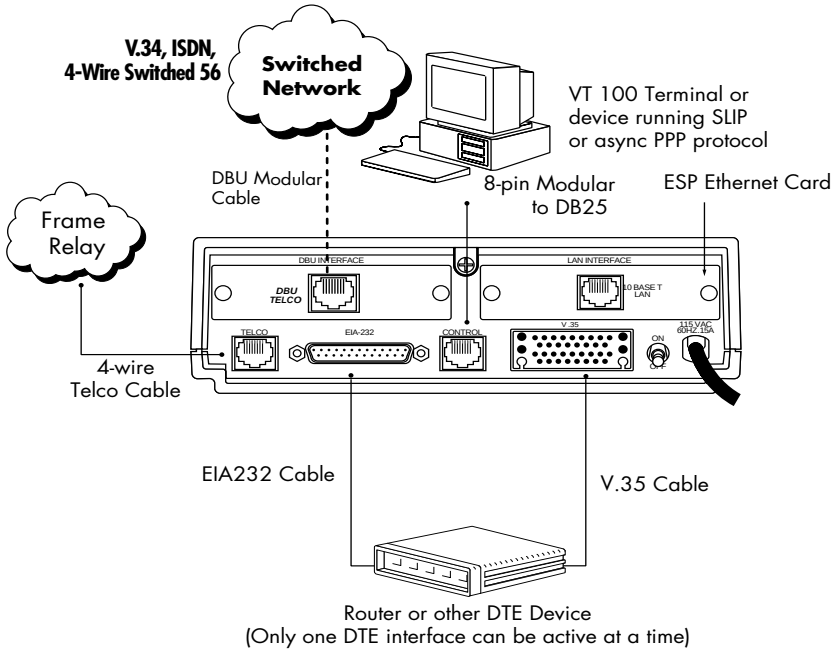
The DSU IQ is provided with a captive 8-foot power cord, terminated by a three-prong plug which connects to a grounded 115 VAC power receptacle.

Power to the DSU must be provided from a grounded 115 VAC, 60 Hz receptacle.

REAR PANEL

The rear panel contains two DTE connectors which provide primary channel V.35 or EIA-232. An 8-pin telco jack, a control port, a captive power cord, and a power switch are also located on the rear panel. Pin assignments for these connectors are listed

in the appendix *Pinouts.* The DSU IQ rear panel is shown in Figure 2-1 with optional ESP DBU and ethernet cards installed.



Item	Function
DBU Interface	ESP DBU card slot
LAN Interface	ESP Ethernet card slot
Telco	Connects to dedicated circuit
EIA-232	Connects to a DTE interface
Control	Connects to a VT 100 terminal or a device running SLIP or async PPP protocol
V.35	High speed DTE interface
Power Switch	Turns power on or off
115 VAC Connection	Power cord connection

Figure 2-1
DSU IQ Rear View

DBU and LAN Card Slots

The DSU IQ rear panel has two card slots for the installation of dial backup, external DCE, and ethernet cards. To insert cards, perform the following procedure:

1. Remove power from the DSU IQ.
2. Slide the card into the corresponding rear slot until the card panel is flush with the DSU IQ chassis.
3. Push card locks in (until they click) to secure the card and ensure proper installation.

Card slots are keyed to prevent improper installation (i.e., putting a DBU card into the ethernet slot). The external DCE card is keyed for the DBU slot.

Remove power from the unit prior to installing or removing option cards.

Telco Connector: Network Interface Connection

The DSU IQ has an 8-position modular jack labeled **TELCO**. The telco connector is used for connecting to the DDS network. The pinout for this connector is listed in the appendix *Pinouts.*

EIA-232 and V.35 Connectors: DTE Data Connection

The DTE should be connected to either the EIA-232 DTE connector or the V.35 DTE connector. The maximum cable lengths recommended are 50 feet for the EIA-232 and 100 feet for the V.35. The pin assignments for the connectors are listed in the appendix *Pinouts*.

The V.35 connector is recommended for use with data rates above 19.2 kbps. The EIA-232 connector works up to 56 kbps with a low capacitance cable or with the external transmit clock option selected. The primary DTE equipment can operate in asynchronous or synchronous modes.

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

Control Port

The DSU IQ has an 8-position modular jack labeled **CONTROL**. 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 adapter connector and cable provide a standard DB-25 EIA-232 interface. See the appendix *Pinouts* for the control port's pin assignments. A description of the operation of this port is covered in the *Operation* chapter.

The control port also functions as the SLIP or Async PPP port when configured for SNMP management. The pinouts are identical when operating in an SNMP management mode.

Chapter 3
Operation

FRONT PANEL

The DSU IQ faceplate is shown in Figure 3-1. Descriptions of each part of the front panel follow.

LCD Window

Displays menu items and messages in 2 lines by 16 characters.

Enter

Selects active menu items. To activate a menu item, scroll to it using the arrow keys or press the number of the item. The flashing cursor indicates which parameter is activated. Press **Enter** to select the active menu item.

Up and Down Arrows

Up and down arrows scroll through and activate the menu items of the current menu. The flashing cursor indicates the active parameter.

Cancel

Pressing the **Cancel** key stops the current activity and returns to the previous menu. Repeat until the desired menu level is reached. When a submenu item is displayed, press **Cancel** to exit the current display and return to the previous menu.

Numeric Keypad

The numeric keypad contains the numbers 0 through 9 and alpha characters A through F, which are used to activate menu items and enter information such as the IP address.

Next, Prev, Add, Delete

To activate these functions, press and release the **Shift** key, then press the **Next**, **Prev**, **Add**, or **Delete** key. Use these keys when editing tables such as the PVC Options table. See the chapter *Configuring the Network Port* for more information.

Shift

Enter alpha characters by first pressing and releasing the **Shift** key and then pressing the desired character. The **Next**, **Prev**, **Add**, and **Delete** keys are also activated by first pressing **Shift**.

To activate a menu item designated by an alpha character rather than a number, place the cursor on the menu item using the up and down arrows or press **Shift** and then the letter. The flashing cursor indicates which parameter is activated. Press **Enter** to select the item.

page holder for foldout Figure 3-1

page holder for back of foldout Figure 3-1

LED Descriptions

The DSU IQ has seven LED indicators: RS, CS, TD, RD, CD, ALM, and TST. These LEDs are identified as follows:

RS: Request to Send
Reflects the status of the RS pin of the DTE interface.

CS: Clear to Send
Reflects the status of the CS pin of the DTE interface.

TD: Transmit Data
This LED is active when the DSU IQ DTE port is transmitting data.

RD: Receive Data
This LED is active when the DSU IQ DTE port is receiving data.

CD: Carrier Detect
This LED is active when frame synchronization is achieved and the DSU IQ is ready to transfer data.

ALM: Alarm
This LED is active when an alarm condition exists. Alarm conditions include:

DDS Alarm Conditions
- Open loop on network
- No frame synchronization
- OOS/OOF

Frame Relay Alarm Condition
- Network frame relay signaling state is down

TST: Test
This LED is active when the unit is in test mode.

Front Panel Operation

To choose a menu item, press the corresponding number or alpha character on the keypad. Press **Shift** to activate menu items with alpha selections. Scrolling to the selection by pressing the up and down arrows also activates the menu items. The flashing cursor indicates which selection is activated. Press **Enter** to select the item. The following steps and Figure 3-2 illustrate how to select DSU IQ options:

1. Activate Configuration (CONFIG) using the arrow keys or by pressing **1**. The cursor will flash on the number next to the activated selection. Press **Enter**.
2. Use the arrow keys to view submenu items.
3. Choose an item on the submenu such as DTE PORT.
4. Activate DTE PORT using the arrow keys or by pressing **1**. Press **Enter**.
5. Activate PHYS LYR OPT using the arrow keys or by pressing **1**. Press **Enter**.
6. Activate INTERFACE using the arrow keys or by pressing **1**. Press **Enter**.
7. Press the arrow keys until the desired interface type is displayed. Press **Enter**.

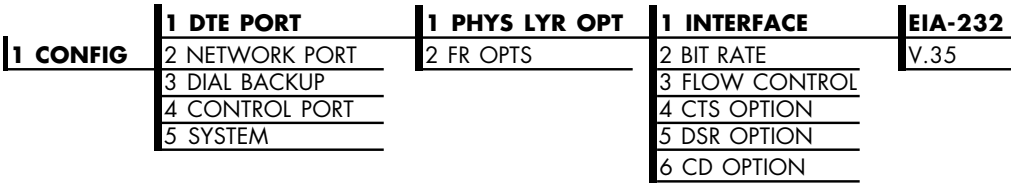


Figure 3-2
Example of Basic Front Panel Menu Navigation (with DBU card installed)

VT 100 Terminal Connection and Operation

To control the DSU IQ using a VT 100 terminal, perform the following procedure:

1. Set the DSU IQ baud rate to match the terminal through the front panel (maximum rate is 38.4k). Select **CONFIG**, then **CONTROL PORT**.

2. Using the ADTRAN provided VT 100 terminal adapter, connect the COM port of a VT 100 compatible terminal or equivalent to the eight-pin modular jack labeled CONTROL on the rear of the DSU IQ. This connection is used for both local and remote configuration.

3. Open the connection and press **Enter** repeatedly until the Login Menu appears (Figure 3-3).

4. Select Local Login to configure the DSU IQ unit connected to the terminal. Select Remote Login to configure a remotely located DSU IQ unit. For remote applications, enter the DLCI (data link connection identifier) number of the remote unit by pressing **1**, **Enter**, the DLCI number, and **Enter** again. Next, select Begin Remote Session by pressing **2** and **Enter**.

*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.*

5. Enter the password. The factory default password is **adtran**. The Main menu will appear (Figure 3-4).

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

In the upper right-hand corner of the VT 100 screen, LOCAL or REMOTE is displayed, indicating which unit the current screen represents. See Figure 3-4.

Figure 3-3
Terminal Login Menu

Figure 3-4
Terminal Main Menu

DSU IQ MENU STRUCTURE

The opening menu is the access point to all other operations. The Main menu branches are Configuration, View Statistics, Test, Dial, and Logout. See Figure 3-4. Each Main menu item has several functions and submenus to identify and access specific parameters.

The Logout selection is available on the terminal interface only.

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

Main Menu

Definitions for the branches of the Main menu follow:

Configuration (CONFIG)
Configuration is used to select DTE, network, dial backup, and system operating parameters. For more information on configuration options, see the following chapters: *Configuration Overview, DTE Port Configuration, Configuring the Network Port, Configuring Dial Backup Options,* and *System Configuration*.

View Statistics (STATS)
This selection displays statistical information for the DTE port, network port, dial backup port, and the system. See the chapter *Statistics* for more information.

Test
Testing options allow you to perform PVC loopback and ping tests. See the chapter *Testing* for more information.

Dial
This selection allows you to access manual dialing capabilities. See the chapter *Activating Dialing Functions* for more information.

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

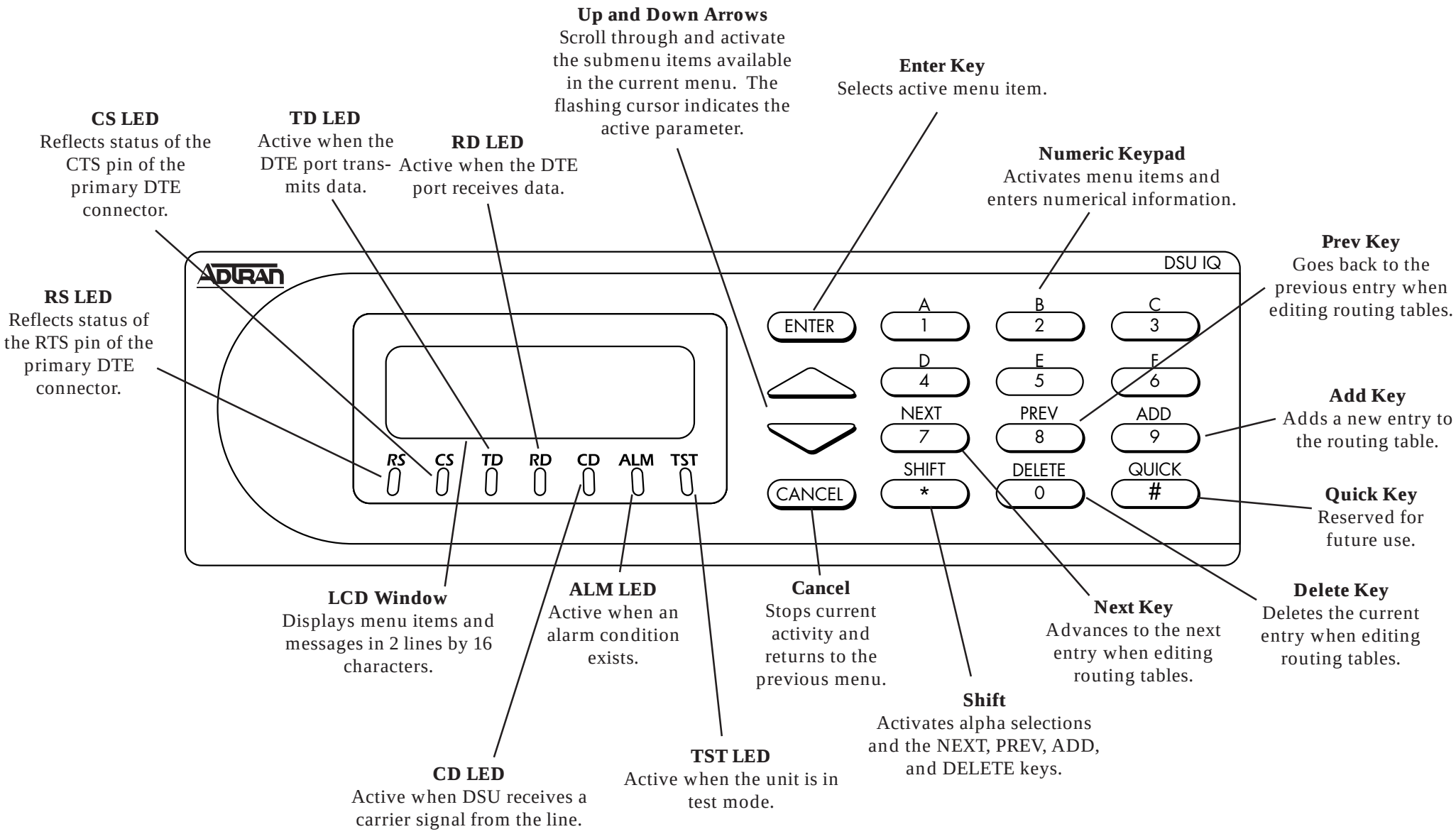


Figure 3-1
DSU IQ Front Panel

Chapter 4
Applications

This chapter provides examples of some common DSU IQ management application options as well as an example of a dial backup application. The management application examples include VT 100 management, out-of-band SNMP/TELNET management, and in-band PVC SNMP/TELNET management. Descriptions and configuration tips for these applications are provided in the sections that follow.

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 in-band management, the management DLCI must be RFC 1490 encapsulated IP traffic.

MANAGEMENT APPLICATIONS

One of the main advantages of the DSU IQ is management flexibility. The DSU IQ front panel interface provides complete 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.

Local VT 100 Terminal Management

Connect a VT 100 terminal to the DSU IQ control port. 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 DSU IQ is fully accessible for configuration, diagnostics, and statistics viewing. See Figure 4-1 for an example 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.

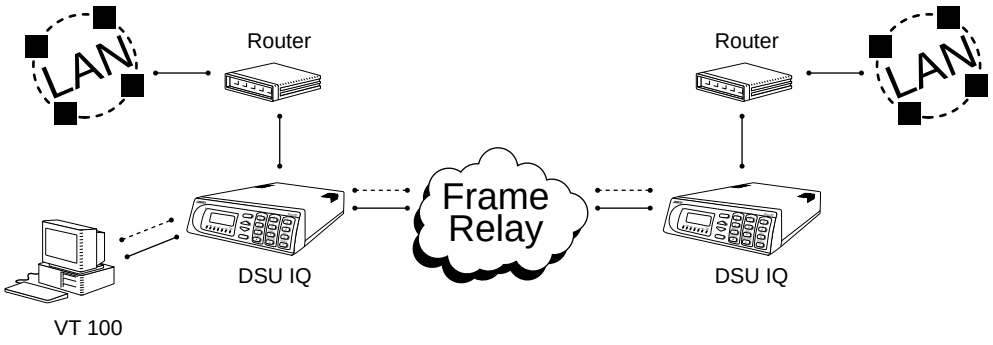


Figure 4-1
VT 100 Management Application Example

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 CONFIGURATION menu).

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

Out-of-Band Management

This management option (shown in Figure 4-2) is commonly used in situations where the customer is trying to reduce the amount of management traffic flowing through the frame relay device. The DSU IQ 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 DSU IQ 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 (i.e., a router) running SLIP protocol. Connection is made through the DSU IQ's control port.
- A device (i.e., a router) running async PPP protocol. Connection is made through the DSU IQ's control port.
- A LAN. Connection is made through the optional 10baseT ethernet interface provided on the ESP ethernet card (part number 1204005L1).

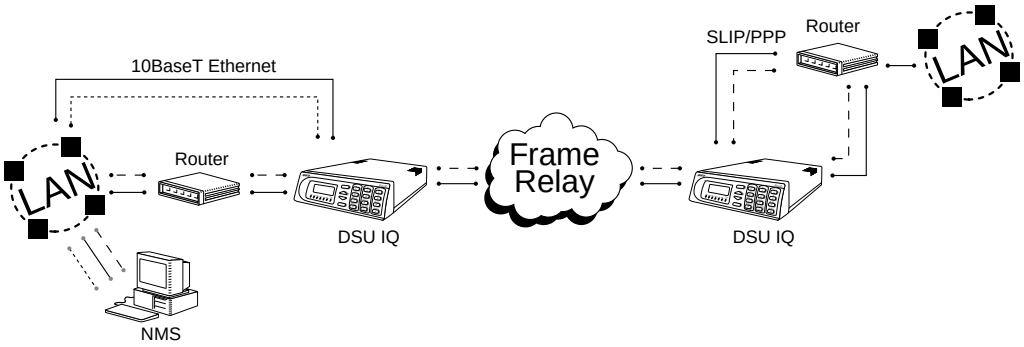


Figure 4-2
Out-of-Band Management Application Example

Minimum Configuration Requirements for Out-of-Band Management

The following options (all found in the SYSTEM portion of the 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 DSU IQ control port mode. If the ESP ethernet card is the interface type, this parameter does not affect setup.

IP Address
Enter the DSU IQ IP address.

Subnet Mask
Enter the subnet mask number assigned to the network formed by the DSU and the other FRAD / routers across the frame relay network. This address is available from the network administrator and is only necessary when using the ESP ethernet card.

Gateway IP Address (if required)
Enter the Gateway node IP address. This address is applicable only if the DSU IQ and the network manager are connected through a Gateway node. This address is available from the network administrator and is only necessary when using the ESP ethernet card.

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 settings.

Trap Manager DLCI
Identify the virtual circuit used for all traps generated by the DSU IQ. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager IP Address
Enter the IP address of the SNMP manager to which the DSU IQ sends traps. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager Port
Enter the DSU IQ port used to transmit traps to the SNMP manager. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

In-Band Management

The ADTRAN DSU IQ supports three modes of in-band management using the frame relay structure of PVCs. These modes are local (see Figure 4-3), shared (see Figure 4-4), and dedicated PVC management (see Figure 4-5). All three types support complete SNMP management as well as TELNET capabilities.

All PVC-based in-band management traffic must be noncompressed IP and use RFC 1490 encapsulation.

Local PVC Management

Local PVC management refers to a PVC created between the DSU IQ and the frame relay router on the DTE interface of the DSU IQ. This type of management is ideal when local management is needed but an ethernet connection is not available. To support this type of management it is required that all traffic on the selected PVC 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 DSU IQ. Since the DSU IQ 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 DSU IQ. Accomplish this by setting a value (between 16 and 1007) for the DTE management DLCI on the DSU IQ 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 DSU is lost.

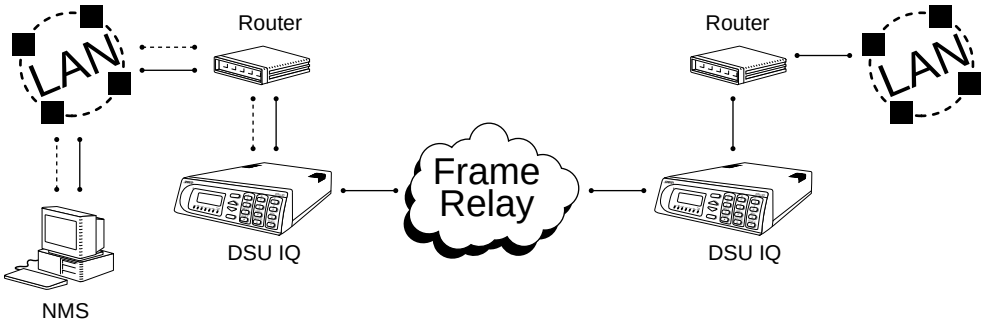


Figure 4-3
Local PVC Management Application

Minimum Configuration Requirements for Local PVC Management

The following options are the minimum configuration requirements for establishing in-band 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 portion of the CONFIGURATION menu.

IP Address
Enter the DSU IQ 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 portion of the CONFIGURATION menu under FRAME RELAY OPTIONS.

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 Manager DLCI
Identify the virtual circuit used for all traps generated by the DSU IQ. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager IP Address
Enter the IP address of the SNMP manager to which the DSU IQ sends traps. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager Port
Enter the DSU IQ port used to transmit traps to the SNMP manager. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Shared PVC Management

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

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

By setting a local PVC management and shared PVC management on the remote DSU IQ 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 getting to the remote router.

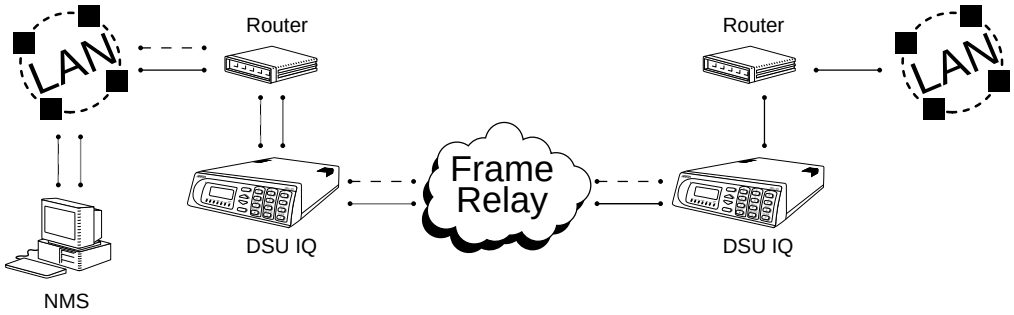


Figure 4-4
Shared PVC Management Application

Minimum Configuration Requirements for Shared PVC Management

The following options are the minimum configuration requirements for establishing in-band 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 portion of the CONFIGURATION menu.

IP Address
Enter the DSU IQ 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 portion of the CONFIGURATION menu.

Management DLCI 1 and/or DLCI 2 Mode
Set to DEDICATED if the management DLCI is used only to manage the DSU IQ (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 portion of the CONFIGURATION menu.

The DSU IQ 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 Manager DLCI
Identify the virtual circuit used for all traps generated by the DSU IQ. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager IP Address
Enter the IP address of the SNMP manager to which the DSU IQ sends traps. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Trap Manager Port
Enter the DSU IQ port used to transmit traps to the SNMP manager. This selection is found under TRAP MGR OPTIONS in the SYSTEM portion of the CONFIGURATION menu.

Dedicated PVC Management

Dedicated PVC management refers to the ability to have a PVC originated from the network and terminated in the DSU IQ. 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 fire-wall that restricts management data to the DSU. Dedicated PVC management is also ideal when the user wants to guarantee access to a remote DSU regardless of the state of the remote LAN.

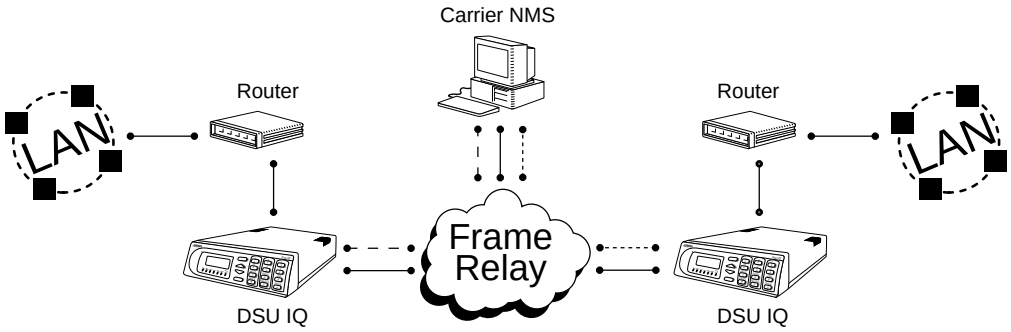


Figure 4-5
Dedicated PVC Management Application

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*, for more information.

DIAL BACKUP APPLICATION

The DSU IQ dial backup (DBU) options allow frame relay circuit outage recovery for one user to network interface (UNI) at a time. The DSU IQ can be configured to originate a call based on physical layer conditions and / or PVC signaling loss. Once the criteria is met, the DSU IQ establishes a call to the configured phone number (see Table 4-A) and the connection is used to carry traffic for the PVC(s) configured for DBU operation.

The DSU IQ's two-port design allows the DSU IQ receiving the call to continue to use the DDS frame relay circuit for PVCs that are not affected by the outage, while using the DBU interface for PVCs that are inactive due to the outage. This is done (without the attached DTE device's intervention) by modifying the status of PVCs that are in DBU state to active when the PVC status is given to the DTE. A DSU IQ with multiple PVCs to multiple sites can also originate a call to one site during an outage and restore connection for PVCs to that destination. Since the DSU IQ can only make one call at a time, the other PVCs to other sites in this scenario will be inactive.

Information entered into the PVC Configuration Table (see Table 4-B) marks PVCs for DBU operation. The key element in each entry of the table is the DBU DLCI. For each PVC connecting two sites for DBU operation, the DLCI field represents the PVC DLCI at the local UNI and the DBU DLCI represents the PVC DLCI at the remote site UNI. The DSU IQ uses this information in the outbound side to change the PVC DLCI so the far end DTE device receives frames on the DBU PVC addressed in the same manner as when the frame relay circuit is operational. For PVCs not used for DBU operation, leave the DBU DLCI field set to zero.

The DBU DLCI information is only required for the DSU IQ originating the call. In cases such as remote sites establishing calls to host sites, the host site with multiple PVCs should have only non-zero values for the DBU DLCI fields in the PVC Configuration Table.

Only PVCs that are used in DBU should have the DBU DLCI set to a non-zero value.

The range for the DBU DLCI field is from 15-1007. Therefore, you cannot manually enter 0 for the PVCs not used in DBU. When an entry is first created with the ADD selection, it is set to 0 by default. To reset a previously configured DBU DLCI to 0, delete the entry and then add it back in (using the DELETE and ADD selections).

See Figure 4-6 for an example of a dial backup application. Tables 4-A and 4-B provide example setups for the DBU Options (CONFIG ->DIAL BACKUP) and the PVC Configuration Table (CONFIG ->NETWORK PORT ->PVC CONFIG). The tables are based on the example application shown in Figure 4-6. Please note that the configuration selections given may need modification based on your network configuration.

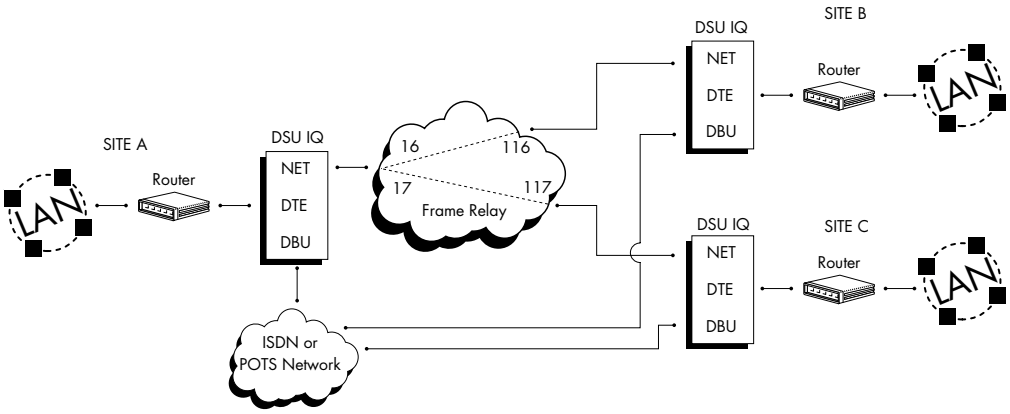


Figure 4-6
Dial Backup Application

Table 4-A
Example Settings for Dial Backup Options

AUTO DBU	Enable
WITH OOS	Disable
WITH NO RX	Disable
WITH NO SC	Disable
WITH NO LMI	Enable
FAIL TIMER	10 seconds
RESTORE TIMER	1 minute
REDIAL COUNTER	5
WAIT TO REDIAL	15 seconds
PHONE NUMBERS	Enter phone number to reach far end.

Table 4-B
Example Settings for PVC Configuration Table

	SITE A (ENTRY #1)	**SITE A (ENTRY #2)**	**SITE B**	**SITE C**
DLCI	16	17	116	117
DBU DLCI	116 or 0 *	117 or 0 **	16	17
SEQ #	Enable	Enable	Enable	Enable
PVC DELAY	Enable	Enable	Enable	Enable

* DBU DLCI should be zero if Site B is not designated as the primary remote.
** DBU DLCI should be zero if Site C is not designated as the primary remote.

Both DBU DLCI entries for Site A should be zero if only the remotes are the originate call.

Chapter 5
Configuration Overview

LOCAL AND REMOTE CONFIGURATION

The DSU IQ can be configured locally or, when using the VT 100 interface, communications can be established so a local DSU IQ can configure a remote DSU IQ. See the chapter *Operation* for information on selecting Local or Remote operation.

The Configuration menu consists of submenus relating to specific interfaces or functions of the DSU IQ requiring setup:

DTE Port
Network Port
Dial Backup (when an ESP DBU card is installed)
Control Port (front panel only)
System

The terminal configuration menu is shown in Figure 5-1.

For detailed information on configuration see the chapters *DTE Port Configuration*, *Configuring the Network Port*, *Configuring Dial Backup Options*, and *System Configuration.*

Configuration menu trees are shown in Figures 5-2 (for the Front Panel) and 5-3 (for the terminal interface).

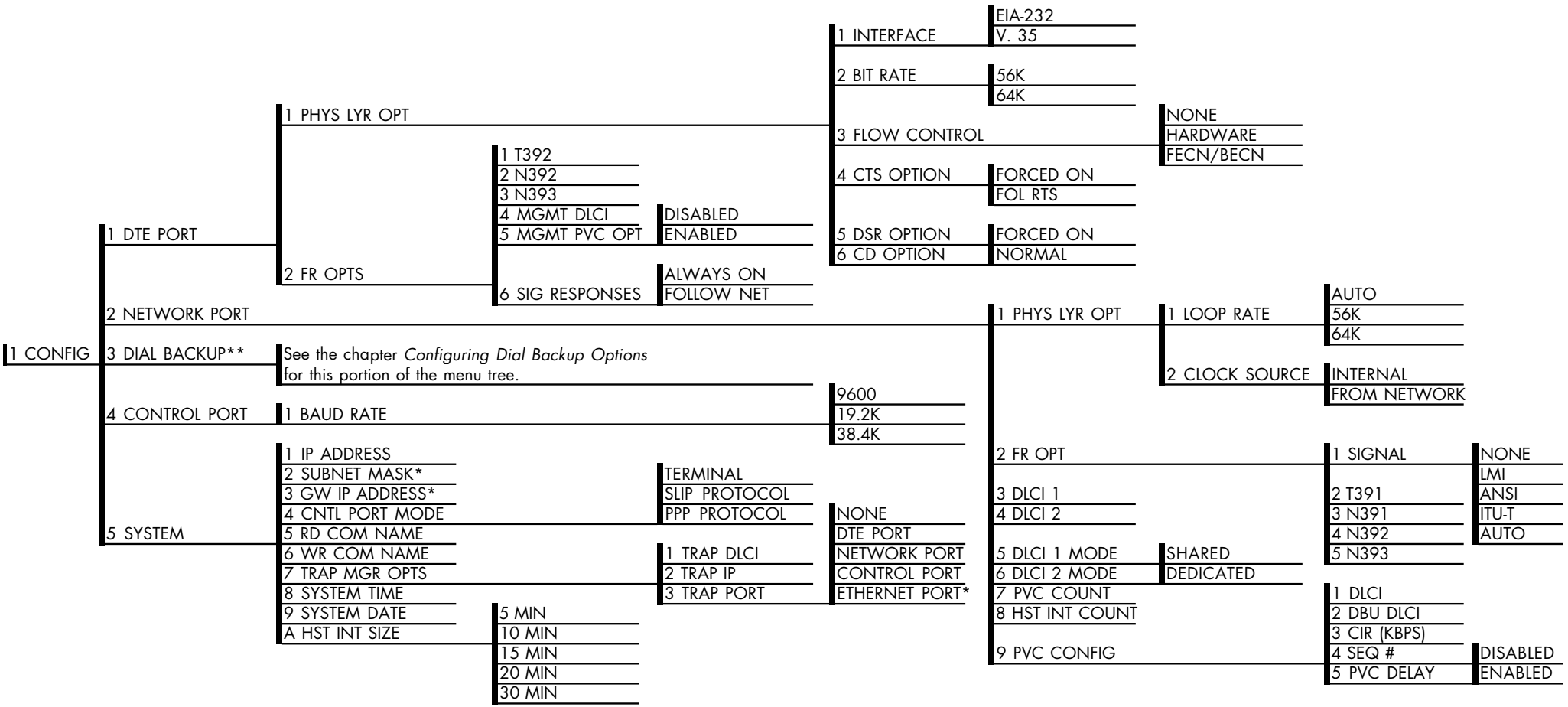
Figure 5-1
Terminal Configuration Menu

Page holder for foldout page (Figure 5-2)

Page holder for back of foldout page (Figure 5-2)

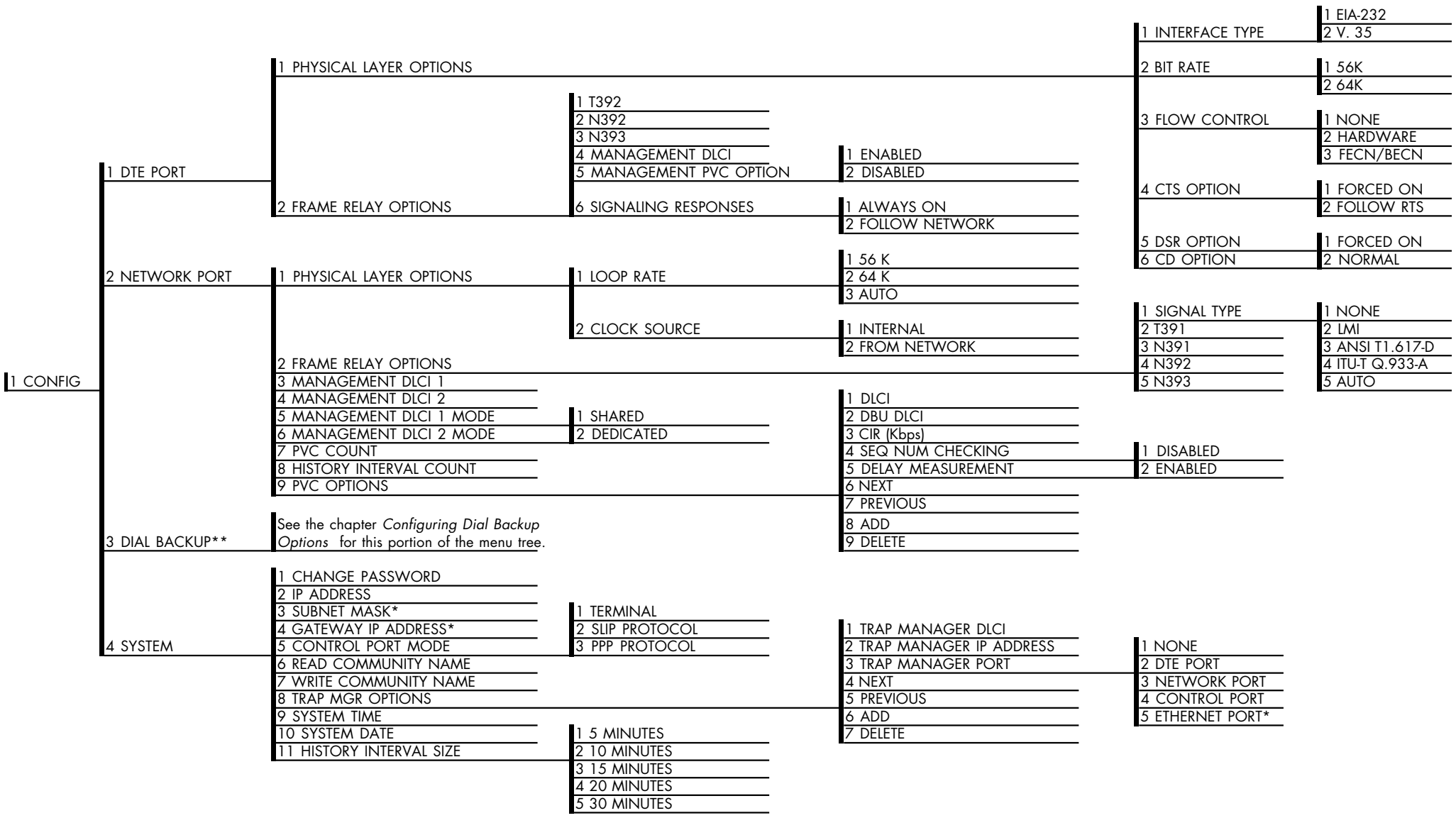
Pageholder for foldout page (Figure 5-3)

Page holder for back of foldout page (Figure 5-3)



*Only available if the ESP ethernet card is installed.
**Only available if an ESP DBU card is installed.

Figure 5-2
Front Panel Configuration Menu Tree



*Only available if the ESP ethernet card is installed.
**Only available if an ESP DBU card is installed.

Figure 5-3
Terminal Configuration 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 DSU IQ 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 shows the choices available in this menu.

Figure 6-1
Terminal DTE Port Configuration Menu

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

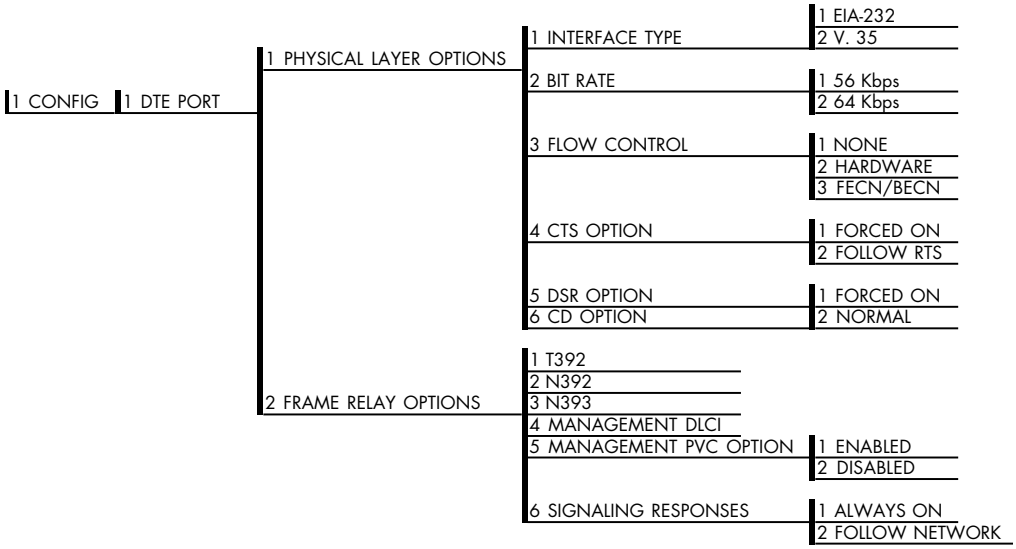


Figure 6-2
DTE Port Menu Tree

Physical Layer Options (PHYS LYR OPT)

Interface Type (INTERFACE)

Select the connector type for the DTE interface. The choices are V.35 and EIA-232. See the appendix *Pinouts* for the connector pin assignments.

Bit Rate

Set the operating speed of the DTE interface to 56 or 64 kbps.

Flow Control

This option determines how the DSU IQ responds to congestion during DBU operation.

None
No flow control is used and the DSU IQ drops frames during severe congestion while in DBU operation.

Hardware
The DSU IQ varies the DTE TC clock as necessary to relieve congestion during DBU operation.

FECN/BECN
While in a congested state during DBU operation, frames across the DBU PVCs have FECN or BECN set depending on the direction. Frames outbound to the network have FECN set, while frames inbound to the attached DTE device have BECN set. This method is useful if the attached DTE devices can respond to congestion notification.

CTS Option

Set the CTS lead to FORCED ON or FOLLOW RTS.

Forced On
The CTS lead remains on and request to send (RTS) is ignored as long as the unit is synchronized and able to pass data.

Follow RTS (FOL RTS)
The CTS lead follows the RTS lead with minimum delay.

DSR Option

Set the DSR lead to FORCED ON or NORMAL.

Forced On
The DSR lead remains on.

Normal
The DSR lead is off when the DSU IQ is in a DSU loopback test or is out of service (OOS).

CD Option

Set the CD lead to FORCED ON or NORMAL.

Forced On
The CD lead remains on.

Normal
The CD lead is off when the DSU IQ is OOS.

Frame Relay Options (FR OPTS)

The frame relay protocol is a synchronous protocol used to concentrate two different devices into a common frame relay link to the network. The DSU IQ 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

These parameters define the error threshold for the UNI (user to network interface) formed by the DSU IQ 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. N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.

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 will return to active once the threshold is no longer exceeded.

Management DLCI (MGMT DLCI)

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

Guidelines for Configuring Management DLCI

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

Management PVC Option (MGMT PVC OPT)

If this option is set to ENABLED, the management DLCI is included in the Full Status response to the router. Enable this option when the management DLCI is used to route management traffic to the DSU IQ.

Signaling Responses (SIG RESPONSES)

This option determines when PVC signaling responses are sent to the router.

Always On

If ENABLED, PVC signaling responses are sent to the router regardless of the network signaling state. Enable this option when the DSU IQ is used for dial backup.

Follow Network (FOLLOW NET)

If ENABLED, PVC signaling responses are sent to the router only when the network signaling state is up. Enable this option when the router is going to use an alternate path for dial backup.

Chapter 7
Configuring the Network Port

NETWORK PORT

Access the network port menus by selecting NETWORK PORT from the CONFIGURATION menu. See the menu tree in Figure 7-1. The network port terminates the user end of the frame relay UNI interface. The DSU IQ supports three standard PVC signaling formats: LMI, ANSI T1.617-D, and ITU Q.933-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.

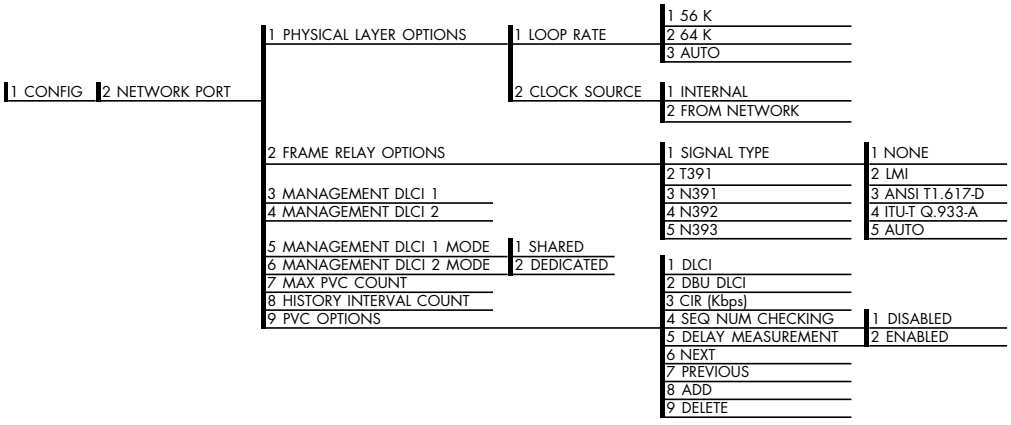


Figure 7-1
Network Port Configuration Menu Tree

When configuring from a terminal, the screen in Figure 7-2 will appear when NETWORK PORT is selected.

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

Figure 7-2
Terminal Network Port Configuration Menu

Physical Layer Options (PHYS LYR OPT)

The following sections describe the physical layer options available for the network port:

Loop Rate

Set the loop rate for 56 kbps, 64 kbps, or auto.

Clock Source

Configure the DSU IQ to derive clocking from itself (INTERNAL) or from the network. The most common application is FROM NETWORK.

Frame Relay Options (FR OPT)

The terminal screen in Figure 7-3 appears when you select FRAME RELAY OPTIONS from the network configuration menu.

Figure 7-3
Terminal Network Port Frame Relay Options Menu

Signal 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 DSU IQ to use the same signaling type as the attached

frame relay DTE. If AUTO is selected and there is no DTE device attached, the DSU IQ 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

These parameters define the error threshold for the UNI formed by the DSU IQ 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. N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.

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 will return to active again once the threshold is no longer exceeded.

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 DSU IQ (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.

Max PVC Count

Sets the maximum number of PVCs that the DSU IQ 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 (HST INT COUNT)

Sets the number of history intervals to store for statistics. History intervals are displayed in the View by Interval portions of the Statistics menus. These views provide data divided into columns 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 (PVC CONFIG)

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

*When configuring PVC options using the front panel the **Next**, **Prev**, **Add**, and **Delete** keys are used. See the chapter **Operation** for more information on front panel operation.*

DLCI

Enter the Network DLCI.

DBU DLCI

Enter the far end DLCI for each PVC used for dial backup. Only the DSU IQ that originates the call is required to have this option set.

Only PVCs that are used in DBU should have the DBU DLCI set to a non-zero value.

The range for the DBU DLCI field is from 15-1007. Therefore, you cannot manually enter 0 for the PVCs not used in DBU. When an entry is first created with the ADD selection, it is set to 0 by default. To reset a previously configured DBU DLCI to 0, delete the entry and then add it back in (using the DELETE and ADD selections).

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.

Seq Num Checking (SEQ #)

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

Delay Measurement (PVC DELAY)

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

Next (NEXT key on front panel)

Edit the next entry in the PVC Options table.

Previous (PREV key on front panel)

Edit the previous entry in the PVC Options table.

Add (ADD key on front panel)

Add a new entry to the PVC Options table.

Delete (DELETE key on front panel)

Delete the current entry in the PVC Options table.

Chapter 8
Configuring Dial Backup Options

DIAL BACKUP OPTIONS

The Dial Backup Configuration menu (Figure 8-1) is available only when an optional ESP DBU card is installed in the DSU IQ. Use this menu to configure DBU options such as auto DBU capability, DBU criteria, DBU timer functions, and DBU phone numbers. See Figure 8-2 for a complete menu tree of the DBU selections.

Figure 8-1
DBU Options Menu (V.34 DBU card installed)

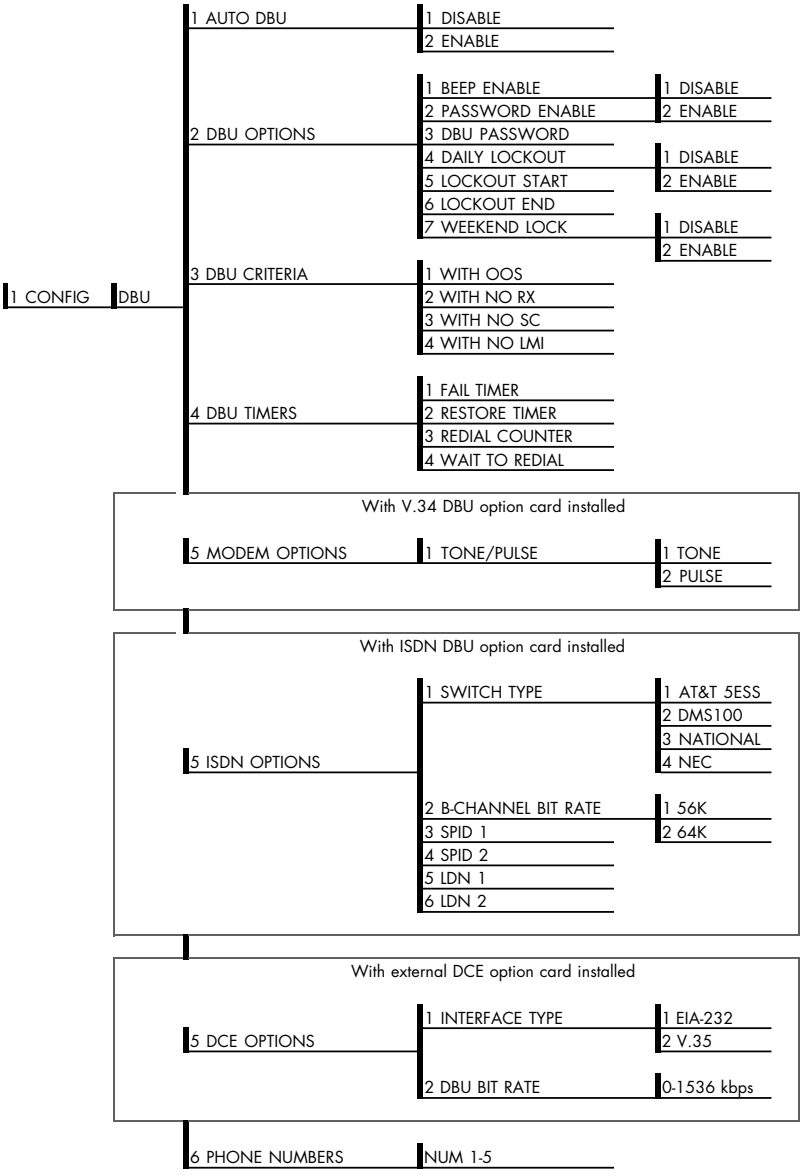


Figure 8-2
Dial Backup Menu Tree

Dial backup is only supported when the unit is operated in point-to-point mode.

Auto DBU

The AUTOMATIC DBU option specifies whether the unit automatically enters dial backup mode or waits for manual setup. The factory default setting is DISABLE.

DBU Options

Beep Enable
If enabled, the DSU IQ issues an intermittent beep while in dial backup.

Password Enable (PASSWRD ENABLE)
When enabled, the passwords entered in the DBU PASSWORD fields of both the near and far end DSU IQs are required to match before a dial backup connection can be made. The setting in this field must also be identical in both units (i.e., they both must be set to either ENABLED or DISABLED).

DBU Password
Enter the authentication string used for making a dial backup connection. The near and far end DSU IQ DBU passwords must be identical. If using front panel entry, see the section *Entering Letters Using the Front Panel* in the chapter *System Configuration* for more information.

Daily Lockout
Enable / disable the daily lockout specified by the fields LOCKOUT START and LOCKOUT END.

Lockout Start (LCKOUT START)
Enter the hour that the daily lockout begins and dial backup is disabled (0 to 23). This setting only applies if the DAILY LOCKOUT parameter is enabled.

Lockout End
Enter the hour that the daily lockout ends and dial backup is

reactivated (0 to 23). This setting only applies if the DAILY LOCKOUT parameter is enabled.

Weekend Lock
If enabled, no backup will occur from midnight Friday to midnight Sunday.

DBU Criteria

With OOS
When enabled, the DSU IQ enters backup mode if an out-of-service condition is detected. The factory default setting is ENABLE.

With No RX
When enabled, the DSU IQ enters backup mode when a loss of signal is detected. The factory default setting is ENABLE.

With No SC
When enabled, the DSU IQ enters backup mode when a loss of sealing current is detected. The factory default setting is ENABLE.

With No LMI
When enabled, the DSU IQ enters backup mode when a loss of signaling from the frame relay switch is detected. The default setting is ENABLE.

DBU Timers

Fail Timer
This option sets the amount of time the dedicated circuit failure condition must be active before the DSU IQ attempts backup. The value entered is multiplied by 10. The amount of time can be up to 990 seconds (i.e., an entry of 99). The factory default setting is 10 seconds (an entry of 1).

Restore Timer
Once the DDS circuit is down, the DSU IQ remains in backup until the DDS circuit is active for the length of time specified for the restore timer. The selection is entered in minutes (up to 255).

If set to 0, the DDS must be restored manually. The factory default setting is 1 minute.

Redial Counter
This option sets the number of times the DSU IQ redials the far end when entering backup mode. The redial count, which is manually entered, can be up to a maximum of 99 attempts. If the DSU IQ encounters a busy or reorder, it attempts to establish the call the specified number of times. The factory default setting is 5.

Wait to Redial
This option works in conjunction with the preceding Redial Counter. It selects the amount of time between redial attempts to connect the backup line. The amount of time, which is manually entered, can be up to 99 seconds. The factory default setting is 15 seconds.

DBU Card Options

The following selections are dependent upon the type of ESP DBU card installed (if any). If no card is installed or if the ESP 4-Wire SW56 card is installed, then the selections in this section do not appear. If the ESP V.34 DBU card is installed, the MODEM OPTIONS selection is available. If the ESP ISDN DBU card is installed, the ISDN OPTIONS selection is available.

Modem Options

The Modem Options field is available when the ESP V.34 DBU card is installed. Select the dialing method for the dial backup service (tone or pulse).

ISDN Options

The ISDN Options field is available when the ESP ISDN DBU card is installed.

Switch Type
Select which type of telco CO switch is providing the ISDN service. There are four options for ISDN switch types:

- AT&T 5ESS
- DMS100
- National
- NEC

B-Channel Bit Rate (B-CH BIT RATE)
Select the channel bit rate for the ISDN service. Select 64k unless your service only provides 56k.

SPID 1/2
For ISDN dial backup, enter the service profile identifier (SPID) for both B-channels. The SPID is a sequence of digits identifying ISDN terminal equipment to the ISDN switch when more than one ISDN set has been attached to the same central office line. The SPID is assigned by the telco when the ISDN line is installed and normally resembles the phone number.

Only the AT&T 5ESS switch is capable of recognizing a point-to-point configuration, eliminating the need for a SPID. All other switch types require a SPID.

LDN 1/2
For ISDN dial backup, enter the LDN for both B-channels.

DCE Options

The DCE Options field is available when the ESP External DCE option card is installed.

Interface Type
Select the connector type for the DCE interface. The choices are EIA-232 and V.35.

DBU Bit Rate
Set to the operating speed of the DBU interface (0-1536 kbps).

Phone Numbers 1-5

The DSU IQ stores up to 5 numbers of 36 digits each. Edit a phone number by reentering the entire number. This process overwrites the previously stored number.

Chapter 9
System Configuration

Access System configuration selections by first choosing CONFIGURATION from the Main menu. Then choose SYSTEM from the Configuration Menu. Full menu trees for the System Configuration selections are shown in Figures 5-2 (*Front Panel Configuration Menu Tree*) and 5-3 (*Terminal Configuration Menu Tree*). The Terminal System Configuration menu is shown in Figure 9-1.

Change Password (not available on front panel)

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

IP Address

Enter the DSU IQ IP (internet protocol) address.

Subnet Mask

Enter the subnet mask assigned to the LAN that the ESP ethernet card is attached to. This option is only available if the ESP ethernet card is installed.

Figure 9-1
System Configuration Menu

Gateway IP Address (GW IP ADDRESS)

Enter the gateway IP address. The gateway is used when an ethernet packet is transmitted from the DSU IQ to a foreign subnet. This option is only available if the ESP ethernet card is installed.

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 (RD COM NAME)

Enter the authentication strings used for SNMP management. Match the DSU IQ to the SNMP manager for read privileges. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

Write Community Name (WR COM NAME)

Enter the authentication strings used for SNMP management. Match the DSU IQ to the SNMP manager for write privileges. If using front panel entry, see the section *Entering Letters Using the Front Panel* in this chapter for more information.

Trap Mgr Options

The Trap Manager Options table defines routes for up to five SNMP managers.

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 DSU IQ.

Trap Manager IP Address (TRAP IP)

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

Trap Manager Port (TRAP PORT)

Enter the DSU IQ port used to transmit traps to the SNMP manager. Choices are NONE, DTE PORT, NETWORK PORT, CONTROL PORT, and ETHERNET PORT. The ETHERNET PORT selection is only available if the ESP ethernet card is installed.

Next (NEXT key on front panel)

Edit the next entry in the Trap Manager Options table.

Previous (PREV key on front panel)

Edit the previous entry in the Trap Manager Options table.

Add (ADD key on front panel)

Add a new entry to the Trap Manager Options table.

Delete (DELETE key on front panel)

Delete the current entry in the Trap Manager Options table.

System Time/Date

Set the current hour, minute, day, month, and year. This is used to date/time stamp all statistical data captured by the DSU IQ.

History Interval Size (HST 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 DSU IQ stores up to 157 intervals. Once the maximum is reached, new information overwrites existing information, beginning with the least current.

If data is not retrieved before it is overwritten, it cannot be restored. Total Time Stored = History Interval Size x History Interval Count. History interval size is configured in the ***System Configuration*** *menu. History interval count is configured in the* ***Network Configuration*** *menu.*

ENTERING LETTERS USING THE FRONT PANEL

Configuring the Read / Write Community Names requires the entry of letters rather than numbers. When configuring the unit using the front panel, special steps must be taken in order to perform these entries. The following example of entering the Write Community Name illustrates this procedure:

1. Press the corresponding number, then **Enter** to select WRITE COMMUNITY NAME from the System Configuration menu.
2. Press the **Up Arrow** to scroll to the desired character.
3. Press **Enter**.
4. Repeat steps 2 and 3 until all characters have been selected.
5. Press the **Enter** key to complete the entry.

Chapter 10
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)*.

VIEWING STATISTICAL INFORMATION (TERMINAL INTERFACE)

Select View Statistics from the Main menu to access the View Statistics Menu shown in Figure 10-1. From this menu, select to view statistics for the ports (DTE, Network, or Dial Backup), all available DLCIs, or the system. Select Reset Statistics to clear all current information.

Figure 10-1
View Statistics Menu

Terminal Statistics Display Options

DTE port, network port, dial backup 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 intervals to be set for (from 5 to 30 minutes, in five minute intervals). The DSU IQ gathers and displays the information according to the time selected.

The DSU IQ cuts the first gathering session short 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 furthest 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.

The first day's column (i.e., the column furthest 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 10-1).

D=DLCI
When viewing Network port statistics, press **D** to view the DLCI Statistics menu shown in Figures 10-6.

C=Current
Press **C** to resume viewing current status information after a freeze.

F=Freeze
Press the **F** key to freeze the current statistics display.

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

Scroll (<, >)
Press the < and > keys to scroll left and right on a statistics 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, DBU port, DLCI, and System Statistics menus.

DTE Port Statistics

Information given is for the DTE port since the last reset. See Figures 10-2 and 10-3 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. See Figure 10-2.

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

Figure 10-2
DTE Port Statistics (View by Interval)

Figure 10-3
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 Errors
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.

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 DSU IQ due to bad IP frames received on the 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.

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 DSU IQ IP address.

Network Port Statistics

Information given is for the network port since the last reset. See Figures 10-4 and 10-5 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.

DSU State
Current state of the DSU. Possible states are listed in Table 10-A.

Table 10-A
Possible DSU States

DSU STATE	DESCRIPTION
56K NORMAL	Normal 56 kbps loop rate
64K NORMAL	Normal 64 kbps loop rate
OPEN LOOP	No sealing current and no Rx signal
OOS/OOF FROM NET	Out of service code received from network
NO FRAME SYNC	No frame sync for 64 kbps loop
DSU IN TEST	Test code received from network
SCANNING	In auto mode searching for loop rate
NO RX SIGNAL	Sealing current present but no Rx signal
CHECK TELCO	Cable with wiring problem

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 percent of network port bandwidth.

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

Tx Frames
Number of frames transmitted by the network port.

Tx Bytes
Number of bytes transmitted by the network port.

Figure 10-4
Network Port Statistics with ISDN DBU Card Installed (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 percent of network port bandwidth.

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

Figure 10-5
Network Port Statistics (View by Day)

Port UA Time
Time in seconds the network port is unavailable for data delivery. This means that the DDS 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 Errors
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 network side.

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

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 DSU IQ.

Async Status
Number of asynchronous status messages received by the DSU IQ.

Discard Frame
Number of frames discarded by the DSU IQ 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.

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

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

BPV/Frame Error
Number of frames received with bipolar violations. 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 a dedicated management DLCI that have RFC 1490 errors. These errors are also reflected in the Discard Frames field.

If both management DLCIs are dedicated, the Encapsulation Error field is N/A. See the section ***Management DLCI Mode*** *in the chapter* ***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 DSU IQ IP address.

If both management DLCIs are dedicated, the Unrouteable field is N/A. See the section ***Management DLCI Mode*** *in the chapter* ***Configuring the Network Port*** *for more information.*

DBU Port Statistics

Information given is for the dial backup port since the last reset. See Figures 10-6 and 10-7 for both formats of the DBU Port Statistic screens.

DBU State
Current state of the DBU circuit.

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

Rx Frames
Number of frames received by the DBU port.

Rx Bytes
Number of bytes received by the DBU 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 percent of DBU port bandwidth.

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

Tx Frames
Number of frames transmitted by the DBU port.

Tx Bytes
Number of bytes transmitted by the DBU port.

Figure 10-6
DBU 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 percent of DBU port bandwidth.

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

Figure 10-7
DBU Port Statistics (View by Day)

Time in DBU
Time in seconds that the DBU port was active.

Discard Frame
Number of frames discarded by the DSU IQ 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.

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.

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.

If both management DLCIs are shared, the Encapsulation Error field is N/A. See the section ***Management DLCI Mode*** *in the chapter* ***Configuring the Network Port*** *for more information.*

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

If both management DLCIs are shared, the Unrouteable field is N/A. See the section ***Management DLCI Mode*** *in the chapter* ***Configuring the Network Port*** *for more information.*

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 10-1. Figure 10-8 shows the statistics menu for a specific DLCI.

Figure 10-8
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.

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 percent of CIR.

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

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

Time in DBU
Time (in seconds) that the specified DLCI is in DBU mode.

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 Frames
Number of frames 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 Frames
Number of lost frames reported by the remote DSU IQ. 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.

Summary of All Available DLCIs

This menu lists all available DLCIs and classifies them as active (A), inactive (I), or unknown (U). See Figure 10-9. 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 (discard eligibility) enabled.

Figure 10-9
DLCI Statistics Summary for All Available DLCIs

System Statistics

The system time and date (as set in the System Configuration menu) 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 troubleshooting situations. See Figure 10-10.

Figure 10-10
System Statistics Screen

VIEWING STATISTICAL INFORMATION (FRONT PANEL INTERFACE)

Select STATS from the Main menu. From this menu, choose to view DTE, Network, DBU, or System statistics or to reset the statistics. The first Statistics screen appears. Scroll through the remaining screens using the arrow keys. The number displayed in reverse video in the upper right-hand corner of the screen indicates which port the displayed information applies to (1=DTE, N=Network, D=DBU). 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 10-11.

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

Figure 10-11
Control Signal Status Screen

Signal State
Current signaling state of DTE port (up or down). See Figure 10-12.

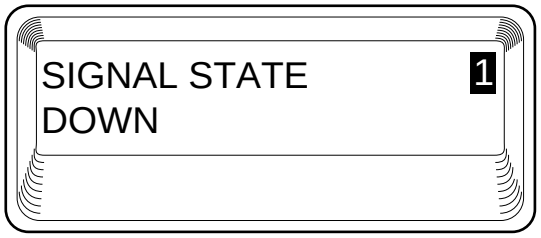


Figure 10-12
Signal State Screen

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

Signal Timeouts
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

DSU Loop State
Current state of the incoming DDS circuit. Possible states are listed in Table 10-A.

DBU Status
Current state of the incoming DBU circuit.

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

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

Signal Timeouts
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 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 DDS link is down or in test, or that the PVC signaling state is down.

BPV
Number of frames received with bipolar violations.

DBU Port Statistics Available on Front Panel

DBU Status
Current state of the DBU circuit.

Time in DBU
The amount of time (in seconds) that the unit has been in dial backup mode.

Frames In
Total received frames since the unit went into dial backup mode (or since last reset).

Frames Out
Total transmitted frames since the unit went into dial backup mode (or since last reset).

Errored Frames
Total errored frames received since the unit went into dial backup mode (or since last reset).

CRC Errors
Number of frames received on the dial backup circuit with CRC violations.

Abort Frames
Total frames received on the dial backup circuit without a closing flag.

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

DLCI List

Select DLCI LIST from the STATS menu to access a list of all DLCIs recognized by the DSU IQ. Each DLCI listed is identified as ACTIVE, INACTIVE, or UNDEFINED. Use the **NEXT** and **PREV** keys to scroll through the information.

System Statistics Available on Front Panel

Select SYS from the STATS menu to display the software version and checksum. This screen is shown in Figure 10-13. Press **Cancel** to return to the STATS menu.

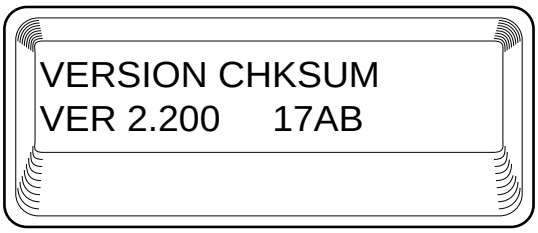


Figure 10-13
System Statistics Screen

Chapter 11
Testing

This menu allows you to perform testing by initiating ping tests (if the ESP ethernet card is installed) or PVC loopback tests. See Figure 11-1 for the terminal Test menu. See Figure 11-2 for the Front Panel menu tree.

Figure 11-1
Terminal Test Menu (with ESP Ethernet Card Installed)

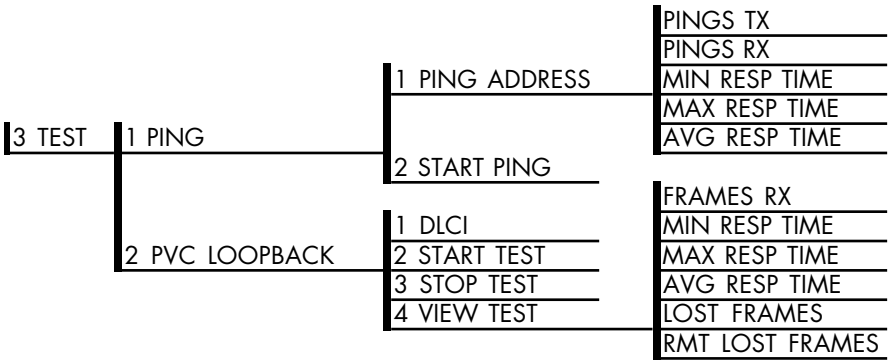


Figure 11-2
Front Panel Test Menu (with ESP Ethernet Card Installed)

Ping

Select **1 PING** to send a ping request to a specific address.

Address to Ping (PING ADDRESS)

Enter the IP address of the unit the DSU IQ is sending an echo request (ping) to.

If the IP address is not manually configured into the IP route table, the path will be determined dynamically through RIP and inverse ARP protocols.

Start Ping

Results are shown once you start the ping. The Start Ping command causes the DSU IQ to send ten ping requests to the target station. At the end of the ten-ping test, the following results are shown:

Number of Pings Transmitted (PINGS TX)
This field shows the number of pings sent (always 10).

Ping Responses (PINGS RX)
This field shows the number of responses received from the pinged device.

Min Response Time (MIN RESP TIME)
This field shows the shortest round-trip delay (in ms) of the received responses. Round-trip delay is counted from the time the ping is sent until the response is received.

Max Response Time (MAX RESP TIME)
This field shows the longest round-trip delay (in ms) of the received responses. If a response is not received before the unit times out, the delay is not calculated in.

Avg Response Time (AVG RESP TIME)
This field shows the average response time (in ms) based on all received responses.

PVC Loopback

A PVC loopback test is a non-intrusive loopback option for each PVC. During this test, the DSU IQ periodically sends test frames to the remote DSU IQ which are then returned for analysis. The bandwidth required is approximately 1 kbps for each PVC in test. See Figure 11-3 for the terminal menu.

Figure 11-3
PVC Loopback Menu

DLCI <0=all> (DLCI)

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

Test Len

Amount of time (in minutes) that you want the test to take place. Enter 0 for a continuous test. This selection is not available on the front panel.

Start Test

Starts the test.

Stop Test

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

View Test

Displays the Test Statistics menu shown in Figure 11-4. 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.

This field is not available on the front panel.

Test Active/No Test Active
Displays current testing state of the DSU IQ. This field is not available on the front panel.

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.

Lost Frames
Number of packets dropped in the receiving direction (traveling from the remote DSU IQ to the local DSU IQ).

Remote Lost Frames
Number of packets dropped in the transmitting direction (traveling from the local DSU IQ to the remote DSU IQ).

Minimum Loop Response Time (MIN RESP TIME)
Minimum round-trip time (in milliseconds) for the current test.

Maximum Loop Response Time (MAX RESP TIME)
Maximum round-trip time (in milliseconds) for the current test.

Average Loop Response Time (AVG RESP TIME)
Average round-trip time (in milliseconds) for the current test.

Figure 11-4
Test Status Screen

Reset Test Stats

Resets the information shown in the Test Statistics menu.

View DLCI List

See the section *Summary of All Available DLCIs* in the chapter *Statistics* for a description of this menu.

Chapter 12
Activating Dialing Functions

DIALING OPTIONS

The dial options available from the Main menu (4=DIAL) appear in Figure 12-1.

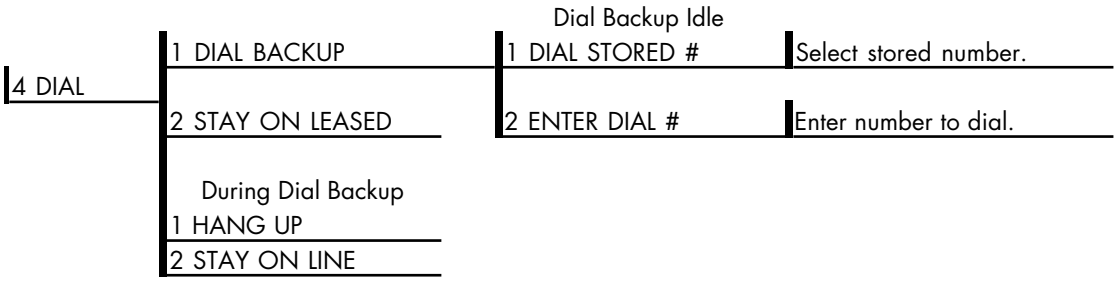


Figure 12-1
Dial Options Menu

Dial Options when Dial Backup is Idle

Dial Backup
The DSU IQ prompts to dial a stored number or enter a number to dial for dial backup.

Stay on Leased
The DSU IQ remains on the leased line and does not enter dial backup mode.

Dial Options During Dial Backup

Hang Up
Terminates the dial backup connection and attempts to reestablish communication on the DDS line.

Stay On Line
This DSU IQ remains in dial backup mode and returns to the Statistics menu.

Appendix A
Pinouts

The following tables give the pin assignments for the DSU IQ and ESP card connectors. For more information on these connectors, see the chapter *Installation*.

Table A-A
Pin Assignments for Telco Connector

Pin	Name	Description
1	R1	Transmit Data from DSU to Network-Ring 1
2	T1	Transmit Data from DSU to Network-Tip 1
3-6	-	Not Used
7	T	Receive Data from Network to DSU-Tip
8	R	Receive Data from Network to DSU-Ring

Table A-B
Pin Assignments for EIA-232 Connector

Pin	EIA	Description
1	AA	Protective Ground (PG)
2	BA	Transmit Data (SD)
3	BB	Receive Data (RD)
4	CA	Request to Send (RS)
5	CB	Clear to Send (CS)
6	CC	Data Set Ready (SR)
7	AB	Signal Ground (SG)
8	CF	Received Line Signal Detector (CD)
9	-	+12 Test Point
10	-	-12 Test Point
15	DB	Transmit Clock (TC)
17	DD	Receive Clock (RC)
18	-	Local Loopback (LL)
20	CD	Data Terminal Ready (TR)
21	-	Remote Loopback (RL)
22	CE	Ring Indicator (RI)
24	DA	External Tx Clock (ETC)
25	-	Test Indicator (TI)

Table A-C
Pin Assignments for V.35 Connector

Pin	CCITT	Description
A	101	Protective Ground (PG)
B	102	Signal Ground (SG)
C	105	Request to Send (RTS)
D	106	Clear to Send (CTS)
E	107	Data Set Ready
F	109	Received Line Signal Detector (CD)
H	-	Data Terminal Ready (DTR)
J	-	Ring Indicator (RI)
L	-	Local Loopback (LL)
N	-	Remote Loopback (RL)
R	104	Received Data (RD-A)
T	104	Received Data (RD-B)
V	115	Receiver Signal Element Timing (SCR-A)
X	115	Receiver Signal Element Timing (SCR-B)
P	103	Transmitted Data (SD-A)
S	103	Transmitted Data (SD-B)
Y	114	Transmitter Signal Element Timing (SCT-A)
AA	114	Transmitter Signal Element Timing (SCT-B)
U	113	External TX Signal Element (SCX-A)
W	113	External TX Signal Element (SCX-B)
NN	-	Test Indicator (TI)

Table A-D
Pin Assignments for Control Connector

RJ Pin#	Function	Direction
1	GND	
2	RTS	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-E
Pin Assignments for 10baseT Connector (Ethernet Card)

Pin	Name	Description
1	TD+	The positive signal for the TD differential pair. This signal contains the serial output data stream transmitted onto the network.
2	TD-	The negative signal for the TD differential pair (pins 1 and 2).
3	RD+	The positive signal for the RD differential pair. This signal contains the serial input data stream received from the network.
4, 5	N/A	not used
6	RD-	The negative signal for the RD differential pair (pins 3 and 6).
7, 8	N/A	not used

Table A-F
ESP DBU Card Pin Assignments

Pin	Name	Description
4-wire Switched 56		
1	R1	Transmit Data from DSU to Network-Ring 1
2	T1	Transmit Data from DSU to Network-Tip 1
3-6	-	Not Used
7	T	Receive Data from Network to DSU-Tip
8	R	Receive Data from Network to DSU-Ring
V.34 and 1B+D ISDN		
1-3	-	Not Used
4	T	Network-Tip
5	R	Network-Ring
6 - 8	-	Not Used

Table A-G
DTE/DCE Connector Pin Assignments (DCE Card Option)

DB25 Pin#	V.35 Pin#	Function	DTEx Port Direction	DCE Port Direction
1	A	FGND		
2		TD(EIA-232)	I	O
3		RD(EIA-232)	O	I
4	C	RTS	I	O
5	D	CTS	O	I
6	E	DSR	O	I
7	B	GND		
8	F	DCD	O	I
9		NEG		
10		POS		
11	AA	TC-B(V.35)	O	I
12	Y	TC-A(V.35)	O	I
13	V	RC-A(V.35)	O	I
14	T	RD-B(V.35)	O	I
15		TC(EIA-232)	O	I
16	R	RD-A(V.35)	O	I
17		RC		
18	S	TD-B(V.35)	I	O
19	P	TD-A(V.35)	I	O
20	H	DTR	I	O
21	W	ETC-B(V.35)	I	O
22				
23	U	ETC-A(V.35)	I	O
24		ETC(EIA-232)	I	O
25	X	RC-B(V.35)	O	I

Appendix B
Specifications Summary

SPECIFICATIONS AND FEATURES

This appendix provides the standard specifications and features of the DSU IQ.

Operating Modes

56/64k frame relay

Line Interfaces

RJ-48S, 4-wire, full duplex

DBU Interfaces

4-Wire SW56 DBU Card
RJ-48S

V.34 and ISDN DBU Cards
RJ-11

DCE Card
EIA-232: DB-25 female DTE emulation
V.35: V.35 Winchester male or female via optional adapter cable (part numbers: male 1200193L1; female 1200194L1)

Receiver Sensitivity

-45 dB

Clocking

Time derived from frame relay network or from the unit

DTE Rates Supported

56k or 64k synchronous (achieve rates up to 512 kbps with the optional ESP external DCE card and an external DSU / CSU)

Dial Backup Rates Supported

4-Wire SW56 DBU Card
56 kbps

V.34 DBU Card
2.4 to 33.6 kbps

ISDN DBU Card
56 or 64 kbps

DTE Interfaces

EIA-232: DB-25 female
V.35 Winchester: M block female

Diagnostics

Network
Responds to CSU and DSU loopbacks from the telco

User
PVC and DTE loopbacks; test pattern with sequence checks

SNMP

SNMP and TELNET
Integrated SLIP / PPP (async) port
Optional 10baseT interface
MIB II, RFC 1315 compliant
ADTRAN enterprise MIB for frame monitoring and DSU control

Agency Approvals

FCC Part 15, Class A
FCC Part 68
Industry Canada CS03
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

SLIP

RFC 1055

SNMP MIB

RFC 1315
RFC 1213

Physical

Operating temperature: 0 to 50°C (32 to 122°F)
Storage: -20 to 70°C (-4 to 158°F)
Relative humidity: Up to 95%, non-condensing
Dimensions: 2.5"H, 7.75"W, 10.375"L
Weight: 4.5 lbs
Power: 115 VAC, 60 Hz, 7 W

Acronyms and Abbreviations

ACK	acknowledgment
ALM	alarm
ANSI	American National Standards Institute
AR	access rate
ARP	address resolution protocol
async	asynchronous
BECN	backward explicit congestion notification
BOP	bit oriented protocol
CCITT	Consultive Committee for International Telephony and Telegraphy
CD	carrier detect
CIR	committed information rate
CO	central office
CPE	customer premise equipment
CR, C/R	command response
CRC	cyclic redundancy check
CS	clear to send
CSU	channel service unit
CTS	clear to send
dB	decibel
DBU	dial backup
DCD	data carrier detect
DCE	data communications equipment
DDS	digital data service
DE	discard eligible
DLCI	data link connection identifier
DSAP	destination service access point
DSR	data set ready

DSU	data service unit
DTE	data terminal equipment
DTR	data terminal ready
EA	extended address
EBCDIC	extended binary coded decimal interexchange code
ESP	embedded SNMP
FECN	forward explicit congestion notification
FEP	front end processor
FIFO	first in first out
FR	frame relay
FRAD	frame relay access device
FRF	frame relay forum
FSU	frame relay service unit
GUI	graphical user interface
HDLC	high-speed data link control
IA	inactive
IP	internet protocol
ISDN	integrated services digital network
ITU	International Telecommunications Union
KA	keep alive
kbps	kilobits per second
LAN	local area network
LED	light emitting diode
LI	link integrity
LLC	logical link control
LMI	local management interface
LRC	lateral redundancy check
MIB	management information base
ms	millisecond
OCU	office channel unit
OOS	out of service
PPP	point-to-point protocol
PU	physical unit
PVC	permanent virtual circuit
RD	receive data
RDL	remote digital loopback
RFC	request for comments
RFECN	remote forward explicit congestion notification
RIP	routing information protocol

RMA ..... return material authorization
RNR ..... receiver not ready
RR ..... receiver ready
RS ..... request to send; also recommended standard
RTS ..... request to send
Rx ..... receive
SAP ..... service access point
SDLC ..... synchronous data link control
SLIP ..... serial line internet protocol
SNA ..... systems network architecture
SNMP ..... simple network management protocol
SR ..... data set ready
SVC ..... switched virtual circuit
SW56 ..... switched 56
sync ..... synchronous
TD ..... transmit data
TR ..... data terminal ready
Tx ..... transmit
UA ..... unavailable
UNI ..... user-to-network interface
VRC ..... vertical redundancy check
WAN ..... wide area network

Glossary

American National Standards Institute (ANSI)
Devices and proposes recommendations for international communications standards.

asynchronous
A method of data transmission which allows characters to be sent at irregular intervals by preceding each character with a start bit, followed by a stop bit.

backward explicit congestion notification (BECN)
A bit set by a frame relay network to notify an interface device (DTE) that congestion avoidance procedures should be initiated by the sending device.

bandwidth
The bandwidth determines the rate at which information can be sent through a channel (the greater the bandwidth, the more information that can be sent in a given amount of time).

bridge
A device that supports LAN-to-LAN communications. Bridges may be equipped to provide frame relay support to the LAN devices they serve. A frame relay capable bridge encapsulates LAN frames in frame relay frames and feeds them to a frame relay switch for transmission across the network. A frame relay capable bridge also receives frame relay frames from the network, strips the frame relay frame off each LAN frame, and passes the LAN frame on to the end device. Bridges are generally used to connect LAN segments to other LAN segments or to a WAN. They route traffic on the Level 2 LAN protocol (e.g. the Media Access Control address), which occupies the lower sub-layer of the LAN OSI data link layer. See also *router*.

CD

carrier detect. A signal generated by a modem or DSU/CSU. CD indicates the presence of a carrier signal on a communications link.

channel service unit

CSU. A device used to connect a digital phone line (T1 or Switched 56 line) coming in from the phone company to either a multiplexer, channel bank, or directly to another device producing a digital signal; for example, a digital PBX, a PC, or data communications device. A CSU performs certain line-conditioning and equalization functions, and responds to loopback commands sent from the central office. A CSU regenerates digital signals. It monitors them for problems, and provides a way of testing the digital circuit.

CIR

committed information rate. Less than or equal to the access rate, the CIR is used by the service provider for rate enforcement when the network is congested. When rates exceed the CIR, frames may be discarded.

clocking

An oscillator-generated signal that provides a timing reference for a transmission link. A clock provides signals used in a transmission system to control the timing of certain functions. The clock has two functions, (1) to generate periodic signals for synchronization and (2) to provide a time base.

CPE

customer premise equipment. All telecommunications terminal equipment located on the customer premises, including telephone sets, private branch exchanges (PBXs), data terminals, and customer-owned coin-operated telephones.

C/R bit

In the Q.921 protocols, a bit that identifies a data-link-layer frame as either a command or a response.

CRC

cyclic redundancy check. A computational means to ensure the accuracy of frames transmitted between devices in a frame relay network. The mathematical function is computed, before the frame is transmitted, at the originating device. Its numerical value is computed based on the content of the frame. This value is compared with a recomputed value of the function at the destination device.

CS
See *CTS*.

CSU
See *channel service unit*.

CTS
clear to send. A signal on the DTE interface indicating that the DCE is clear to send data.

data service unit
DSU. A device designed to transmit and receive digital data on digital transmission facilities.

dB
decibel. A unit of measure of signal strength, usually the relation between a transmitted signal and a standard signal source.

data communications equipment (DCE)
Device that provides all the functions required for connection to telephone company lines and for converting signals between telephone lines and DTE. Also see *DTE*.

DDS
digital data service. A private line digital service, for transmitting data end-to-end at speeds of 2.4, 4.8, 9.6, and 56 kbps and in some cases 19.2, 38.4, or 64 kbps. The systems can use central hub offices for obtaining test access, bridging legs of multipoint circuits, and cross connecting equipment. DDS is offered on an inter-LATA basis by AT&T and on an intra-LATA basis by the Bell operating companies.

data link connection identifier (DLCI)
A unique number assigned to a PVC end point in a frame relay network. Identifies a particular PVC endpoint within a user's access channel in a frame relay network and has local significance only to that channel.

discard eligibility (DE)
A user-set bit indicating that a frame may be discarded in preference to other frames if congestion occurs, to maintain the committed quality of service within the network. Frames with the DE bit set are considered Be excess data.

DSU
See *data service unit*.

DSU loopback
A telco initiated test which loops the DSU back to the telco and is used to test the DDS circuit as well as the DSU/CSU.

DTE
data terminal equipment. The end-user terminal or computer that plugs into the termination point (DCE) of a communications circuit. The main difference between the DCE and the DTE is that pins two and three are reversed.

end device
The ultimate source or destination of data flowing through a frame relay network sometimes referred to as DTE. As a source device, it sends data to an interface device for encapsulation in a frame relay frame. As a destination device, it receives de-encapsulated data (i.e., the frame relay frame is stripped off, leaving only the user's data) from the interface device.

encapsulation
A process by which an interface device places an end device's protocol-specific frames inside a frame rely frame. The network accepts only frames formatted specifically for frame relay; therefore interface devices acting as interfaces to a frame relay network must perform encapsulation. See also *interface device* and *frame-relay-capable interface device*.

file server
In the context of frame relay network supporting LAN-to-LAN communications, a device connecting a series of workstations within a given LAN. The device performs error recover and flow control functions as well as end-to-end acknowledgment of data during data transfer, thereby significantly reducing overhead within the frame relay network.

forward explicit congestion notification (FECN)
A bit set by a frame relay network to notify an interface device (DTE) that congestion avoidance procedures should be initiated by the receiving device. See also *BECN*.

frame check sequence (FCS)
The standard 16-bit cyclic redundancy check used for HDLC and frame relay frames. The FCS detects bit errors occurring in the bits of the frame between the opening flag and the FCS, and is only effective in detecting errors in frames no larger than 4096 octets. See also *cyclic redundancy check (CRC)*.

frame-relay-capable interface device
A communications device that performs encapsulation. Frame-relay-capable routers and bridges are examples of interface devices used to interface the customer's equipment to frame relay network. See also *interface device* and *encapsulation*.

frame relay frame
A variable-length unit of data, in frame-relay format that is transmitted through a frame relay network as pure data. Contrast with *packet*.

frame relay network
A telecommunications network based on frame relay technology. Data is multiplexed. Contrast with *packet switching network*.

gateway
A device which enables information to be exchanged between two dissimilar systems or networks.

high level data link control (HDLC)
A generic link-level communications protocol developed by the International Organization for Standardization (ISO). HDLC manages synchronous code-transparent, serial information transfer over a link connection. See also *synchronous data link control (SDLC)*.

host computer
The primary or controlling computer in a multiple computer operation.

in-band
Signaling (dialing, diagnostics, management, configuration, etc.) over the same channel used for data.

ingress
Frame relay frames leaving from an access device in a direction toward the frame relay network.

interface device
Provides the interface between the end device(s) and a frame relay network by encapsulating the user's native protocol in frame relay frames and sending the frames across the frame relay backbone. See also *encapsulation* and *frame-relay-capable interface device.*

IP
internet protocol. A protocol which provides for transmitting blocks of data between hosts identified by fixed-length addresses.

ISDN
integrated services digital network. A network architecture that enables end-to-end digital connections. The network supports diverse services through integrated access arrangements and defines a limited set of standard, multipurpose interfaces for equipment vendors, network providers, and customers. Interworking with a public switched telephone network is retained.

local area network (LAN)
A privately owned network that offers high-speed communications channels to connect information processing equipment in a limited geographic area.

MIB
management information base. A database of network management information used by SNMP.

out-of-band
Signaling that is separated from the channel carrying information (voice, data, video, etc.). Typically the separation is accomplished by a filter. The signaling includes dialing and other supervisory signals.

packet
A message containing both control information and data. The control information is used for routing the packet through a network to its final destination. Contrast with *frame relay frame.*

packet-switching network
A telecommunications network based on packet-switching technology, wherein a transmission channel is occupied only for the duration of the transmission of the packet. Contrast with *frame relay network.*

parameter

A numerical code that controls an aspect of terminal and / or network operation. Parameters control such aspects as page size, data transmission speed, and timing options.

permanent virtual circuit (PVC)

A frame relay logical link, whose endpoints and class of service are defined by network management. Analogous to an X.25 permanent virtual circuit, a PVC consists of the originating frame relay network element address, originating data link control identifier, terminating frame relay network element address, and termination data link control identifier. Originating refers to the access interface form which the PVC is initiated. Terminating refers to the access interface at which the PVC stops. Many data network customers require a PVC between two points. Data terminating equipment with a need form continuous communion use PVCs. See also *data link connection identifier (DLCI)*.

ping

An internet protocol standard that provides loopback on demand for any device in an IP network. One device "pings" another by sending a loopback request to the device's IP address.

point-to-point

Type of communications link that connects a single device to another single device, such as a remote terminal to a host computer.

remote configuration

A feature designed into ADTRAN DSU / CSU products that allow remote DSU / CSU to be configured from a local DSU / CSU or VT 100 compatible terminal.

router

A device that supports LAN-to-LAN communications. Routers may be equipped to provide frame relay support to the LAN devices they serve. A frame-relay-capable router encapsulates LAN frames in a frame relay frames and feeds those frame relay frames to a frame relay switch for transmission across the network. A frame-relay-capable router also receives frame relay frames from the network, strips the frame relay frame off each frame to produce the original LAN frame, and passes the LAN frame on to the end device. Routers connect multiple LAN segments to each other or to a WAN. Routers route traffic on the Level 3 LAN protocol (e.g., the internet protocol address). See also *bridge*.

service
The provision of telecommunications to customers by a common carrier, administration, or private operating agency, using voice, data, and/or video technologies.

SNA
systems network architecture. The IBM protocol group which governs mainframe communication.

SNMP
simple network management protocol. A control and reporting scheme widely used to manage devices from different vendors. SNMP operates on top of the Internet protocol.

SR
data set ready. A signal on the EIA-232 interface that indicates if the communications is connected and ready to start handshaking control signals so communications can begin.

statistical multiplexing
Interleaving the data input of two or more devices on a single channel or access line for transmission through a frame relay network. Interleaving of data is accomplished using the DLCI.

switched network
The network of dial-up telephone lines using circuit switching to provide communications services to network users.

synchronous
Communications in which the timing is achieved by sharing a single clock. Each end of the transmission synchronizes itself with the use of clocks and information sent along with the transmitted data.

synchronous data link control (SDLC)
A link-level communications protocol used in an international business machines (IBM) systems Network Architecture (SNA) network that manages synchronous, code-transparent, serial information transfer over a link connection. SDLC is a subset of the HDLC protocol developed by ISO.

TELNET

The standard TCP / IP remote login protocol specified in RFC-854.

VT 100

A non-intelligent terminal or terminal emulation mode used for asynchronous communications. Used to configure the DSU IQ.

Index

Symbols

A

B

C

D

E

F

P

R

S

T

U

V

W

Product Support Information

Pre-Sales 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 Return Material Authorization (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 RMA number clearly on the package, and return to the following address:

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