ACCULINK®
3162 DSU/CSU

USER'S GUIDE

Document No. 3162-A2-GB20-40

August 2000

PARADYNE®

Notice

This publication is protected by federal copyright law. No part of this publication may be copied or distributed, transmitted, transcribed, stored in a retrieval system, or translated into any human or computer language in any form or by any means, electronic, mechanical, magnetic, manual or otherwise, or disclosed to third parties without the express written permission of Paradyne Corporation, 8545 126th Ave. N., Largo, FL 33773.

Paradyne Corporation makes no representation or warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability or fitness for a particular purpose. Further, Paradyne Corporation reserves the right to revise this publication and to make changes from time to time in the contents hereof without obligation of Paradyne Corporation to notify any person of such revision or changes.

Changes and enhancements to the product and to the information herein will be documented and issued as a new release to this manual.

Warranty, Sales, Service, and Training Information

Contact your local sales representative, service representative, or distributor directly for any help needed. For additional information concerning warranty, sales, service, repair, installation, documentation, training, distributor locations, or Paradyne worldwide office locations, use one of the following methods:

- **Internet:** Visit the Paradyne World Wide Web site at **www.paradyne.com**. (Be sure to register your warranty at **www.paradyne.com/warranty**.)

- **Telephone:** Call our automated system to receive current information by fax or to speak with a company representative.

  — Within the U.S.A., call 1-800-870-2221
  — Outside the U.S.A., call 1-727-530-2340

Trademarks

ACCULINK, COMSPHERE, FrameSaver, Hotwire, and NextEDGE are registered trademarks of Paradyne Corporation. MVL, OpenLane, Performance Wizard, and TruePut are trademarks of Paradyne Corporation. All other products and services mentioned herein are the trademarks, service marks, registered trademarks, or registered service marks of their respective owners.

Document Feedback

We welcome your comments and suggestions about this document. Please mail them to Technical Publications, Paradyne Corporation, 8545 126th Ave. N., Largo, FL 33773, or send e-mail to **userdoc@paradyne.com**. Include the number and title of this document in your correspondence. Please include your name and phone number if you are willing to provide additional clarification.

⚠ Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.

2. This product is intended to be used with a 3-wire grounding type plug – a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

   Prior to installation, use an outlet tester or a voltmeter to check the ac receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem.

   If a 3-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.

3. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.

4. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.

5. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

6. General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.

7. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.

8. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.

9. Input power to the ac voltage configuration of this product must be provided by a UL-listed or CSA-certified power source with a Class 2 or Limited Power Source (LPS) output.

10. This product contains a coin cell lithium battery that is only to be replaced at the factory. **Caution:** There is a danger of explosion if the battery is incorrectly replaced. Replace only with the same type. Dispose of used batteries according to the battery manufacturer's instructions. **Attention:** Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type. Mettre au rebut les batteries usagées conformément aux instructions du fabricant.

11. In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:

    — Never install telephone wiring during a lightning storm.

    — Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.

    — Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.

    — Use caution when installing or modifying telephone lines.

    — Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.

    — Do not use the telephone to report a gas leak in the vicinity of the leak.

⚠ **UNITED STATES – EMI NOTICE:**

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 communications. 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.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Paradyne Corporation.

⚠ **CANADA – EMI NOTICE:**

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

Government Requirements and Equipment Return

Certain governments require that instructions pertaining to CSU connection to the telephone network be included in the installation and operation manual. Specific instructions are listed in the following sections.

United States
NOTICE TO USERS OF THE UNITED STATES TELEPHONE NETWORK

1. This equipment complies with Part 68 of the FCC rules. On the bottom of the DSU/CSU is a label that contains, among other information, the FCC registration number. If requested, this information must be provided to the telephone company.

2. The T1 network connection should be made using a Universal Service Order Code (USOC) type RJ48C jack. The Service Order Code 6.0F should be specified to the telephone company when ordering the T1 line. In addition, the proper Facility Interface Code must be specified to the telephone company. The DSU/CSU can be configured to support any of the following framing format and line signaling techniques. The DSU/CSU configuration must correspond to the T1 line's parameters.

DSU/CSU Facility Interface Codes

Code	Description
04DU9-BN	1.544 Mbps superframe format (SF) without line power
04DU9-DN	1.544 Mbps SF and B8ZS without line power
04DU9-1KN	1.544 Mbps ANSI ESF without line power
04DU-1SN	1.544 Mbps ANSI ESF and B8ZS without line power

3. An FCC compliant telephone cord and modular plug is provided with this equipment. This equipment is designed to be connected to the telephone network or premises wiring using a compatible modular jack which is Part 68 compliant. See the installation instructions for details.

4. If the DSU/CSU causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

5. The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

6. If you experience trouble with this equipment, please contact your sales or service representative (as appropriate) for repair or warranty information. If the product needs to be returned to the company service center for repair, contact them directly for return instructions using one of the following methods:

   ■ **Internet:** Visit the Paradyne World Wide Web site at http://www.paradyne.com

   ■ **Telephone:** Call our automated call system to receive current information or to speak with a company representative.

   — Within the U.S.A., call 1-800-870-2221

   — Outside the U.S.A., call 727-530-2340

   If the trouble is causing harm to the telephone network, the telephone company may request that you remove the equipment from the network until the problem is resolved.

7. If your DSU/CSU is in need of repair, refer to the *Warranty, Sales and Service Information* section on page A.

8. No repairs may be made by the customer.

Canada
NOTICE TO USERS OF THE CANADIAN TELEPHONE NETWORK

The Industry Canada label identifies certified equipment. This certification means that the equipment meets telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements document(s). 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. 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 coordinated by a representative 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.

CAUTION:

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

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

If your equipment is in need of repair, refer to the procedure on page A of this document.

Contents

About This Guide

1   Introduction

2   Installation

3   Operation

4   Configuration

5   Monitoring and Testing

C   Configuration Options

D   Pin Assignments

E   SNMP MIB Objects

F   IP Network Addressing Scenario

G   Equipment List

Glossary

Index

About This Guide

Document Purpose and Intended Audience

This user's guide contains installation, operation, and maintenance information for the ACCULINK 3162 Data Service Unit (DSU)/Channel Service Unit (CSU).

It is assumed that you are familiar with the operation of digital data communication equipment. You should also be familiar with Simple Network Management Protocol (SNMP) if you want your DSU/CSU to be managed by an SNMP manager.

Document Summary

Section	Description
Chapter 1	*Introduction.* Describes the 3162 DSU/CSU and its features.
Chapter 2	*Installation.* Describes how to install the DSU/CSU and make connections.
Chapter 3	*Operation.* Provides information about the front panel LEDs, and instructions for using an asynchronous terminal to control and configure the DSU/CSU.
Chapter 4	*Configuration.* Contains procedures for configuring the Ethernet port, the COM port, DS0 channels, and access security.
Chapter 5	*Monitoring and Testing.* Contains procedures for monitoring, testing, and troubleshooting.
Appendix A	*Asynchronous Terminal Menu.* Contains a menu tree showing all the main front panel functions.
Appendix B	*Technical Specifications.* Contains technical specifications for the 3162 DSU/CSU.
Appendix C	*Configuration Options.* Contains all the configuration options and default settings.
Appendix D	*Pin Assignments.* Shows the pin assignments for connectors and cables.

Section	Description
Appendix E	*SNMP MIB Objects.* Describes the MIB objects supported by the DSU/CSU.
Appendix F	*IP Network Addressing Scenario.* Provides sample IP addressing scheme.
Appendix G	*Equipment List.* Contains order numbers for cables and other related parts.
Glossary	Defines abbreviations and terms used in this document.
Index	Lists key terms, concepts, and sections in alphabetical order.

Product-Related Documents

Document Number	Document Title
3160-A2-GB24	*ACCULINK DSU/CSU, Models 3160-A4, 3161, 3164-A2, and 3165-A4, Operator's Guide*
3162-A2-GL11	*ACCULINK 3162 DSU/CSU Quick Reference*

Contact your sales or service representative to order additional product documentation.

Paradyne documents are also available on the World Wide Web at:

www.paradyne.com

Reference Documents

AT&T Technical Reference 54016

AT&T Technical Reference 62411

ANSI T1.403-1989

Industry Canada CS-03

CSA-22.2 No. 950

Industry Canada (ICES)-003

FCC Part 15

FCC Part 68

UL 1950

Management Information Base for Network Management of TCP/IP- Based Internets: *MIBII*. RFC 1213, March 1991

Definitions of Managed Objects for the DS1 and E1 Interface Types. RFC 1406, January 1993

Definitions of Managed Objects for RS-232-like Hardware Devices. RFC 1317, April 1992

Extensions to the Generic-Interface MIB. RFC 1229, May 1991

Introduction

1

Overview

The ACCULINK® DSU/CSU acts as an interface between the T1 digital network and the customer premises equipment, converting signals received from the DTE (Data Terminal Equipment) to bipolar signals that can be transmitted over T1 lines. Typical applications include shared access to network-based services, Local Area Network (LAN)/Wide Area Network (WAN) interconnection, and fractional T1 network applications.

In addition to the T1 network interface and the DTE Drop/Insert (DSX-1) interface, the Model 3162 provides two synchronous data ports.

Features

The DSU/CSU optimizes network performance with a wide range of features such as the following:

- Local or remote configuration and operation flexibility.

- Several loopback capabilities and test pattern generators.

- DTE Drop/Insert (DSX-1) capability.

- Asynchronous terminal interface support.

- Alarm message display/print capability.

- Telnet access for remote asynchronous terminal operations.

- Network management provided through industry-standard Simple Network Management Protocol (SNMP).

DTE Drop/Insert (DSX-1) Interface

The DTE Drop/Insert interface allows DTEs/PBXs that support the DS1 signal format to share the T1 network with other high-speed equipment.

Asynchronous Terminal Interface Support

The DSU/CSU can be configured and managed from an asynchronous (async) terminal. The asynchronous terminal's full screen display uses a menu hierarchy to perform device-control operations.

Chapter 3, *Operation*, provides operational examples to help you become familiar with the use of the asynchronous terminal for DSU/CSU control.

Alarm Message Capability

The DSU/CSU can be attached, either locally or remotely, to an ASCII terminal or printer to display or print alarm messages. Alarms can also be displayed on a PC that is using a terminal emulation package.

Chapter 5, *Monitoring and Testing*, provides a list of alarm messages.

Telnet Access

Remote async terminal operations can be performed using Telnet access. Telnet is a Transmission Control Protocol/Internet Protocol (TCP/IP) service that supports a virtual terminal interface.

SNMP Management Support

SNMP is a network management protocol that is used to monitor network performance and status, and to report alarms (i.e., traps). To function, SNMP requires a manager consisting of a software program housed within a workstation or PC; an agent consisting of a software program housed within a device (e.g., the DSU/CSU); and a Management Information Base (MIB) consisting of a database of managed objects. The DSU/CSU can be managed by any industry-standard SNMP manager.

Two link layer protocols, Point-to-Point Protocol (PPP) and Serial Line Internet Protocol (SLIP), are supported for connection to an external SNMP manager or network device (e.g., a router).

The SNMP manager or network device can be directly connected to the communications (COM) port or can be accessed via Ethernet using the 10BaseT port.

The SNMP management system can communicate to the DSU/CSU remotely through the Facility Data Link (FDL) or the synchronous data port's Embedded Data Link (EDL).

Physical Description

The DSU/CSU front panel (Figure 1-1) contains twelve light-emitting diodes (LEDs) and six test jacks.

The LEDs are described in *Front Panel LEDs* in Chapter 3, *Operation*.

The test jacks are described in *Test Jacks* in Chapter 5, *Monitoring and Testing*.

The DSU/CSU rear panel (Figure 1-2) contains the connectors required for the operation of the DSU/CSU. The connectors and their functions are listed in Table 1-1.
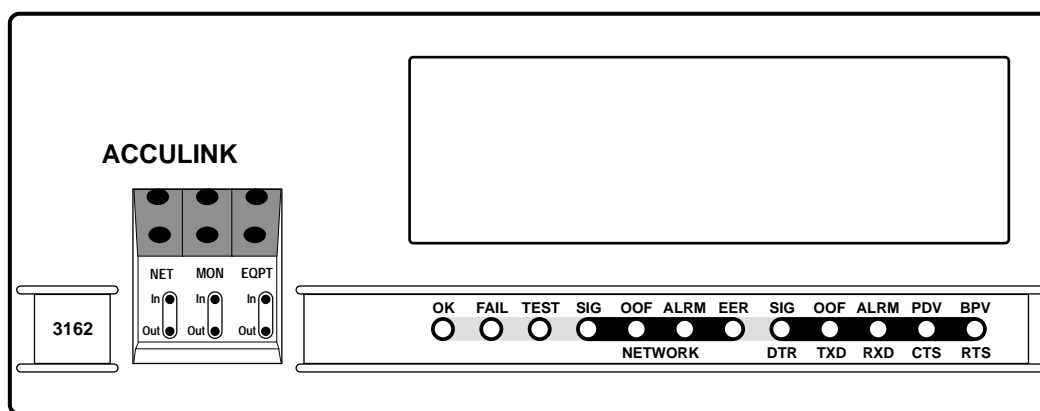
496-15001

Figure 1-1.   3162 DSU/CSU Front Panel
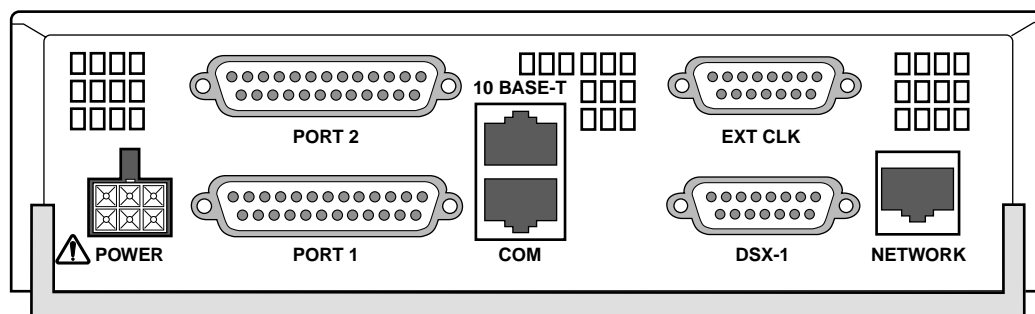
00-16852

Figure 1-2.   3162 DSU/CSU Rear Panel

Table 1-1.   DSU/CSU Rear Panel Connectors

Name	Function
POWER	Supplies power to the DSU/CSU by providing an attachment for the AC power module.
10 BASE-T PORT	Supports connection to an Ethernet LAN.
COM PORT	Provides access to a locally connected PC, ASCII terminal or printer, SNMP management link, or asynchronous terminal interface.
NETWORK	Provides access to the T1 network.
DTE	Provides access to the DTE Drop/Insert (DSX-1) interface.
CLOCK IN	Used to attach an external clock to the DSU/CSU.
PORTs 1–2	Used to connect the customer's synchronous data DTE to the DSU/CSU.

Installation

2

Overview

This chapter contains information for installing your DSU/CSU. It includes application examples, cabling, and power-on information.

Application Examples

The DSU/CSU acts as an interface between the T1 digital network and the customer's equipment.

The DSU/CSU is connected to the customer's equipment through one of the synchronous data ports (PORTs 1– 2) or the DTE Drop/Insert (DSX-1) interface. It is connected to the T1 digital network through the network interface.

Some common applications for the DSU/CSU are:

■ Point-to-Point LAN interconnection (Figure 2-1).

■ Shared access to network-based services (Figure 2-2).

■ Fractional T1 network applications (Figure 2-3).
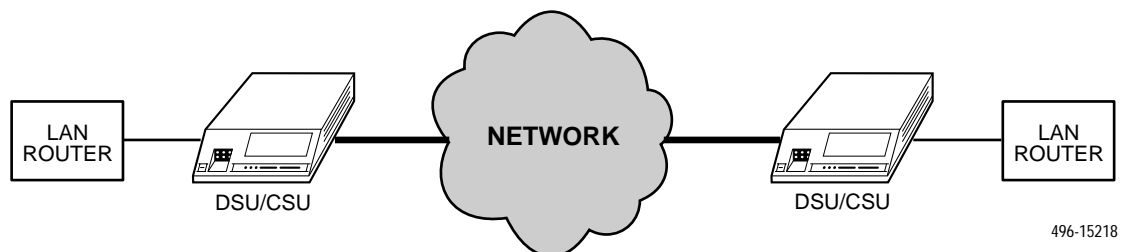
Figure 2-1.   Point-to-Point Application Example
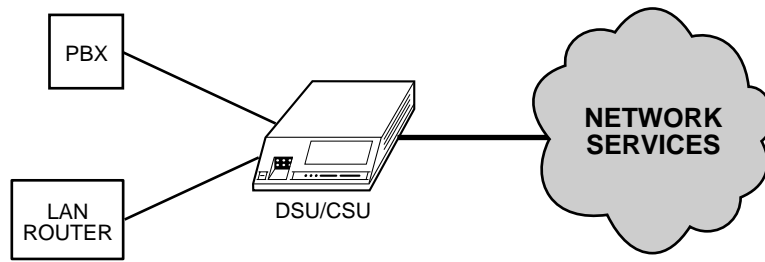
496-15219

Figure 2-2.   Shared Access Application Example
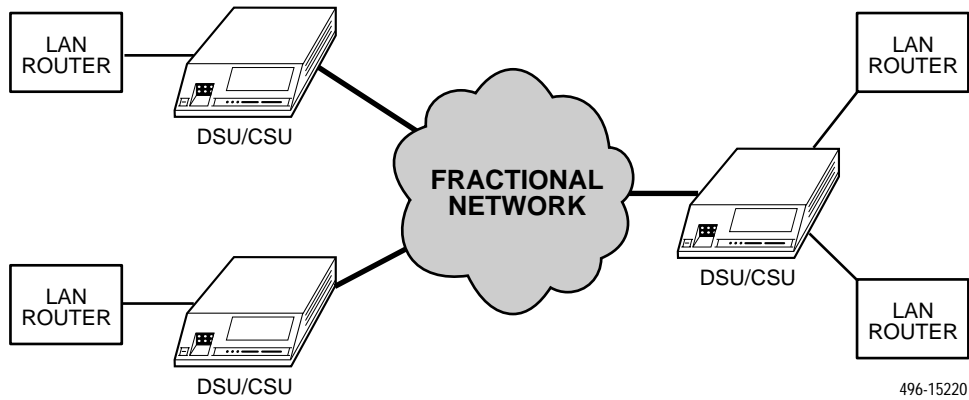
496-15220

Figure 2-3.   Fractional T1 Application Example

SNMP or Telnet Connection Examples

The DSU/CSU can be connected to an SNMP or Telnet system in a number of ways. Some examples include:

- Directly connecting the COM port to the SNMP or Telnet device (Figure 2-4).

- Connecting the COM port to a network device (e.g., a router) (Figure 2-5).

- Connecting to an Ethernet LAN through the 10BaseT port (Figure 2-6).

- Remotely accessing the DSU/CSU through the Facility Data Link (FDL) or the synchronous data port's Embedded Data Link (EDL) (Figure 2-7).
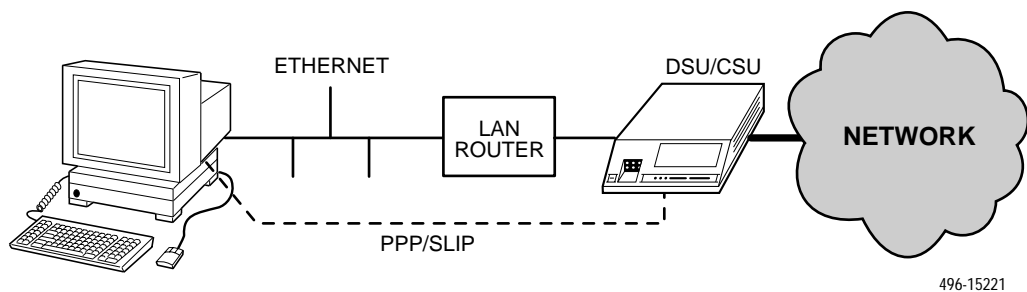
Figure 2-4.   Direct Connection
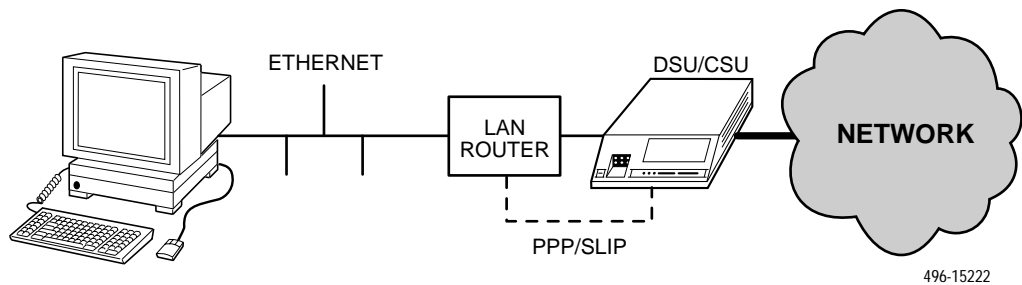
Figure 2-5.   Connection through a Router
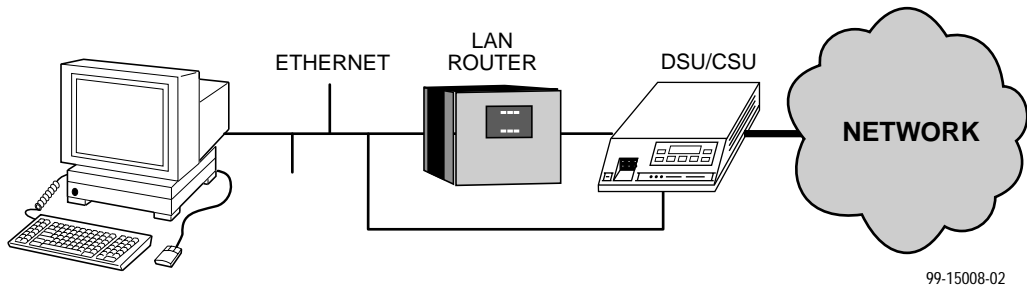
99-15008-02

Figure 2-6.   Connection through the 10BaseT Port
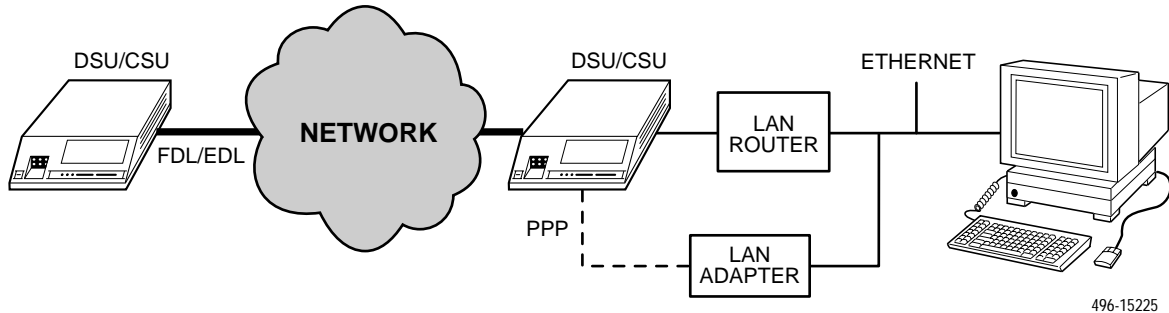
496-15225

Figure 2-7.   Remote Access through FDL/EDL

Important Instructions

Read and follow all warning notices and instructions marked on the DSU/CSU or included in this guide.

For a complete listing of the safety instructions, see the *Important Safety Instructions* at the beginning of this guide.

Cabling Example

The DSU/CSU is supplied with an AC power module, a T1 network cable, and a COM port cable.

Optional cables are described in Appendix D, *Pin Assignments*.

Figure 2-8 illustrates typical cabling.
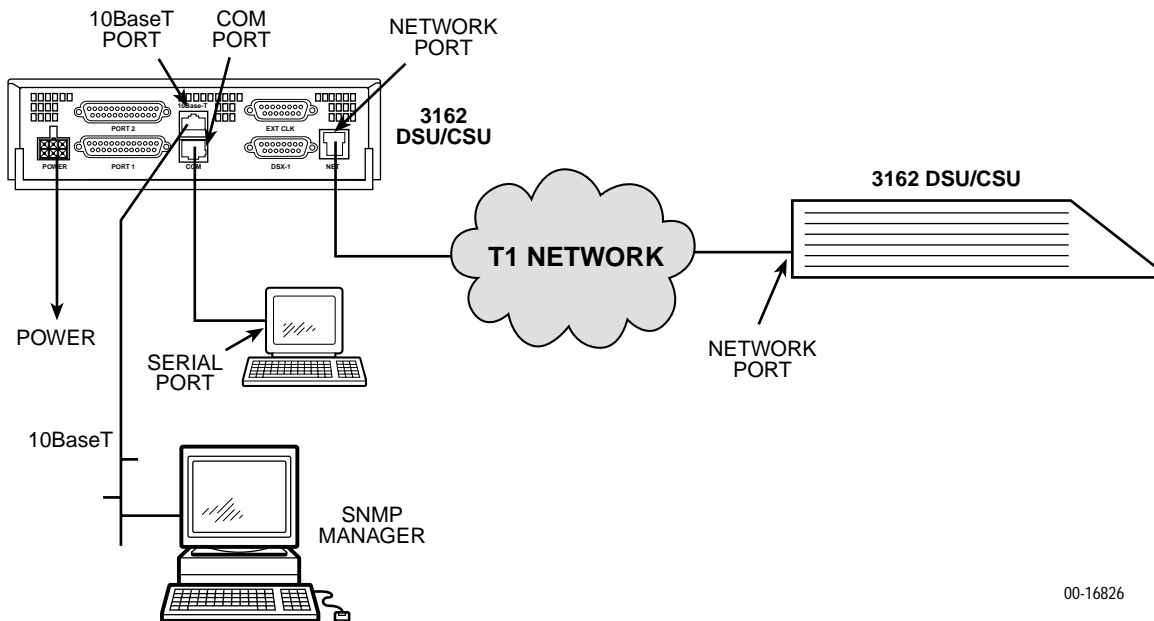
Figure 2-8.   Cabling Example

Power-On Self-Test

After you connect the DSU/CSU to a power source, the unit performs the power-on self-test to ensure that it is in good working order. The DSU/CSU performs this test on itself upon power-on or after a device reset, unless it has been disabled by the Self-Test configuration option (see Appendix C, *Configuration Options*).

The self-test includes a basic processor test, a limited memory test, a code checksum test, and basic verification tests of the internal components.

▶ **Procedure**

The power-on self-test consists of the following steps:

1. Once the DSU/CSU is plugged in, the Fail LED blinks ON and Off continuously.

```
OK  FAIL  TEST  SIG  OOF  ALRM  EER  SIG  OOF  ALRM  PDV  BPV
                    NETWORK              DTR  TXD  RXD  CTS  RTS
                                                        493-14302
```

2. All the LEDs then start to flash simultaneously in the pattern twice ON, then Off.

3. If the self-test is successful, the Fail LED turns Off and the OK LED lights.

```
OK  FAIL  TEST  SIG  OOF  ALRM  EER  SIG  OOF  ALRM  PDV  BPV
                    NETWORK              DTR  TXD  RXD  CTS  RTS
                                                        493-14303
```
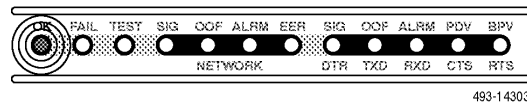
If the self-test fails, the Fail LED lights. The DSU/CSU continues to try to operate. If you are in doubt about the results of the self-test, use the System and Test Status screen to display the results of this test (see *Self-Test Results* in Chapter 5, *Monitoring and Testing*).

```
OK  FAIL  TEST  SIG  OOF  ALRM  EER  SIG  OOF  ALRM  PDV  BPV
                    NETWORK              DTR  TXD  RXD  CTS  RTS
                                                        493-14302
```
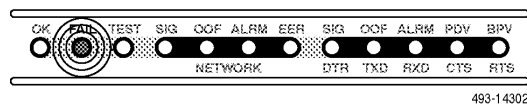
Operation

3

Overview

This chapter contains information for operating your DSU/CSU. It includes a description of the front panel LEDs and sample procedures to help you become familiar with the use of the asynchronous terminal for DSU/CSU control.

Front Panel LEDs

There are twelve LEDs on the DSU/CSU front panel. The five LEDs on the right (Figure 3-1) are shared between the DTE Drop/Insert (DSX-1) interface and the data ports. Use the Control branch of the asynchronous terminal menu tree to choose which port's status the LEDs display (see *Menu Organization* on page 3-7).
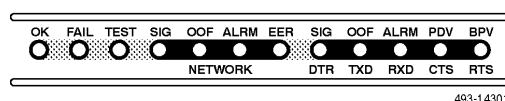
Figure 3-1.   DSU/CSU LEDs

A green LED indicates normal operation. A yellow LED indicates a warning (for the DTE Drop/Insert interface) or activity (for the data ports). Conditions are sampled every tenth of a second.

The twelve front panel LEDs are grouped into four sections to indicate the status of the:

- System (Table 3-1)

- Network Interface (Table 3-2)

- DTE Drop/Insert (DSX-1) Interface (Table 3-3)

- Data Ports (Table 3-4)

Table 3-1.   System LEDs

Name	Color	Meaning
OK	Green	Indicates the current operational state of the DSU/CSU. *ON:* The DSU/CSU is operational and has power. *OFF:* The DSU/CSU is performing a power-on self-test or a system failure has occurred. *BLINKING:* A software download is in progress.
FAIL	Yellow	Indicates a system failure or a self-test. *ON:* A device error/fault is detected or a reset has just occurred. *OFF:* No system failures are detected. *BLINKING*: A self-test is in progress.
TEST	Yellow	A system test is in progress. *ON:* A loopback or pattern test has been initiated either locally, by the network, or externally. *OFF:* No tests are active.

Table 3-2.   Network Interface LEDs

Name	Color	Meaning
SIG	Green	Monitors the signal being received from the network. *ON:* A recoverable signal is being received from the network. *OFF:* The signal cannot be recovered from the network (a Loss of Signal condition exists).
OOF	Yellow	Monitors Out Of Frame (OOF) conditions on the received network signal. *ON*: At least one OOF was detected on the signal during the sampling period. *OFF:* No OOFs were detected on the signal during the sampling period.
ALRM	Yellow	Indicates whether an alarm condition exists on the received network signal. *ON:* An alarm condition (LOS, LOF, EER, Yellow, AIS) exists on the received network signal. Use the System and Test Status screen to determine the alarm type. *OFF:* No alarm condition exists on the network interface signal.
EER	Yellow	Indicates the Excessive Error Rate (EER) has been exceeded on the network interface. **NOTE:** This LED is only valid when ESF framing is being used. *ON:* The EER has been exceeded on the network interface. *OFF:* The EER has not been exceeded on the network interface.

Table 3-3.   DTE Drop/Insert (DSX-1) Interface LEDs

Name	Color	Meaning
SIG	Green	Monitors the signal being received from the DTE Drop/Insert (DSX-1) interface. *ON:* A recoverable signal is being received from the DTE Drop/Insert (DSX-1) interface. *OFF:* The signal cannot be recovered from the DTE Drop/Insert (DSX-1) interface (a Loss of Signal condition exists).
OOF	Yellow	Monitors Out Of Frame (OOF) conditions on the received DTE Drop/Insert (DSX-1) signal. *ON:* At least one OOF was detected on the signal during the sampling period. *OFF:* No OOFs were detected on the signal during the sampling period.
ALRM	Yellow	Indicates whether an alarm condition exists on the received DTE Drop/Insert (DSX-1) signal. *ON:* An alarm condition (LOS, LOF, EER, Yellow, AIS) exists on the received DTE Drop/Insert (DSX-1) signal. Use the Device Health and Status command to determine the alarm type. *OFF:* No alarm condition exists on the DTE Drop/Insert (DSX-1) interface signal.
PDV	Yellow	Monitors Pulse Density Violations (PDV) on the received DTE Drop/Insert (DSX-1) signal. *ON*: At least one PDV was detected (and corrected) on the received DTE Drop/Insert (DSX-1) signal during the sampling period. *OFF:* No PDVs were detected on the received DTE Drop/Insert (DSX-1) signal during the sampling period.
BPV	Yellow	Monitors Bipolar Violations (BPV) on the received DTE Drop/Insert (DSX-1) signal. *ON:* At least one BPV was detected (and corrected) on the received DTE Drop/Insert (DSX-1) signal during the sampling period. *OFF:* No BPVs were detected on the received DTE Drop/Insert (DSX-1) signal during the sampling period.

Table 3-4.   Data Port LEDs

Name	Color	Meaning
DTR	Green	Monitors the state of interchange circuit CD (CCITT 108/1, /2) – Data Terminal Ready received from the synchronous data DTE. *ON:* DTR is being asserted by the synchronous data DTE. *OFF:* DTR is not being asserted.
TXD	Yellow	Monitors activity on interchange circuit BA (CCITT 103) – Transmitted Data. This is the data sent from the synchronous data DTE to the data port on the DSU/CSU. *ON:* Ones are being received from the synchronous data DTE. *OFF:* Zeros are being received from the synchronous data DTE. *CYCLING:* Both ones and zeros are being received from the synchronous data DTE.
RXD	Yellow	Monitors activity on interchange circuit BB (CCITT 104) – Received Data. This is data sent to the synchronous data DTE from the data port on the DSU/CSU. *ON:* Ones are being sent to the synchronous data DTE. *OFF:* Zeros are being sent to the synchronous data DTE. *CYCLING:* Both ones and zeros are being sent to the synchronous data DTE.
CTS	Yellow	Monitors the state of interchange circuit CB (CCITT 106) – Clear-to-Send sent to the synchronous data DTE. *ON:* CTS is being asserted by the DSU/CSU. *OFF:* CTS is not being asserted.
RTS	Yellow	Monitors the state of interchange circuit CA (CCITT 105) – Request-to-Send received from the synchronous data DTE. *ON:* RTS is being asserted by the synchronous data DTE. *OFF:* RTS is not being asserted.

Initiating an Asynchronous Terminal Session

You can configure and manage the DSU/CSU from an asynchronous terminal that is configured for **9.6 kbps, 8 characters, no parity, and 1 stop bit**.

You can connect the asynchronous terminal directly to the COM port of the DSU/CSU, or you can establish a remote connection using dial-in or Telnet access.

Once the appropriate access is established, the Main Menu screen (Figure 3-2) appears (unless a password is required).

If a password is required, the Login screen displays the prompt for password input. (Refer to *Entering a Password to Gain Access* on page 3-10.)

To move between the Screen area and the Screen Function Keys area (Figure 3-2), press Ctrl-a (Control key and a).

From the Screen area, you may select the **Status, Test, Configuration**, or **Control** branches.

Ending an Asynchronous Terminal Session

To end the asynchronous terminal session from any screen, press Ctrl-a to move from the Screen area to the Screen Function Keys area (Figure 3-2), and then select <u>E</u>xit.

```
main
Customer ID: Node A                                          Model: 3162
Slot:  xx

                              MAIN MENU


                         Status
                         Test
                         Configuration
                         Control




------------------------------------------------------------------------------
Ctrl-a to access these functions                                     Exit
```

Screen Area

Screen Function Keys Area
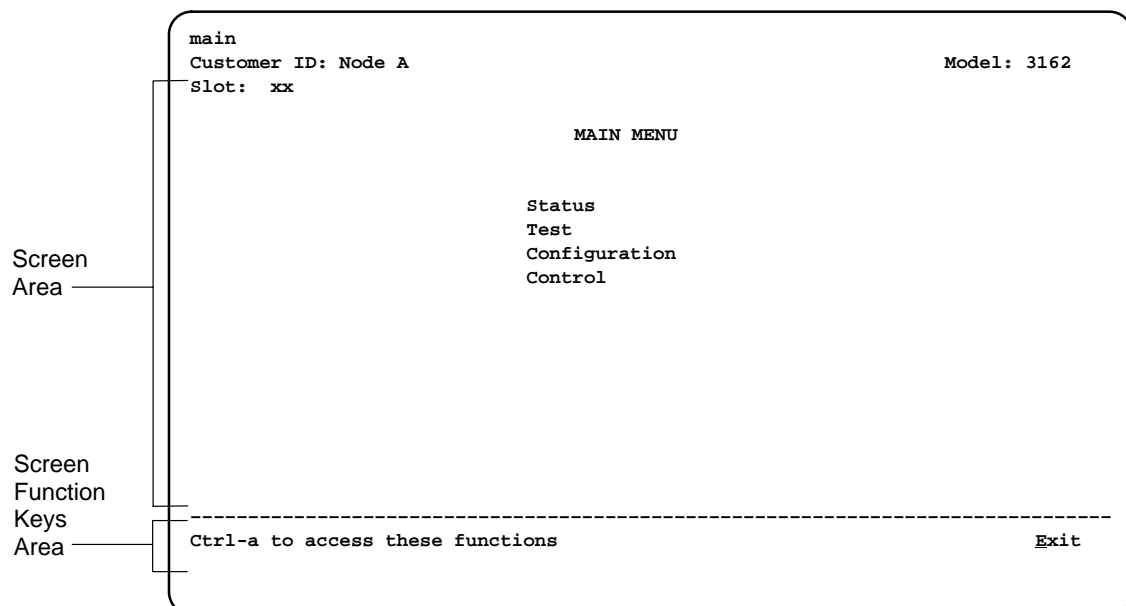
Figure 3-2.   Main Menu Screen

Recovering Asynchronous Terminal Operation

If the DSU/CSU is misconfigured, leaving it in a state that does not support asynchronous terminal operation, use the following recovery procedure.

▶ **Procedure**

1. Power cycle the DSU/CSU, waiting for the completion of the power-on self-test.

2. Press the asynchronous terminal's Return key five times in succession. (Begin pressing the Return key within two seconds after the completion of power-on self-test, and do not wait longer than one second between each successive key press.)

3. The System Paused screen appears. Use it to reset the COM port configuration options or to reload all factory default configuration options.

Menu Organization

Figure 3-3 shows the organization of the asynchronous terminal menu tree.
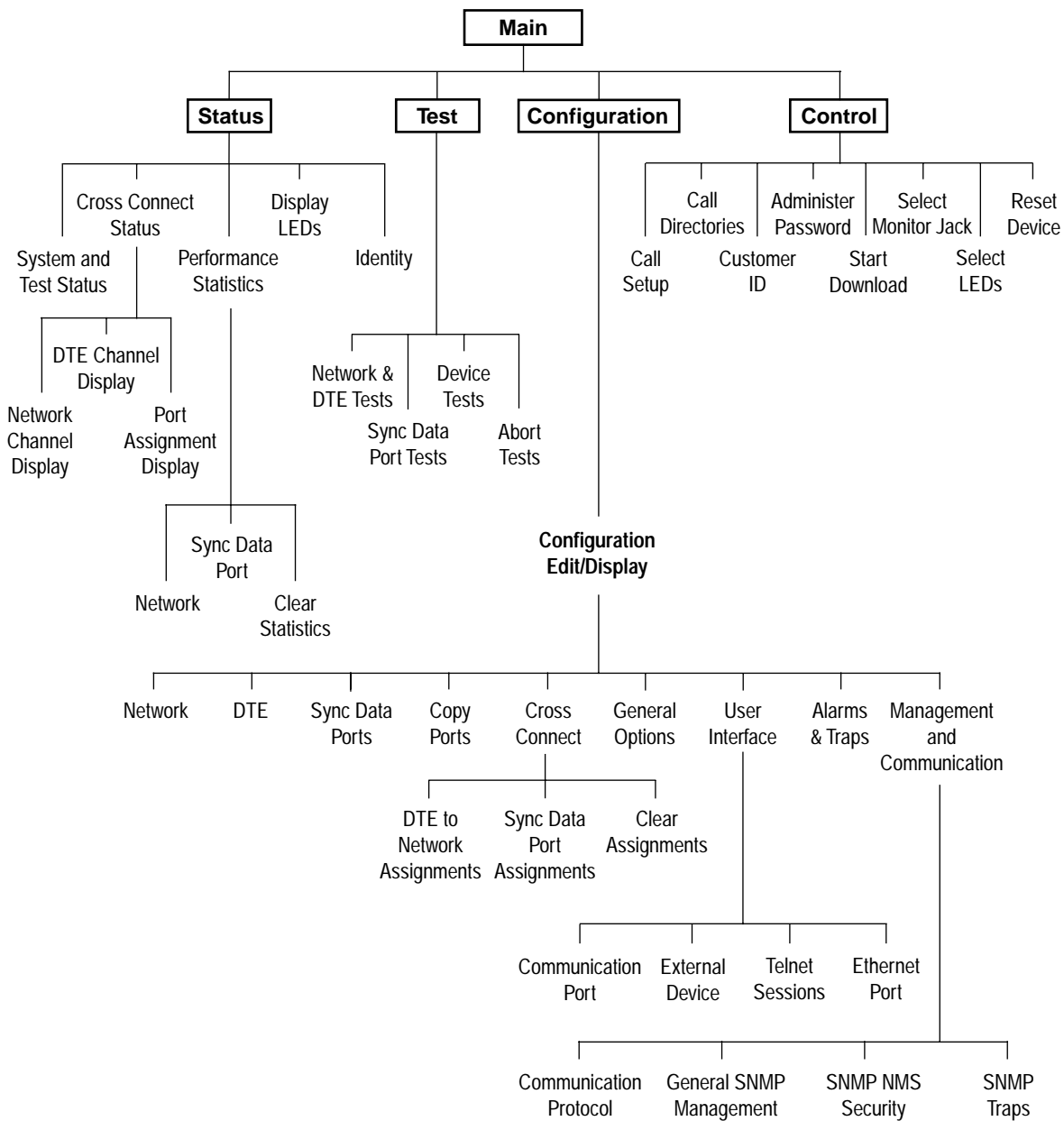
Figure 3-3. Menu Organization

Using Asynchronous Terminal Screens

There are three types of asynchronous terminal screens.

- Menu screens list selections available through the menu system.

- Input screens allow you to edit or change information on a screen using screen function keys (Table 3-5) or keyboard keys (Table 3-6).

- Display screens show the results from a data collection operation or they display device-specific information.

The asynchronous terminal supports character matching for entering values in fields. For example, if the values for a field can be **DTE**, **NET**, or **PORT** and you enter a **D** and press Return (Enter), then the field automatically populates with the value **DTE**.

Once an operation is initiated, status messages appear in the last row of the screen. These include **Please Wait** (when a command takes longer than five seconds) and **Command Complete**.

Table 3-5.   Screen Function Keys

Screen Function Key	Usage
M (<u>M</u>ainMenu)	Returns to the Main Menu screen.
E (<u>E</u>xit)	Terminates the asynchronous terminal session.
R (<u>R</u>efresh)	Updates the screen with the current information.
U (Pg<u>U</u>p)	Pages up to the previously displayed page of information.
D (Pg<u>D</u>n)	Pages down to the previously displayed page of information.
S (<u>S</u>ave)	Stores changes in nonvolatile memory.

Table 3-6.   Keyboard Keys

Keyboard Key	Usage
Ctrl-a	Moves the cursor between the Screen area and the Screen Function Keys area.
Esc	Returns to the previous screen.
Tab	Moves the cursor to the next field.
Back (Shift) Tab or Ctrl-k	Moves the cursor to the previous field.
Backspace	Moves the cursor one position to the left or to the last character of the previous field.
Spacebar	Selects the next valid value for the field.
Delete	Deletes the character that the cursor is on.
Up Arrow key or Ctrl-u	Moves the cursor up one field within a column on the same screen.
Down Arrow key or Ctrl-d	Moves the cursor down one field within a column on the same screen.
Right Arrow key or Ctrl-f	Moves the cursor back one character to the right.
Left Arrow key or Ctrl-b	Moves the cursor back one character to the left.
Ctrl-l	Redraws the screen display.
Return (Enter)	Accepts entry.

NOTE:

Some Telnet applications may require the use of Ctrl-u, Ctrl-d, Ctrl-f, and Ctrl-b as an alternative to the use of the Up, Down, Right, and Left Arrow keys.

Entering a Password to Gain Access

When access security is required, the Login screen (Figure 3-4) appears before you can access the Main Menu screen. The password must be entered.

- *If the password is valid*, the DSU/CSU's top-level menu appears.

- *If the password is invalid*, an invalid password message appears and the screen reappears and waits for password entry.

- *If an invalid password is entered three consecutive times*, the message **User Interface Idle** appears, Telnet sessions are closed, dial-in connections are disconnected, and an SNMP trap is generated.

```
login
Customer ID: Node A                                          Model: 3162
Slot:  xx
                                                                           Enter
                              LOGIN                                        Password
                    Enter Password           _____




    ----------------------------------------------------------------------------
    Ctrl-a to access these functions                                    Exit
```
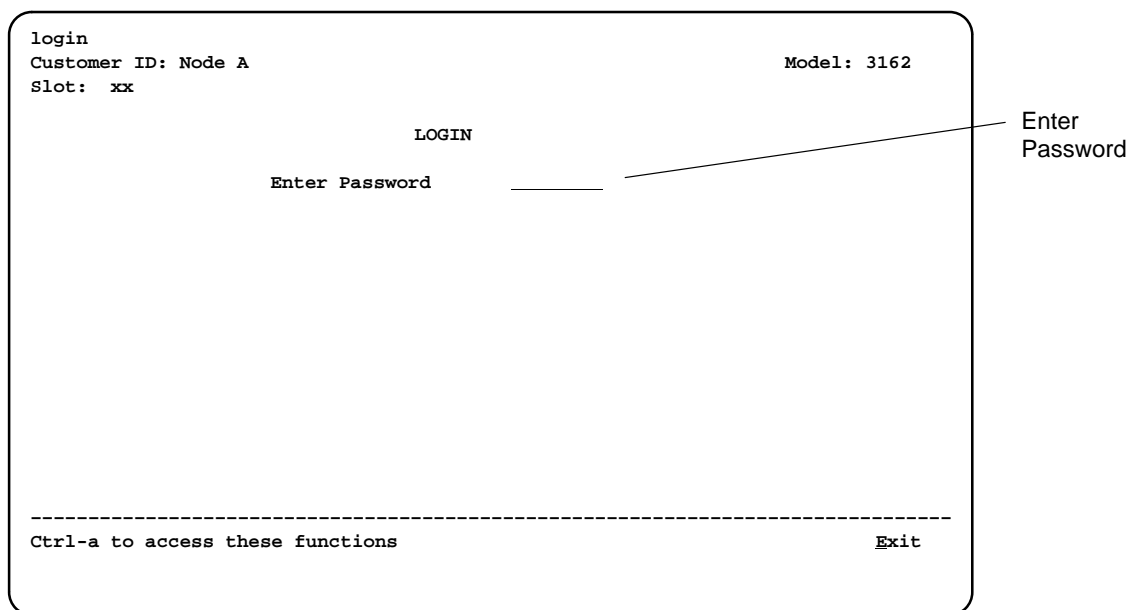
Figure 3-4.   Entering a Password

Displaying LED Conditions

The same conditions monitored by the front panel LEDs can also be monitored by the Display LEDs screen. This screen is most useful when the DSU/CSU is being accessed remotely.

▶ **Procedure**

To display LED conditions:

1. From the Main Menu screen, select Status.

2. From the Status screen, select Display LEDs.
   The Display LEDs screen appears (Figure 3-5).

The screen shows a snapshot of the LEDs every 5 seconds. LEDs that are illuminated are displayed by inverse video.

Select Refresh to update the screen.

```
main/status/leds
Customer ID: Node A                                          Model: 3162
Slot:  xx

                            DISPLAY LEDs

        GENERAL      NETWORK      DTE      PORT 1   PORT 2

        OK           Sig          Sig      DTR      DTR
        Fail         OOF          OOF      TXD      TXD
        Test         Alm          Alm      RXD      RXD
                     EER          PDV      CTS      CTS
                                  BPV      RTS      RTS




-------------------------------------------------------------------------------
Ctrl-a to access these functions, ESC for previous menu       MainMenu    Exit
Refresh
```

Figure 3-5.   Example of Display LEDs Screen

Changing Configuration Options

The DSU/CSU is an intelligent device that displays only valid options for the current configuration. Therefore, you are only presented with menu choices that are consistent with the current configuration and operational state of the DSU/CSU; invalid combinations of configuration options do not appear. For example, if the DTE Drop/Insert (DSX-1) interface selection is disabled, many of the menu choices do not appear.

The DSU/CSU offers configuration options located in the following memory areas:

■ **Current**. This is the configuration option set currently active for the DSU/CSU is stored here. Before a configuration option set becomes active for the DSU/CSU, you must save the set to the Current area. When the DSU/CSU is shipped from the factory, the Current configuration option set is identical to the Default Factory set. This area can be written to and controls the current operation of the device.

■ **Customer 1**. This is the first of two sets of customer-defined configuration options. This area can be written to.

■ **Customer 2**. This is the second of two sets of customer-defined configuration options. This area can be written to.

■ **Default Factory 1**. This is a set of configuration options preset at the factory. This set is determined by what is considered to be the most common configuration used in the DSU/CSU market. Default Factory 1 options are read-only.

■ **Default Factory 2**. This is a set of configuration options preset at the factory. This set is determined by what is considered to be the second most common configuration used in the DSU/CSU market. Default Factory 2 options are read-only.

The configuration options are divided into functional groups. Appendix C, *Configuration Options*, contains a list of the configuration options and defaults.

The DSU/CSU arrives with two preset factory default configuration settings. These settings are based on the following:

■ **Default Factory 1** – ESF framing format with B8ZS line coding format for both the network and the DTE Drop/Insert (DSX-1) interfaces. Data ports are unassigned.

■ **Default Factory 2** – D4 framing format with AMI line coding format for both the network and the DTE Drop/Insert (DSX-1) interfaces. Data ports are unassigned.

If neither of the factory default settings support your network's configuration, you can customize the configuration options to better suit your application.

Use the Configuration branch of the menu tree to display or change DSU/CSU configuration options (see Appendix C, *Configuration Options*).

Displaying or Editing Configuration Options

▶ **Procedure**

To display or edit configuration options:

1. From the Main Menu screen, select Configuration.

   The Load Configuration From screen appears (Figure 3-6).

2. From the Load Configuration From screen, select a configuration option set to load (**Current**, **Customer 1**, **Customer 2**, **Default Factory 1**, or **Default Factory 2**). You cannot edit the Default Factory configuration options, but you can display them.

   After selecting the set of configuration options to load, the Configuration Edit/Display screen appears (Figure 3-7).

3. Select a functional group to display or edit.

   NOTE:

   Screen displays may vary depending on the configuration of the DSU/CSU.

```
main/config
Customer ID: Node A                                              Model: 3162
Slot:  xx

                              LOAD CONFIGURATION FROM:

                              Current Configuration
                              Customer Configuration 1
                              Customer Configuration 2
                              Default Factory Configuration 1
                              Default Factory Configuration 2




-------------------------------------------------------------------------------
Ctrl-a to access these functions, ESC for previous menu         MainMenu   Exit
```

Figure 3-6.   Configuration Load Screen

```
main/config/edit
Customer ID: Node A                                          Model: 3162
Slot:  xx

                            CONFIGURATION EDIT/DISPLAY

                                Network
                                DTE
                                Sync Data Ports
                                Copy Ports
                                Cross Connect
                                General Options
                                User Interface
                                Alarms & Traps
                                Management and Communication




   -------------------------------------------------------------------------------
   Ctrl-a to access these functions, ESC for previous menu        MainMenu   Exit
   Save
```

Figure 3-7.   Configuration Edit/Display Screen

Saving Edit Changes

▶ **Procedure**

To save edit changes:

1. From the last edit screen, select <u>S</u>ave.

   The Save Configuration To screen appears (Figure 3-8).

2. From the Save Configuration To screen, select a configuration option set (**Current**, **Customer 1**, or **Customer 2**).

Save edit changes to the Current area when you want those changes to take effect immediately. Save edit changes to the Customer area when you want to overwrite the existing Customer configuration options and store these changes for future use.

To protect you from accidentally exiting an edit session before saving your changes, the system displays the `Save Changes?` prompt if you select either **MainMenu** or **Exit** from an edit screen. If you respond **No**, the system exits without saving the changes. If you respond **Yes**, you are prompted to specify where the changes should be saved.

```
main/config/save
Customer ID: Node A                                          Model: 3162
Slot:  xx

                            SAVE CONFIGURATION TO:

                            Current Configuration
                            Customer Configuration 1
                            Customer Configuration 2






--------------------------------------------------------------------------------
Ctrl-a to access these functions, ESC for previous menu        MainMenu   Exit
```

Figure 3-8.   Configuration Save Screen

Configuration

4

Overview

Configuring the DSU/CSU may include:

- Setting Customer Identification

- Configuring the 10BaseT Port

- Configuring the COM Port for SNMP or Telnet Access

- Configuring DS0 Channels

- Establishing Access Security on the COM Port

- Setting a Password

- Entering a Password to Gain Access

- Selecting the Timing Source

- Providing Backup Capability

Setting Customer Identification

The customer identification is used to uniquely identify the DSU/CSU.

▶ **Procedure**

To change the customer identification (Customer ID):

1. From the Main Menu screen, select Control.

2. From the Control screen, select Customer ID.
   The Customer ID screen appears (Figure 4-1).

3. Use the Customer ID field to set the customer identification.
   The customer identification may be up to 8 characters long.
   Select Clear to remove all the characters in the associated field.

4. Select Save to store the information in nonvolatile memory.

In addition to the customer identification, you may also enter a system name, system location, and system contact. Although only 40 characters are displayed for these fields, you may enter up to 255 characters. The fields scroll as the additional characters are added.

Customer
Identification
Field

```
main/control/customer id
Customer ID: Node A                                          Model: 3162
Slot:  xx

                              CUSTOMER ID


        Customer ID:        _____                         Clear
        System Name:     _____ Clear
        System Location: _____ Clear
        System Contact:  _____ Clear







    ----------------------------------------------------------------------------
    Ctrl-a to access these functions, ESC for previous menu      MainMenu   Exit
    Save
```

Figure 4-1.   Customer Identification Screen

Configuring the 10BaseT Port

To configure the 10BaseT port for SNMP access:

■ Set the Port Use configuration option to your network protocol.

■ Set the 10BaseT port's IP address and subnet mask.

■ Set the default gateway address.

▶ **Procedure**

To configure the 10BaseT port:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select User Interface.

4. From the User Interface screen, select Ethernet Port.
   The Ethernet Port Options screen appears.

5. In the Port Use field, select **802.3** or **Version 2**.

6. Enter the IP Address, Subnet Mask, and Default Gateway Address.

7. When you are through making configuration option changes, select Save to store these changes in nonvolatile memory. If you want to return to the User Interface screen, press your Esc key and then save your changes from that screen.

```
main/config/user/ethernet
Customer ID: Node A                                        Model: 3162


                      ETHERNET PORT OPTIONS


           Port Use:                      Version 2

           IP Address:                    000.000.000.000     Clear
           Subnet Mask:                   000.000.000.000     Clear

           Default Gateway Address:       000.000.000.000     Clear




    --------------------------------------------------------------------------------
    Ctrl-a to access these functions, ESC for previous menu       MainMenu    Exit
    Save
```

Figure 4-2.   Ethernet Port Options Screen

Configuring the COM Port for SNMP or Telnet Access

To configure the DSU/CSU for SNMP or Telnet access,

- Enable the SNMP agent or Telnet server within the DSU/CSU (see Appendix C, *Configuration Options*).

- Configure the COM port.

- Set the Internet Protocol (IP) address and subnet mask needed to access the DSU/CSU (see Appendix F, *IP Network Addressing Scenario*).

- Select the link layer protocol (PPP or SLIP) for the port that provides the link to the SNMP or Telnet system.

- For SNMP links, specify the two community names (and their access levels) that are allowed to access the device's Management Information Base (MIB) (see Appendix C, *Configuration Options*).

- For SNMP links, configure the device to send traps to the SNMP manager, if desired (see Appendix C, *Configuration Options*, and *SNMP Traps* in Chapter 5, *Monitoring and Testing*).

- Specify the Telnet password or SNMP validation options, if desired (see Appendix C, *Configuration Options*).

Configuring the COM Port for Management

The SNMP manager, Telnet device, or network device (e.g., a router) can be directly connected to the COM port. The COM port can support either synchronous or asynchronous PPP, or asynchronous SLIP at data rates of up to 38,400 bps.

▶ **Procedure**

To configure the COM port as an SNMP or Telnet link:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select User Interface.

4. From the User Interface screen, select Communication Port.

5. In the Port Use field, enter **Mgmt** (Figure 4-3).

6. When you are through making configuration option changes, select <u>S</u>ave to store these changes in nonvolatile memory. If you want to return to the User Interface screen, press your Esc key and then save your changes from that screen.

```
main/config/user/com
Customer ID: Node A                                          Model: 3162
Slot:  xx

                    COMMUNICATION PORT OPTIONS                        Port Use
                                                                     Field

              Port Use:               Mgmt
              Port Type:              Synchronous
              Clock:                  Internal
              Data Rate (Kbps):       9.6




-------------------------------------------------------------------------------
Ctrl-a to access these functions, ESC for previous menu      MainMenu   Exit
Save
```

Figure 4-3.   Communication Port Options Screen

Setting the IP Address

The IP address is the address used by the SNMP or Telnet system to access the DSU/CSU (see Appendix F, *IP Network Addressing Scenario*). For DSU/CSUs using PPP, the IP address can be negotiated if the network device (e.g., router or SNMP manager) supports such negotiation. The IP address is composed of four fields with three digits per field (*xxx.xxx.xxx.xxx*).

The example below assumes that an IP address of 010.155.111.222 is being set for the COM port. You can use the same principles to assign any value (between 000 and 255 for each digit field).

▶ **Procedure**

To assign an IP address to the COM port:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select Management and Communication.

4. From the Management and Communication screen, select Communication Protocol.

5. In the Communication Port's IP Address field, enter the IP address for the COM port. Enter the subnet mask under this.

6. When you are through making configuration option changes, select Save to store these changes in nonvolatile memory. If you want to return to the User Interface screen, press your Esc key and then save your changes from that screen.

Selecting the Link Layer Protocol

Two link layer protocols, Point-to-Point Protocol (PPP) and Serial Line Internet Protocol (SLIP), are supported for connection to an external SNMP manager, Telnet device, or network device (e.g., a router). PPP can be used for synchronous or asynchronous operation. SLIP can be used for asynchronous operation only.

The DSU/CSU implementation of PPP supports the following:

- Full negotiation of PPP's Link Control Protocol (LCP).

- Active negotiation of LCP when the connection is established.

- Maximum Request Unit (MRU) sizes up to 1500 bytes, but the DSU/CSU will attempt to negotiate down to 500 bytes.

- The DSU/CSU provides a unique LCP magic number derived from the unit serial number and the elapsed time.

- Full negotiation of escape characters.

The DSU/CSU implementation of PPP does not support Link Quality Reports (LQR), compression, encryption, Password Authentication Protocol (PAP) or Challenge Handshake Authentication Protocol (CHAP).

The DSU/CSU implementation of SLIP supports a fixed MRU size of 1006 bytes.

▶ **Procedure**

To select the link layer protocol:

1. Select the Communication Protocol Options screen using the procedure described in the previous section, *Setting the IP Address*.

2. In the Communication Port's Com Link Protocol field, enter **PPP** or **SLIP**.

3. When you are through making configuration option changes, select <u>S</u>ave to store these changes in nonvolatile memory. If you want to return to the User Interface screen, press your Esc key and then save your changes from that screen.
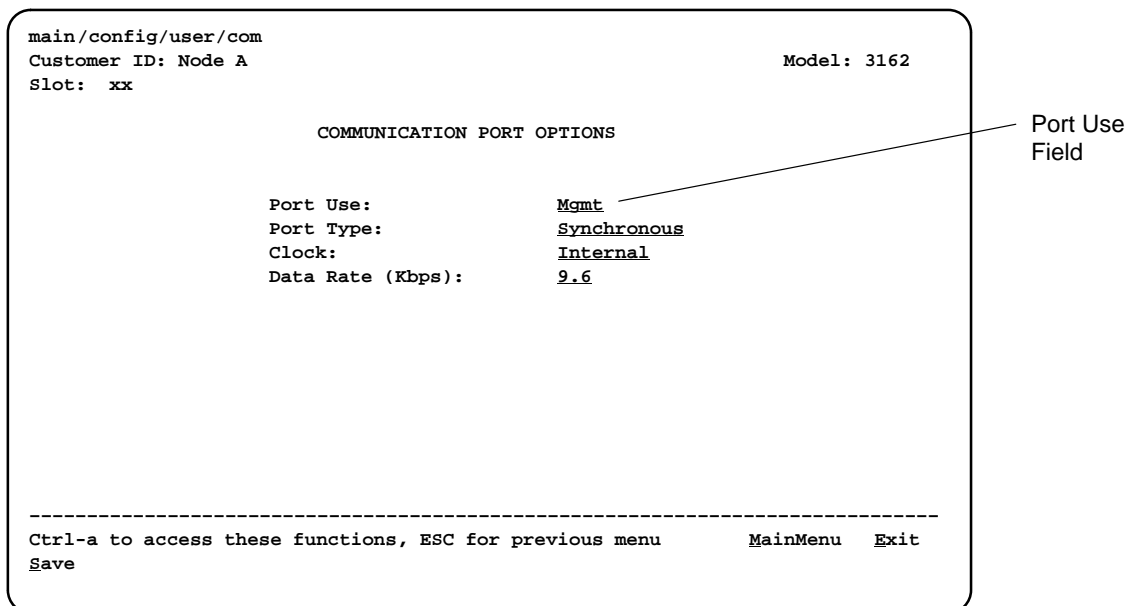
Configuring DS0 Channels

The DSU/CSU provides Cross Connect configuration options that allow you to do the following:

- Display the DS0 assignments for the network, DTE Drop/Insert (DSX-1), and data port interfaces.

- Allocate DS0 channels on the DTE Drop/Insert (DSX-1) interface to the network interface.

- Allocate DS0 channels on the network or DTE Drop/Insert (DSX-1) interface to particular data ports.

- Map data from one port to another.

- Clear (deallocate) all DS0 channels from the network, DTE Drop/Insert (DSX-1), or data port interface.

To allocate DS0 channels, begin by defining the logical channel configuration for the network interface, and then the DTE Drop/Insert (DSX-1) interface, and then any ports, if desired. See Figure 4-4 for an example of a conceptual diagram of a channel configuration.

Blank configuration worksheets are provided at the back of Appendix C, *Configuration Options*. These worksheets will help you prepare to perform the procedures in this section. Figure 4-5 and Figure 4-6 are provided as an example only. See Appendix C for other useful worksheets.

NOTE:

The procedures in this section are examples only. Screen displays may vary depending on the configuration of the DSU/CSU. For example, the DTE Drop/Insert (DSX-1) interface is not displayed if this interface is disabled.

DTE DROP/INSERT
(DSX-1) INTERFACE

NETWORK
INTERFACE

Network	DTE
	D1
	D2
	D3
N1	D4
N2	D5
N3	D6
N4	D7
N5	D8
N6	D9
N7	D10
N8	D11
N9	D12
N10	D13
N11	D14
N12	D15
N13	D16
N14	D17
N15	D18
N16	D19
N17	D20
N18	D21
N19	D22
N20	D23
N21	D24
N22	PORTS
N23	PRT 1
N24	PRT 2

496-15016
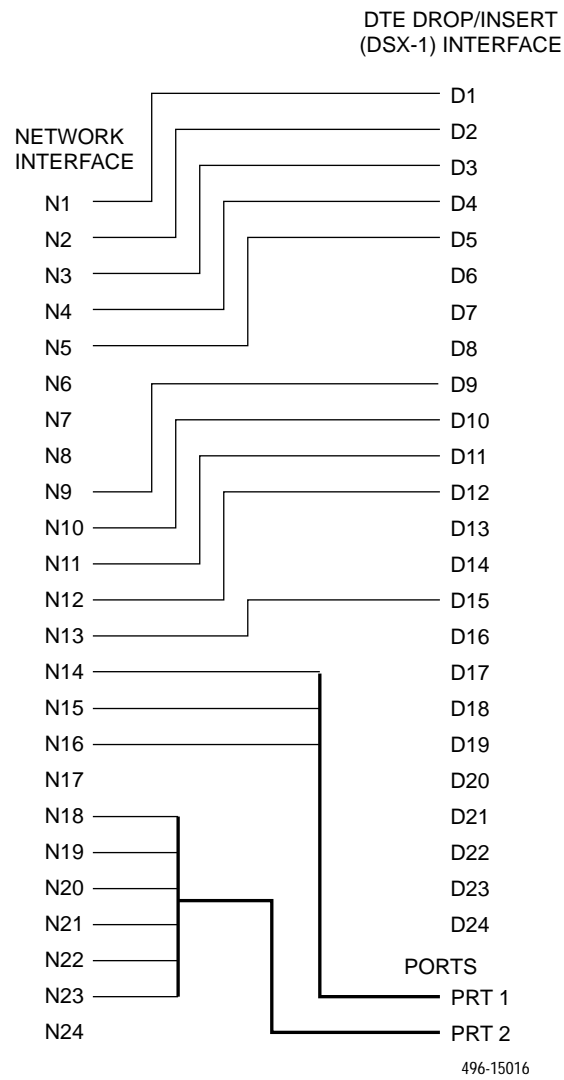
Figure 4-4.   Example of Channel Allocation

Network Interface

Network Channel	Allocation
N1	*D1*
N2	*D2*
N3	*D3*
N4	*D4*
N5	*D5*
N6	
N7	
N8	
N9	*D9*
N10	*D10*
N11	*D11*
N12	*D12*
N13	*D15*
N14	*Prt1*
N15	*Prt1*
N16	*Prt1*
N17	
N18	*Prt2*
N19	*Prt2*
N20	*Prt2*
N21	*Prt2*
N22	*Prt2*
N23	*Prt2*
N24	

Allocations

D1 – D24 indicates allocation to DTE Drop/Insert (DSX-1) channels.

Prt1 – Prt2 indicates allocation to synchronous data ports.

Figure 4-5.   Example of Network Interface Worksheet

DTE Drop/Insert (DSX-1) Interface

DTE (DSX-1) Channel	Allocation
D1	*N1*
D2	*N2*
D3	*N3*
D4	*N4*
D5	*N5*
D6	
D7	
D8	
D9	*N9*
D10	*N10*
D11	*N11*
D12	*N12*
D13	
D14	
D15	*N13*
D16	
D17	
D18	
D19	
D20	
D21	
D22	
D23	
D24	

Allocations

N1 – N24 indicates allocation to network channels.

Figure 4-6.   Example of DTE Drop/Insert Interface Worksheet

Displaying DS0 Channel Assignments

Use the DTE to Network Assignments screen (in the Cross Connect branch) to view how the DS0 channels are currently allocated. DS0 designations used on this screen are shown in Table 4-1.

Table 4-1.   DTE to Network DS0 Designations

Designation	Meaning
Available	The DS0 channel is not allocated.
Assigned	The DS0 channel is allocated to one of the data ports.
N*nn*	The DS0 channel is allocated to the network interface DS0 channel *nn*, where *nn* can be any number from 01 through 24.
DTE*nn*	The DS0 channel is allocated to the DTE Drop/Insert (DSX-1) interface DS0 channel *nn*, where *nn* can be any number from 01 through 24.

▶ **Procedure**

To display the DS0 channel allocation:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select Cross Connect.

4. From the Cross Connect screen, select DTE To Network Assignments.

   The DTE to Network Assignments screen appears (Figure 4-7).

5. To view specific port assignments on the Network Channel Display screen, select <u>N</u>etChan at the bottom of the DTE to Network Assignments screen.

```
main/config/cross_connect/dte
Customer ID: Node A                                          Model: 3162
Slot:  xx
                       DTE (DSX-1) TO NETWORK ASSIGNMENTS



    N01         N02         N03         N04         N05         N06         N07         N08
   DTE01       DTE02       DTE03       DTE04       DTE05      Available   Available   Available

    N09         N10         N11         N12         N13         N14         N15         N16
   DTE09       DTE10       DTE11       DTE12       DTE15      Assigned    Assigned    Assigned

    N17         N18         N19         N20         N21         N22         N23         N24
  Available   Assigned    Assigned    Assigned    Assigned    Assigned    Assigned   Available




  ------------------------------------------------------------------------------
  Ctrl-a to access these functions, ESC for previous menu          MainMenu   Exit
  Save     NetChan    DTEChan    PtAssign
```

NetChan
Selection

Figure 4-7.   Example of DTE Drop/Insert Interface Worksheet

Allocating DS0 Channels from the DTE Drop/Insert Interface to the Network Interface

▶ **Procedure**

To allocate DS0 channels from the DTE Drop/Insert (DSX-1) interface to the network interface:

1. From the Main Menu screen, select Configuration.

   The Load Configuration From screen appears.

2. From the Load Configuration From screen, select Current.

   The Configuration Edit/Display screen appears.

3. From the Configuration Edit/Display screen, select Cross Connect.

   The Cross Connect screen appears.

4. From the Cross Connect screen, select DTE To Network Assignments.

   The DTE to Network Assignments screen appears (Figure 4-8).

5. Assign the DS0 channels from the DTE Drop/Insert (DSX-1) interface to the network interface. In the example shown in Figure 4-7, the DTE Drop/Insert (DSX-1) DS0 channel 01 is assigned to the network DS0 channel 01.

6. Select Save to store these settings in nonvolatile memory.

DTE to
Network
Assignment

```
main/config/cross_connect/dte
Customer ID: Node A                                        Model: 3162
Slot: xx
                    DTE (DSX-1) TO NETWORK ASSIGNMENTS


   N01       N02       N03       N04       N05       N06       N07       N08
  DTE01   Available Available Available Available Available Available Available

   N09       N10       N11       N12       N13       N14       N15       N16
 Available Available Available Available Available  Assigned  Assigned  Assigned

   N17       N18       N19       N20       N21       N22       N23       N24
 Available  Assigned  Assigned  Assigned  Assigned  Assigned  Assigned Available




 ------------------------------------------------------------------------------
 Ctrl-a to access these functions, ESC for previous menu      MainMenu    Exit
 Save     NetChan   DTEChan   PtAssign
```

Figure 4-8.   Making DTE to Network Assignments

Configuring DS0 Channels for Robbed Bit Signaling

By using the DTE configuration options, you can specify which DS0 channels carry Robbed Bit Signaling (RBS) information for voice channels.

▶ **Procedure**

To specify DTE Drop/Insert (DSX-1) channels used to carry voice information:

1. From the Main Menu screen, select Configuration.

   The Load Configuration From screen appears.

2. From the Load Configuration From screen, select Current.

   The Configuration Edit/Display screen appears.

3. From the Configuration Edit/Display screen, select DTE.

   The DTE Interface Options screen appears (Figure 4-9).

4. Enter **RBS** for each DS0 channel that you want to configure for voice applications.

   The designation **None** indicates the absence of RBS information. These channels (known as Clear Channels) are used for data applications.

5. Select <u>S</u>ave to store these settings in nonvolatile memory.

```
main/config/dte
Customer ID: Node A                                          Model: 3162
Slot:  xx                        DTE INTERFACE OPTIONS

                      Interface Status:              Enable
                      Line Framing Format:           ESF
                      Line Coding Format:            B8ZS
                      Line Equalization:             0-133
                      DTE LB on External Contact:    Disable
                      Send all Ones on DTE Failure:  Enable
              DTE
         Signaling: D01     D02     D03     D04     D05     D06     D07     D08
                    None    None    None    None    None    None    None    None


                    D09     D10     D11     D12     D13     D14     D15     D16
                    RBS     None    None    None    None    None    None    None


                    D17     D18     D19     D20     D21     D22     D23     D24
                    None    None    None    None    None    None    None    None

  ------------------------------------------------------------------------------
  Ctrl-a to access these functions, ESC for previous menu      MainMenu    Exit
  Save
```

Configured for RBS

Figure 4-9.   DTE to Interface Options Screen

Allocating Data Ports Using the Block or ACAMI Assignment Method

By using the block or ACAMI (Alternate Channel Alternate Block Inversion) assignment method, you can assign a data port to a block of contiguous DS0 channels on either the network interface or the DTE Drop/Insert (DSX-1) interface.

The block assignment method allows a block of contiguous channels to be assigned by specifying a data port rate and an initial DS0 channel (the first DS0 channel in a block of DS0 channels). The number of channels assigned is determined by the port rate. These channels are automatically assigned to the destination T1 interface (Network or DTE Drop/Insert) when the initial DS0 channel is selected.

The ACAMI assignment method also allows a block of contiguous channels to be assigned, however, with ACAMI, the number of channels assigned is twice the number needed for the port rate. This is because with ACAMI, every alternate DS0 channel (starting with the n+1 DS0 channel), does not carry data from the port, but instead always transmits and receives all ones.

▶ **Procedure**

To assign data ports by the block or ACAMI method:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select Cross Connect.

4. From the Cross Connect screen, select Sync Data Port Assignments.

5. Use the Assign To field to specify the destination T1 interface (Network or DTE).

6. Use the Assign By field to specify the assignment method (Block or ACAMI).

7. After filling in the Port Rate field, specify a port assignment for the initial DS0 channel in a block of contiguous, available DS0 channels.

8. Select <u>S</u>ave or, if you want to return to the Cross Connect screen, press your Esc key and then save your changes from that screen.

Allocating Data Ports Using the Individual Channel Assignment Method

By using the individual channel assignment method, you can assign a data port to individual DS0 channels on either the network interface or the DTE Drop/Insert (DSX-1) interface.

This method individually selects the DS0 channels to allocate to the data port. The data port rate is automatically determined based on the number of channels selected.

▶ **Procedure**

To assign data ports by the individual channel method:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select Cross Connect.

4. From the Cross Connect screen, select Sync Data Port Assignments.

5. Use the Assign To field to specify the destination T1 interface (Network or DTE).

6. Use the Assign By field to specify the assignment method (Channel).

7. Specify the port assignments for the individual DS0 channels. The DS0 channels do not need to be contiguous.

   The port rate increases as the port is assigned to additional DS0 channel. For two DS0 channels (at 64 kbps each), a port rate of 128 kbps is required.

8. Select <u>S</u>ave or, if you want to return to the Cross Connect screen, press your Esc key and then save your changes from that screen.

Clearing DS0 Channel Allocation

You can clear (deallocate) all the DS0 channels currently allocated to either the network interface, the DTE Drop/Insert (DSX-1) interface, or the synchronous data ports.

▶ **Procedure**

To clear DS0 channel allocation:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select Cross Connect.

4. From the Cross Connect screen, select Clear Assignments.

5. To clear all DS0 channel allocations, select Clear All. Otherwise, select the appropriate DS0 channel group to clear (DTE, Network, or Sync Data Ports).

   A message will appear, `Are You Sure?`.

6. Enter **Yes** to clear the specified DS0 channels.

Establishing Access Security on the COM Port

Although the password feature is available, it is not required. If used, it ensures access security before control is passed to a device connected to a port. The following procedure is an example only. It shows how to enable the password for the communication port. Passwords can also be enabled for Telnet sessions.

▶ **Procedure**

To establish access security on the communication port:

1. From the Main Menu screen, select Configuration.

2. From the Load Configuration From screen, select Current.

3. From the Configuration Edit/Display screen, select User Interface.

4. From the User Interface Options screen, select Communication Port.

5. In the Password Required field, enter **Enable**.

6. Select <u>S</u>ave to store this setting in nonvolatile memory.

7. From the Save Configuration To screen, select Current.

The password itself is set separately. Refer to the following section, *Setting a Password*.

Setting a Password

In addition to establishing access security on a port (refer to the previous section, *Establishing Access Security on the COM Port*), the password itself is set. Unless you specify otherwise, the password is null.

▶ **Procedure**

To set a password:

1. From the Main Menu screen, select Control.

2. From the Control screen, select Administer Password.

   The Password Entry screen (Figure 4-10) is used to add a new password or modify an existing password.

3. Enter a new password in the Password field.

   The password may be 1 to 8 characters long and may contain the characters **0** through **9**, **a** through **z**, and/or **A** through **Z**.

4. Use the Re-Enter Password field to verify the new password.

5. Select <u>S</u>ave.

Once a password is saved, the `Login Records Saved` message appears in the last row of the screen.

```
main/control/admin_password
Customer ID: Node A                                        Model: 3162
Slot:  xx

                              PASSWORD ENTRY

                         Password:              _____
                         Re-Enter Password:     _____




-------------------------------------------------------------------------------
Ctrl-a to access these functions, ESC for previous menu        MainMenu   Exit
Save
```

Enter New Password

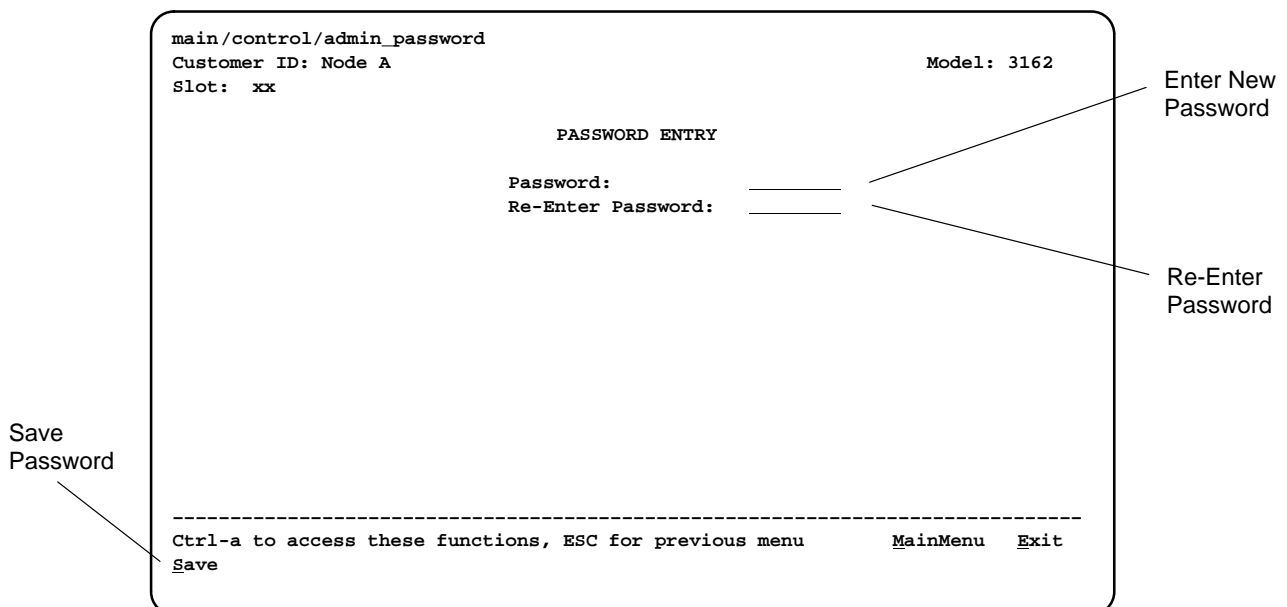Re-Enter Password

Save Password

Figure 4-10.   Setting a Password

Selecting the Timing Source

The DSU/CSU provides the ability to select a master clock (timing) source that is used to synchronize all of the T1 and data port interfaces on the DSU/CSU. The clock for each interface is at the appropriate rate for that interface (e.g., 1.544 Mbps for the T1 interfaces, the configured port rate for the data ports), and it is independent of the master clock rate. This means that the master clock rate and the DSU/CSU interface rates may be different.

The clock source configuration options enable you to select either the network interface, a synchronous data port, the internal clock, the DTE Drop/Insert (DSX-1) interface, or an external clock. If external clocking is selected, you must use the clock rate configuration option to specify the clock rate. Figure 4-11 shows some common clocking configurations. For more information on configuration options, refer to Appendix C.
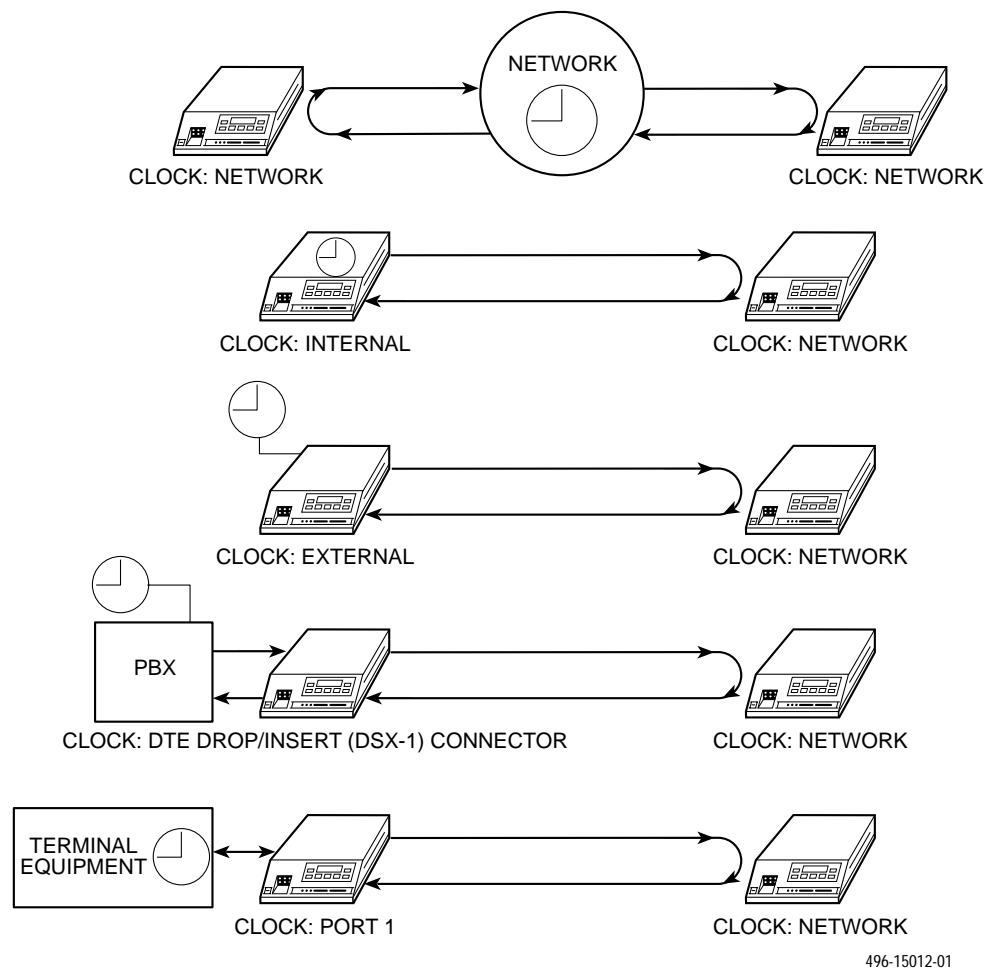
496-15012-01

Figure 4-11.   Common Clocking Configurations

Providing Backup Capability

If the T1 network fails, the DSU/CSU provides the ability to reconfigure the unit and restore (at least partially) priority data circuits through an external backup device.

You can store backup configuration options in the Customer 2 set of customer-defined configuration options. The Enterprise MIB variable devConfigAreaCopy allows the entire contents of one configuration area to be copied into another configuration area via SNMP.

By cross-connecting two synchronous data ports to each other, one port can provide a backup path for the other. As soon as the ports are configured to be mapped to each other, Data Set Ready (DSR) for the ports is turned on. The external backup device can be configured to initiate dialing when it detects the off-to-on transition of DSR.

Monitoring and Testing

5

Overview

The DSU/CSU can detect and report faults, and perform diagnostic tests. These features ensure that your DSU/CSU is giving you optimum performance in your network.

Self-Test Results

Use the System and Test Status screen to display the results of the power-on self-test. Possible messages are listed in Table 5-1.

See Chapter 2, *Installation*, for more information about power-on self-test.

▶ **Procedure**

To display power-on self-test results:

1. From the Main Menu screen, select Status.

2. From the Status screen, select System and Test Status.

Table 5-1.   Self-Test Results

Message	Description
Alarm Fail	The unit failed to transmit AIS or to detect an Yellow alarm.
B8ZS/LOS Fail	The unit failed to encode data properly or to detect Loss Of Signal.
CPU Fail	The central processing unit failed internal testing.
Device Fail	One or more of the unit's integrated circuit chips failed to pass internal device level testing.
DSU Fail	The unit failed to internally loop data on the DSU.
DSU Port *n* Fail	Port's integrated circuitry failed to pass device internal testing.
DTE T1 Fail	The unit failed to internally loop data on the DTE T1 (DSX-1) circuit.
Failure *xxxxxxx*	An 8-digit hexadecimal failure code is provided for service personnel.
Memory Fail	The unit failed program checksum verification.
Modem fail	Unit failed to internally loop data through the modem circuit.
Network T1 Fail	The unit failed to internally loop data on the network T1 circuit.
Passed	No problems were found during power-on.
Unknown Exp Dev	The unit is not able to recognize the expansion device connected to the main circuit card.

Device Health and Status

Use the System and Test Status screen to display the current health and status messages for the DSU/CSU. Table 5-2 lists these messages in priority order.

▶ **Procedure**

To display health and status messages:

1. From the Main Menu screen, select Status.

2. From the Status screen, select System and Test Status.

Table 5-2.   Health and Status Messages (1 of 2)

Message	Description
AIS at DTE	An Alarm Indication Signal is being received by the DTE Drop/Insert (DSX-1) interface.
AIS at Network	An Alarm Indication Signal (unframed all ones signal) is being received by the network interface.
Device Fail *xxxxxxxx*	An internal error has been detected by the operating software. An 8-digit code appears for use by service personnel. The condition is cleared by resetting the device.
Download Failed	A download attempt was interrupted and failed to complete. The condition is cleared by resetting the device.
EER at Network	An Excessive Error Rate condition has been detected on the network interface. The condition is cleared when the error rate falls below the threshold value.
EER at Port *n*	The error rate of the received signal has exceeded the configured threshold for data port Port *n* (where *n* is the port number). This condition only occurs if the synchronous data port's Embedded Data Link (EDL) is enabled. The condition is cleared when the error rate falls below the synchronous data port's configured threshold value.
Ethernet Down	There is no electrical activity on the 10BaseT port.
LOS at DTE	A Loss Of Signal condition (175 consecutive zeros) has been detected on the DTE Drop/Insert (DSX-1) interface. The condition is cleared when the density of ones to zeros received is 12.5%.
LOS at Network	A Loss Of Signal condition (175 consecutive zeros) has been detected on the network interface. The condition is cleared when the density of ones to zeros received is 12.5%.
Modem Connected	The integral modem is currently connected. This message is only displayed for standalone DSU/CSUs.
Network Com Link Down	The network communication link is in a down state. This condition only occurs if the COM port is configured for Mgmt, and communication between the management system and the DSU/CSU is not currently possible for this port.

Table 5-2.   Health and Status Messages (2 of 2)

Message	Description
OOF at DTE	An Out Of Frame condition has been detected on the DTE Drop/Insert (DSX-1) interface. The condition is cleared when a reframe occurs.
OOF at Network	An Out Of Frame condition (2 out of 4 frame synchronization bits in error) has been detected on the network interface. The condition is cleared when a reframe occurs.
OOF at Port *n*	An Out Of Frame condition has been detected on data port Port *n* (where *n* is the port number). This condition only occurs if the synchronous data port's Embedded Data Link (EDL) is enabled.
Primary Clock Failed	The primary clock has failed. Timing for the DSU/CSU is provided by the internal clock.
System Operational	This message only appears if there are no valid alarm or status messages.
Yellow at DTE	A Yellow Alarm signal is being received by the DTE Drop/Insert (DSX-1) interface.
Yellow at Network	A Yellow Alarm signal is being received by the network interface.

Performance Reports

Use the Performance Statistics screen to access performance reports for the DSU/CSU.

When the network interface is configured for ESF operation, network performance is continuously monitored and maintained in two sets of aggregate registers: Carrier Network Interface Registers (Telco) and User Network Interface Registers (User). The User registers contain an extra status register (Status). Registers are listed in Table 5-3. These registers are status registers that collect performance data for the previous 24-hour period. Performance data is updated in 15-minute intervals. After 15 minutes, the current interval is rolled over into a set of accumulator registers that represent the previous 96 15-minute intervals for the register. An interval total of how many of the 96 registers contain valid data is also kept, as well as a 24-hour total for each accumulator register.

Port performance is continuously monitored and maintained in memory registers when the port is configured to use EDL. The DSU/CSU maintains two sets of port registers for each synchronous data port: far-end port registers and near-end port registers. These registers are status registers that collect performance data for the previous 8-hour period. Port data is updated in 15-minute intervals. After 15 minutes, the current interval is rolled over into a set of accumulator registers that represent the previous 32 15-minute intervals for the register. An interval total of how many of the 32 registers contain valid data is also kept, as well as a 8-hour total for each accumulator register.

You can reset the performance registers via the **Clear Statistics** selection on the Performance Statistics screen.

▶ Procedure

To display performance reports:

1. From the Main Menu screen, select Status.

2. From the Status screen, select Performance Statistics.

3. From the Performance Statistics screen, select either Network or Sync Data Ports depending on the type of statistics that you want to view.

Table 5-3.   Performance Registers (1 of 2)

Register	Interval Description	Totals Description
Current Interval Timer	This register records the number of seconds in the current 15-minute interval. The maximum is 900 seconds. This register is valid for the current interval only.	N/A
ESF Error Events	An error event is an ESF frame with either a Cyclic Redundancy Check (CRC) error or an Out Of Frame (OOF) event. The maximum count is 65,535. This register is only reset as a result of a reset command from the network. This register is valid for the current interval only.	N/A
Valid Interval Total	N/A	Records the number of valid 15-minute intervals in the previous x hours, where x is 24 hours for aggregate performance and 8 hours for port performance. This register is not valid for the current interval.
ES	The number of errored seconds for the current interval. An errored second is any second with one or more ESF error events. The maximum is 900 seconds.	The total number of errored seconds for the previous x hours, where x is 24 hours for aggregate performance and 8 hours for port performance.
UAS	The number of unavailable seconds for the current interval. An unavailable second is any one second interval when service is unavailable. (Detection occurs with 10 consecutive unavailable seconds.) The maximum is 900 seconds.	The total number of unavailable seconds for the previous x hours, where x is 24 hours for aggregate performance and 8 hours for port performance.
SES	The number of severely errored seconds for the current interval. A severely errored second is any second with 320 or more CRC errors, or any second with one or more OOF events. The maximum is 900 seconds.	The total number of severely errored seconds for the previous x hours, where x is 24 hours for aggregate performance and 8 hours for port performance.
BES	The number of bursty errored seconds for the current interval. A bursty errored second is any second with more than one, but less than 320, CRC errors. The maximum is 900 seconds.	The total number of bursty errored seconds for the previous x hours, where x is 24 hours for aggregate performance and 8 hours for port performance.

Table 5-3.   Performance Registers (2 of 2)

Register	Interval Description	Totals Description
CSS **(Not valid for** **Port registers.)**	The number of controlled slip seconds for the current interval.	The total number of controlled slip seconds for the previous *x* hours, where *x* is 24 hours for aggregate performance and 8 hours for port performance.
LOFC	The loss of frame count for the current interval. This is a count of the number of times that an LOF is declared. The maximum count is 255.	The total loss of frame count for the previous *x* hours, where *x* is 24 hours for aggregate performance and 8 hours for port performance.
Status **(Only valid for** **User registers.)**	The status events register records whether one or more of the following events have occurred at least once during the interval. The event is identified by a letter as follows: ■ Y – A Yellow Alarm signal has been received on the network interface. ■ L – Loss Of Signal has occurred on the DTE Drop/Insert (DSX-1) interface. ■ E – The Excessive Error Rate threshold has been exceeded. ■ F – A Frame Synchronization Bit Error has been detected. ■ V – A Bipolar Violation has been detected. ■ If none of these events occurred during the interval, **none** will be displayed.	N/A
Complete **(Only valid for** **far-end port** **registers.)**	Bad line conditions or loopback tests may prevent far-end port statistics from reaching the DSU/CSU. This field indicates whether the 15-minute interval contains 900 seconds of statistics. If one or more seconds of far-end statistics are missing, this field will display **no**, otherwise it will display **yes**. This field is only displayed when Far is selected from the Prt*n* screen.	N/A

Ethernet Statistics

You can obtain information about the 10BaseT port with the Ethernet Port Status screen of the Status branch.

▶ **Procedure**

To display Ethernet statistics:

1. From the Main Menu screen, select Status.

2. From the Status screen, select Ethernet Port Status.

   The Ethernet Port Status screen appears, displaying 10BaseT port settings and statistics.

```
main/status/ethernet
Customer ID: Node A                                      Model: 3162


                      ETHERNET PORT STATUS

            Port Use:                    Version 2
            IP Address:                  135.18.40.2
            Subnet Mask:                 255.255.255.000
            Default Gateway Address:     135.18.2.0
            Ethernet MAC Address:        00:60:94:EF:56:5D


            Frames Transmitted:          0000000000
            Frames Received:             0000000000
            Errored Frames:              0000000000
            Excessive Collisions:        0000000000
            Carrier Sense Errors:        0000000000


--------------------------------------------------------------------------------
                              ESC for previous menu      MainMenu   Exit
Refresh       Clrstats
```

Select **Refresh** to update the statistics. Select **Clrstats** to set all the statistics to zero.

Table 5-4.   Ethernet Port Status

Field	Description
Port Use	Shows whether the port is enabled. The field contains one of: ■ Disabled – The port is disabled. ■ 802.3 – The port uses IEEE 802.3 protocol. ■ Version 2 – The port uses Ethernet Version 2 protocol.
IP Address	Displays the IP address of the port.
Subnet Mask	Displays the subnet mask for the IP address.
Default Gateway Address	Displays the IP address used for IP datagrams not on this subnet.
Ethernet MAC Address	Displays the Media Access Control address of the port.
Frames Transmitted	Displays the number of frames successfully transmitted since the unit was last powered up, or this field was reset.
Frames Received	Displays the number of frames successfully received since the unit was last powered up, or this field was reset.
Errored Frames	Displays the number of frames that were in error since the unit was last powered up, or this field was reset.
Excessive Collisions	Displays the number of frames for which transmission failed due to excessive collisions since the unit was last powered up, or this field was reset.
Carrier Sense Errors	Displays the number of times the carrier sense condition was lost or never asserted since the unit was last powered up, or this field was reset.

IP Routing Table

You can obtain information about IP addresses set in the DSU/CSU by using the IP Routing Table screen of the Status branch.

▶ **Procedure**

To display the IP routing table:

1. From the Main Menu screen, select Status.

2. From the Status screen, select IP Routing Table.
   The IP Routing Table screen appears.

```
main/status/ip_route
Customer ID: Node A                                        Model: 3162


                          IP ROUTING TABLE

   Destination         Mask           Gateway     Tbl Hop Proto Intf   TTL

 000.000.000.000 000.000.000.000 135.026.021.254  D    1   Local Ether 999
 135.026.021.000 255.255.255.000 000.000.000.000  R    0   Other Ether 999
 135.026.021.105 255.255.255.255 135.026.021.105  L    0   Local NA    999








 ------------------------------------------------------------------------------
                                 ESC for previous menu     MainMenu   Exit
 Refresh
```

Select **Refresh** to update the fields.

Table 5-5.   IP Routing Table

Field	Description
Destination	Displays the destination IP address for the route.
Mask	Displays the subnet mask for the Destination IP address.
Gateway	Displays the gateway IP address for the route.
Tbl	Displays a code for the routing table the route resides in. Tbl is one of: ■ D – Default Table. The route is added based on the Default Gateway Address set in the Ethernet Port Options screen, or the Default Network Destination set in the Communication Protocol Options screen. ■ L – Local Table. The Local Table has an entry for each interface that can have an IP address. ■ R – Remote Table. This is the primary routing table, which holds routes to other devices.
Hop	Displays the number of hops in the route to the destination.
Proto	Displays the protocol used to add the route to the routing table. Proto is one of: ■ RIP – The route was discovered using Routing Information Protocol. ■ Local – The route was added based the DSU/CSU's local configuration. ■ NMS – The route was added by a Network Management System using SNMP. ■ ICMP – The route was added because an Internet Control Management Protocol redirect message was received from a router, indicating a better route to the destination. ■ Other – None of the above methods was used. This would be shown for a temporary route added to respond to an IP packet.
Intf	Displays the interface used to reach the destination. Intf is one of: ■ COM – The communications port. ■ Ether – The 10BaseT port. ■ FDL – The Facility Data Link. ■ EDL1 – The Embedded Data Link (EDL) for Port 1. ■ EDL2 – The EDL for Port 2. ■ NA – Not Applicable
TTL	Displays the Time To Live set for the route. 1–998 denotes a number of seconds; 999 denotes infinity (the route never expires).

Alarms

To display or print alarm messages, you can attach the DSU/CSU, either locally or remotely, to an ASCII terminal or printer. Alarms can also be displayed on a PC that is using a terminal emulation package.

You can route these alarms to the COM port or dial them out using an external device.

Each alarm message contains a customer identification to indicate which remote DSU/CSU is reporting an alarm. For information about customer identification, refer to *Setting Customer Identification* in Chapter 4, *Configuration*.

Possible alarm messages are as follows:

- `Continuous Loss Of Signal detected at the x Interface` (where *x* is either Network or DTE).

- `Alarm Cleared. Loss Of Signal condition at the x Interface` (where *x* is either Network or DTE).

- `Continuous Out Of Frame condition detected at the x Interface` (where *x* is either Network or DTE).

- `Alarm Cleared. Out Of Frame condition at the x Interface` (where *x* is either Network or DTE).

- `Alarm Indication Signal received at the x Interface` (where *x* is either Network or DTE).

- `Alarm Cleared. Alarm Indication Signal at the x Interface` (where *x* is either Network or DTE).

- `An Excessive Error Rate has been detected at the Network Interface`.

- `Alarm Cleared. An Excessive Error Rate at the Network Interface`.

- `Yellow Alarm signal received at the x Interface` (where *x* is either Network or DTE).

- `Alarm Cleared. Yellow Alarm signal at the x Interface` (where *x* is either Network or DTE).

- `Continuous Out Of Frame condition detected at synchronous data port n` (where *n* is the port number).

- `Alarm Cleared. Out Of Frame condition at synchronous data port n` (where *n* is the port number).

- `An Excessive Error Rate has been detected at synchronous data port n` (where *n* is the port number).

- `Alarm Cleared. An Excessive Error Rate at synchronous data port n` (where *n* is the port number).

If two alarm conditions are detected at once, the higher priority alarm is reported. However, if an even higher priority alarm is detected before the first alarm is cleared, the later alarm is not reported. (The alarms listed above are in priority order with the highest priority listed first.)

Alarms remain active until the alarm condition is cleared. Also, an alarm clear message is only sent when there are no other alarms active.

For information about alarm configuration options, refer to *Alarm and Trap Configuration Options* in Appendix C, *Configuration Options.*

For troubleshooting information, refer to *Troubleshooting* on page 5-15.

SNMP Traps

SNMP traps are unsolicited messages that are sent from the DSU/CSU to an SNMP manager when the DSU/CSU detects certain pre-specified conditions. These traps enable the SNMP manager to monitor the state of the network.

The SNMP Trap configuration option must be enabled for trap messages to be sent over the communications link. You must specify the number of SNMP managers that are to receive traps from this DSU/CSU, an IP address for each SNMP manager specified, and the type of traps to be sent from this DSU/CSU. For more information, refer to Appendix C, *Configuration Options.*

Trap types consist of the following:

- **General traps** – Include warmStart and authenticationFailure. The DSU/CSU sends a warmStart trap after it has been reset to indicate that it has just reinitialized itself. The DSU/CSU sends an authenticationFailure trap when it has received an SNMP protocol message that has not been properly authenticated. These traps are enabled by the General Traps configuration option.

- **Enterprise Specific traps** – Signify that the DSU/CSU has recognized an enterprise-specific event. See Table 5-6 for enterprise-specific traps. These traps are enabled by the Enterprise Specific Traps configuration option.

- **Link Traps** – Identify the condition of the communications interface, either linkDown (one of the communications interfaces has failed) or linkUp (one of the communications interfaces has just come up). These traps are enabled by the Link Traps configuration option. The communications interfaces for which these traps can be generated are specified by the Link Trap Interfaces configuration option. Table 5-7 defines traps for each interface.

Table 5-6.   Enterprise-Specific Trap Definitions

Trap Value	Event
enterpriseClockFail(1)	The currently configured primary clock source has failed.
enterpriseSelfTestFail(2)	A DSU/CSU hardware failure is detected at self-test. This trap is generated after DSU/CSU initialization.
enterpriseDeviceFail(3)	An internal DSU/CSU failure is detected by the operating software.
enterpriseTestStart(5)	A test is initiated.
enterpriseConfigChange(6)	A configuration option is changed.
enterpriseTestClear(105)	A test is concluded.

Table 5-7.   SNMP Trap per Interface

Interface	Trap Meaning
T1 Network	**Up** = No alarm or test conditions. **Down** = Alarm or test conditions.
DTE Drop/Insert (DSX-1)	**Up** = No alarm or test conditions, and the interface is enabled. **Down** = Alarm or test conditions, or the interface is disabled.
Synchronous Data Ports	**Up** = No test conditions, the port is assigned to a network interface, and both CTS and DSR are ON. **Down** = Test conditions, the port is unassigned, or either CTS or DSR is off.

Troubleshooting

The DSU/CSU is designed to provide you with trouble-free service. However, Table 5-8 gives you some direction if a problem occurs.

For problems other than those listed in the table, please contact your service representative.

Table 5-8.   Troubleshooting (1 of 2)

Symptom	Possible Cause	Solutions
No power	1. The power module is not securely attached. 2. The wall receptacle has no power.	1. Check the power module attachment. 2. Check the wall receptacle power by plugging in some equipment that is known to be working.
Power-On Self-Test fails	The DSU/CSU has detected an internal hardware failure.	Contact your service representative.
Message `LOS at Network` appears	1. Network cable problem. 2. No signal is being transmitted at the far end. 3. Facility problem.	1. Check that the network cable is securely attached at both ends. 2. Check the far-end status. 3. Contact your facility provider.
Message `LOS at DTE` appears	1. 1.DTE Drop/Insert (DSX-1) cable problem. 2. No signal being transmitted from the DTE.	1. Check that the DTE Drop/Insert (DSX-1) cable is securely attached at both ends. 2. Check the DTE status.
Message `OOF at Network` appears	1. Incompatible framing format between the network and the DSU/CSU. 2. Network cabling problem. 3. Facility problem.	1. Check that the framing format for the network interface is correct. 2. Check that the network cable is securely attached at both ends. 3. Contact your facility provider.

Table 5-8.   Troubleshooting (2 of 2)

| Symptom	Possible Cause	Solutions
Message `OOF at DTE` appears	1. Incompatible framing format between the Drop/Insert port on the customer premises equipment and the DSU/CSU. 2. DTE Drop/Insert (DSX-1) cabling problem.	1. Check that the framing format for the DTE Drop/Insert (DSX-1) interface is correct. 2. Check that the DTE Drop/Insert (DSX-1) cable is securely attached at both ends.
Message **Yellow at Network** appears	1. Network cable problem. 2. Far-end device has lost framing sync on the line. 3. Facility problem.	1. Check that your network cable is securely attached at both ends. 2. Check the status of the far-end device. 3. Contact your facility provider.
Message **Yellow at DTE** appears	DTE has detected an LOS or LOF condition.	1. Check the status of the DTE. 2. Check that the DTE Drop/Insert (DSX-1) cable is securely attached at both ends.
Message **AIS at Network** appears	1. Upstream device is transmitting an AIS. 2. The network is transmitting an AIS.	1. Check the status of the upstream device(s). 2. Contact your facility provider.
Message **AIS at DTE** appears	DTE is sending an AIS.	Check the DTE.
Message **EER at Network** appears	Facility problem.	Contact your facility provider.
BPV LED is ON	1. Incompatible line coding format between the DTE and the DSU/CSU. 2. DTE Drop/Insert (DSX-1) cable problem.	1. Check that the line coding format for the DTE Drop/Insert (DSX-1) interface is correct. 2. Check that the DTE cable is securely attached at both ends.
A failure message appears followed by an 8-digit code (*x x x x x x x x*)	Internal DSU/CSU problem.	Record the 8-digit code, then contact your service representative.

Test Jacks

Six test jacks (Figure 5-1) are located on the front panel. The DSU/CSU test jack functions are shown in Figure 5-2 and described in Table 5-9. The Selectable Test Jack branch of the asynchronous terminal menu tree (see Appendix A) allows you to select either Equipment (EQPT) or Network (NET) functionality for the Monitor test jack.
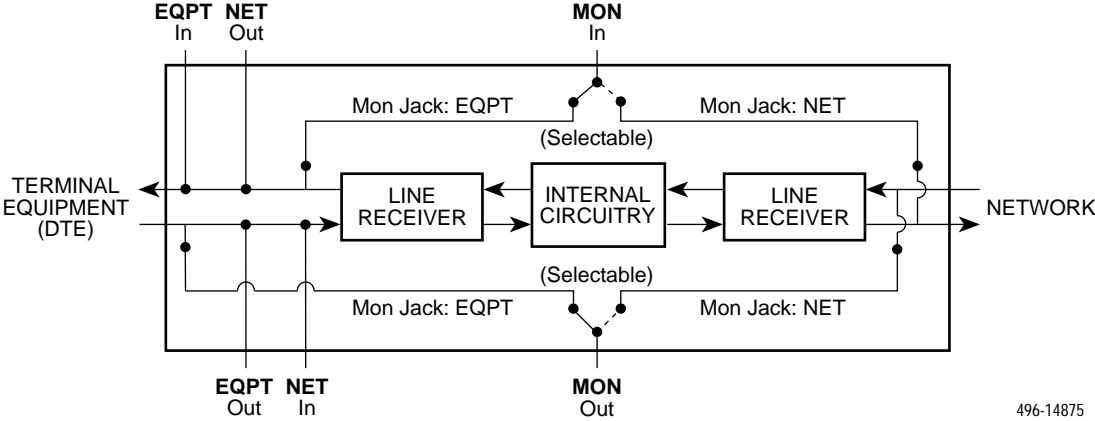
▶ **Procedure**

To select either Equipment or Network for the Monitor test jack:

1. From the Main Menu screen, select Control.

2. From the Control screen, select Select Monitor Jack.

3. Select either EQPT (Equipment) or NET (Network) depending on the type of Monitor test jack that you want to implement.
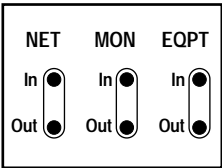
496-14808

Figure 5-1.   Test Jacks

496-14875

Figure 5-2.   Test Jack Block Diagram

Table 5-9.   Test Jack Functions

Test Jack Name	Function
NET In (Network In)	A break-in test jack that allows a signal to be inserted toward the network by external test equipment.
NET Out (Network Out)	A break-in test jack that interrupts the signal coming from the network and allows it to be terminated by the external test equipment.
EQPT In (Equipment In)	A break-in test jack that allows a signal to be inserted toward the terminal equipment (DTE) by external test equipment.
EQPT Out (Equipment Out)	A break-in test jack that interrupts the signal coming from the terminal equipment (DTE) and allows it to be terminated by the external test equipment.
MON In (Monitor In)	A monitor jack that is controlled by the Selectable Test Jack branch of the menu tree. If it is set to Equipment (the default), this jack monitors the signal going into the terminal equipment (DTE). If it is set to Network, this jack monitors the signal going into the network.
MON Out (Monitor Out)	A monitor jack that is controlled by the Selectable Test Jack branch of the menu tree. If it is set to Equipment (the default), this jack monitors the signal coming from the terminal equipment (DTE). If it is set to Network, this jack monitors the signal coming from the network.

Test Commands

The test commands enable you to run loopbacks and test patterns on the DSU/CSU, and to test the front panel LEDs. These tests can help you isolate areas of trouble if you are having problems with your DSU/CSU.

Use the Test branch of the asynchronous terminal menu tree (see Appendix A) to access all test commands.

Remote Loopback Tests

The Remote Loopback tests enable you to troubleshoot your circuit by sending the following to a far-end device:

For Networks

- Line loopback up activation sequence for 10 seconds (Line Loopback Up)

- Line loopback down activation sequence for 10 seconds (Line Loopback Down)

For Channels

- V.54 activation sequence to initiate a V.54 Loop 2 (V.54 Loopback Up)

- V.54 deactivation sequence to terminate a V.54 Loop 2 (V.54 Loopback Down)

- ANSI T1.403 (Annex B) activation sequence to initiate a DCLB on the remote device (FT1 Loopback Up)

- ANSI T1.403 (Annex B) deactivation sequence to terminate a DCLB on the remote device (FT1 Loopback Down)

You cannot perform remote loopbacks if any of the local loopbacks are active. If you attempt to do so, the error message `Invalid Test Combination` appears.

Sending a Line Loopback Up or Down

▶ **Procedure**

To send a Line Loopback Up or Down sequence on the network to a far-end DSU/CSU:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. In the Send Line Loopback field (under Remote Loopbacks), enter either **Up** or **Down** depending on the type of sequence that you want to send.

4. For the Send Line Loopback command, select Send.

Sending a V.54 or ANSI FT1 Activation/Deactivation Sequence

▶ **Procedure**

To send a V.54 or ANSI FT1 activation or deactivation loopback sequence to the far-end DSU/CSU:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Sync Data Port Tests.

3. In the Port field (near the top of the screen), enter either **1** or **2** depending on the synchronous data port that you want to test.

4. In the Send V.54 Loopback field or the Send FT1 Loopback field (under Remote Loopbacks), enter either **Up** or **Down** depending on the type of sequence that you want to send.

5. For the appropriate command (Send V.54 Loopback or Send FT1 Loopback), select Send.

Local Loopback Tests

The Local Loopback tests enable you to conduct circuit testing and fault isolation for the digital line. The supported local loopback tests are:

- Line Loopback (LLB)

- Payload Loopback (PLB)

- DTE Loopback (DLB)

- Repeater Loopback (RLB)

- Data Channel Loopback (DCLB)

- Data Terminal Loopback (DTLB)

NOTE:

DLB is not available when the DTE Drop/Insert (DSX-1) interface is disabled.

The Line Loopback test can be activated and deactivated in response to commands received over the network interface. The Network Initiated LLB configuration option controls whether the DSU/CSU responds to the commands transmitted on the network interface to initiate LLBs (see Appendix C, *Configuration Options*).

The Network Initiated DCLB configuration option controls whether the DSU/CSU responds to inband V.54 commands to initiate DCLB for that port (see Appendix C, *Configuration Options*).

Local loopback tests can be aborted (Abort Command) at any time.

No more than two local loopbacks can be active at any one time. An additional restriction prohibits certain loopbacks from running at the same time. Valid loopback combinations are identified by YES in Table 5-10.

Table 5-10. Valid Loopback Combinations

	LLB	PLB	DLB	RLB	DCLB	DTLB
LLB	N/A	NO	YES	YES	NO	YES
PLB	NO	N/A	YES	NO	NO	YES
DLB	YES	YES	N/A	NO	YES	YES
RLB	YES	NO	NO	N/A	NO	YES
DCLB	NO	NO	YES	NO	YES (on separate ports)	YES (on separate ports)
DTLB	YES	YES	YES	YES	YES (on separate ports)	YES (on separate ports)

Starting a Line Loopback

The Line Loopback command (LLB) loops the received signal on the network interface back to the network without change.

496-14319-02
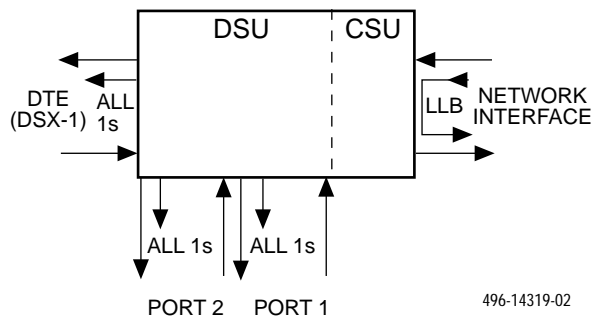
▶ **Procedure**

To perform a Line loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. For the Line Loopback command (under Local Loopbacks), select Start.

Starting a Payload Loopback

The Payload Loopback command (PLB) loops the received signal on the network interface back to the network. The signal is looped back as close to the DTE Drop/Insert (DSX-1) port as possible (after it has passed through the framing circuitry of the DSU/CSU). Framing CRCs and BPVs are corrected.
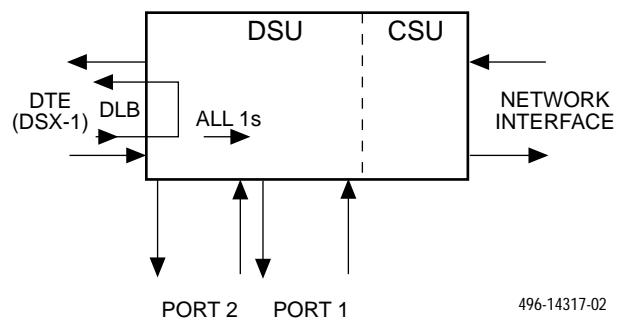

496-14316-02
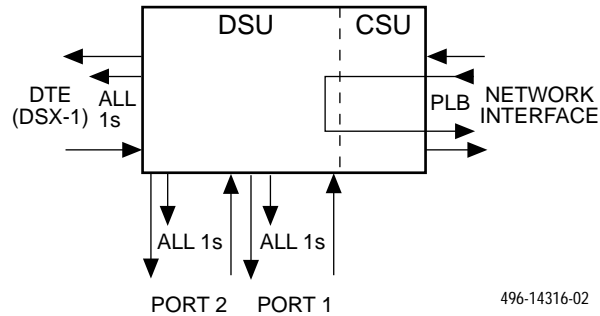
▶ **Procedure**

To perform a Payload loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. For the Payload Loopback command (under Local Loopbacks), select Start.

Starting a DTE Loopback

The DTE Loopback command (DLB) loops the received signal on the DTE Drop/Insert (DSX-1) port back to the DTE without change.
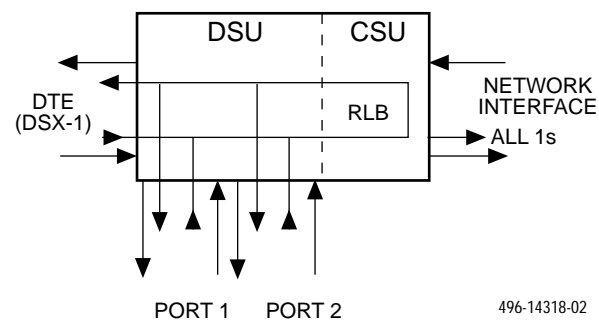

496-14317-02

▶ **Procedure**

To perform a DTE loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select DTE Tests.

3. For the DTE Loopback command (under Local Loopbacks), select Start.

Starting a Repeater Loopback

The Repeater Loopback command (RLB) loops the signal being sent to the network back to the DTE Drop/Insert (DSX-1) and data ports. The signal is looped back as close to the network interface as possible (after it has passed through the framing circuitry of the DSU/CSU). Framing CRCs and BPVs are corrected.
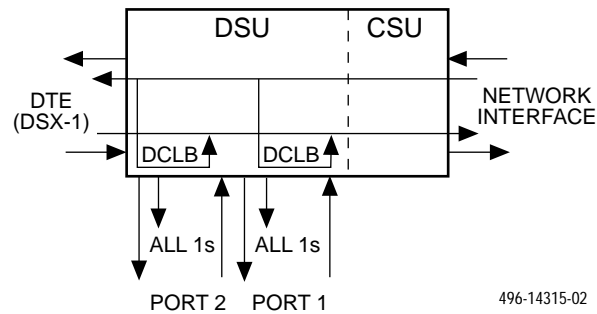

496-14318-02

▶ **Procedure**

To perform a Repeater loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. For the Repeater Loopback command (under Local Loopbacks), select Start.

Starting a Data Channel Loopback

The Data Channel Loopback command (DCLB) loops the data received from the network interface, for all DS0 channels allocated to the selected port, back to the network. The loopback occurs after the data passes through the port circuitry but before it is sent out the data port.
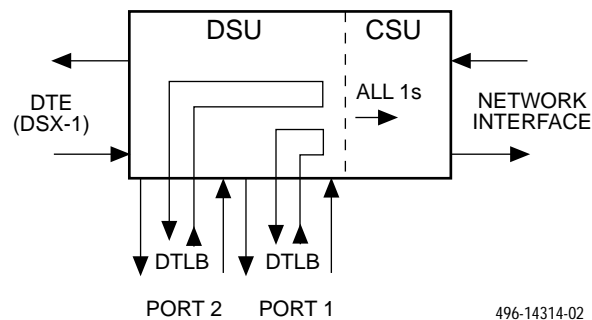

496-14315-02

▶ **Procedure**

To perform a Data Channel loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Sync Data Port Tests.

3. In the Port field (near the top of the screen), enter either **1** or **2** depending on the synchronous data port that you want to test.

4. For the Data Channel Loopback command (under Local Loopbacks), select Start.

Starting a Data Terminal Loopback

The Data Terminal Loopback command (DTLB) loops the data received from the selected port, for all DS0 channels allocated to the port, back out of the port. This loopback occurs after the data passes through the port circuitry but before it reaches the T1 framer.

496-14314-02

▶ **Procedure**

To perform a Data Terminal loopback:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Sync Data Port Tests.

3. In the Port field (near the top of the screen), enter either **1** or **2** depending on the synchronous data port that you want to test.

4. For the Data Terminal Loopback command (under Local Loopbacks), select Start.

Aborting Loopbacks

Use the Abort Tests command to stop all loopback tests or any selected loopback test currently active on the DSU/CSU.

▶ **Procedure**

To abort one or more loopback tests:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Abort Tests.

NOTE:

To verify the abort procedure, use the System and Test Status screen in the Status branch.

Test Patterns

Use test pattern commands to send, monitor, and abort test patterns. Available test patterns are:

- **QRSS** – A quasi-random signal source approximating live data that can be monitored for logic errors (on the network and the data ports).

- **1-in-8** – A test pattern consisting of a one (1) followed by seven zeros (on the network only).

- **511** – A pseudo-random bit sequence (PRBS) that is 511 bits long (on the data ports only). This is a PRBS 2^9–1 test.

Use a monitor command to monitor a QRSS test pattern over all the channels on the network interface, or to monitor QRSS or 511 test patterns on the channels allocated to an individual port. A monitor command provides the number of errors detected in the test pattern (5 digits, maximum 99999).

Only one test pattern can be active at a time on one port. Valid combinations are identified by YES in Table 5-11.

Table 5-11.   Valid Send Test Pattern Combinations

	QRSS (Network)	QRSS (Port)	1-in-8 (Network)	511 (Port)
QRSS (Network)	N/A	NO	NO	NO
QRSS (Port)	NO	YES (on separate ports)	N/A	YES (on separate ports)
1-in-8 (Network)	NO	NO	N/A	NO
511 (Port)	NO	N/A	N/A	YES (on separate ports)

Sending Network QRSS or Network 1-in-8 Test Patterns

▶ **Procedure**

To send a Network QRSS or Network 1-in-8 test pattern:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. In the Send field (under Pattern Tests), enter either **QRSS** or **1in8** depending on the type of test pattern that you want to send.

4. For the Send command (under Pattern Tests), select Start.

Sending Port QRSS or Port 511 Test Patterns

▶ **Procedure**

To send a Port QRSS or Port 511 test pattern:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Sync Data Port Tests.

3. In the Port field (near the top of the screen), enter either **1** or **2** depending on the synchronous data port that you want to test.

4. In the Send field (under Pattern Tests), enter either **QRSS** or **511** depending on the type of test pattern that you want to send.

5. For the Send command (under Pattern Tests), select Start.

Monitoring Network QRSS Test Patterns

▶ **Procedure**

To monitor a Network QRSS test pattern:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Network & DTE Tests.

3. For the Monitor QRSS command (under Pattern Tests), select Start.

Monitoring Port QRSS or Port 511 Test Patterns

▶ **Procedure**

To monitor a Port QRSS or Port 511 test pattern:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Sync Data Port Tests.

3. In the Port field (near the top of the screen), enter either **1** or **2** depending on the synchronous data port that you want to test.

4. In the Monitor field (under Pattern Tests), enter either **QRSS** or **511** depending on the type of test pattern that you want to monitor.

5. For the Monitor command (under Pattern Tests), select Start.

Aborting Test Patterns

Use the Abort Tests command to stop all test patterns or any selected test pattern active on the DSU/CSU.

▶ **Procedure**

To abort test patterns:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Abort Tests.

Lamp Test

Use the Lamp Test command to start or stop a test of the DSU/CSU front panel LEDs.

Starting a Lamp Test

▶ **Procedure**

To start a Lamp test:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Device Tests.

3. For the Lamp Test command, select Start.

Aborting a Lamp Test

▶ **Procedure**

To abort the Lamp test:

1. From the Main Menu screen, select Test.

2. From the Test screen, select Device Tests.

3. For the Lamp Test command, select Stop.

Displaying DSU/CSU Test Status

Use the System and Test Status screen to display the active tests for the DSU/CSU. Table 5-12 lists these messages.

▶ **Procedure**

To display test status:

1. From the Main Menu screen, select Status.

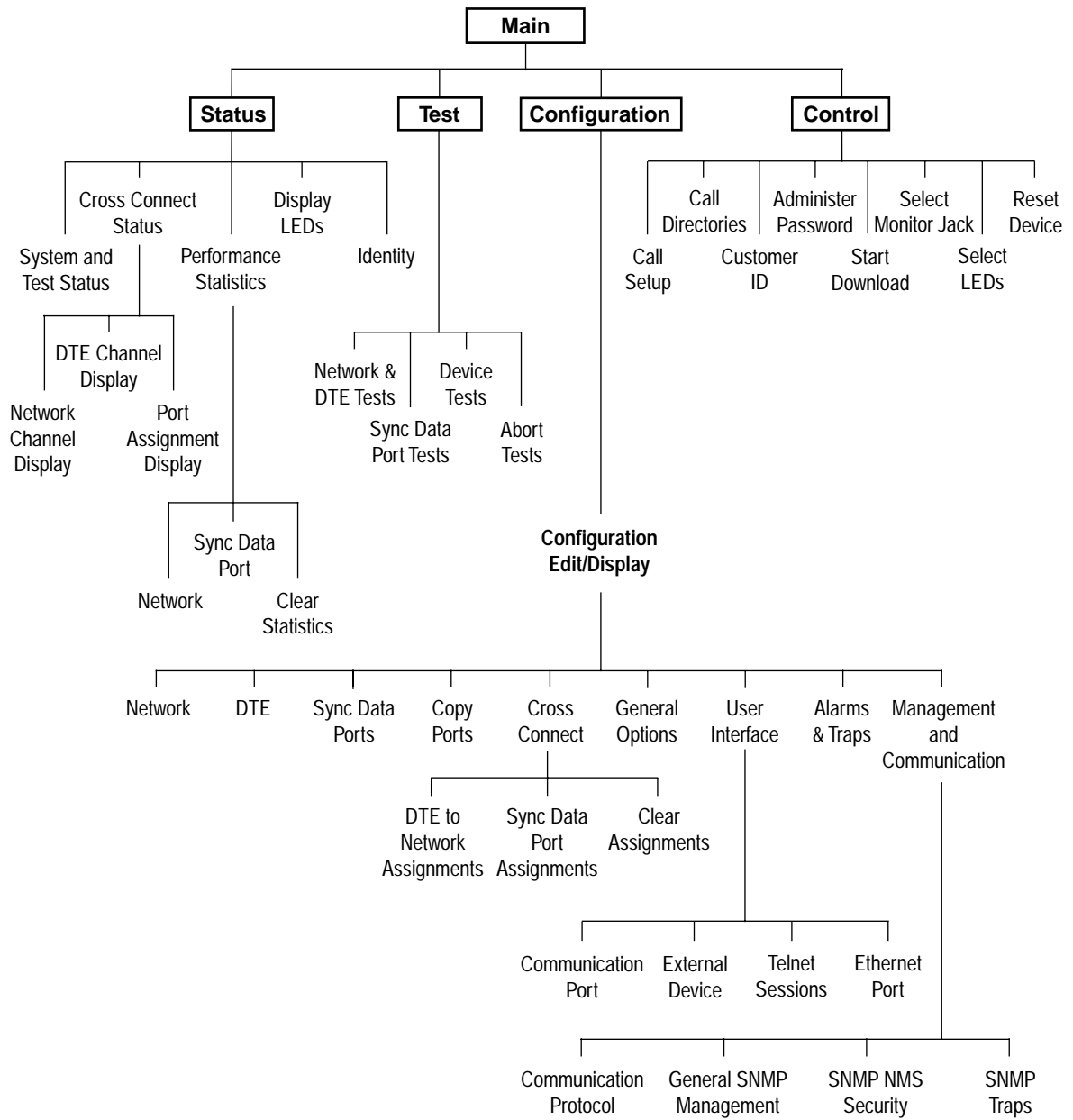2. From the Status screen, select System and Test Status.

Table 5-12.   Test Status Messages

Message	Description
No Test Active	No tests are currently active.
LLB Test Active	The network interface is in Line loopback.
PLB Test Active	The network interface is in Payload loopback.
DLB Test Active	The DTE Drop/Insert (DSX-1) port is in DTE loopback.
RLB Test Active	The DTE Drop/Insert (DSX-1) port is in Repeater loopback.
DCLB Test Active, Port *n*	Port *n* is in a Data Channel loopback.
DTLB Test Active, Port *n*	Port *n* is in a Data Terminal loopback.
QRSS Test Active, Network	A QRSS test pattern is being sent on the network interface.
1–8 Test Active, Network	A 1-in-8 test pattern is being sent on the network interface.
Mon QRSS Test Active, Network	A QRSS test pattern is being monitored on the network interface.
QRSS Test Active, Port *n*	A QRSS test pattern is being sent to the network on the channels allocated to port *n*.
511 Test Active, Port *n*	A 511 test pattern is being sent to the network on the channels allocated to port *n*.
Mon QRSS Test Active, Port *n*	A QRSS test pattern is being monitored on the channels allocated to port *n*.
Mon 511 Test Active, Port *n*	A 511 test pattern is being monitored on the channels allocated to port *n*.
DLB Test, External Contact	The DTE Drop/Insert (DSX-1) port is being held in DTE loopback by the external contact.
Lamp Test Active	The Lamp test is currently active.

Asynchronous Terminal Menu

A

The menu tree on the next page shows the structure and relationship of the user interface screens.

Main

- **Status**
  - Cross Connect Status
    - System and Test Status
    - Performance Statistics
      - DTE Channel Display
        - Network Channel Display
        - Port Assignment Display
      - Sync Data Port
        - Network
        - Clear Statistics
  - Display LEDs
    - Identity
- **Test**
  - Network & DTE Tests
    - Sync Data Port Tests
  - Device Tests
    - Abort Tests
- **Configuration**
  - **Configuration Edit/Display**
    - Network
    - DTE
    - Sync Data Ports
    - Copy Ports
    - Cross Connect
      - DTE to Network Assignments
      - Sync Data Port Assignments
      - Clear Assignments
    - General Options
    - User Interface
      - Communication Port
      - External Device
      - Telnet Sessions
      - Ethernet Port
    - Alarms & Traps
    - Management and Communication
      - Communication Protocol
      - General SNMP Management
      - SNMP NMS Security
      - SNMP Traps
- **Control**
  - Call Directories
    - Call Setup
  - Administer Password
    - Customer ID
  - Select Monitor Jack
    - Start Download
  - Reset Device
    - Select LEDs

00-16827

Technical Specifications

B

Overview

The technical specifications for the standalone DSU/CSUs are listed in Table B-1.

Table B-1.   Model 3162 DSU/CSU Technical Specifications (1 of 2)

Specifications	Criteria
POWER REQUIREMENTS	
AC Power Module	Refer to the labeling on the AC power module for input requirements
POWER CONSUMPTION AND DISSIPATION	16.0 watts, 55.0 Btu per hour at 115 volts (AC power)
DTE DROP/INSERT (DSX-1) INTERFACE	
Physical Interface Framing Format Coding Format DTE Line Equalization Send AIS	DB15 socket D4, ESF AMI, B8ZS 5 selectable ranges from 0 to 655 feet (0 to 196.5 meters) Selectable
NETWORK T1 INTERFACE	
Physical Interface (USA) Physical Interface (Canada) Framing Format Coding Format Line Build-Out (LBO) ANSI PRM Bit Stuffing Yellow Alarm Generation	RJ48C CA81A using adapter cable D4, ESF AMI, B8ZS 0.0 dB, −7.5 dB, −15 dB, −22.5 dB Selectable AT&T TR 62411 Selectable
LOOPBACKS	
Standard Additional	AT&T TR 54016, AT&T TR 62411, ANSI T1.403.1989 RLB (Repeater Loopback), DLB (DTE Loopback), V.54 Loop 2 and Loop 3, ANSI T1.403 Annex B Fractional T1 Loopback

Table B-1.   Model 3162 DSU/CSU Technical Specifications (2 of 2)

Specifications	Criteria
PORT INTERFACE Standards Rates	 EIA 530-A, V.35, RS-449, X.21 Nx64 – 64K-1.536 Mb Nx56 – 56K-1.344 Mb
APPROVALS	Refer to the product labeling
CLOCKING SOURCES	T1 network interface, Port 1, internal clock, DTE Drop/Insert (DSX-1) interface or external clock
PHYSICAL DIMENSIONS Height Width Depth	 2.13 inches (5.4 cm) 7.63 inches (19.4 cm) 12.13 inches (30.8 cm)
WEIGHT	2.4 pounds (1.1 kg)
ENVIRONMENT Operating Temperature Storage Temperature Relative Humidity Shock and Vibration	 32°F to 122°F (0°C to 50°C) −4°F to 158°F (−20°C to 70°C) 5%—95% (noncondensing) Withstands normal shipping and handling

Configuration Options

C

Overview

The DSU/CSU configuration option tables contain a list of all configuration options and their available selections. In the tables, **the top line of each configuration option entry indicates the factory default setting.**

The configuration options are arranged into functional groups:

- Network Interface Configuration Options (Table C-1)

- DTE Interface Configuration Options (Table C-2)

- Sync Data Port Configuration Options (Table C-3)

- Cross Connect Configuration Options

    — DTE-to-Network Assignment Options (Table C-4)

    — Sync Data Port Assignment Options (Table C-5)

- General Configuration Options (Table C-6)

- User Interface Configuration Options

    — Communication Port Configuration Options (Table C-7)

    — External Device Configuration Options (Table C-8)

    — Telnet Sessions Configuration Options (Table C-9)

    — Ethernet Port Configuration Options (Table C-10)

- Alarm and Trap Configuration Options (Table C-11)

- Management and Communication Configuration Options

    — Communication Protocol Configuration Options (Table C-12)

    — General SNMP Management Configuration Options (Table C-13)

    — SNMP NMS Security Configuration Options (Table C-14)

    — SNMP Traps Configuration Options (Table C-15)

Network Interface Configuration Options

Table C-1. Network Interface Configuration Options (1 of 2)

Line Framing Format: ESF (Factory 1) D4 (Factory 2) **D4 ESF**
The framing format to be used on the network interface.
D4 – Configures for the D4 framing format.
ESF – Configures for the Extended Superframe format.
Line Coding Format: B8ZS (Factory 1) AMI (Factory 2) **AMI B8ZS**
The line coding format to be used on the network interface.
AMI – Configures for the Alternate Mark Inversion coding format.
B8ZS – Configures for the Bipolar 8 Zero Suppression coding format.
Bit Stuffing: 62411 **62411 Disable**
Determines when bit stuffing is performed to meet the ones density requirements for data transmission on the network.
62411 – Specifies that a one be inserted in the data stream after 15 consecutive zeros or when the density of ones falls below 12.5% (complies with AT&T TR 62411).
Disable – Disables bit stuffing so that ones density is not enforced.
NOTES: – To comply with Canadian DOC CS-03 regulations, equipment installed in Canada must be configured to select 62411. – This configuration option is only available if the network interface line coding format is set to AMI.
Line Build Out (LBO): 0.0 **0.0 −7.5 −15 −22.5**
The line build out (LBO), in decibels, for the signal transmitted to the network.
Management Link: Disable **Enable Disable**
Specifies whether Facility Data Link (FDL) is enabled. Selecting Enable allows SNMP or Telnet traffic to flow over the 4 kbps data link provided by FDL. Running SNMP or Telnet over FDL requires an end-to-end FDL connection and cannot be terminated within the network.
Enable – Enables the FDL management link for SNMP or Telnet.
Disable – Disables the FDL management link.
NOTES: – This configuration option is only available if the framing format is set to ESF. – This configuration option is not available if EDL is enabled. – If the local DSU/CSU's FDL is enabled, the remote DSU/CSU's FDL must also be enabled.

Table C-1. Network Interface Configuration Options (2 of 2)

ANSI Performance Report Messages: Disable **Enable   Disable**
Specifies whether ANSI T1.403 compliant performance report messages (PRMs) are generated. **Enable** – Generates and sends ANSI PRMs over the FDL every second. **Disable** – Prevents the DSU/CSU from generating ANSI PRMs.   NOTE: This configuration option is only available if the framing format is set to ESF.
Network Initiated LLB: Enable **Enable   Disable**
Allows initiation and termination of the LLB to be controlled by the receipt of LLB-Actuate and LLB-Release commands from the network (or remote DSU/CSU). **Enable** – Causes the DSU/CSU to enter an LLB (if the DSU/CSU can perform an LLB in its current state) and to cause an LLB-Release command to terminate the LLB. **Disable** – Causes the DSU/CSU to ignore LLB-Actuate and LLB-Release commands (the DSU/CSU is not in compliance with ANSI T1.403 and AT&T TR 62411).   NOTE: If this configuration option is enabled, the DSU/CSU recognizes the in-band LLB-Actuate and LLB-Release codes specified by AT&T as well as the bit-oriented FDL messages specified by ANSI (for ESF only).
Network Initiated PLB: Enable **Enable   Disable**

Allows initiation and termination of the PLB to be controlled by the receipt of PLB-Actuate and PLB-Release commands from the network (or remote DSU/CSU).
 	
Enable – Causes the DSU/CSU to enter a PLB (if the DSU/CSU can perform a PLB in its current state) and to cause a PLB-Release command to terminate the PLB.
 	
Disable – Causes the DSU/CSU to ignore PLB-Actuate and PLB-Release commands (the DSU/CSU is not in compliance with ANSI T1.403 and AT&T TR 54016).
 	
  NOTES: – If this configuration option is enabled, the DSU/CSU recognizes the in-band PLB-Actuate and PLB-Release codes specified by AT&T as well as the bit-oriented FDL messages specified by ANSI.
 	
  – This configuration option is only available if the network interface framing is set to ESF.

Circuit Identifier: *Text Field* ***Text Field*   Clear**
Specifies the transmission vendor's circuit identifier for the purpose of facilitating troubleshooting. The network circuit identifier is an ASCII text string that may be up to 255 characters in length. *Text Field* – Allows you to edit or display the network circuit identifier. **Clear** – Allows you to clear the network circuit identifier. The network circuit identifier is set to a null string.

DTE Interface Configuration Options

Table C-2. DTE Interface Configuration Options (1 of 2)

Interface Status: Enable **Enable   Disable**
Enables the use of the DTE Drop/Insert (DSX-1) port. **Enable** – Allows the use of the DTE Drop/Insert (DSX-1) interface. **Disable** – Prohibits the use of the DTE Drop/Insert (DSX-1) interface.   NOTE: When this configuration option is disabled, you cannot display or configure any other DTE Interface configuration options. If the clock source configuration option is set to DTE, it is changed to NET.
Line Framing Format: ESF (Factory 1)   D4 (Factory 2) **D4   ESF**
Designates the framing format for the DTE Drop/Insert (DSX-1) interface. **D4** – Configures for the D4 framing format. **ESF** – Configures for the Extended Superframe framing format.
Line Coding Format: B8ZS (Factory 1)   AMI (Factory 2) **AMI   B8ZS**
Designates the line coding format to be used on the DTE Drop/Insert (DSX-1) interface. **AMI** – Uses the Alternate Mark Inversion coding format. **B8ZS** – Uses the Bipolar 8 Zero Suppression coding format.
Line Equalization: 0—133 **0—133   133—266   266—399   399—533   533—655**
Specifies the DTE line equalization compensation parameters that permit a standard DTE Drop/Insert (DSX-1) signal to be delivered over a distance of up to 655 feet.
DTE LB on External Contact: Disable **Next   Enable   Disable**
Allows the control of a DTE Loopback (DLB) by an external contact on the DTE Drop/Insert (DSX-1) interface. **Enable** – Allows the DSU/CSU to begin a DLB when the external contact is closed. The DSU/CSU remains in DLB as long as the contact remains closed. **Disable** – Prevents the state of the external contact from affecting the operation of DLB.
Send All Ones on DTE Failure: Enable **Enable   Disable**
Specifies the action to take on the signal transmitted to the network when a valid signal cannot be recovered from the DTE Drop/Insert (DSX-1) interface (due to an LOS, OOF, or AIS condition). **Enable** – Sends all ones on the DS0 channels allocated to the network interface when an LOS, AIS, or OOF condition occurs on the DTE Drop/Insert (DSX-1) interface. **Disable** – Passes the data unchanged to the network interface channels.

Table C-2.   DTE Interface Configuration Options (2 of 2)

DTE Signaling												
D01	D02	D03	D04	D05	D06	D07	D08	D09	D10	D11	D12	D24
RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS	RBS

Specifies which DS0 channels from the DTE Drop/Insert (DSX-1) interface are voice channels and should pass Robbed Bit Signaling information to the network interface.

Line 1 displays the 24 channels for the DTE Drop/Insert (DSX-1) interface. Line 2 displays whether the DS0 channel indicated in Line 1 is a voice or data channel. Possible values for Line 2 are:

Value   Meaning

RBS   This DS0 channel is a voice channel carrying RBS information. When this DS0 channel is assigned to a network DS0 channel, RBS information is preserved across the connection.

None   This DS0 channel is a data channel that does not contain RBS information. Signaling is not preserved across the connection.

Sync Data Port Configuration Options

Table C-3.   Sync Data Port Configuration Options (1 of 5)

Port Type: E530 (Factory 1)   V.35 (Factory 2) **E530   V.35   RS449   X.21**
Allows selection of the data port interface type. **E530** – Configures the port as an EIA-530-A compatible interface. EIA-530-A DTEs can be directly connected to a port connector on the back of the DSU/CSU. **V.35** – Configures the port as a V.35 compatible interface. V.35 DTEs can be connected to a port connector using an EIA-530A-to-V.35 adapter cable. **RS449** – Configures the port as an RS-449 compatible interface. RS-449 DTEs can be connected to a port connector using an EIA-530-A-to-RS-449 adapter cable. **X.21** – Configures the port as an X.21 compatible interface. X.21 DTEs can be connected to a port connector using an EIA-530-A-to-X.21 adapter cable. NOTE: If this configuration option is set to X.21, set the Send All Ones configuration option to RTS or Disable.
Port Base Rate: Nx64 **Nx64   Nx56**
Allows selection of the base rate for the data port. The data rate for the port is a multiple (from 1 to 24) of the base rate specified with this configuration option. **Nx64** – Sets the base rate for this port to 64 kbps. The data rate is $Nx64$ kbps, where N is a number from 1 to 24. **Nx56** – Sets the base rate for this port to 56 kbps. The data rate is $Nx56$ kbps, where N is a number from 1 to 24.
Transmit Clock Source: Internal **Internal   External**
Specifies whether the transmitted data for the port is clocked using an internal clock provided by the DSU/CSU (synchronized to the clock source specified by the clock source configuration option) or an external clock provided by the DTE connected to the port. If an external clock is used, it must be synchronized to the same clock source as the DSU/CSU. **Internal** – Indicates the clock is provided internally by the DSU/CSU on the TXC interchange circuit DB (CCITT 114). **External** – Indicates the clock is provided externally by the DTE on the XTXC interchange circuit DA (CCITT 113). Use this selection if the clock source is set to this data port.

Table C-3.   Sync Data Port Configuration Options (2 of 5)

Embedded Data Link: Disable
Enable   Disable

Specifies whether Embedded Data Link (EDL) is enabled for a particular port. If EDL is enabled, then 8 kbps of the total bandwidth allocated for this port is not available to the synchronous data port. For example, if the port rate is 256 kbps (4 DS0 channels allocated) and EDL is enabled, then only 248 kbps is available to the port. EDL provides the following: detection of frame synchronization, CRC of the data stream (excluding the 8 kbps EDL), and an in-band data link (4 kbps) between the local and remote units. The 4 kbps in-band data link can be used for performance report messages and as an IP link for SNMP or Telnet sessions.

Enable – Indicates the port's EDL is enabled.

Disable – Indicates the port's EDL is disabled.

> NOTES: – If the local DSU/CSU's EDL is enabled, then the remote DSU/CSU's EDL must also be enabled.
>
> – EDL is not recommended for networks in which data is examined for routing purposes (e.g., frame relay, x.25).

EDL Management Link: Disable
Enable   Disable

Specifies whether the EDL management link is enabled for a particular port. Selecting Enable allows SNMP or Telnet traffic to flow over the 4 kbps in-band data link provided by EDL.

Enable – Enables the port's EDL management link.

Disable – Disables the port's EDL management link.

> NOTES: – This configuration option is not available if EDL is disabled or FDL is enabled.
>
> – If the local DSU/CSU's EDL is enabled, then the remote device's EDL must also be enabled.

Invert Transmit Clock: Disable
Enable   Disable

Specifies whether the clock supplied by the DSU/CSU on the TXC interchange circuit DB (CCITT 114) is phase inverted with respect to the Transmitted Data interchange circuit BA (CCITT 103). This configuration option is useful when long cable lengths between the DSU/CSU and the DTE are causing data errors.

Enable – Indicates TXC supplied by the DSU/CSU on this port is phase inverted.

Disable – Indicates TXC supplied by the DSU/CSU on this port is not phase inverted.

Invert Transmit and Received Data: Disable
Enable   Disable

Specifies whether the port's transmitted data and received data are logically inverted before being transmitted or received. This configuration option is useful for applications where HDLC data is being transported. Inverting the data ensures that the density requirements for the network interface are met.

Enable – Indicates the transmitted data and received data for this port are inverted.

Disable – Indicates the transmitted data and received data for this port are not inverted.

Table C-3. Sync Data Port Configuration Options (3 of 5)

Send All Ones on Data Port Not Ready: Both **Disable   DTR   RTS   Both**
Specifies the conditions on the data port that determine when valid data is not being sent from the DTE. When this condition is detected, all ones are sent to the network on the DS0 channels allocated to the port. **Disable** – Disables the monitoring of interchange circuits from the DTE connected to this port. **DTR** – Monitors the DTE Ready interchange circuit CD (CCITT 108/1/2). When DTR is interrupted, all ones are sent to the network. **RTS** – Monitors the Request-to-Send interchange circuit CA (CCITT 105). When RTS is interrupted, all ones are sent to the network. **Both** – Monitors both DTR and RTS. If either is interrupted, all ones are sent to the network.   NOTE: If the Port Type configuration option is set to X.21, set this configuration option to RTS or Disable.
Action on Network Yellow Alarm: Halt **None   Halt**
Specifies the action taken on this port when a Yellow Alarm is received on the network interface. **None** – Makes the data port unaffected by Yellow Alarms received on the network interface. **Halt** – Stops the transmission of data on the port and disables the data port when Yellow Alarms are received on the network interface. When Yellow Alarms are received, all ones are sent on the Received Data interchange circuit BB (CCITT 104). The Clear-to-Send interchange circuit CB (CCITT 106) is interrupted.
Network Init. Data Channel Loopback: Disable (Factory 1)   Both (Factory 2) **Disable   V.54   FT1   Both**
Allows the initiation and termination of a Data Channel Loopback (V.54 loop 2) by the receipt of a V.54 DCLB-actuate sequence or DCLB-release sequence from the network or far-end device. The sequences may be either V.54 or FT1 (ANSI) compliant sequences. **Disable** – Ignores the DCLB-actuate and DCLB-release sequences for this port. **V.54** – Enables DCLB-actuate and DCLB-release sequences that comply with the V.54 standard for "Inter-DCE signaling for point to point circuits." **FT1** – Enables DCLB-actuate and DCLB-release sequences that comply with the ANSI T1.403, Annex B standard for "In-band signaling for fractional-T1 (FT1) channel loopbacks." **Both** – Enables DCLB-actuate and DCLB-release sequences that comply with either the ANSI or V.54 standard. The type of actuate and release sequences do not have to match.

Table C-3.   Sync Data Port Configuration Options (4 of 5)

Port (DTE) Initiated Loopbacks: Disable (Factory 1)   Both (Factory 2) **Disable   DTLB   DCLB   Both**
Allows the initiation and termination of a local Data Terminal Loopback (DTLB) or remote Data Channel Loopback (DCLB) by the DTE connected to this port. (DTLB is equivalent to a V.54 loop 3, and DCLB is equivalent to a V.54 loop 2.) Control of these loopbacks is through the DTE interchange circuits as specified by the V.54 standard. **Disable** – Disables control of local DTLBs and remote DCLBs by the DTE connected to this port. **DTLB** – Gives control of the local DTLBs for this port to the DTE attached to this port. This loopback is controlled by the Local Loopback interchange circuit LL (CCITT 141). **DCLB** – Gives control of the remote DCLBs for the far-end port connected to this port to the DTE attached to this port. This loopback is controlled by the Remote Loopback interchange circuit RL (CCITT 140). The far-end equipment must support in-band V.54 loopbacks. **Both** – Gives control of local DTLBs and remote DCLBs to the DTE connected to this port.
Near-End Performance Statistics: Disable **Disable   Maintain   Send   Both**
Specifies whether the DSU/CSU maintains near-end performance statistics and sends performance report messages (PRMs) for a particular port. **Disable** – Disables near-end performance statistics and does not send PRMs. **Maintain** – Maintains near-end performance statistics for this port. **Send** – Sends PRMs over the port's EDL every second. Each PRM contains the performance statistics for the previous 4 seconds. **Both** – Maintains near-end performance statistics and sends PRMs over the port's EDL. NOTES: – This configuration option is not available if EDL is disabled. – If the local DSU/CSU is configured to send near-end performance statistics, then the remote device must be configured to maintain far-end performance statistics.
Far-End Performance Statistics: Disable **Disable   Maintain**
Specifies whether to monitor for far-end performance report messages (PRMs) and maintain far-end performance registers for a particular port. **Disable** – Disables far-end performance statistics. **Maintain** – Monitors the port's EDL for PRMs and maintains far-end performance statistics. NOTES: – This configuration option is not available if EDL is disabled. – If the local DSU/CSU is configured to maintain far-end performance statistics, then the remote device must be configured to send near-end performance statistics.

Table C-3.   Sync Data Port Configuration Options (5 of 5)

Excessive Error Rate Threshold: 10E-4 **10E-4   10E-5   10E-6   10E-7   10E-8   10E-9**
Sets the error rate threshold that determines when an Excessive Error Rate (EER) condition is declared for a particular port. The error rate selected by this configuration option is determined by the ratio of the number of CRC5 errors to the total number of bits received over a set period of time. **10E-4** – 10E-4 Threshold. For example, at 1536 kbps, EER is declared if more than 1,535 CRC5 errors are detected in a 10-second period. It is cleared with less than 1,536 errors in ten seconds. **10E-5** – 10E-5 Threshold. For example, at 1536 kbps, EER is declared if more than 921 CRC5 errors are detected in a 60-second period. It is cleared with less than 922 errors in sixty seconds. **10E-6** – 10E-6 Threshold. For example, at 1536 kbps, EER is declared if more than 92 CRC5 errors are detected in a 60-second period. It is cleared with less than 93 errors in sixty seconds. **10E-7** – 10E-7 Threshold. For example, at 1536 kbps, EER is declared if more than 9 CRC5 errors are detected in a 60-second period. It is cleared with less than 10 errors in sixty seconds. **10E-8** – 10E-8 Threshold. For example, at 1536 kbps, EER is declared if more than 41 CRC5 errors are detected in three 15-minute intervals. It is cleared with less than 42 errors in three 15-minute intervals. **10E-9** – 10E-9 Threshold. For example, at 1536 kbps, EER is declared if more than 4 CRC5 errors are detected in three 15-minute intervals. It is cleared with less than 5 errors in three 15-minute intervals.   NOTE: This configuration option is not available if EDL is disabled.

Cross Connect Configuration Options

The Cross Connect configuration options are divided into two tables as follows:

- DTE-to-Network Assignment Options (Table C-4)
- Sync Data Port Assignment Options (Table C-5)

DTE-to-Network Assignment Options

Table C-4. DTE-to-Network Assignment Options

DTE to Network Assignments
N01   N02   N03   N04   N05   N06   N07   N08   N24 DTE01   DTE02   DTE03   DTE04   DTE05   DTE06   DTE07   DTE08   DTE24
Assigns DS0 channels from the DTE Drop/Insert (DSX-1) interface to the network interface.

Line 1 displays the 24 channels for the network interface. Line 2 displays what is allocated to the DS0 channel indicated in Line 1. Possible values for Line 2 are:

Value	Meaning
Available	This DS0 channel is not allocated. You can modify this value on this screen.
Assigned	This DS0 channel is allocated to a synchronous data port. You cannot modify this value on this screen.
DTE*nn*	This DS0 channel is allocated to the DTE Drop/Insert (DSX-1) interface DS0 channel *nn*, where *nn* is a number from 01 to 24. You can modify this value on this screen.

Sync Data Port Assignment Options

Table C-5.   Sync Data Port Assignment Options (1 of 3)

Sync Data Port Assignments
Assign To: Network Network   DTE   Port
Allows you to assign a synchronous data port to DS0 channels on either the network interface, the DTE Drop/Insert (DSX-1) interface, or another port.
Network – Assigns this port to DS0 channels on the network interface.
DTE – Assigns this port to DS0 channels on the DTE Drop/Insert (DSX-1) interface. If the DTE Drop/Insert (DSX-1) interface is disabled, this selection does not appear.
Port – Assigns this port to another port. Use this feature to designate a port as a backup port. You can attach an external backup device to a backup port and manually assign the selected port to the backup port (i.e., route data from the selected port to the backup port). When a port is assigned to another port, DSR is turned on. EDL does not operate when a synchronous data port is assigned to another synchronous data port. Therefore, if EDL is enabled, it is ignored.
NOTE: Changing this configuration option from one T1 interface to the other (Network or DTE) deallocates all DS0 channels assigned to the previous interface.
Sync Data Port Assignments
Assign By: Block Block   ACAMI   Channel
If you select NET or DTE using the Assign To configuration option, this configuration option designates the method for assigning DS0 channels to the destination T1 interface.
Block – Allocates DS0 channels to this port by the block method.
ACAMI – Allocates DS0 channels to this port by the Alternate Channel Alternate Mark Inversion method. The difference between block and ACAMI is that the number of channels allocated with ACAMI is double the number needed for the port rate. With ACAMI, every alternate DS0 channel does not carry data from the port but always transmits and receives all ones.
Channel – Allocates DS0 channels to this port by the individual channel method.
NOTE: Changing this configuration option from one method to another (Block, ACAMI, or Channel) deallocates all DS0 channels assigned to either the network interface or the DTE Drop/Insert (DSX-1) interface.

Table C-5.   Sync Data Port Assignment Options (2 of 3)

Sync Data Port Assignments
Port Data Rate: 384 64   128   192   256   320   384   448   512   576   640   704   768   832 896   960   1024   1088   1152   1216   1280   1344   1408   1472   1536 *OR* 56   112   168   224   280   336   392   448   504   560   616   672   728 784   840   896   952   1008   1064   1120   1176   1232   1288   1344   **Prev**

Designates the data rate for the port. Available selections depend on the current base rate configured for the port. The factory default for Nx64 is 384 kbps, and Nx56 is 336 kbps.
 	
   NOTES: – This selection is not available if the individual channel allocation method (Channel) is selected using the Assign By field.
 	
          – Changing this selection from one rate to another deallocates all DS0 channels assigned to either the network interface or the DTE Drop/Insert (DSX-1) interface.
 	
          – When you enable EDL, 8 kbps of the total bandwidth allocated for this port is not available to the synchronous data port. For example, if you select 256 kbps and EDL is enabled, only 248 kbps are available.
 	
          – When you enable EDL on a synchronous data port and the clock source is set to that synchronous data port, the external device must provide a clock of 8 kbps less than the expected data port rate. For example, if you select 64 kbps, the external clock source must supply a 56 kbps clock signal.

Sync Data Port Assignments
Assign To: Port **Port*n*:   P*n***
Allows you to assign this port to another port. Possible values are: **<u>Value</u>   <u>Meaning</u>** Available   This DS0 channel is not allocated. You can modify this value on this screen. Assigned   This DS0 channel is allocated to the network interface or the DTE Drop/Insert (DSX-1) interface. You cannot modify this value on this screen. P*n*   This DS0 channel is allocated to Port *n*, where *n* is 1 or 2. You can modify this value on this screen.

Table C-5.   Sync Data Port Assignment Options (3 of 3)

Sync Data Port Assignments

N01	N02	N03	N04	N05	N06	N07	N08	N24
P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*

  OR

D01	D02	D03	D04	D05	D06	D07	D08	D24
P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*	P*n*

Designates the DS0 channel to allocate to this port, N01–N24 for the network interface and D01–D24 for the DTE Drop/Insert (DSX-1) interface.

Line 1 displays the 24 channels for the network interface or the DTE Drop/Insert (DSX-1) interface. Line 2 displays what is allocated to the DS0 channel indicated in Line 1. Possible values are:

<u>Value</u>	<u>Meaning</u>
N*nn*	This DS0 channel is allocated to the network interface DS0 channel *n*, where *n* is a number from 1 to 24. You cannot modify this value on this screen.
D*nn*	This DS0 channel is allocated to the DTE Drop/Insert (DSX-1) interface DS0 channel *n*, where *n* is a number from 1 to 24. You can modify this value on this screen.
P*n*	This DS0 channel is allocated to port *n,* where *n* is 1 or 2. You can modify this value on this screen for this port only.

General Configuration Options

Table C-6.   General Configuration Options (1 of 2)

Generate Yellow Alarm Signals: Enable **Enable   Disable**

Determines whether the DSU/CSU generates Yellow Alarm signals on the network and DTE Drop/Insert (DSX-1) interfaces.
 	
   NOTE: This configuration option is not available if the DTE Drop/Insert (DSX-1) Interface is disabled. If the DTE Drop/Insert (DSX-1) interface is disabled, the DSU/CSU always generates the Yellow Alarm signal on the network interface.
 	
Enable – Generates the Yellow Alarm signal for both the network and DTE Drop/Insert (DSX-1) interfaces.
 	
Disable – Disables the Yellow Alarm signal. When this configuration option is disabled, Yellow Alarm conditions on the network interface cause an AIS signal to be transmitted on the DTE Drop/Insert (DSX-1) interface.
 	
   NOTE: When this configuration option is disabled, the DTE equipment connected to the DTE Drop/Insert (DSX-1) interface is responsible for generation of the Yellow Alarm signal on the network interface. In this case, the interface port marked DTE must only be connected to an FCC Part 68 Registered (for USA) and Canadian DOC Certified (for Canada) Digital Service Unit or System, such as PBX, with a DTE Drop/Insert (DSX-1) interface. Failure to do so is a violation of FCC Rules or DOC Regulations.

Self Test: Enable **Enable   Disable**
Specifies whether the DSU/CSU performs a device self-test at power-up and after a device reset. **Enable** – Enables a self-test. **Disable** – Disables the self-test.
Test Timeout: Enable **Enable   Disable**
Specifies whether user-initiated loopback and pattern tests have durations that are specified by the Test Duration configuration option. **Enable** – Loopback and pattern tests initiated on the DSU/CSU have specified durations. **Disable** – Disables test timeout. The tests are terminated manually.   NOTE**:**   For DSU/CSUs that are remotely managed through an inband data stream such as EDL or FDL, the recommended setting is Enable. If tests are inadvertently left in the active state, the Enable setting will allow the test to timeout (terminate) after a specified time.
Test Duration: 10 **1 to 120 minutes**
Specifies the duration (1 to 120 minutes) of user-initiated loopback and pattern tests. (The Test Timeout configuration option must be set to Enable.)

Table C-6.   General Configuration Options (2 of 2)

Primary Clock Source: Network **Network   DTE   Internal   External   Port 1**
Specifies the master clock source for the DSU/CSU. This selection synchronizes all internal timing and external interface clocks. The clock rate(s) for the external timing interfaces are independent of the input rate for the master clock. Failure of the clock specified by the clock source selection results in automatic fallback to internal clock. **Network** – Configures the network interface as the master clock source. **DTE** – Configures the DTE Drop/Insert (DSX-1) interface as the master clock source. This selection is not available if the DTE Drop/Insert (DSX-1) interface is disabled. If the DTE Drop/Insert (DSX-1) interface is disabled after making this selection, the master clock source is changed to Network. **Internal** – Configures the internal clock as the master clock source. **External** – Configures an external clock (provided through the Clock In connector) as the master clock source. **Port 1** – Configures Port 1 as the master clock source. This is the only synchronous data port you can use for the master clock. If you enable EDL if for Port 1 and the DSU/CSU Clock Source is set to Port 1, the external device must provide clocking of 8 kbps less than the expected data port rate. For example, if you select 64 kbps, the external clock must supply a 56 kbps clock signal.
External Clock Rate (KHz):   1544 **2048   1544   8**
Specifies the clock rate when the master clock source is configured for external clock. This configuration option does not appear when the clock source is not an external clock. **2048** – Sets the input rate of the external clock to 2,048 kHz. **1544** – Sets the input rate of the external clock to 1,544 kHz. **8** – Sets the input rate of the external clock to 8 kHz.   NOTE: External clock rate 2,048 kHz does not imply E1 compatibility.

User Interface Configuration Options

The User Interface configuration options are divided into four tables as follows:

- Communication Port Configuration Options (Table C-7)
- External Device Configuration Options (Table C-8)
- Telnet Sessions Configuration Options (Table C-9)
- Ethernet Port Configuration Options (Table C-10)

Communication Port Configuration Options

Table C-7.   Communication Port Configuration Options (1 of 3)

Port Use: Terminal **Mgmt   ASCII   Terminal**
Specifies how the communication port is used.
Mgmt – Configures the communication port as the link to an SNMP or Telnet system.
ASCII – Configures the communication port as an ASCII port supporting ASCII alarm messages.
Terminal – Configures the communication port as the interface to an async terminal.
Port Type: Asynchronous **Asynchronous   Synchronous**
Specifies whether the communication port uses synchronous or asynchronous operation when it is configured as the SNMP or Telnet management link.
Asynchronous – Configures the communication port for asynchronous operation.
Synchronous – Configures the communication port for synchronous operation.
NOTE**:**   This configuration option is not available if the Port Use configuration option is set to ASCII or Term. In these cases, the communication port is always asynchronous.
Clock Source: Internal **Internal   External**
Specifies whether the communication port uses internal or external clocking when it is configured for synchronous operation.
Internal – Configures the communication port for internal clocking.
External – Configures the communication port for external clocking.
NOTE**:**   This configuration option is not available if the Port Type configuration option is set to Asynchronous.

Table C-7.   Communication Port Configuration Options (2 of 3)

Data Rate: 9.6 **1.2   2.4   4.8   9.6   14.4   19.2   38.4** Configures the bit rate for the communication port. **1.2** – Sets the bit rate to 1200 bps (for asynchronous operation only). **2.4** – Sets the bit rate to 2400 bps. **4.8** – Sets the bit rate to 4800 bps. **9.6** – Sets the bit rate to 9600 bps. **14.4** – Sets the bit rate to 14,400 bps. **19.2** – Sets the bit rate to 19,200 bps. **38.4** – Sets the bit rate to 38,400 bps. 　　NOTE**:**　This configuration option is not available if the communication port is configured for synchronous operation and the clock source is external.
Character Length: 8 **7   8** Configures the character length (7 or 8 bits) for the communication port. 　　NOTES:　– This configuration option must be set to 8 if the communication port is used as the network communication link. 　　　　　　– This configuration option is not available if the communication port is configured for synchronous operation.
Parity: None **None   Even   Odd** Configures the parity (none, even, or odd) for the communication port. 　　NOTE:　This configuration option is not available if the communication port is configured for synchronous operation.
Stop Bits: 1 **1   1.5   2** Configures the number of stop bits (1, 1.5, or 2) for the communication port. 　　NOTE**:**　This configuration option is not available if the communication port is configured for synchronous operation.
Ignore Control Leads: Disable **Disable   DTR** Specifies whether the DSU/CSU ignores the state of the Data Terminal Ready (DTR) input to the communication port. **Disable** – The control leads are treated in the standard manner. **DTR** – DTR is ignored. 　　NOTE:　This configuration option is not available if the communication port is configured for synchronous operation.
Password Required: Disable **Enable   Disable** Activates a password prompt that prevents access until a password is entered. **Enable** – Prompts the communications port user to enter a password. **Disable** – Does not require a password.

Table C-7.   Communication Port Configuration Options (3 of 3)

Inactivity Timeout: Disable **Enable   Disable**
Specifies whether the communication port disconnects after a period of inactivity specified by the Disconnect Time configuration option. **Enable** – The communication port disconnects after the period of inactivity specified by the Disconnect Time configuration option. **Disable** – The communication port does not disconnect due to inactivity.
Disconnect Time: 5 **1 to 60 minutes**
Specifies the period of time (1 to 60 minutes) before the communication port disconnects due to inactivity. (The Inactivity Timeout configuration option must be set to Enable.)

External Device Configuration Options

Table C-8.   External Device Configuration Options (1 of 3)

External Device Commands: Disable **Disable   AT   Other**

Specifies the communication port's external device commands. If this configuration option is disabled, no commands are sent out the communication port. Select AT to have standard attention (AT) commands sent out the communication port to control the external device. Select Other to configure the connect prefix, the connect indication string, the escape sequence, the escape sequence delay, and the disconnect string.
 	
Disable – Allows no commands to be sent out the communication port.
 	
AT – Allows standard AT commands to be sent out the communication port.
 	
Other – Allows user-configurable commands to be sent out the communication port.
 	
NOTES: – This configuration option is not available if the communications port is disabled.
 	
  – Carrier Detect (CD) is used to detect that the external device's connection is lost. Therefore, do not allow the CD lead to be forced on by the external device.
 	
  – The external device should be strapped to ignore Data Terminal Ready (DTR).

Dial-In Access: Disable **Enable   Disable**
Allows dial-in access to the DSU/CSU through an external device that is connected to the communication port. **Enable** – Allows dial-in access to the DSU/CSU. **Disable** – Prevents dial-in access. Incoming calls to the DSU/CSU are not answered. NOTE: To enable Dial-In, the external device must be configured for automatic answer and the External Device Commands configuration option must be enabled.

Table C-8.   External Device Configuration Options (2 of 3)

Connect Prefix: *Text Field* *Text Field* **Clear**
Specifies the connect prefix to the dial directory phone number. When you make a connection or the DSU/CSU automatically makes a connection (dial-out alarms or traps) through the communication port, the connect prefix and the dial directory phone number are used to establish the connection. The connect prefix is an ASCII text string and may be up to 20 characters in length. If the connect prefix is NULL, then no connect prefix is used. *Text Field* – Allows you to edit or display the connect prefix. **Clear** – Allows you to clear the connect prefix. The connect prefix is set to a null string.   NOTE: This configuration option is not available if the External Device Commands configuration option is set to AT.
Connect Indication String: *Text Field* *Text Field* **Clear**
Specifies the communication port's connect indication string. When you make a connection or the DSU/CSU automatically makes a connection (dial-out alarms or traps) through the communication port, this string determines that the connection has been established. The connect indication string is an ASCII text string and may be up to 20 characters in length. If the connect indication string is not received within 1 minute, it will time-out the connection. If the connect indication string is NULL, the communication port's receive data stream is not searched and a transition in the Carrier Detect (CD) lead is used to determine that a connection has been established. *Text Field* – Allows you to edit or display the case-sensitive connect indication string. **Clear** – Allows you to clear the connect indication string. The connect indication string is set to a null string.   NOTE: This configuration option is not available if the External Device Commands configuration option is set to AT.
Escape Sequence: *Text Field* *Text Field* **Clear**
Specifies the communication port's escape sequence. Once the external device connection has been established, either you or the DSU/CSU can command the external device to disconnect. Before doing so, you may need to send the escape sequence out to switch the external device into command mode. The escape sequence is an ASCII text string and may be up to 20 characters in length. If the escape sequence is NULL, no escape sequence is sent out. *Text Field* – Allows you to edit or display the escape sequence. **Clear** – Allows you to clear the escape sequence. The escape sequence is set to a null string.   NOTE: This configuration option is not available if the External Device Commands configuration option is set to AT.

Table C-8.   External Device Configuration Options (3 of 3)

Escape Sequence Delay (sec):   None **None   0.2   0.4   0.6   0.8   1.0**

Specifies the delay used while sending the communication port escape sequence. Use the communication port escape delay to specify the delay before sending the first character of the escape sequence and the delay after the last character of the escape sequence. During the delay, no data is sent out the communication port.
 	
None – No communication port escape sequence delay.
 	
*X.X*s – The delay used during the communication port escape sequence (where *X.X* is 0.2, 0.4, 0.6, 0.8, or 1.0 seconds).
 	
  NOTES: – This configuration option is not available if the External Device Commands configuration option is set to AT.
 	
         – Escape Sequence Delay must be configured for a delay greater than or equal to the escape guard time required by the external device.

Disconnect String: *Text Field* ***Text Field*   Clear**
Specifies the communication port's disconnect string. The communication port's disconnect string is sent to the external device if either you or the DSU/CSU wants to command the external device to disconnect. The external device must be in command mode before this command can be sent, so the escape sequence will always be sent before the disconnect string. The disconnect string is an ASCII text string and may be up to 20 characters in length. If the disconnect string is NULL, then no disconnect string is sent out. *Text Field* – Allows you to edit or display the disconnect string. **Clear** – Allows you to clear the disconnect string. The disconnect string is set to a null string.   NOTE: This configuration option is not available if the External Device Commands configuration option is set to AT.

Telnet Sessions Configuration Options

Table C-9.   Telnet Sessions Configuration Options

Telnet Session: Disable **Enable   Disable**
Specifies whether the DSU/CSU responds as a server to Telnet session requests.
Enable – The DSU/CSU responds to Telnet session requests.
Disable – The DSU/CSU does not respond to Telnet session requests.
Password Required: Disable **Enable   Disable**
Specifies whether a password is required for Telnet access.
Enable – A password is required for Telnet access.
Disable – A password is not required for Telnet access.
Inactivity Timeout: Disable **Enable   Disable**
Specifies whether the Telnet session disconnects after a period of inactivity specified by the Disconnect Time configuration option.
Enable – The Telnet session disconnects after the period of inactivity specified by the Disconnect Time configuration option.
Disable – The Telnet session does not disconnect due to inactivity.
Disconnect Time: 5 **1 to 60 minutes**
Specifies the period of time (1 to 60 minutes) before the Telnet session disconnects due to inactivity. (The Inactivity Timeout configuration option must be set to Enable.)

Ethernet (10BaseT) Port Configuration Options

Table C-10.   Ethernet Port Configuration Options

Port Use: Version 2 **Next   802.3   Version 2   Disable   Prev**
Ethernet Port Use. Specifies the protocol for the 10BaseT port. **802.3** – IEEE 802.3 protocol is used for the 10BaseT port. **Version 2** – Ethernet Version 2 protocol is used for the 10BaseT port. **Disable** – The 10BaseT port is disabled.
IP Address: 000.000.000.000 **Next   Edit   Clear   Prev**
Ethernet Port IP Address. Specifies the IP address for the 10BaseT port. **Edit** – Allows you to edit or display the IP address for the 10BaseT port. **Clear** – Allows you to clear the IP address for the 10BaseT port. The IP address is set to 000.000.000.000.   NOTE: This configuration option is not displayed if 10BaseT port use (ENET Use) is disabled.
Subnet Mask: 000.000.000.000 **Next   Edit   Clear   Prev**
Subnet Mask. Specifies the subnet mask for the 10BaseT port's IP Address. **Edit** – Allows you to edit and/or display the subnet mask for the 10BaseT port. **Clear** – Allows you to clear the subnet mask for the 10BaseT port. The subnet mask is set to 000.000.000.000. If the subnet mask is 000.000.000.000, the IP protocol creates a default subnet mask based on the class of the IP address (Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000).   NOTE: This configuration option is not displayed if 10BaseT port use (ENET Use) is disabled.
Default Gateway Address: 000.000.000.000 **Next   Edit   Clear   Prev**
Default Gateway Address. Specifies the address where messages for other subnets are sent. **Edit** – Allows you to edit and/or display the default gateway address. **Clear** – Allows you to clear the default gateway address. The address is set to 000.000.000.000.   NOTE: This configuration option is not displayed if 10BaseT port use (ENET Use) is disabled.

Alarm and Trap Configuration Options

Table C-11.   Alarm and Trap Configuration Options (1 of 2)

ASCII Alarm Messages: Disable **Disable   Com Port**
Controls the generation of alarm messages, which are routed to an ASCII terminal or printer attached to the communication port.
Disable – Prevents an alarm message for any alarm conditions.
Com Port – Enables alarm messages routed to the communication port.
NOTE: Alarm messages are only sent to the communication port if the Port Use configuration option is set to ASCII, otherwise the alarm messages are discarded.
Alarm & Trap Dial-Out: Disable **Enable   Disable**
Controls whether generated alarm or trap messages initiate a call if the external communication port device connection has not already been established. When enabled, a call is placed to the phone number contained in the alarm directory (directory A). If the call cannot be completed and the retry option is enabled, the alarm or trap message is held until the call is completed or the call has been retried. If more than one alarm message is received while waiting for a call retry, only the highest priority alarm message received is held; all previous messages are discarded.
Enable – Enables automatic call initiation (dial out) if an alarm or trap message needs to be sent.
Disable – Disables automatic call initiation. Trap messages sent to the external communication port device are queued (held) if an external communication port device connection has not been previously established. Alarm messages are not queued.
NOTE: This configuration option is only available if the External Device Commands option is enabled.
Trap Disconnect: Enable **Enable   Disable**
Specifies whether the external communication port device connection is disconnected after sending a trap message. This configuration option applies only to external communication port device connections initiated as a result of the trap message being sent.
Enable – Specifies that the external communication port device call is disconnected after a trap message is sent.
Disable – Specifies that the external communication port device call is not disconnected after a trap message is sent. The line is held until it is manually disconnected or disconnected by the device.
NOTE: This configuration option is only available if SNMP traps are enabled and the external communication port device is enabled and configured as an SNMP management link.

Table C-11.   Alarm and Trap Configuration Options (2 of 2)

Call Retry: Disable **Enable   Disable**
Determines whether a call that cannot complete (busy, no answer, etc.) is retried. This affects calls that are initiated in attempting to send an alarm or trap message to the external communication port device. If call retry is specified, the DSU/CSU attempts to complete the call after a configurable delay. **Enable** – Enables call retry. If enabled, the call is retried once per alarm or trap message. A delay as specified by the dial-out delay time is imposed between call attempts. If an alternate dial-out directory is specified, both the alarm directory as well as the alternate directory are retried up to five times. **Disable** – Disables call retry. If a call setup cannot be completed it is not retried. NOTE: This configuration option is only available if the communication port is enabled for an external device.
Dial Out Delay Time (min):   5 **1   2   3   4   5   6   7   8   9   10**
Specifies the number of minutes to wait between successive dial-out alarms or traps and between retry attempts after failed alarm dial-outs. NOTE: This configuration option is only available if the communication port is enabled for an external device.
Alternate Dial-Out Directory: None **None   1   2   3   4   5**
Specifies whether a call that cannot be completed (busy, no answer, etc.) is retried using an alternate phone number. This affects calls that are initiated in an attempt to send an alarm or trap message to the external communication port device. The alternate phone number to try is contained in one of the five call directories. If call retry is enabled, the initial call is retried at the original number once before a call attempt to the alternate number is tried. If the call is not completed at the alternate number, it is also retried once. The alternate dial-out option applies to each alarm/trap event. Once a call for an alarm/trap message either completes or fails all retry attempts, the next alarm/trap attempts to establish a call to the phone number contained in the alarm directory. **None** – Specifies that alternate alarm dial-out is not attempted. **1–5** – Specifies the call directory that contains the phone number to call if a call cannot be completed to the telephone number contained in the alarm directory. NOTE: This configuration option is only available if the communication port is enabled for an external device.

Management and Communication Configuration Options

The Management configuration options are divided into four tables as follows:

- Communication Protocol Configuration Options (Table C-12)
- General SNMP Management Configuration Options (Table C-13)
- SNMP NMS Security Configuration Options (Table C-14)
- SNMP Traps Configuration Options (Table C-15)

Communication Protocol Configuration Options

Table C-12.   Communication Protocol Configuration Options (1 of 2)

Node IP Address: *Text Field* *Text Field*   **Clear**
Specifies the IP address needed to access the DSU/CSU. Since this IP Address is not bound to a particular port, it can be used for remote access via the FDL or EDL management link. *Text Field* – Allows you to edit or display the IP address for the DSU/CSU. **Clear** – Allows you to clear the IP address for the DSU/CSU. The IP address is set to 000.000.000.000.
Node Subnet Mask: *Text Field* *Text Field*   **Clear**
Specifies the subnet mask needed to access the DSU/CSU. Since this subnet mask is not bound to a particular port, it can be used for remote access via the FDL or EDL management link. *Text Field* – Allows you to edit or display the subnet mask for the DSU/CSU. **Clear** – Allows you to clear the subnet mask for the DSU/CSU. The subnet mask is set to 000.000.000.000. If the subnet mask is 000.000.000.000, the IP protocol creates a default subnet mask based on the class of the IP address (Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000).

Table C-12.   Communication Protocol Configuration Options (2 of 2)

Default Net Destination: None **None   Com   FDL   EDL1   EDL2**
Specifies where the default network is connected. For example, if the default network is connected to the communication port, you select Com. If the default network is connected to the far-end 31xx Series device over the FDL, you select FDL. The routing protocol uses the default network destination to route data that does not have a specific route. **None** – No default network destination. Data that cannot be routed is discarded. **Com** – The default network destination is the communication port. This selection only appears if the Port Use configuration option is set to Mgmt. **FDL** – The default network destination is FDL. This selection only appears if the FDL management link is enabled. **EDL*n*** – The default network destination is the EDL*n* port (where *n* is 1 or 2). This selection only appears if the synchronous data port's EDL management link is enabled.   NOTE: If the chosen default network link is disabled or down, data is discarded. Choose another default network.
Communication Port IP Address: *Text Field* ***Text Field*   Clear**
Specifies the IP address for the communication port if the Port Use configuration option is set to Mgmt. ***Text Field*** – Allows you to edit or display the IP address for the communication port. **Clear** – Allows you to clear the IP address for the communication port. The IP address is set to 000.000.000.000.
Communication Port Subnet Mask: *Text Field* ***Text Field*   Clear**
Specifies the subnet mask for the communication port if the Port Use configuration option is set to Mgmt. ***Text Field*** – Allows you to edit or display the subnet mask for the communication port. **Clear** – Allows you to clear the subnet mask for the communication port. The subnet mask is set to 000.000.000.000. If the subnet mask is 000.000.000.000, the IP protocol creates a default subnet mask based on the class of the IP address (Class A: 255.000.000.000, Class B: 255.255.000.000, or Class C: 255.255.255.000).
Com Link Protocol: PPP **PPP   SLIP**
Specifies the link layer protocol for the communication port if the Port Use configuration option is set to Mgmt. **PPP** – Specifies PPP as the link layer protocol for the IP management link on the communication port. **SLIP** – Specifies SLIP as the link layer protocol for the IP management link on the communication port. The communication port must be configured for asynchronous operation to support SLIP.

General SNMP Management Configuration Options

Table C-13.   General SNMP Management Configuration Options

SNMP Management: Disable **Enable   Disable**
Specifies whether the DSU/CSU responds to SNMP session requests. **Enable** – The DSU/CSU responds to SNMP session requests. **Disable** – The DSU/CSU does not respond to SNMP session requests.
Community Name 1:   *Text Field* ***Text Field*   Clear**
Specifies the first of two community names that are allowed to access this unit's Management Information Base (MIB). External SNMP managers must supply this name to access an object in the MIB. *Text Field* – Allows you to edit or display the first community name. **Clear** – Allows you to clear the first community name.
Name 1 Access: Read **Read   Read/Write**
Specifies the type of access allowed for Community Name 1. This is the type of access allowed for external SNMP managers accessing objects in the MIB using Community Name 1. **Read** – Allows read-only access (SNMP Get) to the accessible objects in the MIB for this device if community name 1 is used. This includes all objects specified as either read-only or read/write in the MIB RFCs. **Read/Write** – Allows read and write access (SNMP Get and Set) to the objects in the MIB for this device if community name 1 is used. Write access is allowed for all objects specified as read/write in the MIB RFCs. Read access is allowed for all objects specified as either read-only or read/write.
Community Name 2:   *Text Field* ***Text Field*   Clear**
Specifies the second of two community names that are allowed to access this unit's Management Information Base (MIB). External SNMP managers must supply this name to access an object in the MIB. *Text Field* – Allows you to edit or display the second community name. **Clear** – Allows you to clear the second community name.
Name 2 Access: Read **Read   Read/Write**
Specifies the type of access allowed for Community Name 2. This is the type of access allowed for external SNMP managers accessing objects in the MIB using Community Name 2. **Read** – Allows read-only access (SNMP Get) to the accessible objects in the MIB for this device if community name 2 is used. This includes all objects specified as either read-only or read/write in the MIB RFCs. **Read/Write** – Allows read and write access (SNMP Get and Set) to the objects in the MIB for this device if community name 2 is used. Write access is allowed for all objects specified as read/write in the MIB RFCs. Read access is allowed for all objects specified as either read-only or read/write.

SNMP NMS Security Configuration Options

Table C-14.   SNMP NMS Security Configuration Options

NMS IP Validation: Disable **Enable   Disable**
Specifies whether the DSU/CSU validates (for security reasons) the IP address of an SNMP manager attempting to access the DSU/CSU. Allowable addresses are specified using the NMS *n* IP Adr configuration option. **Enable** – The DSU/CSU validates the IP address of SNMP managers attempting to access the DSU/CSU. **Disable** – The DSU/CSU does not validate the IP address of SNMP managers.
Number of Managers: 1 **1   2   3   4   5   6   7   8   9   10**
Specifies the number of SNMP managers that are allowed to access the DSU/CSU.   NOTE: You must configure an IP address for each SNMP manager that is allowed access to the DSU/CSU. Allowable addresses are specified using the NMS *n* IP Adr configuration option.
NMS *n* IP Address: *Text Field* ***Text Field*   Clear**
Specifies the allowable IP address of an SNMP manager attempting to access the DSU/CSU. The manager number (*n*) is specified by the Number of Managers configuration option. ***Text Field*** – Allows you to edit or display the allowable IP address for the SNMP manager. **Clear** – Allows you to clear the allowable IP address for the SNMP manager. The IP address is set to 000.000.000.000.
Access Level: Read **Read   Read/Write**
Specifies the allowable type of access for an authorized SNMP manager if IP address validation has occurred. **Read** – Allows read-only access (SNMP Get) to the accessible objects in the MIB for this device. This includes all objects specified as either read-only or read/write in the MIB RFCs. **Read/Write** – Allows read and write access (SNMP Get and Set) to the objects in the MIB for this device. Write access is allowed for all objects specified as read/write in the MIB RFCs. Read access is allowed for all objects specified as either read-only or read/write.

SNMP Traps Configuration Options

Table C-15.   SNMP Traps Configuration Options (1 of 3)

SNMP Traps: Disable **Enable   Disable**
Specifies whether SNMP trap messages are sent over the SNMP management link. **Enable** – Enables sending SNMP trap messages from this unit over any SNMP management link. **Disable** – Disables sending SNMP trap messages from this unit over any SNMP management link.
Number of Trap Managers: 1 **1   2   3   4   5   6**
Specifies the number of SNMP trap managers that are to receive traps for this unit. NOTE: You must configure an IP address for each trap manager that is to receive trap messages.
NMS *n* IP Address: *Text Field* ***Text Field*   Clear**
Specifies the IP address for each trap manager. This configuration option is repeated for all trap managers supported by the unit. ***Text Field*** – Allows you to edit or display the IP address for Trap Manager *n*. **Clear** – Allows you to clear the IP address for Trap Manager *n*. The IP address is set to 000.000.000.000.
Destination: None **None   Com   FDL   EDL1   EDL2**
Specifies the network destination for Trap Manager *n*. This configuration option is displayed for the number of trap managers (*n*) specified by the Number of Trap Managers configuration option. **None** – No Trap Manager *n* network destination. Traps are discarded. **Com** – The Trap Manager *n* network destination is the communication port. This selection only appears if the Port Use configuration option is set to Mgmt. **FDL** – The Trap Manager *n* network destination is the FDL management link. This selection only appears if the FDL management link is enabled. **EDL*n*** – The Trap Manager *n* network destination is the EDL*n* port (where *n* is 1 or 2). This selection only appears if the synchronous data port's EDL management link is enabled. NOTE: If the chosen destination link is disabled or down, the traps are discarded. Choose another destination.

Table C-15.   SNMP Traps Configuration Options (2 of 3)

General Traps: Both **Disable   Warm   AuthFail   Both**
Specifies the general trap types to enable. **Disable** – Disables the sending of trap messages for warmStart and authenticationFailure events. **Warm** – Sends trap messages for warmStart events to the currently configured trap manager(s). **AuthFail** – Sends trap messages for authenticationFailure events to the currently configured trap manager(s). **Both** – Sends trap messages for warmStart and authenticationFailure events to the currently configured trap manager(s).   NOTE: This configuration option is not available if the SNMP Traps configuration option is disabled.
Enterprise Specific Traps: Enable **Enable   Disable**
Specifies whether enterpriseSpecific traps are enabled. **Enable** – Sends trap messages for enterpriseSpecific events to the currently configured trap manager(s). **Disable** – Disables the sending of trap messages for enterpriseSpecific events.   NOTE: This configuration option is not available if the SNMP Traps configuration option is disabled.
Link Traps: Both **Disable   Up   Down   Both**
Specifies the link trap type to enable. Interfaces monitored for linkUp and linkDown traps are specified with the Link Trap Interfaces configuration option. **Disable** – Disables the sending of trap messages for linkDown or linkUp events. **Up** – Sends trap messages for linkUp events to the currently configured trap manager(s). **Down** – Sends trap messages for linkDown events to the currently configured trap manager(s). **Both** – Sends trap messages for linkUp and linkDown events to the currently configured trap manager(s).   NOTE: This configuration option is not available if the SNMP Traps configuration option is disabled.

Table C-15.   SNMP Traps Configuration Options (3 of 3)

Link Trap Interfaces: All **Network   DTE   T1s   Ports   All**
Specifies which interfaces generate linkUp and linkDown trap messages. These traps are supported on the T1 interfaces (network and DTE Drop/Insert) and the synchronous data ports. **Network** – Sends trap messages for linkUp and linkDown events occurring on the network interface. **DTE** – Sends trap messages for linkUp and linkDown events occurring on the DTE Drop/Insert (DSX-1) interface. This selection does not appear if the DTE Drop/Insert (DSX-1) interface is disabled. **T1s** – Sends trap messages for linkUp and linkDown events occurring on the network or DTE Drop/Insert (DSX-1) interface. **Ports** – Sends trap messages for linkUp and linkDown events occurring on the synchronous data ports. **All** – Sends trap messages for linkUp and linkDown events occurring on the network interface, DTE Drop/Insert (DSX-1) interface, or the synchronous data ports. NOTE: This configuration option is not available if the Link Traps configuration option is not configured to generate trap messages for linkUp or linkDown events.

Configuration Worksheets

This section contains one set of blank worksheets to be used when configuring your DSU/CSU using the async terminal interface. In the tables, **default settings** for Factory 1 are indicated by **bold** type. It is recommended that you copy these blank worksheets before using them.

Network Interface Options	Value (Default in Bold)
Line Framing Format	D4, **ESF**
Line Coding Format	AMI, **B8ZS**
Bit Stuffing	**62411**, Disable
Line Build Out (LBO)	**0.0**, −7.5, −15, −22.5
Management Link	Enable, **Disable**
ANSI Performance Report Messages	Enable, **Disable**
Network Initiated LLB	**Enable**, Disable
Network Initiated PLB	**Enable**, Disable
Circuit Identifier	*Text Field*, Clear

DTE Interface Options	Value (Default in Bold)
Interface Status	**Enable**, Disable
Line Framing Format	D4, **ESF**
Line Coding Format	AMI, **B8ZS**
Line Equalization	**0−133**, 133−266, 266−399, 399−533, 533−655
DTE LB on External Contact	Enable, **Disable**
Send All Ones on DTE Failure	**Enable**, Disable

Sync Data Port Options (Port 1)	Value (Default in Bold)
Port Type	**E530**, V.35, RS449, X.21
Port Base Rate	**Nx64**, Nx56
Transmit Clock Source	**Internal**, External
Invert Transmit Clock	Enable, **Disable**
Invert Transmit and Received Data	Enable, **Disable**
Send All Ones on Data Port Not Ready	Disable, DTR, RTS, **Both**
Action on Network Yellow Alarm	None, **Halt**
Network Init. Data Channel Loopback	**Disable**, V.54, FT1, Both
Port (DTE) Initiated Loopbacks	**Disable**, DTLB, DCLB, Both
Embedded Data Link	Enable, **Disable**
EDL Management Link	Enable, **Disable**
Excessive Error Rate Threshold	**10E−4**, 10E−5, 10E−6, 10E−7, 10E−8, 10E−9
Near-End Performance Statistics	**Disable**, Maintain, Send, Both
Far-End Performance Statistics	**Disable**, Maintain

Sync Data Port Options (Port 2)	Value (Default in **Bold**)
Port Type	**E530**, V.35, RS449, X.21
Port Base Rate	**Nx64**, Nx56
Transmit Clock Source	**Internal**, External
Invert Transmit Clock	Enable, **Disable**
Invert Transmit and Received Data	Enable, **Disable**
Send All Ones on Data Port Not Ready	Disable, DTR, RTS, **Both**
Action on Network Yellow Alarm	None, **Halt**
Network Init. Data Channel Loopback	**Disable**, V.54, FT1, Both
Port (DTE) Initiated Loopbacks	**Disable**, DTLB, DCLB, Both
Embedded Data Link	Enable, **Disable**
EDL Management Link	Enable, **Disable**
Excessive Error Rate Threshold	**10E−4**, 10E−5, 10E−6, 10E−7, 10E−8, 10E−9
Near-End Performance Statistics	**Disable**, Maintain, Send, Both
Far-End Performance Statistics	**Disable**, Maintain

Network Interface

Network Channel	Allocation
N1	
N2	
N3	
N4	
N5	
N6	
N7	
N8	
N9	
N10	
N11	
N12	
N13	
N14	
N15	
N16	
N17	
N18	
N19	
N20	
N21	
N22	
N23	
N24	

Allocations

N1 – N24 indicates allocation to DTE (Drop/Insert) channels.

DTE Drop/Insert (DSX-1) Interface

DTE (DSX-1) Channel	Allocation
D1	
D2	
D3	
D4	
D5	
D6	
D7	
D8	
D9	
D10	
D11	
D12	
D13	
D14	
D15	
D16	
D17	
D18	
D19	
D20	
D21	
D22	
D23	
D24	

Allocations

D1 – D24 indicates allocation to network channels.

DTE Signaling	Assign: (N1 – 24)	Voice RBS or Data)
D1		
D2		
D3		
D4		
D5		
D6		
D7		
D8		
D9		
D10		
D11		
D12		
D13		
D14		
D15		
D16		
D17		
D18		
D19		
D20		
D21		
D22		
D23		
D24		

Sync Data Port Channel	Options		Value (Default in **Bold**)
Port 1	Assign To		**Network**, DTE, Port 2
	Assign By		**Block**, ACAMI, Channel
	If Assign By Block	Port Rate	Nx64: 64, 128, 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536 Nx56: 56, 112, 168, 224, 280, 336, 392, 448, 504, 560, 616, 672, 728, 784, 840, 896, 952, 1008, 1064, 1120, 1176, 1232, 1288, 1344
		Start At	Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 (Select One)
	If Assign By ACAMI	Port Rate	Nx64: 64, 128, 192, 256, 320, 384, 448, 512, 576, 640, 704, 768 Nx56: 56, 112, 168, 224, 280, 336, 392, 448, 504, 560, 616, 672
		Start At	Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 (Select One)
	If Assign By Channel		Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 (Select Multiple)
Port 2	Assign To		**Network**, DTE, Port 1
	Assign By		**Block**, ACAMI, Channel
	If Assign By Block	Port Rate	Nx64: 64, 128, 192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536 Nx56: 56, 112, 168, 224, 280, 336, 392, 448, 504, 560, 616, 672, 728, 784, 840, 896, 952, 1008, 1064, 1120, 1176, 1232, 1288, 1344
		Start At	Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 (Select One)
	If Assign By ACAMI	Port Rate	Nx64: 64, 128, 192, 256, 320, 384, 448, 512, 576, 640, 704, 768 Nx56: 56, 112, 168, 224, 280, 336, 392, 448, 504, 560, 616, 672
		Start At	Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 (Select One)
	If Assign By Channel		Time Slot (N*x* or D*x*): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 (Select Multiple)

General Options	Value (Default in **Bold**)
Generate Yellow Alarm Signals	**Enable**, Disable
Initial Self Test	**Enable**, Disable
Primary Clock Source	**Network**, DTE, Internal, External, Port 1
External Clock Rate (KHz)	2048, **1544**, 8
Test Timeout	**Enable**, Disable
Test Duration	1–120 (Default = **10**)

User Interface: Communication Port Options	Value (Default in **Bold**)
Port Use	Mgmt, ASCII, **Terminal**
Port Type	**Asynchronous**, Synchronous
Clock Source	**Internal**, External
Data Rate	1.2, 2.4, 4.8, **9.6**, 14.4, 19.2, 38.4
Character Length	7, **8**
Parity	**None**, Even, Odd
Stop Bits	**1**, 1.5, 2
Ignore Control Leads	**Disable**, DTR
Password Required	Enable, **Disable**
Inactivity Timeout	Enable, **Disable**
Disconnect Time	1–60 (Default = **5**)

User Interface: External Device Options	Value (Default in **Bold**)
External Device Commands	**Disable**, AT, Other
Dial-In Access	Enable, **Disable**
Connect Prefix	*Text Field*, Clear
Connect Indication String	*Text Field*, Clear
Escape Sequence	*Text Field*, Clear
Escape Sequence Delay (sec)	**None**, 0.2, 0.4, 0.6, 0.8, 1.0
Disconnect String	*Text Field*, Clear

User Interface: Telnet Sessions Options	Value (Default in **Bold**)
Telnet Session	Enable, **Disable**
Password Required	Enable, **Disable**
Inactivity Timeout	Enable, **Disable**
Disconnect Time	1–60 (Default = **5**)

User Interface: Ethernet Port Options	Value (Default in **Bold**)
Port Use	**Version 2**, 802.3
IP Address	**000.000.000.000**
Subnet Mask	(Default based on class of IP Address)
Default Gateway Address	**000.000.000.000**

Alarm and Trap Configuration Options	Value (Default in **Bold**)
ASCII Alarm Messages	**Disable**, Com Port
Alarm & Trap Dial-Out	Enable, **Disable**
Trap Disconnect	**Enable**, Disable
Call Retry	Enable, **Disable**
Dial Out Delay Time (min)	1, 2, 3, 4, **5**, 6, 7, 8, 9, 10
Alternate Dial-Out Directory	**None**, 1, 2, 3, 4, 5

Management and Communication: Communication Protocol Options	Value (Default in **Bold**)
Node IP Address	*Text Field*, Clear
Node Subnet Mask	*Text Field*, Clear
Default Network Destination	**None**, Com, FDL, EDL1, EDL2
Communication Port IP Address	*Text Field*, Clear
Communication Port Subnet Mask	*Text Field*, Clear
Com Link Protocol	**PPP**, SLIP

Management and Communication: General SNMP Management Options	Value (Default in Bold)
SNMP Management	Enable, **Disable**
Community Name 1	*Text Field*, Clear
Name 1 Access	**Read**, R/W
Community Name 2	*Text Field*, Clear
Name 2 Access	**Read**, R/W

Management and Communication: SNMP NMS Security Options	Value (Default in Bold)
NMS IP Validation	Enable, **Disable**
Number of Managers	**1**, 2, 3, 4, 5, 6, 7, 8, 9, 10
NMS *n* IP Address	*Text Field*, Clear
Access Level	**Read**, R/w

Management and Communication: SNMP Traps Options	Value (Default in Bold)
SNMP Traps	Enable, **Disable**
Number of Trap Managers	**1**, 2, 3, 4, 5, 6
NMS *n* IP Address	*Text Field*, Clear
Destination	**None**, Com, FDL, EDL1, EDL2
General Traps	Disable, Warm, AuthFail, **Both**
Enterprise Specific Traps	**Enable**, Disable
Link Traps	Disable, Up, Down, **Both**
Link Trap Interfaces	Network, DTE, T1s, Ports, **All**

Pin Assignments

D

Overview

The DSU/CSU is shipped with a power module. Various other interconnecting cables are available. For cable feature numbers, refer to Appendix G, *Equipment List*. This appendix describes connector pin assignments and cables.

T1 Network Interface

The T1 network interface connector is an RJ48C, 8-position, unkeyed modular jack (Table D-1).

The T1 line interface cable is a 20-foot, 24 AWG solid, 2-twisted-pair cable that is either RJ48C-to-RJ48C (Figure D-1) or RJ48C-to-DA15P (Figure D-2).

Table D-1. T1 Network Interface Connector

Signal	Pin Number
Receive Ring	1
Receive Tip	2
Transmit Ring	4
Transmit Tip	5
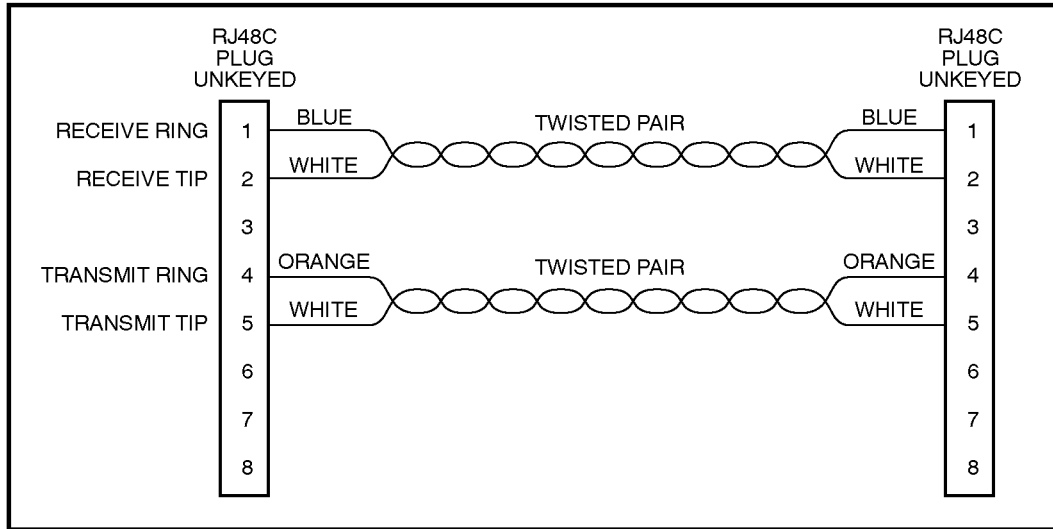
493-14156-01

Figure D-1.   T1 Line Interface Cable, RJ48C-to-RJ48C
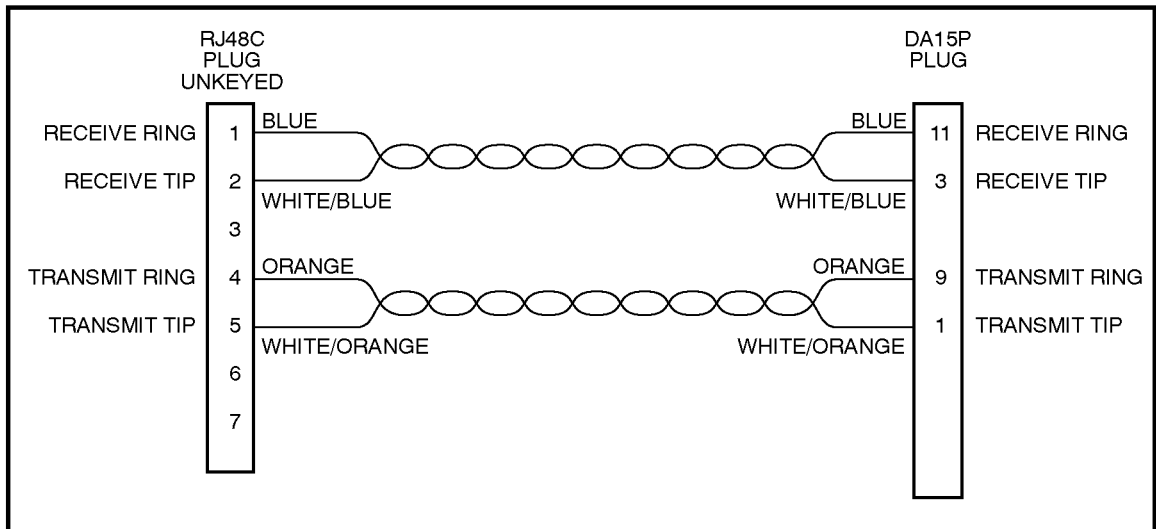
493-14342

Figure D-2.   T1 Line Interface Cable, RJ48C-to-DA15P

DTE Drop/Insert Interface

The DTE Drop/Insert (DSX-1) interface connector is a DB15-type socket connector (Table D-2). For information about using Relay Contact Sense for external DTE loopback, refer to the DTE LB on Contact configuration option in *DTE Interface Configuration Options* of Appendix C.

The DTE Drop/Insert (DSX-1) cable (Figure D-3) is typically supplied by a DTE vendor. It is made of shielded twisted-pair wires (22 AWG). The cable connector is a DB15-type plug connector. Be sure to connect the shield ground only at the DSU/CSU end to prevent ground loops.

Table D-2. DTE Drop/Insert (DSX-1 Connector)

Signal	Pin Number
Receiver Tip from DTE	1
Receiver Ring from DTE	9
Transmitter Tip to DTE	3
Transmitter Ring to DTE	11
Relay Contact Sense Return	12
Relay Contact Sense	14
Shield Ground	2,4
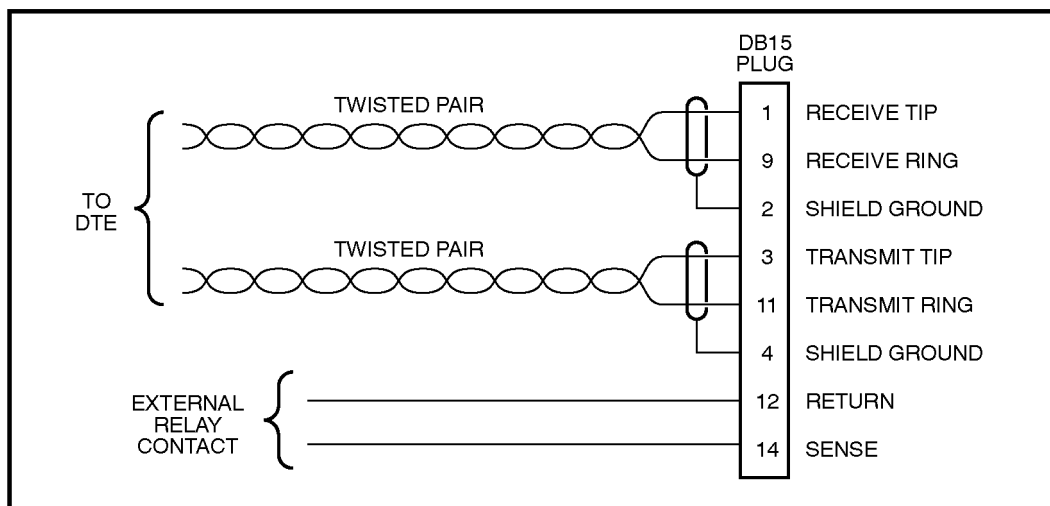
493-14152-01

Figure D-3. DTE Drop/Insert (DSX-1) Cable

10BaseT Connector

Use a standard 10BaseT cable to connect the DSU to an Ethernet LAN. A cable is provided with the DSU.

The following table defines the pinouts for the 10BaseT port. It is an 8-pin, unkeyed jack.

Use	Pin #
Transmitted Data +	1
Transmitted Data –	2
Received Data +	3
NC	4
NC	5
Received Data –	6
NC	7
NC	8
NC = Not connected (unused).	

COM Port Interface

The COM port connects to a PC for front panel emulation, to an ASCII terminal or printer for alarms, to an async terminal, or to a network device (e.g., a router) for SNMP or Telnet applications. The COM port connector is an 8-position keyed modular connector (Table D-3). The data signals on this port are referenced to a DTE interface.

The COM port-to-PC cable is shown in Figure D-4 and the COM port-to-terminal/printer cable is shown in Figure D-5.

Table D-3.   COM Port Connector

Signal	Direction	Pin Number
DCE Transmit Clock	From DSU/CSU	1
DCE Receive Data	From DSU/CSU	2
Signal Ground	—	3
DCE Transmit Data	To DSU/CSU	4
DCE Data Terminal Ready	To DSU/CSU	5
DCE Carrier Detect	From DSU/CSU	6
DCE Request-to-Send	To DSU/CSU	7
DCE Receive Clock	From DSU/CSU	8
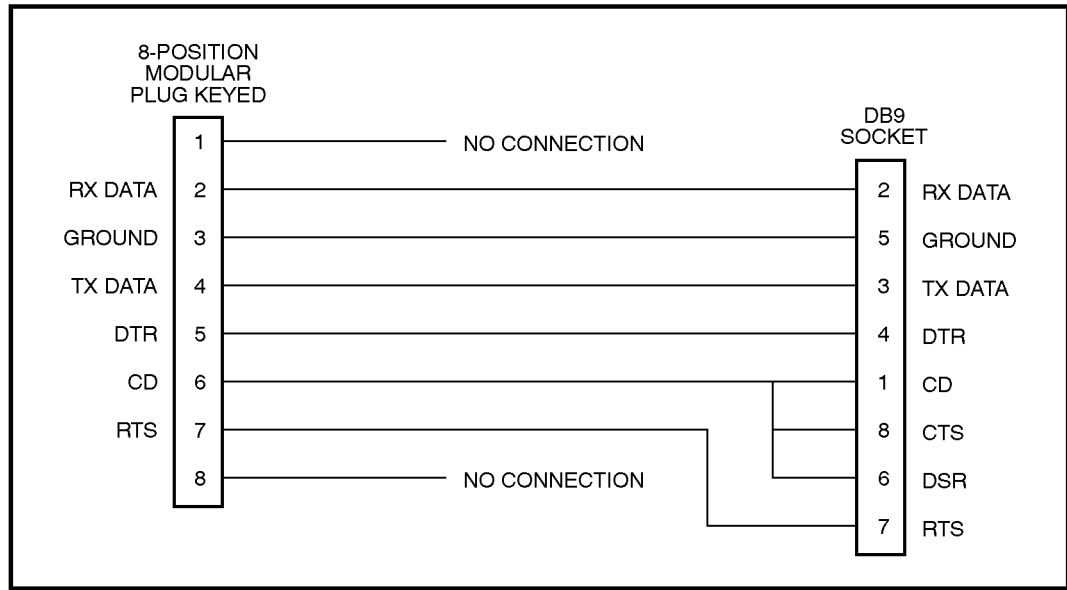
Figure D-4.   COM Port-to-PC Cable
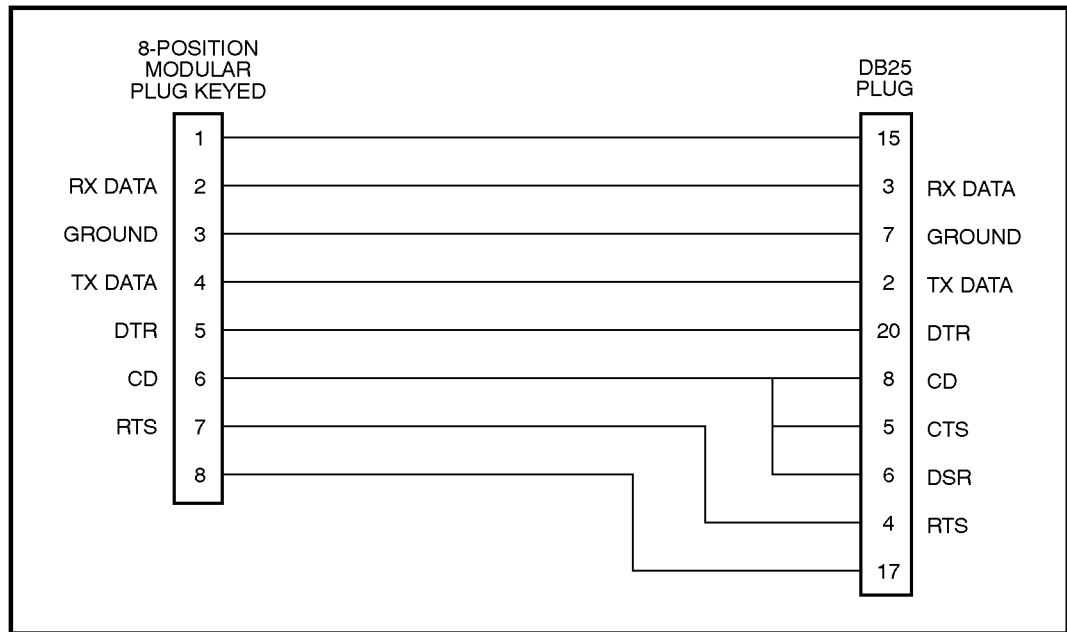
Figure D-5.   COM Port-to-Terminal/Printer Cable

Serial Crossover Cable

Use a serial crossover cable like the one shown in Figure D-6 (with an adapter wired like the cable in Figure D-5) to connect an external modem to the DSU/CSU's COM port.

P1	Pin		Pin	P2
Chassis Ground	1		1	Chassis Ground
TXD	2		2	TXD
RXD	3		3	RXD
RTS	4		4	RTS
CTS	5		5	CTS
DSR	6		6	DSR
Signal Ground	7		7	Signal Ground
CD (RLSD)	8		8	CD (RLSD)
	9		9	
	10		10	
	11		11	
	12		12	
	13		13	
	14		14	
	15		15	
	16		16	
	17		17	
	18		18	
	19		19	
DTR	20		20	DTR
	21		21	
	22		22	
	23		23	
	24		24	
	25		25	
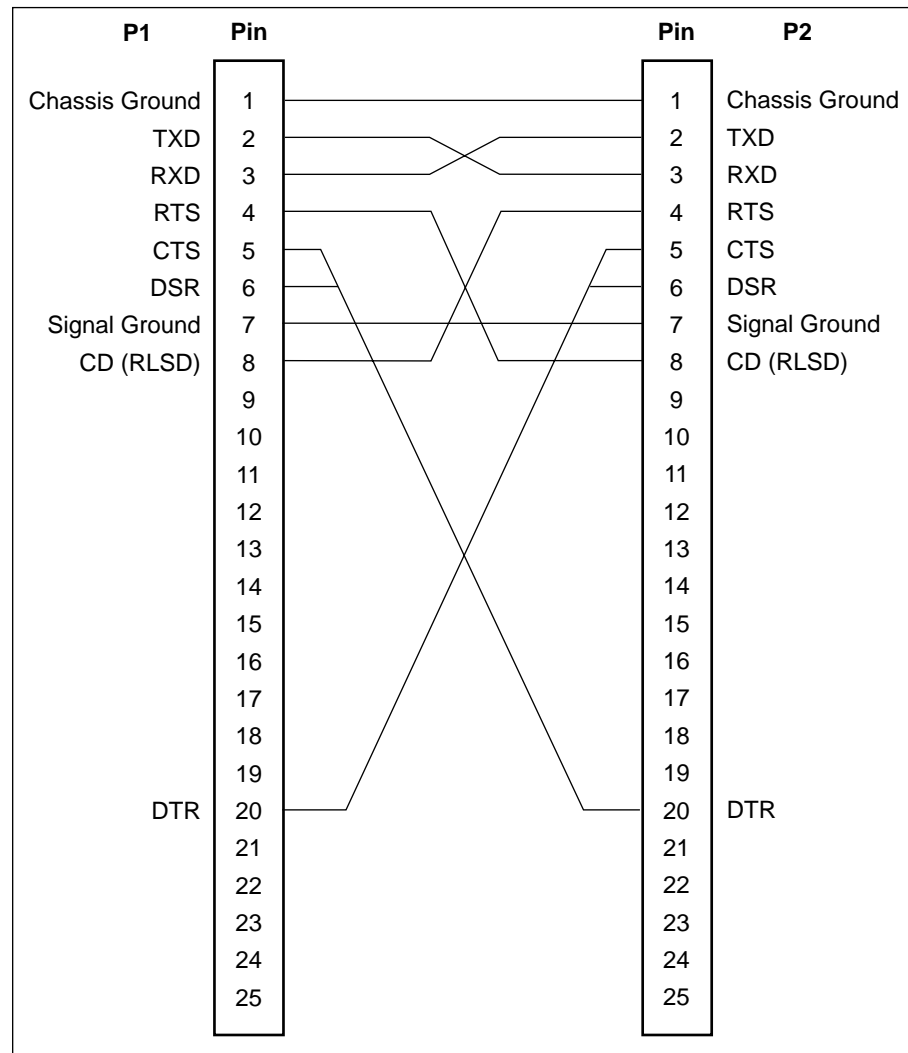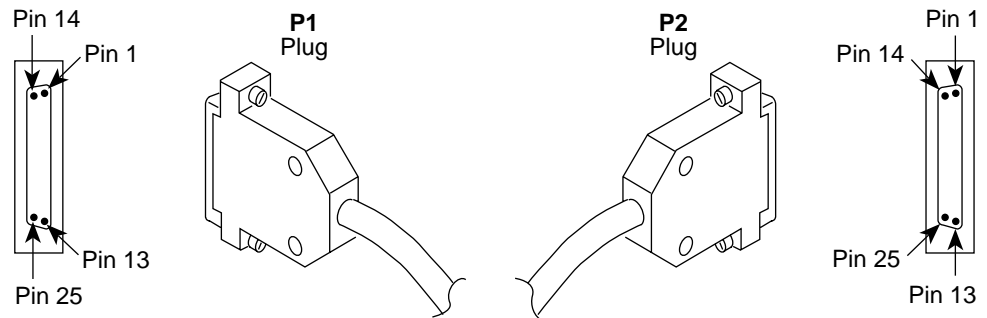
497-15180a

Figure D-6.   Serial Crossover Cable

EIA-530-A Port Interface Connector

The EIA-530-A Port interface connector information is shown in Table D-4.

Table D-4.   EIA-530-A Port Interface Connector

Signal	Circuit Mnemonic	CCITT Number	Direction	Pin
Shield	—	—	—	1
Signal Common	AB	102A	—	7
Signal Common	AC	102B	—	23
Transmitted Data	BA	103	To DSU/CSU	2 (A) 14 (B)
Received Data	BB	104	From DSU/CSU	3 (A) 16 (B)
Request-to-Send	CA	105	To DSU/CSU	4 (A) 19 (B)
Clear-to-Send	CB	106	From DSU/CSU	5 (A) 13 (B)
Received Line Signal Detector	CF	109	From DSU/CSU	8 (A) 10 (B)
DCE Ready	CC	107	From DSU/CSU	6
DTE Ready	CD	108/1, /2	To DSU/CSU	20
Transmit Signal Element Timing (DTE Source)	DA	113	To DSU/CSU	11 (B) 24 (A)
Transmit Signal Element Timing (DCE Source)	DB	114	From DSU/CSU	12 (B) 15 (A)
Receiver Signal Element Timing (DCE Source)	DD	115	From DSU/CSU	17 (A) 9 (B)
Local Loopback	LL	141	To DSU/CSU	18
Remote Loopback	RL	140	To DSU/CSU	21
Test Mode	TM	142	From DSU/CSU	25

EIA-530-A-to-RS-449 Adapter

The EIA-530-A-to-RS-449 adapter (Figure D-7) provides the RS-449 interface shown in Table D-5.
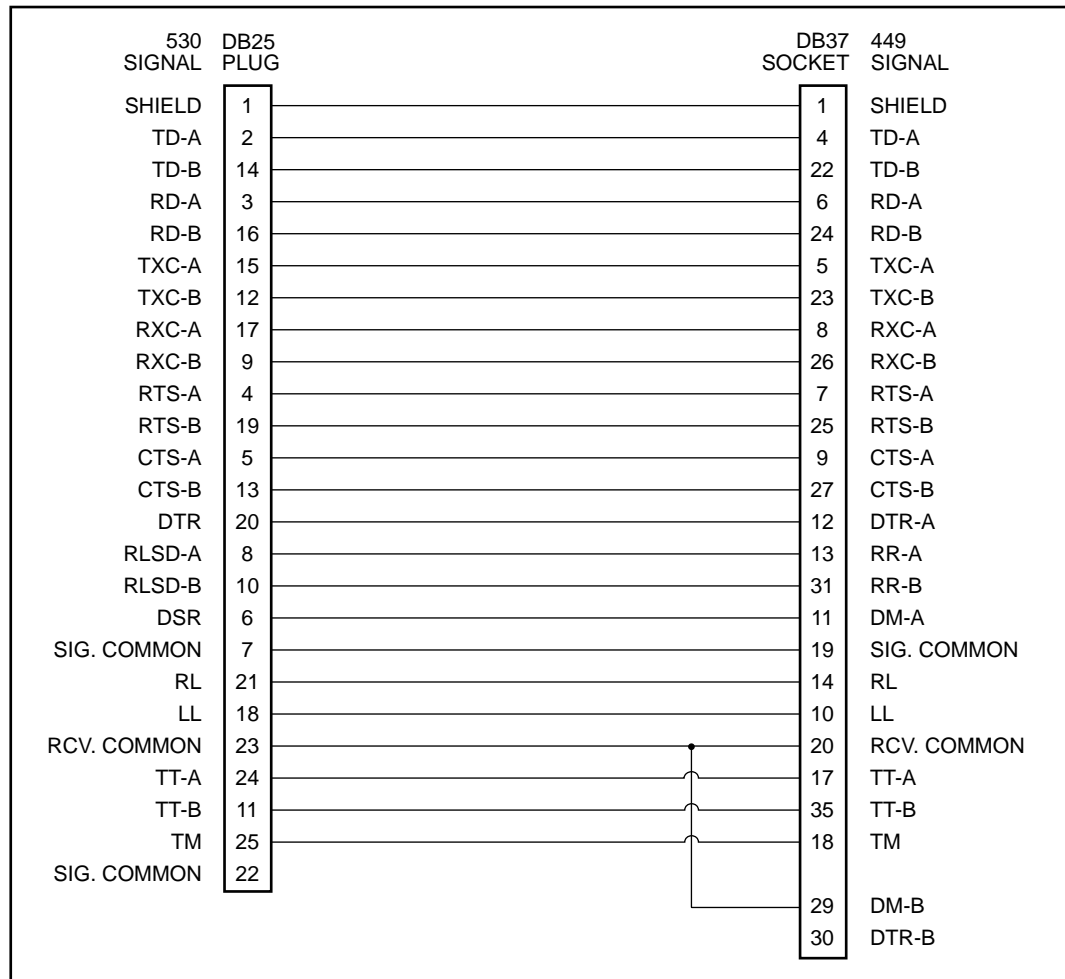
495-14323-01

Figure D-7.   EIA-530-A-to-RS-449 Adapter

Table D-5.   RS-449 Cable Interface

Signal	Circuit Mnemonic	CCITT Number	Direction	Pin
Shield	—	—	—	1
Signal Ground	SG	102A	—	19
Receive Ground	RC	102B	—	20
Send Common	SC	—	—	37
Send Data	SD	103	To DSU/CSU	4 (A) 22 (B)
Receive Data	RD	104	From DSU/CSU	6 (A) 24 (B)
Request-to-Send	RS	105	To DSU/CSU	7 (A) 25 (B)
Clear-to-Send	CS	106	From DSU/CSU	9 (A) 27 (B)
Receiver Ready	RR	109	From DSU/CSU	13 (A) 31 (B)
Data Mode	DM	107	From DSU/CSU	11 (A) 29 (B)
Terminal Ready	TR	108/1, /2	To DSU/CSU	12 (A) 30 (B)
Terminal Timing	TT	113	To DSU/CSU	17 (A) 35 (B)
Send Timing	ST	114	From DSU/CSU	5 (A) 23 (B)
Receive Timing	RT	115	From DSU/CSU	8 (A) 26 (B)
Local Loopback	LL	141	To DSU/CSU	10
Remote Loopback	RL	140	To DSU/CSU	14
Test Mode	TM	142	From DSU/CSU	18

EIA-530-A-to-V.35 Adapter

The EIA-530-A-to-V.35 adapter (Figure D-8) provides the V.35 interface shown in Table D-6.
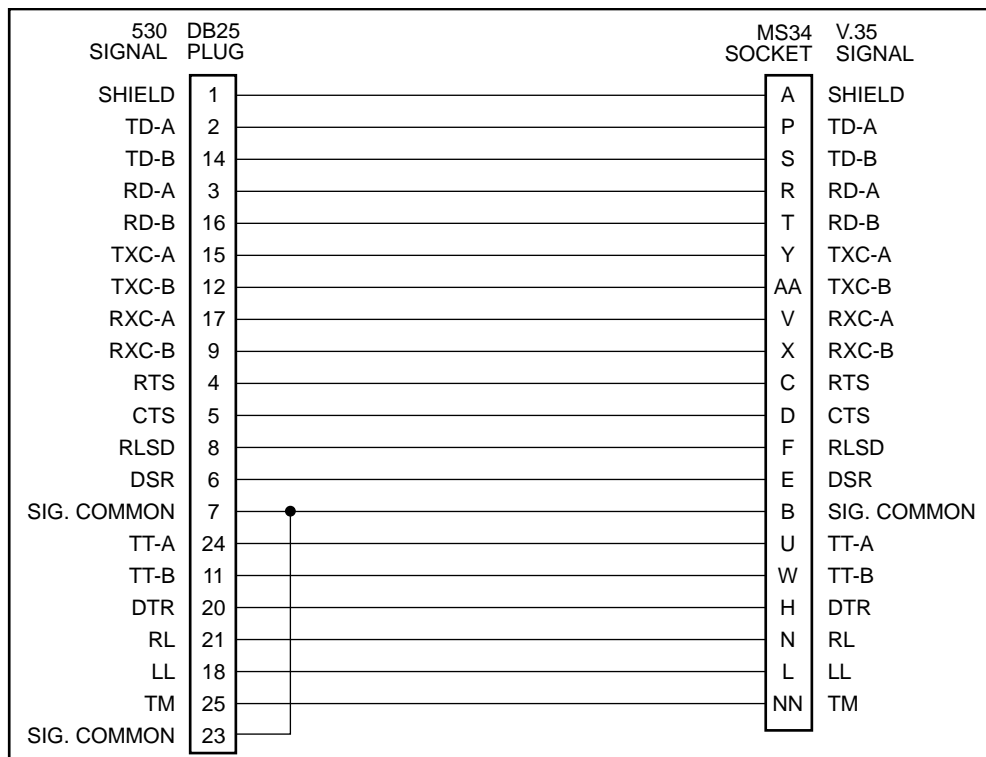
497-15233

Figure D-8.   EIA-530-A-to-V.35 Adapter

Table D-6. V.35 Cable Interface

Signal	CCITT Number	Direction	Pin
Shield	—	—	A
Signal Common	102	—	B
Transmitted Data	103	To DSU/CSU	P (A) S (B)
Received Data	104	From DSU/CSU	R (A) T (B)
Request to Send	105	To DSU/CSU	C
Clear to Send	106	From DSU/CSU	D
Data Channel Received Line Signal Detector	109	From DSU/CSU	F
Data Set Ready	107	From DSU/CSU	E
Data Terminal Ready	108/1, /2	To DSU/CSU	H
Transmit Signal Element Timing (DTE Source)	113	To DSU/CSU	U (A) W (B)
Transmit Signal Element Timing (DCE Source)	114	From DSU/CSU	Y (A) AA (B)
Receiver Signal Element Timing (DCE Source)	115	From DSU/CSU	V (A) X (B)
Local Loopback	141	To DSU/CSU	L
Loopback/Maintenance	140	To DSU/CSU	N
Test Indicator	142	From DSU/CSU	NN

EIA-530-A-to-X.21 Adapter

The EIA-530-A-to-X.21 adapter (Figure D-9) provides the X.21 interface shown in Table D-7.
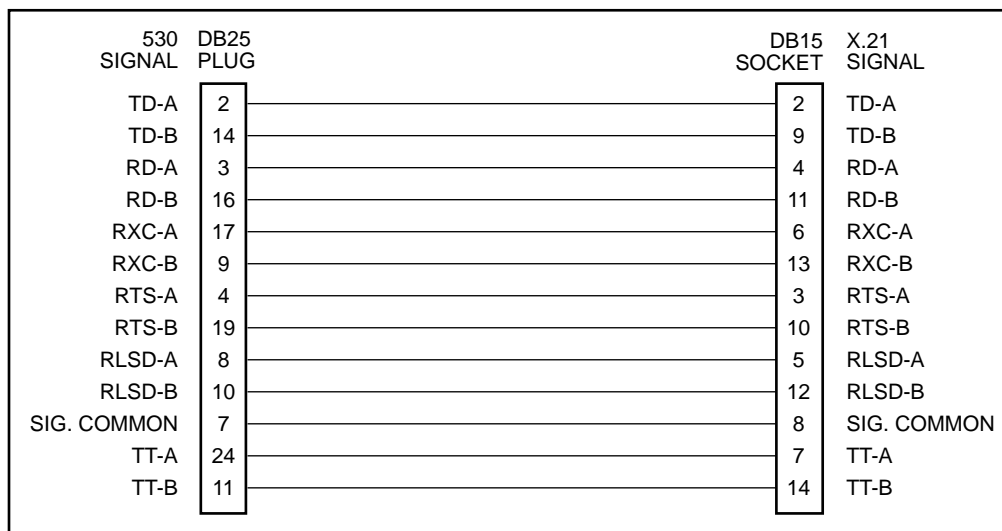
495-14787

Figure D-9.   EIA-530-A-to-X.21 Adapter

Table D-7.   X.21 Cable Interface

Signal	CCITT Number	Direction	Pin
Signal Common	102	—	8
Transmitted Data	103	To DSU/CSU	2 (A) 9 (B)
Received Data	104	From DSU/CSU	4 (A) 11 (B)
Request-to-Send	105	To DSU/CSU	3 (A) 10 (B)
Data Channel Received Line Signal Detector	109	From DSU/CSU	5 (A) 12 (B)
Transmit Signal Element Timing (DTE Source)	113	To DSU/CSU	7 (A) 14 (B)
Receiver Signal Element Timing (DCE Source)	115	From DSU/CSU	6 (A) 13 (B)

External Clock Interface

The External Clock connector pinouts are in Table D-8.

Table D-8.   External Clock Connector

Signal	Pin Number
Shield	1
Clock (+) (RS-422 only)	2
Clock (–) (RS-422 only)	3
Clock In (RS-423 only)	9
Signal Common	11

SNMP MIB Objects

E

Overview

This appendix describes the Management Information Base (MIB) objects that are supported by the DSU/CSU.

The DSU/CSU supports the following MIBs:

- **MIB II** – Defines the general objects for use in Transmission Control Protocol/Internet Protocol (TCP/IP) internets and provides general information about the DSU/CSU.

- **DS1/E1 MIB** – Defines objects for managing DS1 interfaces and supports the network and DTE Drop/Insert (DSX-1) interfaces on the DSU/CSU.

- **RS-232-like MIB** – Defines objects for managing RS-232-type interfaces and supports synchronous data ports (PORTs 1–2) and management communication (COM) port on the DSU/CSU.

- **Generic-Interface MIB Extension** – An extension to MIB II that defines additional objects for control of generic interfaces in MIB II. It supports control of tests on the DTE Drop/Insert (DSX-1) and synchronous data interfaces that are not supported by other MIBs.

- **Enterprise MIB** – Defines objects unique to devices like the Model 3162.

MIB II (RFC 1213)

The objects defined by MIB II are organized into 10 different groups. The DSU/CSU implements only those groups where the semantics of the group are applicable to the implementation of a DSU/CSU. The MIB II object groups supported or not supported by the 3100 Series devices are as follows:

System Group	Supported.
Interface Group	Supported for the network interface, the DTE Drop/Insert (DSX-1) interface, the synchronous data ports, and the COM port. Interface statistics (counters) apply to the COM port when it is defined as the SNMP management link.

Address Translation Group	Not supported since this group is not supported in MIB II.
IP Group	Supported.
ICMP Group	Supported.
TCP Group	Supported.
UDP Group	Supported.
EGP Group	Not supported since the EGP protocol is not supported by the DSU/CSU.
Transmission Group	Supported on the T1 interfaces using the DS1/E1 MIB. Supported on the synchronous data ports using the RS-232-like MIB. Supported on the COM port using the RS-232-like MIB.
SNMP Group	Supported.

System Group, MIB II

The System Group objects are fully supported by the DSU/CSU. The following sections provide clarification for objects contained in the System Group where it is not otherwise clear how the object definition in MIB II is related to the DSU/CSU. Objects not mentioned are supported as stated in the MIB.

System Group – "sysDescr" Object (system 1)

This object provides the full name and version identification for the system hardware and software. This object displays the following string:

[*Company Name*] T1 DSU/CSU; model *xxxx-xx-xxx*; S/W Release: *yy.yy.yy*; H/W CCA: *zzzz-zzz*; Serial number: *ssssssss.*

 Where: *xxxx-xx-xxx* represents the full model number of the unit.

    yy.yy.yy represents the software revision number of the unit.

    zzzz-zzz represents the hardware revision number of the unit.

    ssssssss represents the serial number of the unit.

System Group – "sysObjectID" Object (system 2)

This object provides the authoritative identification of the network management subsystem contained in the unit.

This object displays the following object identifier:

3162   [*Company OID*].1.14.2.2.7

System group –"sysContact" Object (system 4)

This object provides a textual identification of the contact person for this managed node.

System Group – "sysName" Object (system 5)

This object provides an administratively-assigned name for this managed node.

System Group – "sysLocation" Object (system 6)

This object provides the physical location of this node.

System Group – "sysServices" Object (system 7)

This object provides a value which indicates the set of services that are potentially offered by the DSU/CSU. Only the following values are supported.

■ physical(1) – Layer 1 functionality for all interfaces.

■ datalink/subnetwork(2) – Layer 2 functionality (SLIP, PPP) for the COM port.

■ internet(4) – Layer 3 functionality (IP) for all management links.

■ end-to-end(8) – Layer 4 functionality (UDP) for all management links.

Therefore, set this object to 15 (the sum of 1 + 2 + 4 + 8).

Interface Group, MIB II

The Interfaces Group consists of an object indicating the number of interfaces supported by the unit and an interface table containing an entry for each interface. The DSU/CSU provides an entry in the interface table for the network interface, the DTE Drop/Insert (DSX-1) interface, each of the synchronous data ports (1 or 2), the COM port. The following sections provide clarification for objects contained in the Interface Group where it is not clear how the object definition in MIB II is related to the DSU/CSU.

Interface Group – "ifNumber" Object (interfaces 1)

This variable contains the maximum number of MIB II supported interfaces possible across the 31xx Series product line (9). This is different from the MIB description, which is defined as the number of interfaces on the particular device. This change allows the use of the same ifIndexes across all 31xx Series models.

Interface Group – "ifIndex" Object (ifEntry 1)

This object provides the index into the ifTable and typically into tables in other MIBs also. The values of the ifIndex object do not vary between models even though not all indexes are supported for a particular model. When an unsupported index is accessed, "noSuchName" is returned.

The following are the values of the ifIndexes for all DSU/CSU models:

- 1–Net T1

- 2–DTE T1

- 3–COM port

- 4–Modem port

- 5–Auxiliary RS-232 port

- 6–DCE port 1

- 7–DCE port 2

- 8–DCE port 3

- 9–DCE port 4

The supported ifIndexes for the 3162 DSU/CSU are:

- Net T1

- DTE T1

- COM port

- DCE port 1

- DCE port 2

Interface Group – "ifDescr" Object (ifEntry 2)

This object provides information about the interface. Each interface displays a text string as shown below:

Network T1:	"Network T1. [*Company Name*] T1 DSU/CSU, Hardware Version: [CCA number]".
DTE T1:	"DTE T1. [*Company Name*] T1 DSU/CSU, Hardware Version: [CCA number]".
COM:	"COM port. [*Company Name*] T1 DSU/CSU, Hardware Version: [CCA number]".
Data Ports:	"Data Port n. [*Company Name*] T1 DSU/CSU, Hardware Version: [CCA number]" (where *n* is 1 or 2).

Interface Group – "ifType" Object (ifEntry 3)

This object identifies the type of the interface based on the physical/link protocol(s) immediately below the network layer. Only the following values are supported by the DSU/CSU:

■ ds1 – Used for the network and DTE Drop/Insert (DSX-1) interfaces.

■ propPointToPointSerial(22) – Used for the synchronous data ports. Used for the COM port when the port is not configured as the SNMP management interface.

■ ppp(23) – Used for the COM port when the port is configured for PPP.

■ slip(28) – Used for the COM port when the port is configured for SLIP.

Interface Group – "ifMtu" Object (ifEntry 4)

This object identifies the largest datagram that can be sent or received on the interface. It is applicable only to the interface configured as the SNMP management link. This object is zero for all other interfaces.

Interface Group – "ifSpeed" Object (ifEntry 5)

This object provides the interface's current bandwidth in bits per second. The value of this object for each interface is specified as follows:

T1 Interfaces:	1,544,000 bps.
COM:	The currently configured data rate for the port.
Data Ports:	The currently configured data rate for the port when the port is allocated to one of the T1 interfaces. If the port is not allocated the data rate is defined as zero.

Interface Group – "ifAdminStatus" Object (ifEntry 7)

This object specifies the desired state (configuration) of the interface. This object is supported only for the COM port. It provides the ability to switch between using the port for SNMP or ASCII operations (dial-out, front panel emulation). The value of this object will not affect the state of any of the interfaces on the DSU/CSU other than the COM port. Only the following values are supported by the DSU/CSU:

■ up(1) – The SNMP management link is active on the COM port.

■ testing(3) – The SNMP management link is inactive on the COM port; the COM port can be used for proprietary ASCII functions.

Interface Group – "ifOperStatus" Object (ifEntry 8)

This object specifies the current operational state of the interface. The value of this object for each interface is defined as follows:

Network T1: The interface is up(1) when no alarm conditions exist.

The interface is down(2) when an alarm condition is active.

The interface is testing(3) when a test is active on the interface.

DTE T1: The interface is up(1) when no alarm conditions exist and the interface is enabled.

The interface is down(2) when an alarm condition is active and the interface is disabled.

The interface is testing(3) when a test is active on the interface.

COM Port: When configured as an SNMP management link, up and down are based on the current state of the link layer protocol. Otherwise, the interface is always up(1).

The interface is never in the testing(3) state.

Data Ports: The interface is up(1) when the port is assigned to a T1 interface or another data port as a backup, and both CTS and DSR are ON.

The interface is down(2) when the port is unassigned, or either CTS or DSR is OFF.

The interface is testing(3) when a test is active on the interface.

Interface Group – "ifLastChange" Object (ifEntry 9)

This object contains the value of "sysUpTime" at the time the interface entered its current operational state.

Interface Group – Input Counters (objects ifEntry 10 to ifEntry 15)

These objects collect statistics on the data received by the COM port when it is configured as an SNMP management link. If it is not configured as an SNMP management link, these statistics are not provided and an error status is returned if access is attempted. The objects used to collect input statistics are listed below:

- ifInOctets (ifEntry 10)

- ifInUcastPkts (ifEntry 11)

- ifInNUcastPkts (ifEntry 12)

- ifInDiscards (ifEntry 13)

- ifInErrors (ifEntry 14)

- ifInUnknownProtos (ifEntry 15)

Interface Group – Output Counters (objects ifEntry 16 to ifEntry 21)

These objects collect statistics on the data received by the COM port when it is configured as an SNMP management link. If it is not configured as an SNMP management link, these statistics are not provided and an error status is returned if access is attempted. The objects used to collect output statistics are listed below:

- ifOutOctets (ifEntry 16)

- ifOutUcastPkts (ifEntry 17)

- ifOutNUcastPkts (ifEntry 18)

- ifOutDiscards (ifEntry 19)

- ifOutErrors (ifEntry 20)

- ifOutQLen (ifEntry 21)

IP Group, MIB II

The IP Group objects are supported by the DSU/CSU for all data paths which currently are configured to carry IP data to or from the DSU/CSU, including the COM port, EDL, and FDL. All of the objects in the IP Group other than the IP Address Translation table are fully supported. The IP Address Translation table (ipNetToMediaTable) does not apply to the DSU/CSU and will be empty (i.e., have zero entries). The following sections provide clarification for objects contained in the IP Group when it is not clear how the object definition in MIB II is related to the DSU/CSU.

IP Group – "ipForwarding" Object (ip 1)

This object specifies whether the unit is acting as an IP gateway in respect to the forwarding of a datagram received by, but not addressed to, this unit. Only the following value is supported by the DSU/CSU.

- forwarding(1) – The unit is acting as a gateway.

IP Group – "ipAddrTable" Object (ip 20)

The address table is supported by the DSU/CSU.

IP Group – "ipAdEntAddr" Object (ipAddrEntry 1)

The ipAdEntAddr object is an IP address supported by the device and serves as the index to the address table. Since indexes for tables must be unique, only one ifIndex may be displayed for each IP address supported by the device. If you have configured the same IP address for multiple interfaces or for default IP addresses, you will not see all interfaces that support a particular IP address upon display of the ipAddrTable.

IP Group – "ipAdEntIfIndex" Object (ipAddrEntry 2)

For some address table entries, the ipAdEntIfIndex object may have a value greater than ifNumber. In these cases, the ipAdEntIfIndex refers to a proprietary interface which is not currently implemented by the interface group of MIB II.

IP Group – "ipRouteTable" Object (ip 21)

The routing table used by the DSU/CSU is supported as a read/write table. Entries in this table may be added, deleted, or changed. You should exercise great caution when adding or modifying routes in the ipRoutingTable. In general, it should not be necessary to add or modify routes in the DSU/CSU. In those cases where it is deemed necessary, the routes should only be added to the connected device (i.e., the device closest to the destination). Internal routing mechanisms will propagate the route to the other devices.

An existing route may be effectively deleted by setting the ipRouteType object to "invalid" for the entry to be deleted. An existing route may be modified by changing fields in the desired entry (indexed by ipRouteDest) of the routing table. A new route may be added by specifying values for a table entry for which the index ("ipRouteDest") does not already exist.

To add a route using an SNMP set, you must specify a group of minimal objects. These variable bindings must be contained in a single Protocol Data Unit (PDU). The objects are described in more detail in the following sections. The minimal set consists of:

- ipRouteDest
- ipRouteIfIndex

The following objects are defaulted if not specified in the set PDU used to add a route.

- ipRouteMetric1 – Defaulted to 1 hop.

- ipRouteMetric2 – Defaulted to –1 for standalone devices.

- ipRouteType – Defaulted to indirect.

- ipRouteMask – Defaulted as specified in the MIB description.

The following objects are unused in the DSU/CSU and setting them will have no effect on the operation of the IP implementation.

- ipRouteMetric3, ipRouteMetric4, ipRouteMetric5 – Defaulted to –1 as specified in the MIB.

- ipRouteNextHop – Defaulted to 0.0.0.0.

The following read-only objects must not be specified in the set PDU used to add a route.

- ipRouteProto – Set to netmgmt(3) by software.

- ipRouteAge – Defaulted to 999.

- ipRouteInfo – Set to OBJECT IDENTIFIER {0, 0} since it is unused.

IP Group – "ipRouteDest" Object (ipRouteEntry 1)

The ipRouteDest object serves as the index to the routing table. Since indexes for tables must be unique, only one route per destination may appear in the table. To ensure that no duplicate destinations appear in the routing table, the ipRouteDest object of the ipRouteTable will be treated as described in RFC 1354 (IP Forwarding Table MIB):

"The destination IP address of this route. An entry with a value of 0.0.0.0 is considered a default route. This object may not take a Multicast (Class D) address value. Any assignment (implicit or otherwise) of an instance of this object to a value x must be rejected if the bitwise logical–AND of x with the value of the corresponding instance of the ipForwardMask object is not equal to x."

IP Group – "ipRouteIfIndex" Object (ipRouteEntry 1)

When the routing table is displayed, the ipRouteIfIndex object for some entries may have a value greater than ifNumber. In these cases, the ipRouteIfIndex refers to a proprietary interface which is not currently implemented by the interface group of MIB II. Route entries with an unrecognized ipRouteIfIndex value should not be deleted.

When setting this object via SNMP, the ipRouteIfIndex value can only assume an appropriate value of ifIndex defined for the particular device type.

IP Group – "ipRouteMetric2" Object (ipRouteEntry 4)

For standalone devices, ipRouteMetric2 is not used and contains –1.

When adding a route to the routing table using SNMP, do not specify a value for ipRouteMetric2.

IP Group – "ipRouteProto" Object (ipRouteEntry 9)

This object is a read-only object and may have the following values in the DSU/CSU.

- other(1) – Temporary route added by IP.

- local(2) – Route added or modified as a result of user configuration via the front panel.

- netmgmt(3) – Route added or modified by means of an SNMP set.

- icmp(4) – Route added or modified by Internet Control Management Protocol (ICMP).

- rip(8) – Route added or modified by Routing Information Protocol (RIP) or similar proprietary protocol.

IP Group – "ipRouteAge" Object (ipRouteEntry 10)

This object is implemented as a read-only object in the DSU/CSU. In the DSU/CSU, it reflects the value of the route's time-to-live (in seconds). When displays, a value of 999 represents a route that is retained permanently. For temporary routes, the ipRouteAge object decrements over time. All routes added via an SNMP set of the ipRouteTable are considered permanent routes. These routes do not age, but will remain unless deleted via SNMP.

ICMP Group, MIB II

The ICMP Group objects are fully supported by the DSU/CSU.

TCP Group, MIB II

The TCP Group objects are fully supported by the DSU/CSU, with the exception of the tcpConnState object, which will be read-only.

UDP Group, MIB II

The User Datagram Protocol (UDP) Group objects are fully supported by the DSU/CSU.

Transmission Group, MIB II

Objects in the transmission group are supported on the network and DTE Drop/Insert (DSX-1) interfaces, the COM port, and the synchronous data ports. The objects in the transmission group are not defined within MIB II, but rather through other Internet standard MIB definitions. The following two transmission group objects are supported by the DSU/CSU.

- ds1 (transmission 18) – The transmission object supported on the T1 interfaces.

- rs232 (transmission 33) – The transmission object supported on the synchronous data ports and the COM port.

The "ds1" transmission object is defined by the DS1/E1 MIB. The rs232 transmission object is defined by the RS-232-like MIB.

SNMP Group, MIB II

The SNMP Group objects that apply to a management agent are fully supported by the DSU/CSU. The following objects apply only to an NMS and return a zero value if accessed.

- snmpInTooBigs (snmp 8)

- snmpInNoSuchNames (snmp 9)

- snmpInBadValues (snmp 10)

- snmpInReadOnlys (snmp 11)

- snmpInGenErrs (snmp 12)

- snmpInGetResponses (snmp 18)

- snmpInTraps (snmp19)

- snmpOutGetRequests (snmp 25)

- snmpOutGetNexts (snmp 26)

- snmpOutSetRequests (snmp 27)

DS1/E1 MIB (RFC 1406)

The "ds1" object defined by RFC 1406 is supported for both the network and DTE Drop/Insert (DSX-1) interfaces. The DS1 Near End Group and DS1 Fractional Group are supported for both interfaces. The DS1 Far End Group is not supported.

Near End Group, DS1/E1 MIB

The DS1 Near End Group consists of the following four tables:

- DS1 Configuration
- DS1 Current
- DS1 Interval
- DS1 Total

All four tables are fully supported for the network interface. Since statistics are not kept for the DTE Drop/Insert (DSX-1) interface, only the DS1 Configuration table is fully supported. The "statistic" objects for the DTE Drop/Insert (DSX-1) interface entry in the DS1 Current, DS1 Interval, and DS1 Total tables are always zero (null). The following sections provide clarification for objects contained in the Near End Group when it is not clear how the object definition in the DS1/E1 MIB is related to the DSU/CSU.

Near End Group – "dsx1TimeElapsed" Object (dsx1ConfigEntry 3)

Applies to the network interface only. An error status is returned if access is attempted for the DTE Drop/Insert (DSX-1) interface.

Near End Group – "dsx1ValidIntervals" Object (dsx1ConfigEntry 4)

Applies to the network interface only. An error status is returned if access is attempted for the DTE Drop/Insert (DSX-1) interface.

Near End Group – "dsx1LineType" Object (dsx1ConfigEntry 5)

This object corresponds to the NET Framing/DTE Framing configuration options for the T1 interfaces on the DSU/CSU. Only the following values are supported by the DSU/CSU.

- dsx1ESF(2) – Indicates ESF framing.
- dsx1D4(2) – Indicates D4 framing.

Near End Group – "dsx1LineCoding" Object (dsx1ConfigEntry 6)

This object corresponds to the NET Coding/DTE Coding configuration options for the T1 interfaces on the DSU/CSU. Only the following values are supported by the DSU/CSU.

- dsx1B8ZS(2) – Indicates B8ZS line coding.
- dsx1AMI(5) – Indicates AMI line coding.

Near End Group – "dsx1SendCode" Object (dsx1ConfigEntry 7)

This object specifies the test patterns/codes being sent over the network interface. These tests are not supported on the DTE Drop/Insert (DSX-1) interface. Only the following values are supported by the DSU/CSU.

- dsx1SendNoCode(1) – Specifies that the interface is sending normal or looped data. Setting the interface to this value stops an active "send pattern" test on the interface. This is the only value supported by the DTE Drop/Insert (DSX-1) interface.

- dsx1SendLineCode(2) – Specifies that the network interface is sending a Remote Loopback (Rlpbk) LLBUP code. The code is sent for 10 seconds.

- dsx1SendResetCode(4) – Specifies that the network interface is sending Remote Loopback (Rlpbk) LLBDN code. The code is sent for 10 seconds.

- dsx1SendQRS(5) – Specifies that the network interface is sending a QRSS test pattern. The pattern is sent until the test is halted (i.e., setting to dsx1SendNoCode).

- dsx1SendOtherTestPattern(8) – Specifies that the network interface is sending a 1-in-8 test pattern. The pattern is sent until the test is halted (i.e., setting to dsx1SendNoCode).

Near End Group – "dsx1CircuitIdentifier" Object (dsx1ConfigEntry 8)

This object is only supported on the Net T1 Interface.

Near End Group – "dsx1LoopbackConfig" Object (dsx1ConfigEntry 9)

This object specifies the loopback state of the T1 interfaces. Only the following values are supported by the DSU/CSU.

- dsx1NoLoop(1) – The T1 interface is not in a loopback state.

- dsx1PayloadLoop(2) – Specifies that a Payload Loopback (PLB) is active for the network interface or a Repeater Loopback (RLB) is active for the DTE Drop/Insert (DSX-1) interface.

- dsx1LineLoop(3) – Specifies that a Line Loopback (LLB) is active for the network interface or a DTE Loopback (DLB) is active for the DTE Drop/Insert (DSX-1) interface.

Near End Group – "dsx1LineStatus" Object (dsx1ConfigEntry 10)

This object specifies the line (alarm) status of the T1 interfaces. Only the following values are supported by the DSU/CSU. More than one value may be active at a time.

- dsx1NoAlarm(1) – No alarm present.

- dsx1RcvFarEndLOF(2) – A yellow alarm signal is being received.

- dsx1RcvAIS(8) – An Alarm Indication Signal (AIS) is being received.

- dsx1LossOfFrame(32) – An Out Of Frame condition has persisted for more that 2.5 seconds (i.e., Red Alarm).

- dsx1LossOfSignal(64) – A Loss of Signal condition has persisted for more that 2.5 seconds (i.e., Red Alarm).

- dsx1LoopbackState(128) – The near end of the T1 interface is in a loopback state.

- dsx1Other Failure(4096) – An Excessive Error Rate (EER) has been detected on the network interface.

Near End Group – "dsx1SignalMode" Object (dsx1ConfigEntry 11)

This object specifies whether Robbed Bit Signaling (RBS) is being used. This object differs from the MIB definition in that it is "read-only" (not read/write) for DSU/CSUs. Only the following values are supported by the DSU/CSU.

- none(1) – No signaling is being used on this interface.

- robbedBit(2) – Robbed Bit Signaling is being used on at least one DS0 on this T1 interface.

Near End Group – "dsx1TransmitClockSource" Object (dsx1ConfigEntry 12)

This object specifies the timing source for the transmit clock for this T1 interface. This object differs from the MIB definition in that it is "read-only" (not read/write) for DSU/CSUs. Only the following values are supported by the DSU/CSU.

- loopTiming(1) – The recovered receive clock is being used as the transmit clock.

- localTiming(2) – The DSU/CSU's internal clock is used being as the transmit clock.

- ThroughTiming(3) – The recovered receive clock from another interface (e.g., T1, Port, or External) is being used as the transmit clock.

Near End Group – "dsx1Fdl" Object (dsx1ConfigEntry 13)

This object specifies how Facility Data Link is being used. Only the following values are supported by the DSU/CSU. More than one value may be active at a time.

- dsx1other(1) – SNMP data is being sent over FDL.

- dsx1Ansi-T1-403(2) – ANSI PRMs are supported on the network interface as specified by ANSI T1.403.

- dsx1Att-54016(4) – FDL supports the requirements specified by AT&T publication TR54016.

- dsx1Fdl-none(8) – Indicates that the device does not use FDL. This is the only value that applies to the DTE Drop/Insert (DSX-1) interface.

Near End Group – The DS1 Current Table Objects (dsx1CurrentEntry)

The following DS1 current table objects are provided for the network interface only. Objects in the table that are not listed are not supported and will return an error status if access is attempted.

- dsx1CurrentIndex – The index that identifies the T1 interface.

- dsx1CurrentESs – Errored Seconds for the current interval.

- dsx1Current SESs – Severely Errored Seconds for the current interval.

- dsx1CurrentUASs – Unavailable Seconds for the current interval.

- dsx1CurrentCSSs – Controlled Slip Seconds for the current interval.

- dsx1CurrentBESs – Bursty Errored Seconds for the current interval.

Near End Group – The DS1 Interval Table Objects (dsx1IntervalEntry)

The following DS1 interval table objects are provided for the network interface only. Objects in the table that are not listed are not supported and will return an error status if access is attempted.

- dsx1IntervalIndex – The index that identifies the T1 interface.

- dsx1IntervalNumber – The interval number (1 to 96).

- dsx1IntervalESs – Errored Seconds for the interval.

- dsx1Interval SESs – Severely Errored Seconds for the interval.

- dsx1IntervalUASs – Unavailable Seconds for the interval.

- dsx1IntervalCSSs – Controlled Slip Seconds for the interval.

- dsx1Interval BESs – Bursty Errored Seconds for the interval.

Near End Group – The DS1 Total Table Objects (dsx1TotalEntry)

The following DS1 total table objects are provided for the network interface only. Objects in the table that are not listed are not supported and will return an error status if access is attempted.

- dsx1TotalIndex – The index that identifies the T1 interface.

- dsx1TotalESs – The 24-hour total Errored Seconds.

- dsx1Total SESs – The 24-hour total Severely Errored Seconds.

- dsx1TotalUASs – The 24-hour total Unavailable Seconds.

- dsx1TotalCSSs – The 24-hour total Controlled Slip Seconds.

- dsx1TotalBESs – The 24-hour total Bursty Errored Seconds.

Far End Group, DS1/E1 MIB

The DS1 Far End Group consists of the following three tables:

- DS1 Far End Current

- DS1 Far End Interval

- DS1 Far End Total

These tables are not supported for either the network or DTE Drop/Insert (DSX-1) interface.

DS1 Fractional Group, DS1/E1 MIB

The DS1 Fractional Group consists of the DS1 fractional table. This table (dsx1FracTable) is fully supported by the DSU/CSU and allows channel (time slots) to be mapped between the T1 interfaces and data ports. If an invalid channel map (e.g., two interfaces mapped to a single time slot, one interface mapped to two T1s, etc.) is received, an error will be returned to the SNMP manager. The DSU/CSU will validate all channel configurations before applying them.

Operational Note: The fractional T1 group only allows specification of an entire interface to a particular time slot on another interface (i.e., a time slot on one interface cannot be mapped to a time slot on another interface). This prevents complete mapping of time slots on the DTE Drop/Insert (DSX-1) interface to time slots on the network interface. For mapping time slots between the network and DTE T1 interfaces, the following convention is used: Time slots on the T1 interface that are mapped to another T1 interface (i.e., not a data port) are connected in ascending order. For example, if the fractional table for the network interface maps time slots 1, 3 and 5 to the DTE T1 interface and the DTE T1 interface maps time slots 10, 11 and 15 to the network the following time slots will be connected: N1 to D10, N3 to D11 and N5 to D15.

RS-232-like MIB (RFC 1317)

The "rs232" object defined by RFC 1317 is supported for the synchronous data ports and the COM port. The RS-232-like MIB consists of one object and five tables, as follows:

- Number of RS-232-like ports

- The General Port Table

- The Asynchronous Port Table

- The Synchronous Port Table

- The Input Signal Table

- The Output Signal Table

The Asynchronous Port table is not supported by the DSU/CSU for the synchronous data ports. The Input Signal and Output Signal tables are not supported for the COM port. The following sections provide clarification for objects contained in the RS-232-like MIB when it is not clear how the object definition in MIB is related to the DSU/CSU.

Number of Ports – "rs232Number" Object (rs232 1)

This object contains the number of ports in the RS-232-like general port table. This number is 3 for the 3162.

General Port Table, RS-232-like MIB

The general port table contains general configuration objects for the RS-232-like interfaces.

General Port Table – "rs232PortIndex" Object (rs232PortEntry 1)

This object contains a unique value for each port and is used as an index into the general port table (rs232PortTable). The values of the rs232PortIndex object vary between models and are listed below.

The values of rs232PortIndex for the 3162 DSU/CSU are:

- 1 – COM port

- 4 – DCE port 1

- 5 – DCE port 2

General Port Table – "rs232PortType" Object (rs232PortEntry 2)

This object is used to identify the port's hardware type. Only the following values are supported by the DSU/CSU.

- rs232(2) – Used to identify the COM port.

- rs422(3) – Used to identify synchronous data ports that are configured as EIA-530-A or RS-449.

- V35(5) – Used to identify synchronous data ports that are configured as V.35.

General Port Table – "rs232PortInSigNumber" Object (rs232PortEntry 3)

This object contains the number of input signals contained in the input signal table. This is the number of signals that can be detected. This number is 2 for the synchronous data ports and 0 for the COM port.

General Port Table – "rs232PortOutSigNumber" Object (rs232PortEntry 4)

This object contains the number of output signals contained in the output signal table. This is the number of signals that can be asserted. This number is 2 for the synchronous data ports and 0 for the COM port.

General Port Table – "rs232PortInSpeed" Object (rs232PortEntry 5)

This object contains the port's input speed in bits per second. For the DSU/CSU, the rs232PortInSpeed object has the same value as the rs232PortOutSpeed object. The input speed of a synchronous data port is determined by the channel configuration and cannot be changed through this object. Thus, for the synchronous data ports, this object is read-only. The input speed of the COM port is the currently configured speed. Setting of this value for the COM port causes the configured port speed to be changed.

General Port Table – "rs232PortOutSpeed" Object (rs232PortEntry 6)

This object contains the port's output speed in bits per second. For the DSU/CSU, the rs232PortInSpeed object has the same value as the rs232PortOutSpeed object. The input speed of a synchronous data port is determined by the channel configuration and cannot be changed through this object. Thus, for the synchronous data ports, this object is read-only. The input speed of the COM port is the currently configured speed. Setting of this value for the COM port causes the configured port speed to be changed.

Asynchronous Port Table, RS-232-like MIB

The asynchronous port table contains an entry for the COM port when the port is configured for asynchronous operation. For the DSU/CSU, the entries in the table that are counters (rs232AsyncPortEntry 6–8) are used to collect statistics and are not supported.

Asynchronous Port Table, "rs232AsyncPortBits" (rs232AsyncPortEntry 2)

This object specifies the number of bits in a character. Only the following values are supported by the DSU/CSU.

- 7 – 7-bit characters. Supported on the COM port only.

- 8 – 8-bit characters.

Asynchronous Port Table, "rs232AsyncPortStopBits" (rs232AsyncPortEntry 3)

This object specifies the number of stop bits supported. Only the following values are supported by the DSU/CSU.

- one(1) – One stop bit.

- two(2) – Two stop bits. Supported on the COM port only.

- one-and-half(3) – One and a half stop bits. Supported on the COM port only.

Asynchronous Port Table, "rs232AsyncPortParity" (rs232AsyncPortEntry 4)

This object specifies the parity used by the port. Only the following values are supported by the DSU/CSU.

- none(1) – No parity bit.

- odd(2) – Odd parity. Supported on the COM port only.

- even(3) – Even parity. Supported on the COM port only.

Asynchronous Port Table, "rs232AsyncPortAutoBaud" (rs232AsyncPortEntry 5)

This object specifies the ability to automatically sense the input speed of the port. Only the following value is supported by the DSU/CSU.

- disabled(2) – Autobaud is not supported.

Synchronous Port Table, RS-232-like MIB

The synchronous port table contains an entry for each of the synchronous data ports and the COM port when the port is configured for synchronous operation. For the DSU/CSU, the entries in the table that are counters (rs232SyncPortEntry 3–7) are used to collect statistics and are not supported.

Synchronous Port Table – "rs232SyncPortClockSource" (rs232SyncPortEntry 2)

This object specifies the clock source for the port. Only the following values are supported by the DSU/CSU.

- internal(1) – The port uses an internal clock.
- external(2) – The port uses an external clock.

Input Signal Table, RS-232-like MIB

This table contains entries for the input signals that can be detected by the unit for each of the synchronous data ports.

Input Signal Table – "rs232InSigName" (rs232InSigEntry 2)

This object contains the identification of a hardware input signal. Only the following values are supported by the DSU/CSU.

- rts(1) – Request-To-Send.
- dtr(4) – Data Terminal Ready.

Input Signal Table – "rs232InSigState" (rs232InSigEntry 3)

This object contains the current signal state. Only the following values are supported by the DSU/CSU.

- on(2) – The signal is asserted.
- off(3) – The signal is not asserted.

Input Signal Table – "rs232InSigChanges" (rs232InSigEntry 4)

This object is not supported by the DSU/CSU.

Output Signal Table, RS-232-like MIB

This object contains entries for the output signals that can be asserted by the unit for each of the synchronous data ports.

Output Signal Table – "rs232OutSigName" (rs232OutSigEntry 2)

This object contains the identification of a hardware output signal. Only the following values are supported by the DSU/CSU.

- cts(1) – Clear-To-Send.

- dsr(4) – Data Set Ready.

Output Signal Table – "rs232OutSigState" (rs232OutSigEntry 3)

This object contains the current signal state. Only the following values are supported by the DSU/CSU.

- on(2) – The signal is asserted.

- off(3) – The signal is not asserted.

Output Signal Table – "rs232OutSigChanges" (rs232OutSigEntry 4)

This object is not supported by the DSU/CSU.

Generic-Interface MIB Extensions (RFC 1229)

This generic-interface MIB is an experimental MIB that provides extensions to the generic interface group defined in MIB II. This MIB describes three tables:

- Generic Interface Extension Table

- Generic Interface Test Table

- Generic Receive Address Table

Only the generic interface test table is supported by the DSU/CSU. This table is supported for the network interface only.

Generic Interface Test Table, Generic Interface MIB

The test table provides access to additional tests (loopbacks and pattern tests) that are not in the interface group of MIB II.

Generic Interface Test Table – "ifExtnsTestType" Object (ifExtnsTestEntry 4)

This object is a control variable used to start and stop operator-initiated tests on the interface. It provides the capability to:

■ Start/stop the Monitor QRSS test pattern on the network interface.

■ Start/stop the Send QRSS/511 test pattern on a synchronous data port.

■ Start sending a V.54/FT1 UP/DOWN code to the remote unit for a synchronous data port.

■ Start/stop the Monitor QRSS/511 test pattern on a synchronous data port.

■ Start/stop the DCLB/DTLB loopback test on a synchronous data port.

The following object identifiers are used to control the tests on the interface.

■ noTest – Stops the test in progress on the interface.

■ testFullDuplexLoopBack – Initiates a DCLB on the interface. Only supported for the data ports.

■ testLoopDTLB – Initiates a DTLB on the interface. Only supported for the data ports.

■ testMonQRSS – Initiates a Monitor QRSS test on the interface. Supported for the data ports and the network interface.

■ testMon511 – Initiates a Monitor 511 test on the interface. Only supported for the data ports.

■ testSendQRSS – Initiates a Send QRSS test on the interface. Only supported for the data ports.

■ testSend511 – Initiates a send 511 test on the interface. Only supported for the data ports.

■ testSendV54Up – Sends a V54 up code to the remote unit. Only supported for the data ports.

■ testSendV54Down – Sends a V54 down code to the remote unit. Only supported for the data ports.

■ testSendFT1Up – Sends a FT1 up code to the remote unit. Only supported for the data ports.

■ testSendFT1Down – Sends a FT1 down code to the remote unit. Only supported for the data ports.

Where these object identifiers are defined as follows:

- testLoopDTLB – OBJECT IDENTIFIER ::= [wellKnownTests 2]

- testMonQRSS – OBJECT IDENTIFIER ::= [wellKnownTests 3]

- testMon511 – OBJECT IDENTIFIER ::= [wellKnownTests 4]

- testSendQRSS – OBJECT IDENTIFIER ::= [wellKnownTests 5]

- testSend511 – OBJECT IDENTIFIER ::= [wellKnownTests 6]

- testSendV54Up – OBJECT IDENTIFIER ::= [wellKnownTests 7]

- testSendV54Down – OBJECT IDENTIFIER ::= [wellKnownTests 8]

- testSendFT1Up – OBJECT IDENTIFIER ::= [wellKnownTests 9]

- testSendFT1Down – OBJECT IDENTIFIER ::= [wellKnownTests 10]

Generic Interface Test Table – "ifExtnsTestResult" Object (ifExtnsTestEntry 5)

This object contains the result of the most recently requested test. Only the following values are supported by the DSU/CSU.

- none(1) – No test currently active.

- inProgress(3) – A test is currently in progress.

- notSupported(4) – The requested test is not supported.

- unAbleToRun(5) – The requested test cannot run due to the state of the unit.

Generic Interface Test Table – "ifExtnsTestCode" Object (ifExtnsTestEntry 6)

This object contains a code that contains more specific information on the test result. This object is defined as an object identifier. Only the following values are supported by the DSU/CSU.

- none – No further information is available. Used for the send pattern/code and loopback tests.

- inSyncNoBitErrors – A monitor pattern (QRSS or 511) test has synchronized on the pattern and has not detected any bit errors.

- inSyncWithBitErrors – A monitor pattern (QRSS or 511) test has synchronized on the pattern and has detected bit errors.

- notInSync – A monitor pattern (QRSS or 511) test has not synchronized on the requested pattern.

Where these object identifiers are defined as follows:

- wellKnownCodes – OBJECT IDENTIFIER ::= [ifExtensions 5]

- none – OBJECT IDENTIFIER ::= [wellKnownCodes 1]

- inSyncNoBitErrors – OBJECT IDENTIFIER ::= [wellKnownCodes 2]

- inSyncWithBitErrors – OBJECT IDENTIFIER ::= [wellKnownCodes 3]

- notInSync – OBJECT IDENTIFIER ::= [wellKnownCodes 4]

Enterprise MIB

The variable devConfigAreaCopy under the devConfigAreaCopy group in the common area of the Enterprise MIB will be fully supported. This variable allows the entire contents of one configuration area to be copied into another configuration area.

IP Network Addressing Scenario

F

Overview

This appendix describes a means of configuring 31xx Series devices in an Internet Protocol (IP) network to provide SNMP or Telnet connectivity. Since there are many possible network addressing schemes, this appendix describes an addressing scheme for typical customer network management system (NMS) scenarios. This appendix is not intended to be an IP addressing or routing tutorial, and a basic understanding of IP and 31xx Series devices is assumed.

The following notes apply to these scenarios:

■ Connections to remote devices may be via EDL or FDL; however, the FDL is only available on full T1 links (not fractional T1s). Check with the service provider to be sure that the FDL is end-to-end (i.e., not terminated at an intermediate point within the network).

■ Interconnected 31xx Series devices automatically pass routing information between them; however, a static route to the subnet(s) must be set in the routing table of the NMS host. This route uses the 31xx Series device connected to the LAN or the NMS (via a direct PPP or SLIP connection) as a gateway to the subnet(s). In all instances, the addressing scheme presented works for both the LAN and the direct connections.

■ Although routing table entries are maintained automatically by 31xx Series devices, without the need for user configuration, only a maximum of 100 routes is supported for a given device.

■ The choice of a host address within a given subnet is completely arbitrary. Choose any legal host address for a given subnet, without regard to the local or remote devices.

■ Although the default route (to the NMS) is configurable for all devices, only devices that have a direct external connection to an NMS need a default route set.

Standalone at the Central Site

The first scenario (Figure F-1) shows a 3162 DSU/CSU at the central site, with remotes connected via the FDL. In this scenario, all 31xx Series devices are on the same subnet (135.18.1.0). The subnet mask for each device is 255.255.255.00. A static route is set in the NMS host to subnet 135.18.1.0.

ETHERNET

135.18.40.1

135.18.1.2

135.18.1.3

NETWORK

SUBNET 135.18.40.0

135.18.1.4

10 BaseT PORT IP ADDRESS: 135.18.40.2

135.18.1.5

SUBNET 135.18.1.0

135.18.1.1
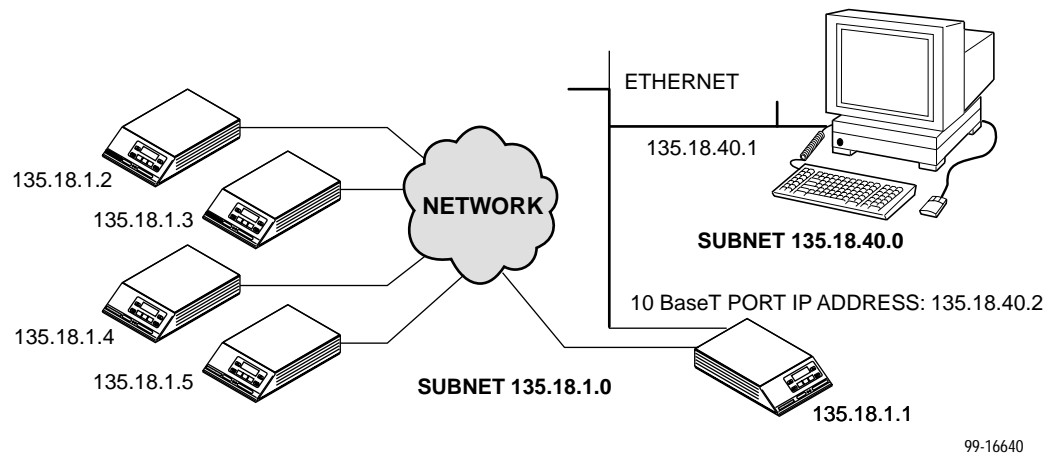
99-16640

Figure F-1.   Standalone at the Central Site

Local Carrier with Remote Standalone

The second scenario (Figure F-2) is a carrier communicating with standalone remotes. All devices are still on the same subnet, and the subnet mask is 255.255.255.00. A static route still must be set in the NMS host to subnet 135.18.2.0.
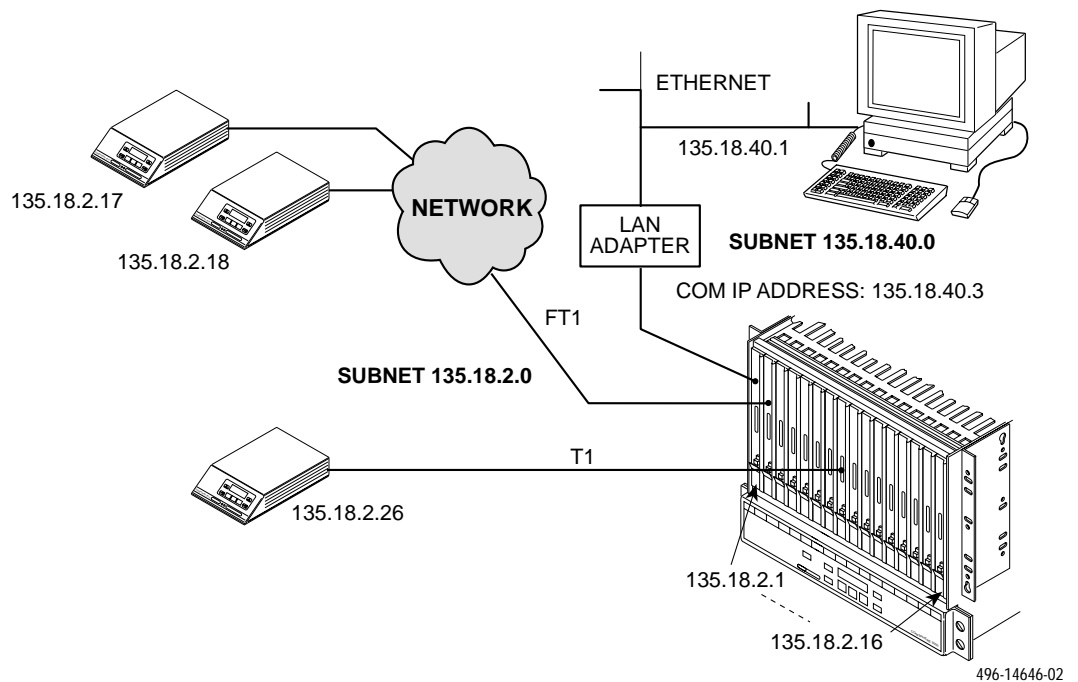
Figure F-2.   Local Carrier with Remote Standalone

Local and Remote Carriers — Different Subnets

This third scenario (Figure F-3) shows a local carrier connected to remote carriers that have remote standalones. Each carrier must be on a separate subnet but, as in the previous scenario, the carrier-remote combination can share a common subnet. Once again, the subnet mask is 255.255.255.00 for all devices. A static route must be set up in the NMS host for each subnet: 135.18.4.0, 135.18.6.0, 135.18.20.0.
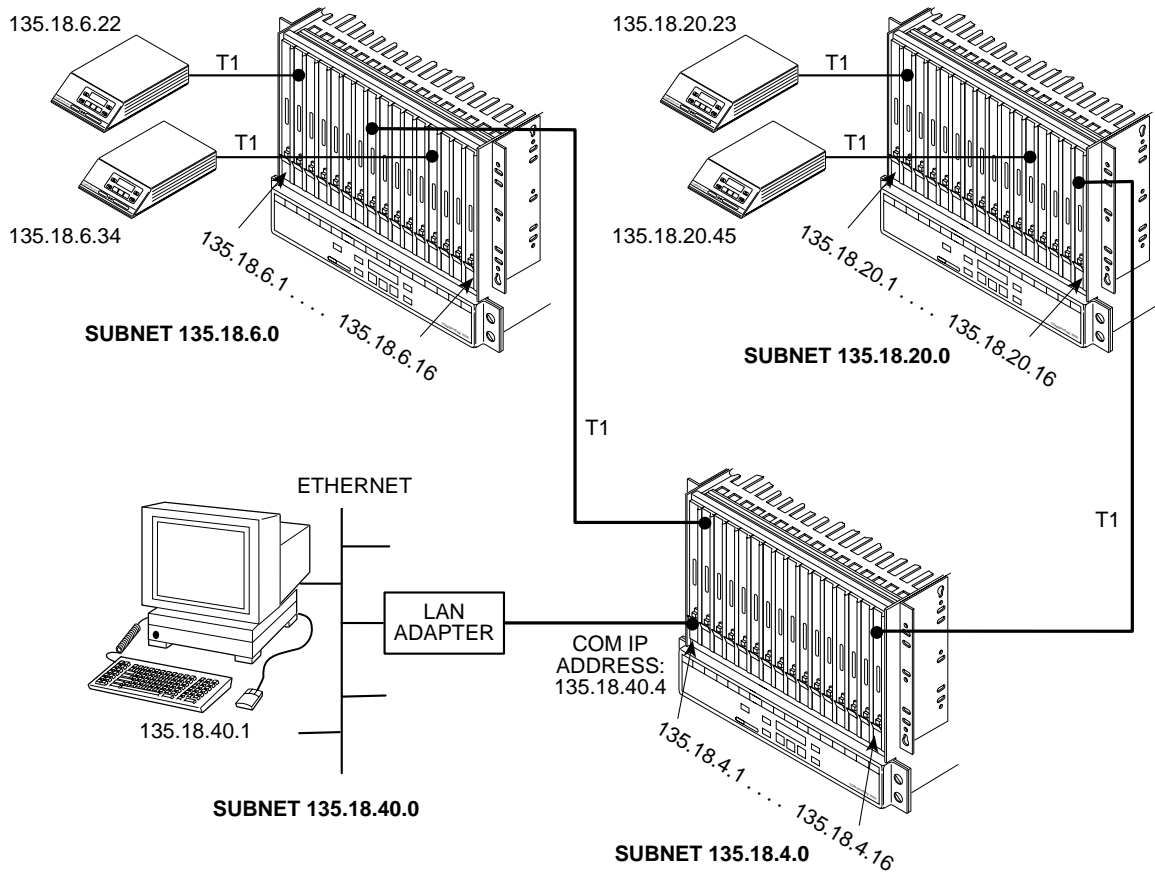
Figure F-3.   Local Carrier Connected to Remote Carriers

Local and Remote Carriers — Same Subnet

An alternative addressing scheme, for the network is shown in Figure F-4. This example uses a subnet mask of 255.255.00.00 for the COM port in the central-site carrier (only), with all of the remaining subnet masks set to 255.255.255.00. The advantage to this scheme is that only one route must be added to the NMS host (135.18.0.0).
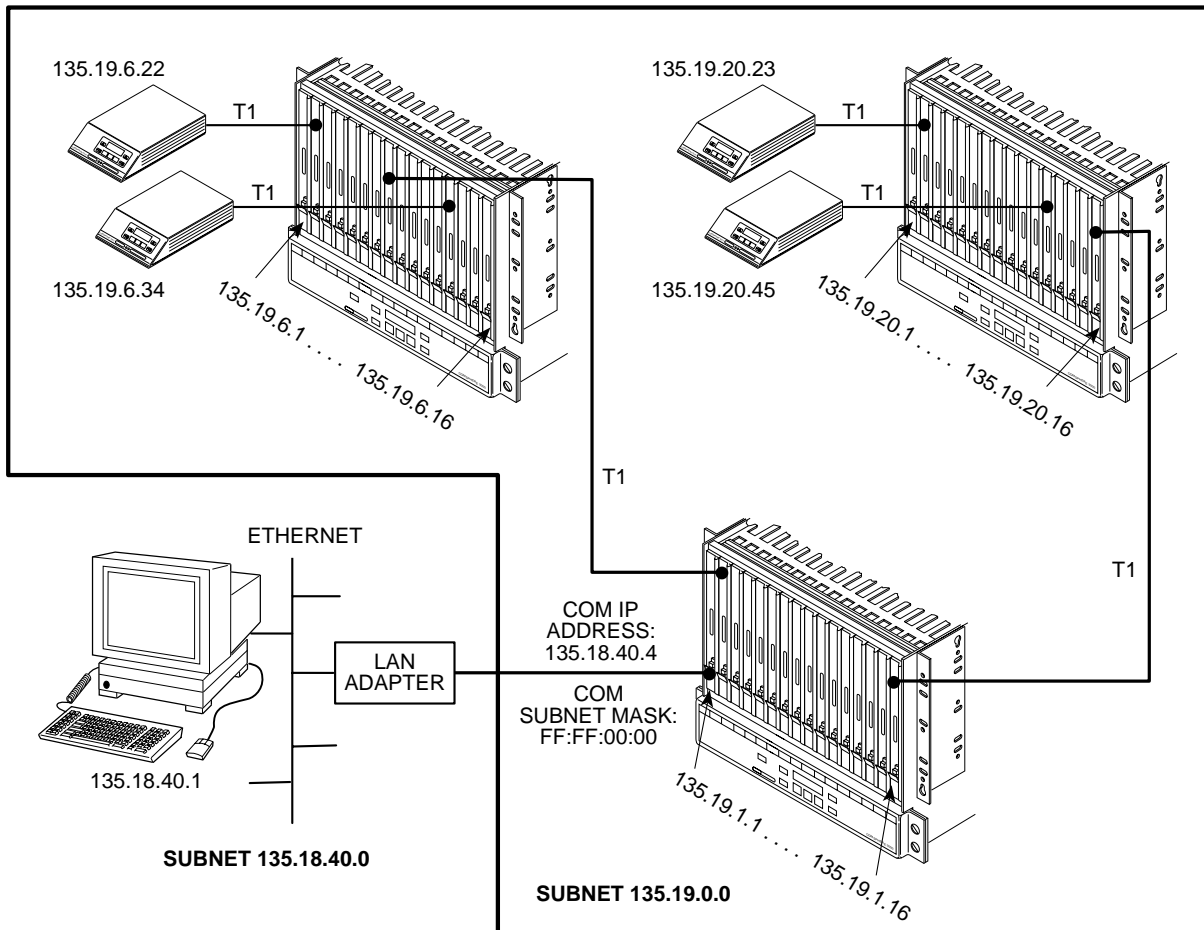
496-14648-02

Figure F-4.   Local Carrier Connected to Remote Carriers – an Alternative

Multiple NMSs

Figure F-5 illustrates multiple COM ports on the same carrier connected to different NMSs. This might be used in service-provider applications, where some of the carrier's circuit cards (and their remotes) are managed by one NMS and other cards are managed by a different NMS. In this example, each card and remote is on a separate subnet. Also, note that each LAN Adapter connection is on a different subnet. The subnet mask is 255.255.255.00. The NMS hosts would only need routes added for the subnets that they are to manage.
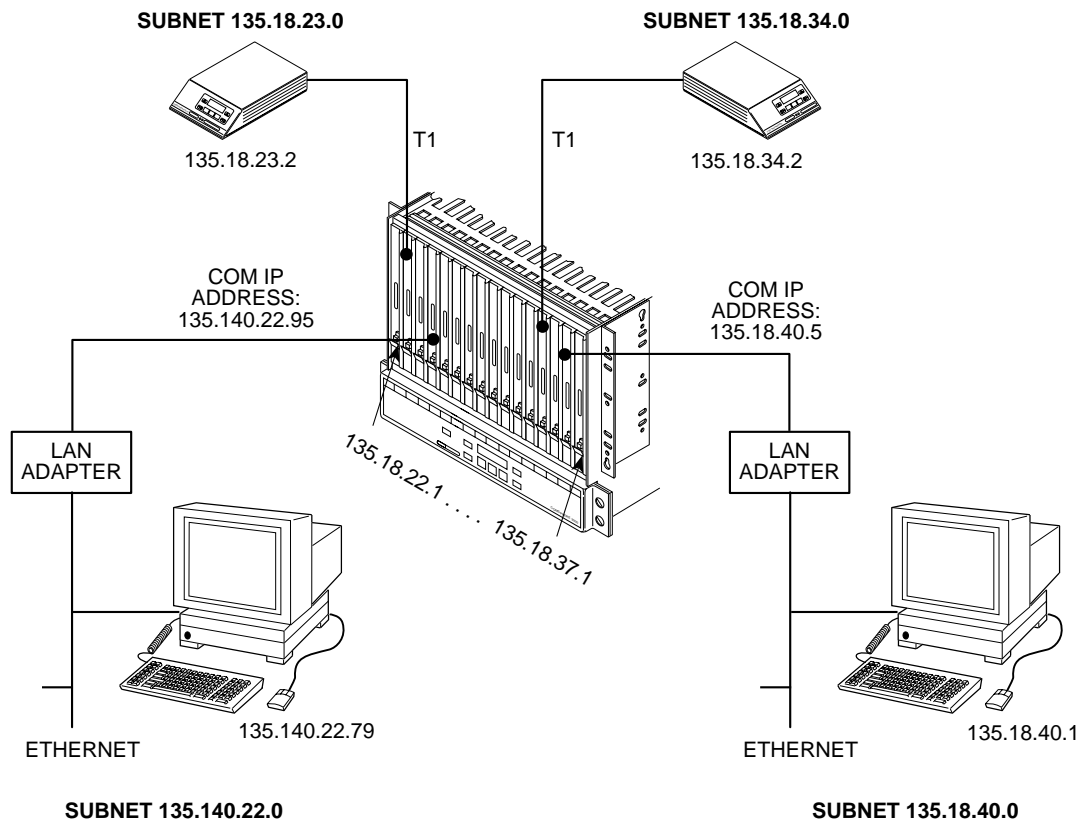
496-14649-02

Figure F-5.   Multiple COM Ports Connected to Different NMSs

Equipment List

Equipment	Feature Number
Model 3162 DSU/CSU	3162-A4-210
T1 Line Interface Cable, RJ48C-to-RJ48C	3100-F1-500
T1 Line Interface Cable, RJ48C-to-DA15P (Canada)	3100-F1-510
COM Port-to-PC Cable, 8-pin modular to DB9S	3100-F1-550
COM Port-to-Terminal/Printer Cable, 8-pin modular to DB25P	3100-F1-540
EIA-530-A-to-RS449/422 Adapter	3100-F1-580
EIA-530-A-to-V.35 Adapter	3100-F1-570
EIA-530-A-to-X.21 Adapter	3100-F1-571
Wall-Mount/Rack-Mount Adapter	3100-F1-400

Glossary

1in8 Test	A test pattern consisting of a one (1) followed by seven zeros (on the network only).
10BaseT	A 10-Mbps Ethernet LAN that works on twisted-pair wiring.
3000 Series Carrier	A rack-mounted device containing 17 slots in which to place circuit cards.
ACCULINK	A product family and a registered trademark of Paradyne.
ACO	Alarm Cut-off command. A command for carrier-mounted CSUs that forces a deactivation of the alarm relay on the 3000 Series Carrier.
adapter	Hardware that provides some transitional function between two or more devices.
address	A symbol (usually numeric) that identifies the interface attached to a network.
agent (SNMP)	A software program housed within a device to provide SNMP functionality. Each agent stores management information and responds to the manager's request for this information.
AIS	Alarm Indication Signal. An all ones signal transmitted to maintain transmission continuity and to indicate to the receiving terminal that a transmission fault exists at either the transmitting terminal or upstream of the transmitting signal. Sometimes referred to as Blue Alarm.
AMI	Alternate Mark Inversion. A line coding technique used to accommodate the ones density requirements of E1 or T1 lines.
ANSI	American National Standards Institute. A member of ISO, ANSI accredits and implements standards.
application	The use to which a device is put.
ASCII	American Standard Code for Information Interchange. The standard for data transmission over telephone lines. A 7-bit code establishes compatibility between data services. The ASCII code consists of 32 control characters (nondisplayed) and 96 displayed characters.
ASCII terminal/printer	A device that can be attached, either locally or remotely, to a DSU/CSU to display or print alarm messages.
asynchronous data	Data that is formatted so it is synchronized by a transmission start bit at the beginning of a character and one or more stop bits at the end.
authenticationFailure trap	An SNMP trap that indicates that the device has received an SNMP protocol message that has not been properly authenticated.
Auxiliary Backplane	An 8-slot backplane that fits over one half of the open section of the 3000 Series Carrier. This is a passive assembly that provides all interface connectors.
AWG	American Wire Gauge. An indication of wire size. The heavier the gauge, the lower the AWG number, and the lower the impedance.
B8ZS	Bipolar 8 Zero Substitution. Encoding scheme for transmitting clear channel signals over a T1 line.
bandwidth	The range of frequencies that can be passed by a transmission medium, or the range of electrical frequencies a device is capable of handling.

BES Bursty Error Seconds. A second in which more than one but less than 320 CRC6 error events have occurred.

bipolar signal A signal in which successive ones (marks, pulses) are of alternating positive and negative polarity, and in which a zero (space, no pulse) is of zero amplitude.

bit Binary digit. The smallest unit of information, representing a choice between a one or a zero (sometimes called mark or space).

bps Bits per second. Indicates the speed at which bits are transmitted across a data connection.

BPV Bipolar Violation. In a bipolar signal, a one (mark, pulse) which has the same polarity as its predecessor.

byte A sequence of successive bits (usually eight) handled as a unit in data transmission.

CCITT Consultative Committee on International Telegraphy and Telephony. An advisory committee established by the United Nations to recommend communications standards and policies. It was renamed ITU in March 1993.

CD Carrier Detect. The received line signal detector. V.24 circuit 109.

channel A bidirectional DS0, voice, or data path, for electrical transmission between two or more points. Also called a circuit, line, link, path, or facility.

CHAP Challenge Handshake Authentication Protocol. A security technique that allows a user password to be encrypted for transmission.

character A letter, figure, number, punctuation, or other symbol.

client A device that receives a specific service, such as database management, from a server.

coding A technique used to accommodate the ones density requirements of E1 lines.

community name An identification used by an SNMP manager to grant an SNMP server access rights to a MIB.

COMSPHERE A proprietary product family name and a registered trademark of Paradyne.

configuration The arrangement of a system or network as defined by the characteristics of its functional units.

configuration option Device software that sets specific operating parameters for the device. Sometimes referred to as straps.

CPU fail Central Processing Unit failure. A Self-Test Health message indicating a failure in the device's central processing unit.

CRC Cyclic Redundancy Check. A mathematical method of confirming the integrity of received digital data.

CRC6 CRC using six check bits.

CSA Canadian Standards Association.

CSU Channel Service Unit. A device that connects service user equipment such as a DSU to the local digital telephone loop, protects the line from damage, and regenerates the signal.

CTS Clear To Send. A signal indicating that the device is ready for the DTE to transmit data. Usually occurs in response to Request To Send (RTS).

D4 The transmission standard that specifies 12 frames as a superframe that is used for frame synchronization and to locate signaling bits.

database An organized compilation of computerized data.

DB15 connector   A 15-position connector used on cables or devices.

data carrier   A continuous frequency signal that can be modulated by another signal that contains information to be transmitted.

DCE   Data Communications Equipment. The equipment that provides the functions required to establish, maintain, and end a connection. It also provides the signal conversion required for communication between the DTE and the network.

default   A factory-preset value that is assumed to be correct unless changed by the user.

DevFail   Device Failure. A message that indicates that an internal failure has been detected by the operating firmware. An 8-digit code appears for use by service personnel.

device   A mechanical, electrical, or electronic unit with a special purpose.

digital signal   A signal composed of only two discrete values, representing the binary digits 0 and 1.

diskette   A thin, flexible magnetic disk enclosed in a protective jacket.

DLB   DTE Loopback. Loopback mode that loops the information received on the DTE T1 network interface back to the network as close to the network interface as possible.

download   A process that transfers device firmware and software from a locally-attached PC to a device, or allows the duplication of firmware and software from a local device to a remote device.

drop/insert   An interconnection point for terminals, multiplexers, and transmission facilities. Individual channels may be inserted into the aggregate stream or dropped out to accommodate specific applications.

DS0   Digital signal level 0 (zero). A 64 kbps digital telecommunications signal or channel.

DS1   Digital signal level 1 (one). A digital signal transmitted at the rate of 1.544 Mbps in North America.

DS1/E1 MIB   Defines objects for managing E1 interfaces and supports the network and G.703 DTE interfaces on the E1 NTU.

DSR   Data Set Ready. A signal from the modem to the DTE that indicates the modem is turned ON and connected to the DTE.

DSU   Data Service Unit. Data communications equipment that provides timing, signal regeneration, and an interface to data terminal equipment. A subrate DSU/CSU is normally referred to as a DSU.

DSX-1   Digital Signal Cross Connect level 1. An interconnection point for terminals, multiplexers and transmission facilities.

DTE   Data Terminal Equipment. The equipment, such as a computer or terminal, that provides data in the form of digital signals for transmission.

DTE interface   The DTE interface on the rear panel of the CSU.

DTMF   Dual-Tone Multi-Frequency. A signaling method using two voice frequencies to designate the tones used for touch-tone dialing, as distinguished from pulse dialing.

DTR   Data Terminal Ready. A signal from the DTE to the modem, sent via Pin 20 of the EIA-232 interface (V.24 circuit 108/1, /2), that indicates the DTE is turned ON and connected to the modem.

E1   A wideband digital interface operating at 2.048 Mbps, defined by ITU recommendations G.703 and G.704. It is used primarily outside North America.

EER   Excessive Error Rate. An error rate that is greater than the threshold that has been configured in the device.

Enterprise MIB	MIB objects unique to a specific company's devices.
enterprise-specific trap	A trap unique to a specific company's devices.
EON	End of Number.
error	A discrepancy between a measured or computed value or condition and the true or specified value or condition.
ES	Errored Seconds. A second with one or more ESF error events (one or more CRC6 error events or OOFs).
ESD	ElectroStatic Discharge. An undesirable discharge of static electricity that can damage equipment and degrade electrical circuitry.
ESF	Extended SuperFrame. The T1 transmission standard that specifies 24 frames as an extended superframe to be used for frame synchronization and to locate signaling bits.
Ethernet	A type of network that supports high-speed communication among systems. It is a widely implemented standard for LANs. All hosts are connected to a coaxial cable where they contend for network access using a Carrier Sense, Multiple Access with Collision Detection (CSMA/CD) paradigm.
failure	An uncorrected hardware error.
fault	An accidental condition that causes a functional unit to fail to perform its required function.
FCC	Federal Communications Commission. The Board of Commissioners that regulates all electrical communications that originate in the United States.
FDL	Facility Data Link. The selected framing bits in the ESF format used in a wide-area link that are used for control, monitoring, and testing.
Fractional T1	Individual DS0 channels that may be sold separately or in groups to provide bandwidth that is some fraction of the total T1 capability.
frame	One identifiable group of bits that includes a sequence of bits for control, framing, etc.
frame relay	A high-speed connection-oriented packet switching WAN protocol using variable-length frames.
framing	A technique that separates bits into identifiable groups.
Generic-Interface Extension MIB	An extension to MIB II that defines additional objects for control of generic interfaces in MIB II.
Get (SNMP)	A command providing read-only access to SNMP MIB objects.
ground	A physical connection to earth or other reference point.
HDLC	High-Level Data Link Control. A communications protocol defined by the International Standards Organization (ISO).
host	A computer attached to a network that shares its information and devices with the rest of the network.
Hz	Hertz. A unit of frequency that equals one cycle per second.
ICMP	Internet Control Management Protocol. Internet protocol that allows for the generation of error messages, tests packets, and information messages related to IP.
IEEE 802.3	A standard for a LAN protocol suite, implemented as Ethernet.
interface	A shared boundary between functional units.

Internet	The worldwide internetwork, which predominantly uses the TCP/IP protocol.
internetwork	An interconnected collection of networks (also called an internet).
IP address	Internet Protocol address. The address assigned to an internet host.
ISO	International Standards Organization.
ITU	International Telecommunications Union. The telecommunications agency of the United Nations, established to provide standardized communications procedures and practices. Before March 1993 it was called CCITT.
kbps	Kilobits per second. One kilobit is usually taken to be 1,024 bits.
LAN	Local Area Network. A privately owned and administered data communications network limited to a small geographic area.
LBO	Line Build-Out. The amount of attenuation of the transmitted signal that is used to compensate for the length of wire between the transmitter and the receiver.
LCD	Liquid Crystal Display. Thin glass plates containing liquid crystal material. When voltage is applied, the amount of light able to pass through the glass plates is altered so that messages can be displayed.
LCP	Link Control Protocol.
LED	Light Emitting Diode. A light or status indicator that glows in response to the presence of a certain condition (e.g., an alarm).
link	The physical connection between one location and another used for data transmission.
link layer protocol	The protocol that regulates the communication between two network nodes.
link trap	A trap that identifies the condition of the communications interface (linkDown or linkUp traps).
LLB	Line LoopBack. A test in which the received signal on the network interface is looped back to the network without change.
LOF	Loss of Frame. Occurs when a DS1 terminal is unable to synchronize on the DS1 signal for some interval.
LOFC	Loss Of Frame Count. The number of LOFs declared.
loopback test	A test that verifies a device's operation by connecting the device's output to the device's input.
LOS	Loss of Signal. The T1 line condition where there are no pulses.
LQR	Link Quality Reports.
MB	Megabyte or megabytes. A unit of memory measurement equal to approximately one million bytes (typically 1,048,576 bytes).
Mbps	Megabits per second. One megabit is 1,048,576 (1024^2) bits.
menu tree	The structure containing the menu hierarchy starting at a Top-Level menu and extending down to various device functions.
MIB	Management Information Base. A database of managed objects used by SNMP to provide network management information and device control.
MIB II	MIB Release 2. The current Internet-standard MIB, defined by RFC 1213.
module	A compact assembly functioning as a component in a larger system or unit.

MRU	Maximum Request Unit.
network	A configuration of data processing devices used for information exchange.
network interface	The T1 network interface connector on the rear panel of the CSU.
NMS	Network Management System. A computer system used for monitoring and controlling network devices.
node	A connection or switching point on the network.
object (SNMP)	A specific item within a Management Information Base (MIB).
OOF	Out Of Frame. An error condition in which frame synchronization bits are in error.
option	A hardware or software function that can be selected or enabled as part of a configuration process.
PAP	Password Authentication Protocol. A security technique that requires a user password for access to a system.
parity	A way of checking data accuracy by counting the number of bits that have a value of one.
payload	The information bits in a frame.
PBX	Private Branch Exchange. Telephone switching equipment dedicated to one customer. A PBX connects private telephones to each other and to the public dial network.
PC	Personal Computer.
PDU	Protocol Data Unit. A message containing protocol-specific information.
PDV	Pulse Density Violation. The number of ones (marks, pulses) is not adequate for the line requirement.
PLB	Payload Loopback. Loopback mode that loops the information received on the T1 network interface back to the network after it has passed through receive and transmit framing section.
port	An access point for data entry or exit.
POWER connector	The power input connector on the CSU.
power-on self-test	A test that checks most hardware components when power is applied to the device or a reset is initiated.
PPP	Point-to-Point Protocol. A protocol for packet transmission over serial links, specified by Internet RFC 1661.
PRM	Performance Report Messages. Messages indicating the current state of a T1 line as specified by ANSI-T1-403.
protocol	A set of rules that determines the behavior of devices in achieving and maintaining communication.
PSTN	Public Switched Telephone Network. A network shared among many users who can use telephones to establish connections between two points. Also known as dial network.
pulse density	A measure of the number of ones (marks, pulses) in relation to the total number of bits transmitted.
QRSS	Quasi-Random Signal Source. A test pattern simulating a random pattern of digital ones and zeros used to simulate normal transmission.
RAM	Random-Access Memory. Read/write memory that is volatile and loses its contents when power is removed.

register	A part of the device's memory that holds stored values.
reset	An initialization of the device that occurs at power-up or in response to a reset command.
RFC	Request for Comments. One of the documents published by the Internet Engineering Task Force that describe Internet protocols and policies.
RIP	Routing Information Protocol. A protocol for exchanging routing information.
RJ48C	An 8-position modular connector.
RLB	Repeater LoopBack. Loops the signal being sent to the network back to the DTE Drop/Insert and data ports after it has passed through the framing circuitry of the device.
router	A device that connects LANs by dynamically routing data according to destination and available routes.
RS-232	An Electronic Industries Association's standard for a low-speed, 25-position, DCE/DTE interface.
RS-232-like MIB	RFC 1659, which defines objects for managing RS-232-type interfaces (e.g., RS-422, RS-423, etc.) and supports synchronous data ports and management communication ports on the device.
RTS	Request to Send. A signal from the DTE to the device, indicating that the DTE has data to send. V.24 circuit 105.
RX	Receive. To obtain transmitted signals.
RXC	Receive Clock. V.24 circuit 115.
RXD	Received Data. Pin 3 of the EIA-232 interface that is used by the DTE to receive data from the modem. Conversely, the modem uses Pin 3 to transmit data to the DTE.
SDCP	Shared Diagnostic Control Panel. A feature that allows carrier-mounted devices to share the same diagnostic control panel.
self-test	A test that checks most hardware components when power is applied to the device or a reset is initiated.
server	A device that offers a specific service, such as database management, to a client.
SES	Severely Errored Seconds. Usually defined as a second during which a specific number of CRC errors was exceeded, or an OOF or other critical error occurred.
Set (SNMP)	A command providing write access to SNMP MIB objects.
SLIP	Serial Line Internet Protocol. Protocol for serial operation on an internet.
SNMP	Simple Network Management Protocol. Protocol for open networking management.
StEvent	Status Event Register. Records the occurrence of certain alarm conditions.
subnet	A portion of a network, which may be a physically independent network segment, that shares a network address with other portions of the network and is distinguished by a subnet number. A subnet is to a network what a network is to an internet.
subnet mask	A number that identifies the subnet portion of a network address. The subnet mask is a 32-bit Internet address written in dotted-decimal notation with all the 1s in the network and subnet portions of the address.
TCP/IP	Transmission Control Protocol/Internet Protocol. The dominant protocol suite in the worldwide Internet, TCP allows a process on one machine to send data to a process on another machine using the IP. TCP can be used as a full-duplex or one-way simplex connection.

Telnet	Virtual terminal protocol in the Internet suite of protocols. Allows the user of one host computer to log into a remote host computer and interact as a normal terminal user of the remote host.
trap (SNMP)	A notification message to the SNMP manager when an unusual event occurs on a network device, such as a reinitialization.
T1	A term for a digital carrier facility used to transmit a DS1 formatted digital signal at 1.544 Mbps. It is used primarily in North America.
TX	Transmit. To send signals from a device.
TXD	Transmit Data. Pin 2 of the EIA-232 interface that is used by the DTE to transmit data to the modem. Conversely, the modem uses Pin 2 to receive data from the DTE.
UAS	Unavailable Seconds. A count of one-second intervals when service is unavailable.
UDP	User Datagram Protocol. A TCP/IP protocol describing how messages reach application programs within a destination computer.
UL	Underwriter's Laboratories, Inc. An organization which promotes product safety.
V.24	An ITU-T standard for a low-speed, 25-position, DCE/DTE interface.
V.35	An ITU-T standard for a high-speed, 34-position, DCE/DTE interface.
V.54	An ITU-T standard for local and remote diagnostic loopback tests.
V.54 Loop 2	An ITU-T standard for a data channel loopback (DCLB).
V.54 Loop 3	An ITU-T standard for a data terminal loopback (DTLB).
Vac	Volts alternating current.
Vdc	Volts direct current.
VF	Voice Frequency. The part of the audio frequency range used to transmit voice sound (usually 300 Hz to 3400 Hz). This band is used by the modem for its modulated signal.
WAN	Wide Area Network. A network that spans a large geographic area.
warmStart trap	An SNMP trap that indicates that the device has reinitialized itself.
XTXC	External Transmit Clock. V.24 circuit 113.
Yellow Alarm	An outgoing signal transmitted when a DS1 terminal has determined that it has lost the incoming signal.

Index

Numbers

A

B

C