STDX 6000 Hardware Installation Guide

Ascend Communications, Inc.

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Ascend Communications, Inc. warrants the *STDX Hardware* against defects in materials and workmanship for a period of one year from the date of shipment. During the warranty period, Ascend will, at its option, repair, replace, or refund the purchase price of any defective product at no additional cost, provided you return it during the warranty period, transportation charges prepaid, to Ascend. You must attach your name, address and telephone number, a description of the problem(s), and a dated proof-of-purchase bearing the serial number of each product returned for warranty service.

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FEDERAL COMMUNICATIONS COMMISSION WARNING

This device complies with Part 15 of the FCC Rules and Regulations. Operation is subject to the following two conditions:

This device may not cause harmful interference, and

This device must withstand any interference received, including interference that may cause undesired operation.

The *STDX Hardware* has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules and Regulations. These limits are designed to provide reasonable protection against harmful interference when this 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 and television communications. Operation of this equipment in a residential area is likely to cause interference in which case the user will be required to correct the interference at his or her own expense.

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

Do not attempt to repair or modify this equipment. Any repairs to the unit must be performed by Ascend Communications Inc. or a Ascend-authorized representative.

Maintenance Agreements

Ascend offers a comprehensive program to provide hardware support, a 24-hour emergency hotline, overnight parts replacement, and an escalation procedure. Non-contract maintenance services are provided at current time-and-materials rates. For more information, contact Ascend Technical Assistance Center at:

- 1-800-DIAL-WAN (U.S. and Canada)
- 0-800-96-2229 (U.K.)
- 1-978-952-7299 (all other areas)

Ascend has adopted a maintenance strategy based on customer-initiated requests to the Ascend Technical Assistance Center. The Ascend Technical Assistance Center coordinates all customer services, including hardware and software technical support, on-site service requirements, and module exchange and repair.

If the Product Is Damaged

If any portion of the switch is damaged, forward an immediate request to the delivering carrier to perform an inspection of the product and to prepare a damage report. Save the container and all packing materials until the contents are verified.

Concurrently, report the nature and extent of the damage to the Ascend Technical Assistance Center so that action can be initiated, either to repair or replace the damaged items.

Do not return any items to Ascend until you obtain instructions from a Ascend Technical Assistance Center representative. Report the problem or deficiency to the Ascend Technical Assistance Center representative, along with the model, type, and serial number. Upon receipt of this information, the Ascend Technical Assistance Center will provide you with service instructions, or a Return Authorization Number and shipping information. All items returned under warranty must be shipped to the manufacturer with the charges prepaid.

If Problems Arise

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. If the telephone company notes a problem, they may temporarily discontinue service. When practical, they notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

In the event that repairs are ever needed on this equipment, they should be performed by Ascend Communications Corporation or an authorized Ascend representative. For information contact the Ascend Technical Assistance Center at:

- 1-800-DIAL-WAN (U.S. and Canada)
- 0-800-96-2229 (U.K.)
- 1-978-952-7299 (all other areas)

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About This Guide

The *STDX 6000 Hardware Installation Guide* contains all of the procedures you need to successfully set up, install, and test the STDX 6000 hardware configuration. This guide also provides basic troubleshooting solutions for resolving potential problems. The *STDX 6000 Hardware Installation Guide* is intended for systems integrators and other implementation personnel who are responsible for the installation of the STDX 6000 switch.

What You Need To Know

The procedures in this guide dictate that you understand and follow the safety practices at your site, as well as those identified in this guide.

Before you can configure the switch using the NavisCore NMS software, you must complete all of the hardware installation procedures outlined in this guide. After you finish the hardware installation, see the *Networking Services Technology Overview* if you need information on Ascend's networking services and the technologies used by these services. See the *NavisCore Physical Interface Configuration Guide* and the *NavisCore Frame Relay Configuration Guide* for network configuration instructions.

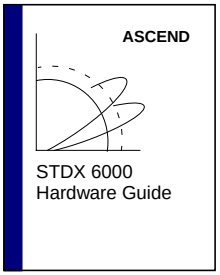
You should work closely with the NMS operator and other systems integration personnel to assure a function installation.

Customer Comments

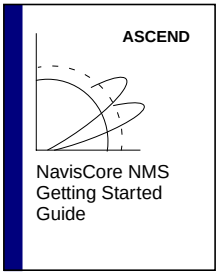
Customer comments are welcome. Please fill out the Customer Comment form located in the back of this guide and return it to us.

Documentation Reading Path

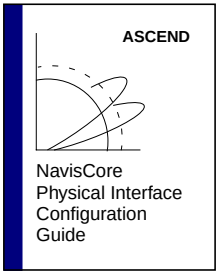
Use the following guides to install and manage the STDX Switch:



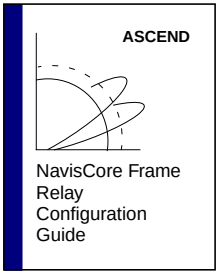
Explains how to install and set up the STDX 6000 Switch hardware, replace hardware modules, and interpret LED status indicators. This guide also provides basic troubleshooting solutions for potential hardware-related problems.



Provides an overview of basic NavisCore features. Use this guide to learn how to create network maps. This guide includes a step-by-step example that enables you to create a network map containing two switch objects connected by a direct line trunk.



Explains how to configure processor modules, I/O cards, and physical ports for STDX, B-STDX, CBX 500, and GX 550 switches.



Describes how to configure Frame Relay services on your switch network.

How To Use This Guide

The following list summarizes the information contained in this guide.

Read	To Learn About
Chapter 1	Introduces the STDX 6000, and describes the interface, features, and typical applications for this switch.
Chapter 2	Lists the product specifications for the STDX 6000, including environmental and electrical considerations. This chapter also lists the Safety Warnings related to the use of the STDX hardware.
Chapter 3	Describes the prerequisites for installing the hardware, such as unpacking the unit, taking an inventory, gathering the necessary installation items, and verifying the hardware configuration.
Chapter 4	Explains, in a step-by-step format, how to set up and install the STDX 6000.
Chapter 5	Describes how to complete the installation of the STDX 6000 and determine its operating status by viewing the LEDs on the front panel of the Packet Processor and I/O modules.
Chapter 6	Explains the steps involved in installing new modules or replacing existing modules in the STDX 6000, including the Packet Processor, I/O modules, power supply, and cooling fan modules.
Chapter 7	Describes redundancy and explains how to set up and install a redundant partner for the STDX 6000.
Chapter 8	Explains how to determine the operational status of the hardware, and where appropriate, provides general troubleshooting solutions. This chapter also provides information about how to contact the Ascend Technical Assistance Center for assistance.
Appendix A	Contains a description of each of the hardware I/O modules that are available for the STDX 6000.
Appendix B	Shows the various forms of cables and details the pin-out assignments for each type of cable.

Read	To Learn About
Appendix C	Contains country-specific regulatory information, including recommended and mandatory requirements of certification authorities. It also contains information on environmental standards compliance for the STDX 6000, as well as an example of the affidavit that has to be filed with the Telco.
Appendix D	Contains the console commands for the STDX 6000, as well as sample screen outputs for each command
Appendix E	Defines the terminology associated with the installation and operation of the STDX 6000.

Related Documents

- *B-STDX Hardware Installation Guide* (80005)
- *CBX 500 Hardware Installation Guide* (80011)
- *NavisCore NMS Getting Started Guide (*80070)
- *NavisCore Frame Relay Configuration Guide* (80071)
- *NavisCore Diagnostics and Troubleshooting Guide (80074)*
- *Network Management Station Installation Guide* (80014)
- *NavisCore Console Command User's Guide* (80075)

Conventions

This guide uses the following conventions, when applicable:

Convention	Indicates	Example
[*bold italics*]	Variable parameters to enter.	**[*your IP address*]**
`Courier Regular`	Screen or system output; command names in text.	`Please wait...`
Bold	User input in body text.	Type **cd install** and ...
`Courier Bold`	User input in a command line.	> **`show ospf names`**
Menu => Option	A selection from a menu.	NavisCore => Logon
Italics	Book titles, new terms, and emphasized text.	*Network Management Station Installation Guide*
Boxes around text	Notes, warnings, cautions.	See examples below.

Notes provide additional information or helpful suggestions that may apply to the subject text.

Cautions notify the reader to proceed carefully to avoid possible equipment damage or data loss.

Warnings notify the reader to proceed carefully to avoid possible personal injury.

Acronyms

This guide uses many acronyms to describe various networking terms. Use the following list to quickly identify the meaning of the acronyms contained in this guide.

Acronym	Meaning
ATM	Asynchronous Transfer Mode
CSU	Channel Service Unit
DCE	Data Communications Equipment
DLCI	Data Link Connection Identifier
DSU	Data Service Unit
DTE	Data Terminal Equipment
DXI	Data Exchange Interface
FRAD	Frame Relay Assembler/Disassembler
HDLC	High-Level Data Link Control
IOA	I/O Adapter
IP	Internet Protocol
ISDN	Integrated Services Digital Network
Kbps	Kilobits per Second
LAP	Link Access Protocol
Mbps	Megabits per Second
MIB	Management Information Base
NMS	Network Management Station
NNI	Network-to-Network Interface

Acronym	Meaning
OSI	Open Systems Interconnection
OSPF	Open Shortest Path First
PAD	Packet Assembler/Disassembler
PP	Packet Processor
PPP	Point-to-Point Protocol
PRAM	Parameter RAM
PRI	Primary Rate Interface
PVC	Permanent Virtual Circuit
RFC	Request for Comments
SLIP	Serial Line over Internet Protocol
SMDS	Switched Multimegabit Data Services
SNMP	Simple Network Management Protocol
SVC	Switched Virtual Circuit
UIO	Universal Input/Output
UNI	User-to-Network Interface

1

Overview

This chapter describes the overall architecture of the Ascend STDX Frame Relay/SMDS WAN switches. It also describes the interface, features, and typical applications of these switches.

STDX Product Description

The STDX 6000 is a 6-slot, modular Frame Relay/SMDS WAN platform with various interface modules installed to fit the particular needs of the user. The STDX 6000 also comes with the Operating System already loaded into Flash memory.

Each STDX 6000 consists of a Packet Processor (PP) that interacts with multiple I/O modules to accommodate numerous interface specifications, speeds, and protocols. The hardware platform is based on an 800 Mbps backplane.

The PP provides the background management and static networking functions in support of the real time networking functionality provided by the I/O modules. The I/O modules manage the lowest level of a node's trunk or user interfaces. They perform physical data link (frame) and multiplexing operations on external trunks and user links. All I/O modules are completely interchangeable among the Ascend family of STDX Frame Relay/SMDS WAN switches.

The PP and I/O modules use Intel's i960 RISC processor for high performance packet switching. The STDX uses passive connectors for I/O modules, power supplies, and cooling fan modules to allow for on-line (hot swap) removal and replacement.

The PP module is not hot swappable. Removal of the PP module during operation causes the switch to fail and may damage the PP card.

Features

The STDX 6000 provides the following features:

- High performance LAN-WAN internetworking for public and private networks based on industry standards for networking and network management
- Support for broadband technologies, including Frame Relay and SMDS
- Support for a wide spectrum of line speeds ranging from Sub-DS0 to 6 Mbps
- Ease of expansion through modular design

- Permanent Virtual Circuit (PVC) network services
- PVC rate monitoring for usage statistics, network accounting, and design
- Congestion management, based on Open Shortest Path First (OSPF) packet routing for large network support
- Protocol translation features, such as the PPP to RFC 1490 Translation FRAD. (Point-to-Point Protocol to Request for Comments 1490 Translation Frame Relay Assembler/Disassembler.)
- Flexibility with DTE, DCE, and NNI interfaces
- Minimal upgrade and repair time with hot swap and live insertion of all I/O cards
- Optional hot standby configurations providing full redundancy and high availability needed for critical applications
- SMDS Access Server
- QuickPath
- OPTimum Trunking

I/O Modules

Table 1-1 lists the supported I/O modules for STDX 6000 switches. This table also identifies the port speeds and interfaces for each type, as well as the port capacity of each module. For more information on each I/O module, see Appendix A.

Table 1-1. STDX I/O Modules

I/O Module	Port Speeds	Port Capacity	SMDS	Frame Relay
6-Port Universal IO (V.35, X.21, EIA530)	4.096 Mbps	2 V.35, 2 X.21, and 2 EIA 530	yes	yes
V.35	4.096 Mbps	6 V.35	yes	yes
8- or 18-Port Universal IO (V.24, X.21)[a, b]	128 Kbps	8 V.24, 8 X.21, 18 V.24, or 18 X.21	yes	yes
Channelized T1	1.54 Mbps	1 24-bundle T1 (full or fractional)	yes	yes
Channelized E1	1.984 Mbps	1 30-bundle E1	yes	yes

[a] The switch can be configured with up to 60 ports. As a result, a maximum of three 18-port UIO modules can be installed in a STDX switch.
[b] The 8- and 18-port UIO modules do not support redundancy.

2

Specifications and Safety Warnings

This chapter provides product-specific information about the STDX 6000, as well as safety warnings relating to the use of this equipment. This chapter outlines the following types of specifications:

- Electronic/Electrical Specifications
- Physical Specifications
- Environmental Specifications

Electronic/Electrical Specifications

The STDX power cord is connected via a 3-prong plug that grounds the switch and polarizes the connection. The ground conductor has to be properly grounded. An AC power cord is supplied by Ascend Communications and packaged in the Accessory Kit. Table 2-1 describes the electronic/electrical specifications for the STDX 6000.

Table 2-1. STDX 6000 Electronic/Electrical Specification

Feature	Specification
120 VAC applications	3.0 amps max, 300 watts max, 50-60 Hz, single phase
240 VAC applications	1.0 amps max, 300 watts max, 50-60 Hz, single phase
-48 VDC applications	-39 to -76 VDC, 300 watts max

Physical Specifications

Table 2-2 describes the STDX 6000 specifications. Optional redundant power supplies and I/O modules can be selected separately.

Table 2-2. STDX 6000 Physical Specifications

Specification	Description
Frame Relay Standards	ANSI T1.606; T1.617; T1.618; RFC1157; RFC1213; RFC1247
Wide Area Network Port	Frame Relay, HDLC FRAD; UNI-DDCE; UNI-DTE; NNI, PP-RFCI1294 FRAD
Network Management	Simple Network Management Protocol (SNMP); Management Information Base-II (MIBII)
WAN Interfaces	V.35, T1, G.703, EIA449, X.21, RS530, RS530A
Management Interfaces	Ethernet, RS-232, RJ-45
Physical Characteristics	Basic switch includes a minimum of one power module, one fan module, and one PP module. The STDX 6000 has the capacity for five I/O modules.
Size[a]	17.5 in. wide x 8.75 in. high x 11.25 in. deep
Weight	50 lbs. max
Thermal Dissipation	300 watts max, 512 BTU/hr.

[a] Depth size does not include cables.

Environmental Specifications

Table 2-3 describes the environmental requirements for selecting an installation site for the STDX 6000.

Table 2-3. STDX 6000 Environmental Specifications

Characteristic	Requirement
Ambient Operating Temperature	0˚C to +49˚C
Relative Humidity	10% to 95% (non-condensing)
Operating Altitude	to 10,000 feet
Ambient Storage Temperature	-40˚C to +65˚C, 95% relative humidity
Storage Altitude	-1,000 to +30,000 feet

The STDX 6000 should also be installed in an area that allows the following clearances for the chassis:

- A minimum of 6 in. (15 cm) at the back panel (for cable routing)
- A minimum air flow space of 3 in. (8 cm) on both sides of the chassis

Product Information and Warnings

This equipment is approved only when operated in the following environment:

Temperature Range	0° to 49°C
Humidity	10-90% (noncondensing)
Atmospheric Pressure	10,000 feet (3050 meters)
Power Input Range	100 to 240 VAC, 50/60 Hz, or -48 VDC

A readily accessible disconnect device must be provided in the fixed wiring for a DC power supply. It must be suitable for the rated voltage and current specified.

Safety Warnings

1. This equipment must be connected to a protective ground in accordance with the instructions provided in this guide. Improper grounding may result in an electrical shock.
2. Interconnection directly, or by way of other apparatus, to ports marked “SAFETY WARNING - SEE INSTRUCTIONS FOR USE” with other ports (marked or unmarked) may produce hazardous conditions on the network. Seek advice from a competent engineer before attempting to make such a connection.
3. The ports marked “SAFETY WARNING - SEE INSTRUCTIONS FOR USE” do not provide isolations sufficient to satisfy the requirements of BS6301; therefore, any apparatus connections to these ports should have either been approved to BS6301 or previously evaluated against British Telecommunications PLC (Post Office) Technical Guides 2 or 26, and given the proper permission. Attachment for any other usage will invalidate any approval given to this apparatus.
4. This equipment does not provide safety isolation between any port that is connected to a digital network termination point and any other port to which terminal equipment may be connected.
5. The STDX is designed for Class A use only. Do not attempt to use this equipment in a domestic environment, which requires Class B distinction. The STDX will cause interference with domestic products.

This unit has more than one power supply cord. To avoid electrical shock, disconnect the appropriate power supply cord prior to servicing.

Power Cord Requirements

Table 2-4 outlines the requirements, by country, for the plug type and ratings for power cords. Note that the other end of the power cord must be terminated with an IEC 320 receptacle.

Table 2-4. Power Cord Requirements

Country	Power Cord Type
U.S.A. and Canada	NEMA 5-15 15A/125 VAC
U.K.	BS 1363 10A/240 VAC
Australia	AS 3112 10A/240 VAC
Japan	JIS 8303 15A/125 VAC
Switzerland	SEV 1011 10A/220-240 VAC
Germany	AS 3112 10A/240 VAC

The 75Ω G.703 (E1) interface cannot be connected to cabling that would be required by BS6701: Part 1: 1986 to be equipped with over voltage protection. Bit integrity is maintained across the apparatus with 0 dB gain/loss through the switch.

Canadian IC CS-03 Requirements

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements as prescribed in the appropriate Terminal Equipment Technical Requirements documents. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, the user 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.

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

FCC Part 68 General Information

Read the following FCC Part 68 information before you connect the AX 800/1600 to the public telecommunications network.

- This equipment complies with Part 68 of the FCC rules. On the back of this equipment is a label that contains (among other information) the FCC registration number and ringer equivalence number (REN) for this equipment. If requested, this information must be provided to the telephone company.

- This equipment uses the following USOC jacks as defined in Table 2-5.

Table 2-5. STDX 6000 FCC Information

Type of Interface	USOC Jack Connector	Service Code	Facility Code
1.544 Mbps Superframe format (SF) without line power	RJ-48C	6.0N	04DU9-BN
1.544 Mbp Superframe format (SF) and B8ZF without line power	RJ-48C	6.0N	04DU9-DN
1.544 Mbp ANSI ESF without line power	RJ-48C	6.0N	04DU9-1KN
1.544 Mbp ANSI ESF and B8ZF without line power	RJ-48C	6.0N	04DU9-1SN

- 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 that is Part 68 compliant.

- This equipment cannot be used on telephone company-provided coin service. Connection to Party Line Service is subject to state tariffs.

- If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't 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.

- 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 and maintain uninterrupted service.

- If trouble is experienced with this equipment, please contact Ascend Communications for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may ask you to remove the equipment from the network until the problem is resolved.

- It is recommended that the customer install an AC surge arrestor in the AC outlet to which this device is connected. This is to avoid damaging the equipment caused by local lightning strikes and other electrical surges.

FCC and Telephone Company Procedures and Requirements

In order to connect this system to the network, the local operating company must be provided with the registration number of this equipment, and the proper connections must be ordered.

To order the proper service, provide the telephone company with the following information:

- Quantities and USOC numbers of the required jacks
- Sequence in which the trunks are to be connected
- Facility interface codes by position
- Ringer equivalence number or service code, as applicable, by position

Radio Frequency Interference

The AX 800/1600 switch is designed for Class A use only. Do not attempt to use this equipment in a domestic environment, which requires Class B distinction. These switches cause interference with domestic products.

In accordance with FCC Part 15 Subpart B requirements, changes or modifications made to this equipment not expressly approved by Ascend Communications could void the user's authority to operate this equipment.

This equipment produces electromagnetic energy at radio frequencies, and, if not installed and operated in accordance with the manufacturer's instructions as contained in this document, this equipment could cause interference to radio communications and/or interfere with the operation of other RF devices. The equipment has been tested and found to comply with the limits for a Class A Computing Device pursuant to Subpart B of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial

environment. Operation of the equipment in a residential area may cause interference. Should this occur, the user may be required to discontinue operation of the equipment, or take other such measures as may be adequate to rectify the condition at the user's expense.

If Problems Arise

If any of your telephone equipment is not operating properly, you should immediately remove it from your telephone line, as it may cause harm to the telephone network. The telephone operating company must be notified before removal of equipment connected to 1.544 Mbps digital services. If the telephone company notes a problem, it may temporarily discontinue service. When practical, the telephone company will notify you in advance of this disconnection. If advance notice is not feasible, you will be notified as soon as possible. When you are notified, you will be given the opportunity to correct the problem and informed of your right to file a complaint with the FCC.

In the event repairs are ever needed on this equipment, they should be performed by Ascend Communications or an authorized representative of Ascend Communications. You can contact the Ascend Technical Assistance Center 24 hours a day, 7 days a week at:

- 1-800-DIAL-WAN (1-800-342-5296) for the United States and Canada
- 0-800-96-2229 (in the United Kingdom)
- 1-978-952-7299 (outside the U.S., Canada, and the United Kingdom)

3

Preparing for the Installation

This chapter describes the components in the STDX 6000 hardware package and corresponding Accessory Kit, and outlines the preparations and prerequisites for installing the switch.

Unpacking the Switch

The STDX switch is delivered in a protective shipping carton. Accessory items are either included in the same carton or shipped in a separate Accessory Kit.

When you open the carton, if the switch or any enclosed items appear to be damaged, see “If the Product Is Damaged” on page v.

When you unpack the switch:

1. Remove and save all enclosed packing materials in case you need to repack the switch for relocation at a later date.
2. Check the contents of the carton against the items listed on the packing slip.

Unpacking the Accessory Kit

Unpack the accessories and check the contents against the items listed on the packing slip. The accessory items vary with each order.

The following *required* items are shipped with each STDX 6000 order:

- RS-232 shielded console cable (RJ-48 to DB-9) for connecting the switch to a PC
- Modem to serial interface cable (RJ-48 to DB-25) for connecting the switch to a modem
- DB-9 to DB-25 adapter for connecting the switch to a SPARCstation or console terminal that does not have a 9-pin connector
- Power cord (AC only)
- *STDX 6000 Hardware Installation Guide*, Revision 05 (Product Code 80006)
- NavisCore Documentation Set
- *Networking Services and Technology Overview*, Revision 03 (Product Code 80001)

The following *optional* accessory items are shipped as ordered:

- I/O module-specific cables
- Ethernet adapter card
- Ethernet cable
- Dial modem

Selecting the Installation Site

Select the site for your STDX 6000 installation carefully, keeping in mind that the switch requires proper ventilation and all cables attach to the back of the switch. Also, read and follow the environmental and electrical requirements outlined in Chapter 2.

You can rack mount the STDX 6000 in a standard 19- or 23-inch wide equipment cabinet, or place it on a flat surface as a free-standing switch. (See Chapter 4 for the appropriate set up instructions.)

Determining the Setup

The items you need to install in the switch may vary according to the connection method that you use for setup. You can choose from one of these following four connection methods described in Chapter 4:

- "Direct Ethernet Method" on page 4-8
- "Indirect Ethernet Method" on page 4-9
- "Using a SLIP Connection" on page 4-10
- "Using a Management DLCI Connection" on page 4-12

The items needed for setup also depend on which of the following two methods you will use to download the initial software configuration install script:

Using the NavisCore software — Requires you to connect either a direct or asynchronous dial-up link between the NMS serial port and the STDX Serial Management Port on the PP. Using this method, the configuration script is generated within NavisCore and then downloaded from the NMS to the switch.

Using a Terminal Emulator — Requires you to connect an ASCII/VT100 console terminal, or equivalent terminal emulator, to the Serial Management Port on the PP. You can make this connection directly, or you can make the connection remotely using an asynchronous dial-up link. The ASCII/VT100 terminal console can then be used to invoke the install script from the switch, prompting you for all information needed to enable the switch to communicate with the NMS.

Gathering the Setup Items

To install the STDX 6000 hardware configuration, you need:

- TIP
- RS-232 shielded console cable supplied by Ascend for connecting the console terminal to the switch. (See Appendix B for a diagram of this cable.)
- Modem-to-Serial Interface cable supplied by Ascend for connecting the switch to a modem.
- (Optional) An Ethernet transceiver or LAN connection for connecting the switch to the NMS, if the switch is to be used as the gateway to the NMS.
- A flathead screwdriver.
- You need the *Network Management Station Installation Guide*, *NavisCore Physical Interface Configuration Guide*, *NavisCore SMDS Configuration Guide*, and *NavisCore Frame Relay Configuration Guide* to configure the STDX's modules and physical ports and Frame Relay.

Checking the Configuration

The STDX 6000 is delivered to you with the OS already loaded into flash memory. Before installing the STDX, check the I/O modules in the back of the switch to verify the switch is configured as ordered. Figure 3-1 shows an example of a STDX 6000 switch.

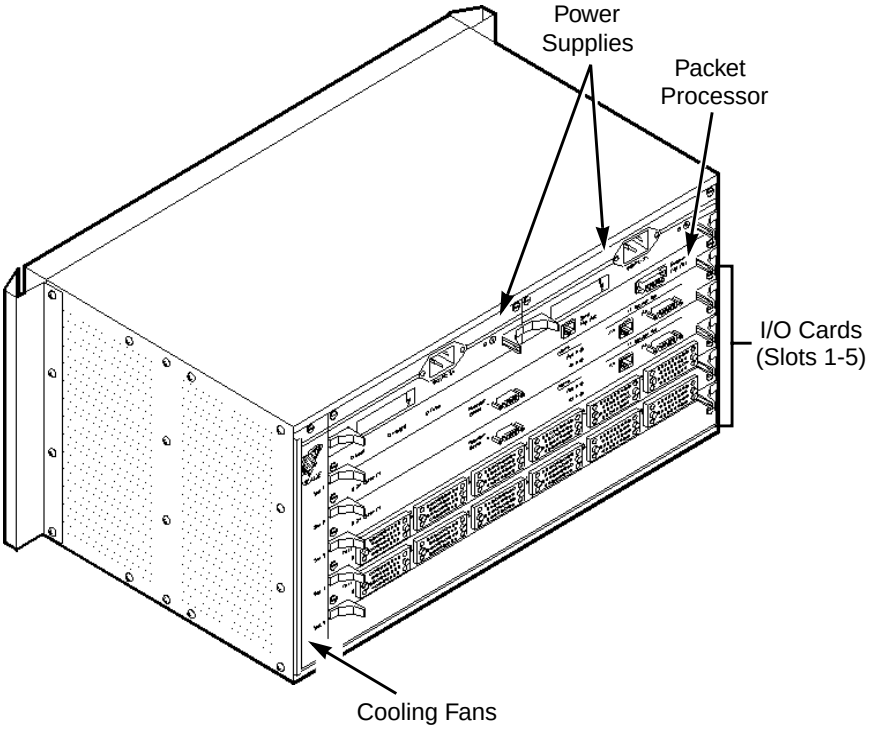


Figure 3-1. Back View of the STDX 6000

The top slot in the switch can only house the PP. The STDX 6000 has five IO slots available. All slots in the switch require occupation for proper air flow; therefore, unused slots contain blank filler modules.

The cable connectors and power supply inlets are also located at the back of the switch.

What's Next

Once you unpacked the STDX 6000 hardware and accompanying Accessory Kit, have gathered the necessary items, and checked the hardware configuration, you are ready to begin installing the switch. Proceed to Chapter 4, "Installing the STDX 6000," for detailed step-by-step installation instructions.

4

Installing the STDX 6000

This chapter provides step-by-step instructions for setting up and installing the STDX 6000 either as a free-standing switch or as a rack-mounted switch. Before you use the instructions in this chapter, verify that the following steps are complete:

- Unpacked the switch
- Unpacked the Accessory Kit
- Selected the installation site
- Determined the setup that you will use
- Gathered the setup items
- Checked the hardware configuration

See Chapter 3 for more information about how to perform any of these steps.

Setting Up the Switch

The STDX 6000 can be placed on a flat surface as a free-standing switch or rack-mounted into a standard 19- or 23-inch wide equipment cabinet.

As a Free-Standing Switch

If you choose to place the switch on a flat surface as a free-standing switch, choose a location that allows for current and future cabling considerations. Keep in mind that all cables attach to the back of the switch. Also, ensure the setup location meets with the ventilation requirements outlined in Chapter 2.

As a Rack-Mounted Switch

If the switch is to be rack-mounted, it must have a mounting bracket installed on each side of the switch. There are three positions available on the switch for installing the mount brackets: front mount, mid-mount, or rear mount. The switch is delivered with mount brackets installed as ordered, but their position can be changed as needed.

The rack-mount spacing meets IEC 297-2 and ANSI/EIA-RS-310C standards.

Figure 4-1 shows the three possible positions to install the mount brackets.

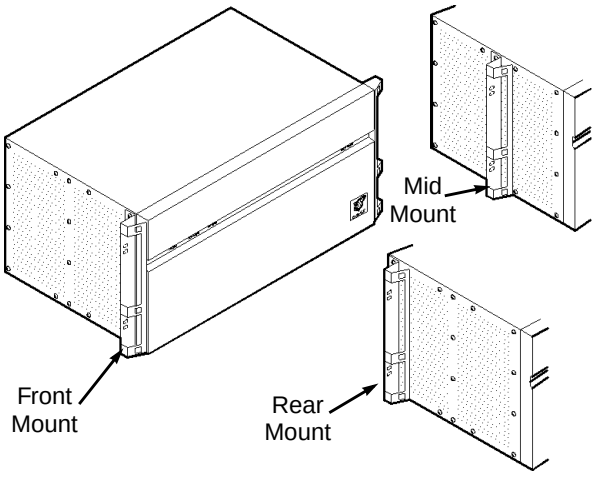


Figure 4-1. Positioning and Installing Mount Brackets

Changing the Position of the Mounting Brackets

To change the position of the mount brackets on the switch:

1. Using a *#2* Phillips screwdriver, remove the screws from each of the mount bracket, and remove the brackets from the switch.
2. Set the mount brackets aside and re-install the screws into the switch.
3. Locate the desired position for brackets (front mount, mid-mount, or rear mount), then use a *#2* Phillips screwdriver to remove the screws located in that position.
4. Place the mount bracket onto the switch by lining up the screw holes on the mount bracket with the screw holes on the switch.
5. Use a *#2* Phillips screwdriver to install the screws into the mount bracket and tighten them onto the switch.

Failure to use the proper screws may damage the switch.

Rack Mounting the Switch

Complete the following steps to rack-mount the switch into the standard 19- or 23-inch wide equipment cabinet. Ascend recommends the use of a hand lift or a minimum of two installers for raising and securing the switch into the equipment cabinet.

Installation into a 23-inch cabinet requires the use of optional adapter brackets (Product Code 90009).

1. Carefully raise the switch to the desired installation height in the equipment cabinet.
2. Line up the screw holes on each of the mount brackets with the screw holes on each side of the equipment cabinet.
3. Using a *#2* Phillips screwdriver, install two truss head screws of the appropriate size through each of the mount brackets on the switch into the screw holes on the equipment cabinet.
4. Verify that the switch is securely attached to the equipment cabinet.

Setting Up the Network Management Station

Connect the switch in one of the following ways:

- Connect the switch to a Sun SPARCstation to serve as the gateway to the Network Management Station (NMS).
- Connect the switch to an ASCII/VT100 terminal emulator running TIP, for use in downloading the install script (see Figure 4-2).

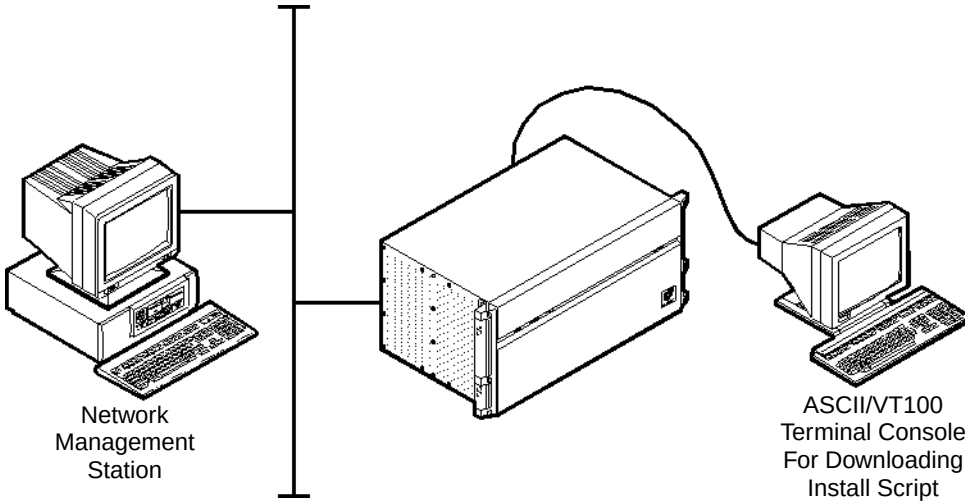


Figure 4-2. STDX Connection to NMS and Console Terminal

For instructions on how to install the operating system software and the network management software for use in configuring, monitoring, and controlling the Ascend network, refer the *Network Management Station Installation Guide.*

If the STDX that you are installing is to be used as the gateway to the NMS, read and follow the instructions in this section, starting with "Choosing a Connection Method," otherwise, proceed to "Setting up the Console" on page 4-13 for instructions on setting up the terminal for use in downloading the install script.

The SPARCstation(s) you are using for the NMS should be solely dedicated for that purpose. Using the NMS for other tasks may hinder the performance of the network management functions.

Prior to connecting the NMS to the gateway switch, see the *Network Management Station Installation Guide* for NMS hardware and software requirements.

Choosing the Connection Method

There are four different ways to connect the NMS to the STDX 6000:

- Direct Ethernet
- Indirect Ethernet
- Serial Line Over Internet Protocol (SLIP)
- Management Data Link Connection Identifier (DLCI) Link

Ascend recommends either direct or indirect Ethernet as the primary connection method from the NMS to the switch. Should the primary connection method fail, SLIP configuration is useful as a backup for network management.

Figure 4-3 through Figure 4-6 shows the basic structure of the four connection methods. For instructions on how to make the actual connections, see "Connecting the NMS" on page 4-7.

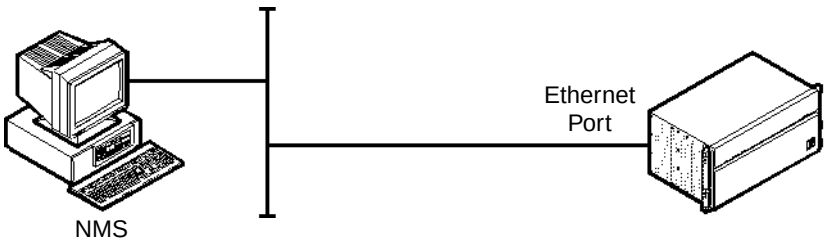


Figure 4-3. Direct Ethernet Method

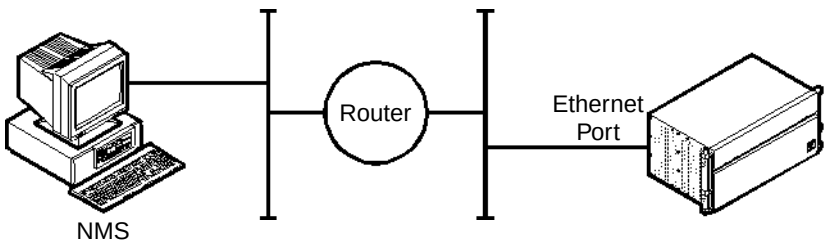


Figure 4-4. Indirect Ethernet Method

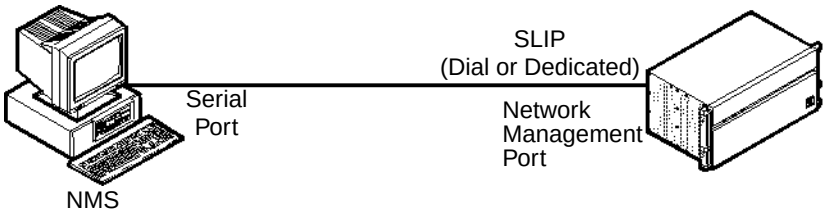


Figure 4-5. Serial Line Over Internet Protocol (SLIP) Method

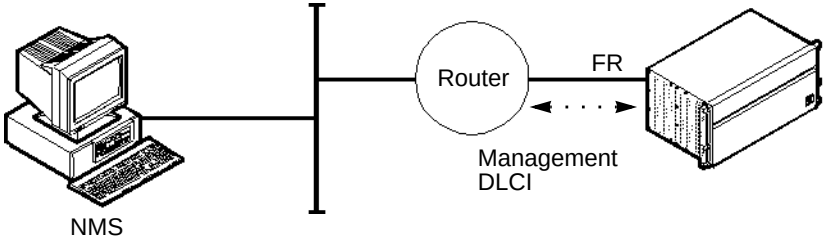


Figure 4-6. Management Data Link Connection Identifier (DLCI) Link Method

Connecting the NMS

The next sections describe how to connect the switch to the NMS using each of the connection methods described in "Choosing the Connection Method" on page 4-6.

Using an Ethernet Connection

There are two ways to make an Ethernet connection from the switch to the NMS:

Direct Ethernet — Connecting the switch and the NMS to the same LAN. This setup provides the greatest interface speed and ease-of-use.

Indirect Ethernet — Connecting the switch and the NMS to separate LANs, having connectivity through a router.

In either case, the optional 15-pin Ethernet port must be installed on the PP to make the connection.

Direct Ethernet Method

Figure 4-7 illustrates how to make a direct Ethernet connection from the switch to the NMS.

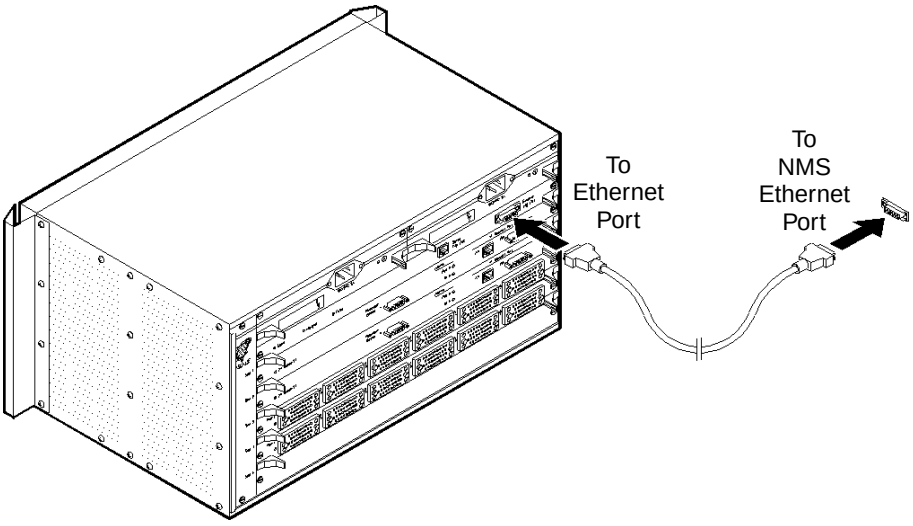


Figure 4-7. Direct Ethernet Connection from the Switch to the NMS

To connect the NMS to the switch using a direct Ethernet connection:

1. Connect the Ethernet to the 15-pin Ethernet port on the STDX. The Ethernet port is located on the Packet Processor.
2. Connect the NMS console Ethernet cable to the same LAN.
3. Ensure the Ethernet transceivers are properly connected to the network.

Indirect Ethernet Method

Figure 4-8 illustrates how to make an indirect Ethernet connection from the switch to the NMS.

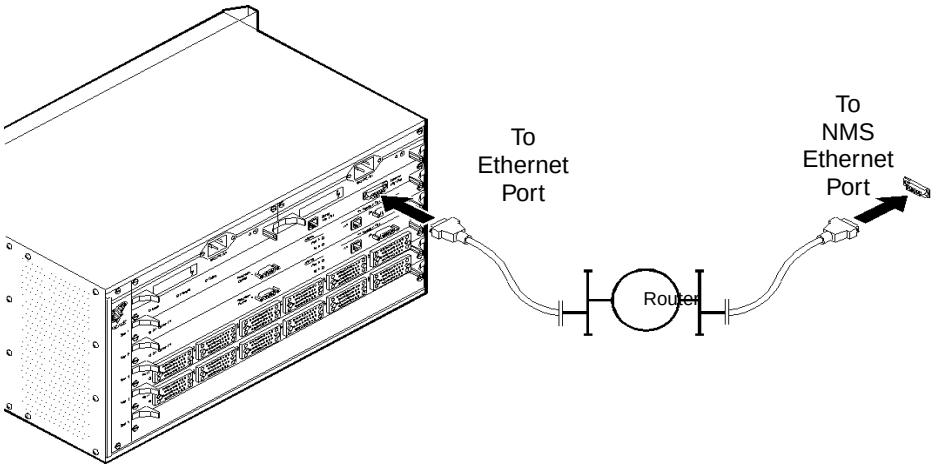


Figure 4-8. Indirect Ethernet Connection from the Switch to the NMS

To connect the NMS to the switch using an indirect Ethernet connection:

1. Connect the Ethernet from the 15-pin Ethernet port on the STDX PP to the LAN that has connectivity to the NMS LAN via a router.
2. Connect the NMS console Ethernet cable to the local LAN.
3. Ensure the Ethernet transceivers are properly connected to the network.

Using a SLIP Connection

The SLIP method of connection enables the NMS to monitor the network either directly via a serial line to a switch or indirectly from a modem link or asynchronous PAD connection.

There are two ways to make a SLIP connection from the switch to the NMS:

Direct SLIP — Using a DTE crossover cable connection from the switch to the NMS.

Dial SLIP — Using a modem connection with a straight-through cable from the modem to the switch and from the modem to the NMS.

Direct SLIP Method

Figure 4-9 shows how to make the SLIP connection from the switch to the NMS using the direct SLIP method.

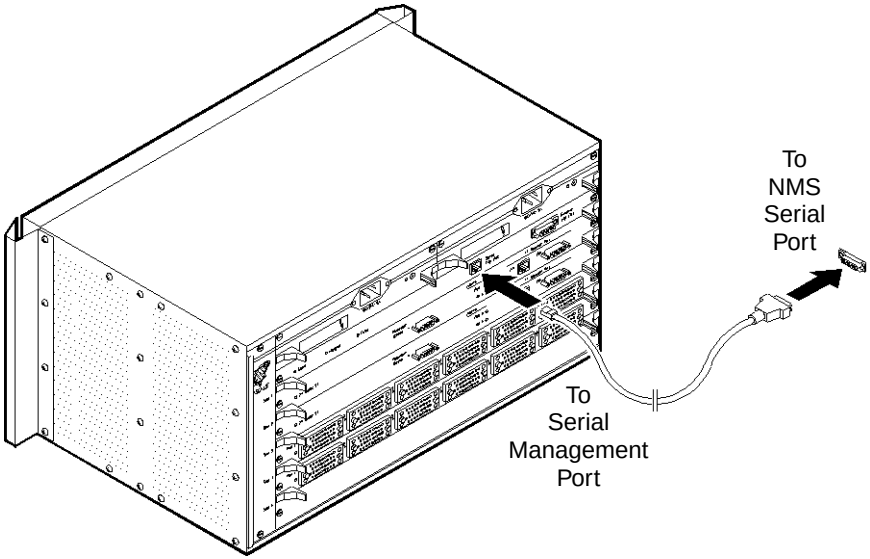


Figure 4-9. Direct SLIP Connection from the Switch to the NMS

To connect the NMS to the switch using a direct SLIP connection:

1. Connect the RJ-48C end of the Serial Interface DTE crossover cable (RS-232 Shielded Console Cable) to the STDX Serial Management Port on the Packet Processor. See Appendix B, Figure B-4 for a diagram of this cable.
2. Connect the DB-9 end of Serial Interface DTE crossover cable to the serial port on the NMS.

Dial SLIP Method

To use a dial SLIP connection, configure the modem for 9600 bps, 8 bit, no parity, with RTS-CTS hardware flow control. *Do not use Xon/Xoff flow control.*

Figure 4-10 shows how to make the SLIP connection from the switch to the NMS using the dial up SLIP method.

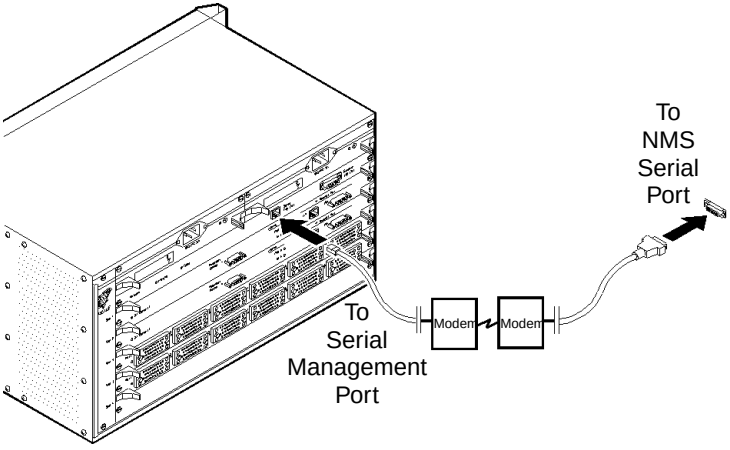


Figure 4-10. Dial SLIP Connection from the Switch to the NMS

To connect the switch to the NMS using a dial up SLIP connection:

1. Connect the DB-25 end of the RS-232 PP1-DCE cable to the modem on the switch side. See Appendix B, Figure B-3 for a diagram of this cable.
2. Connect the RJ-48C end of the RS-232 PP1-DCE cable to the STDX Serial Management Port located on the Packet Processor.

Using a Management DLCI Connection

A Management DLCI connection enables the NMS to manage the network through a Permanent Virtual Circuit (PVC) of a router that is connected to the switch through a Frame Relay UNI-DCE connection.

Figure 4-11 shows how to make a Management DLCI connection from the switch to the NMS.

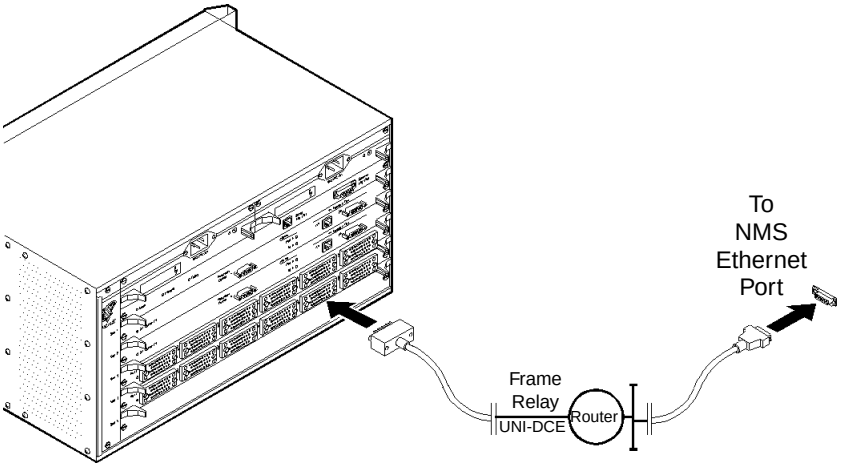


Figure 4-11. Management DLCI Connection from the Switch to the NMS

To connect the switch to the NMS using a Management DLCI connection:

1. Connect the NMS to the LAN that has a router connection to the switch via a Frame Relay UNI connection.
2. Configure the NMS to use a DLCI connection. For instructions, see the *NavisCore Frame Relay Configuration Guide*.
3. Configure the switch to route management traffic through the designated Management DLCI.
4. Configure the router with a “static route” to the Ascend network.

Setting up the Console

After you connect the NMS to the switch, you must set up the console terminal to download the install script. The install script download enables the switch to communicate with the NMS. The console that you use to download the install script must meet the following minimum configuration requirements:

- An ASCII/VT100 terminal emulator running TIP
- Asynchronous full-duplex transmission/reception
- Configured for 9600 bps, 8 data bits, 1 stop bit, no parity

The Serial Management Port on the switch allows an operator to access the console to perform diagnostics and other management commands via an asynchronous terminal or computer running a terminal emulation program (such as TIP).

Connecting the Console

Figure 4-12 illustrates the connection from the switch to the console terminal.

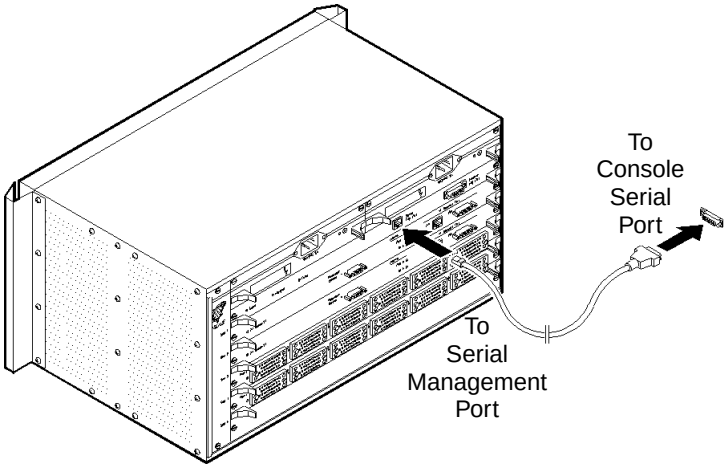


Figure 4-12. Console Connection to the STDX

To connect the console to the switch:

1. Connect the DB-9 end of the Serial Interface DTE (RS-232 Shielded Console) crossover cable to the console's serial port. See Appendix B, Figure B-4 for a diagram of this cable.
2. Connect the RJ-48C end of the DTE crossover cable to the STDX Serial Management Port on the PP.

For a remote connection from the console to the switch, use a straight through cable.

Proceed to Chapter 5 to complete the installation of your STDX 6000 switch.

5

Determining the Operating Status

This chapter describes how to power up the STDX 6000 and determine its operating status. Before you do this, verify you did the following:

- Set up the switch hardware (either as a free standing or rack-mounted switch)
- Set up the Network Management Station (NMS)
- Connect the switch to the NMS
- Set up the console terminal
- Connect the switch to the console terminal

See Chapter 4 for more information about any of these steps.

Completing the Hardware Installation

To complete the installation of your STDX 6000:

1. Verify that the correct power source is available for the power supply. (See Chapter 4 for power supply requirements.)
2. Attach the power cord to the switch as follows:

   AC power supply — Attach the main power cord to the switch by plugging the AC power cord into the receptacle on the power supply (at the back of the switch). If you have a redundant power supply, plug a second power cord into the receptacle on the redundant power supply.

   48 VDC power supply — Attach the power cord as follows:

   a. Using a 12 AWG two-wire cable with two *#8* forked terminals, connect the negative terminal to the -48V connector on the terminal block, and connect the positive terminal to the RET connector on the terminal block (see Figure 5-1).

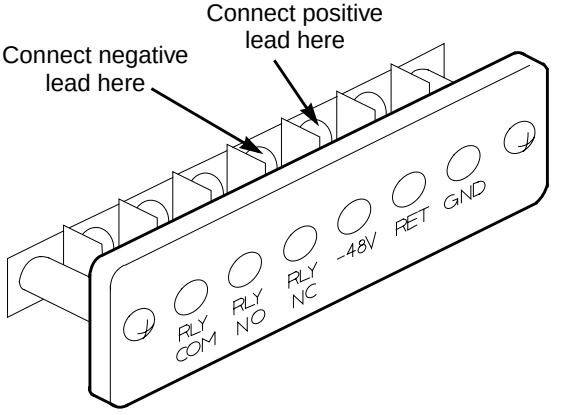


Figure 5-1. -48 VDC Power Supply Terminal Block

   b. Using a *1/8-in.* flathead screwdriver, tighten the connector screws to secure the terminals.

   c. If you have a redundant power supply, repeat these steps for the second power supply.

3. Plug the power cord(s) into the wall outlet.

For -48 VDC power supplies, you must also turn on the power supply switch after plugging in the power cord.

The following events should occur:

- The switch performs a series of self checks and initialization.
- During power-up diagnostics, all LEDs (Good, Marginal, Failed) on the front of the switch flash continually. The green Good LED begins to flicker as the Flash Operating System is decompressed into memory.
- After the Flash OS download completes, the Good LEDs on the front of the switch and on the Packet Processor card should both remain solid green.
- Each I/O module's LED should also remain solid Green to indicate that the card has a configuration loaded and is operational. (A blinking LED on an I/O module indicates the switch is in power-up diagnostics or is initializing.)

If any other condition exists, see Chapter 8 for further instructions.

The STDX is delivered with the OS already loaded into Flash memory. If the OS appears to be lost or damaged, consult an Ascend Technical Assistance Center representative (see page 8-3) and see the *NavisCore Diagnostic and Troubleshooting Guide* for instructions.

Displaying the Diagnostic Results

To view the status of power-up diagnostics, a console must be connected to the Serial Management Port on the switch, and the manual mode jumper must be on. See "Setting Up the Network Management Station" on page 4-4 for instructions on connecting the console. See the *NavisCore Diagnostic and Troubleshooting Guide* for instructions on setting the jumper.

What's Next

After you complete the hardware installation, you must configure the switch so that it can communicate with the NMS. TIP (from Solaris) must be installed on the console to enter or download the install script. For instructions, see the *NavisCore NMS Getting Started Guide.*

6

Installing or Replacing Modules

This chapter describes how to insert additional modules or replace existing or defective modules in the STDX 6000. In addition, this chapter describes the following hardware components:

- Packet Processor (PP)
- I/O modules
- Power supplies
- Cooling fans

Installation and Replacement Considerations

The STDX enables “hot swap” installation and replacement of most modules without having to power down the switch. However, if the switch is not currently operational, you can power down the switch as a precautionary.

The Packet Processor (PP) can never be replaced while the switch is operational. However, all other hardware components (I/O modules, power supplies, and cooling fan) can be hot swapped. Hot swapping does not adversely affect the operation of other hardware components in the switch.

Never attempt to remove or install modules without first using appropriate static guard measures.

Never attempt to repair parts or modules yourself. Return all defective modules to Ascend for repair. Only Ascend-qualified service representatives are authorized to repair parts.

Replacing the Packet Processor

Figure 6-1 shows the procedure for removing the PP from the STDX 6000.

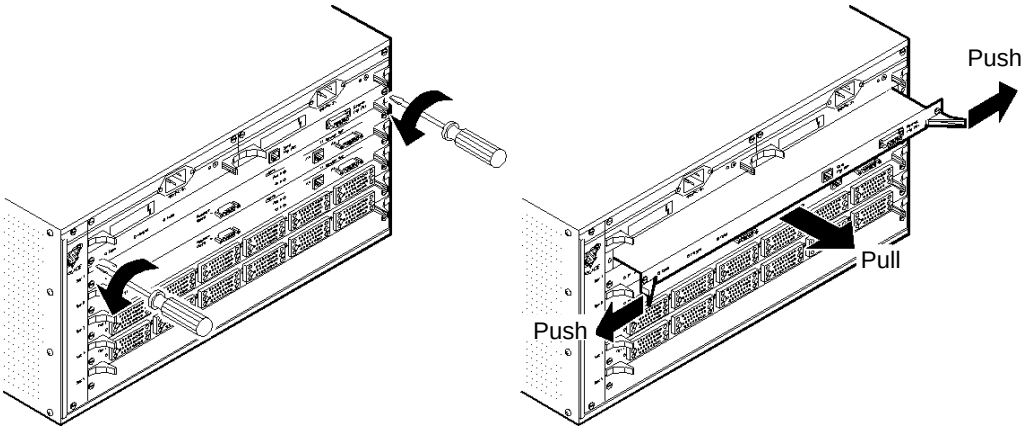


Figure 6-1. Removing the Packet Processor Module

To remove the PP module and replace it with a new PP module:

1. Using the appropriate static guard measures, power off the switch and disconnect all cables from the PP module.
2. Using a flathead screwdriver, remove each of the *#2* flathead screws from the PP module.
3. Simultaneously depress the two ejector tabs to disengage the PP module from the switch.
4. While holding the ejector tabs, carefully slide the PP module out of the switch.
5. Line up the replacement PP module with the card guide in the switch and slide the PP module into the chassis.
6. Line up the screw holes on the switch with the screw holes on the PP card.
7. Install each of the *#2* flathead screws into the PP module using a flathead screwdriver.
8. Reconnect the cables that you removed in Step 1.
9. Power the switch back up. The green Good LED should remain solid on the new PP. If any other condition exists, see Chapter 8.

Installing or Replacing I/O Modules

Figure 6-2 shows the procedure for installing or replacing I/O modules from the back of the STDX 6000. Step-by-step instructions follow the illustration.

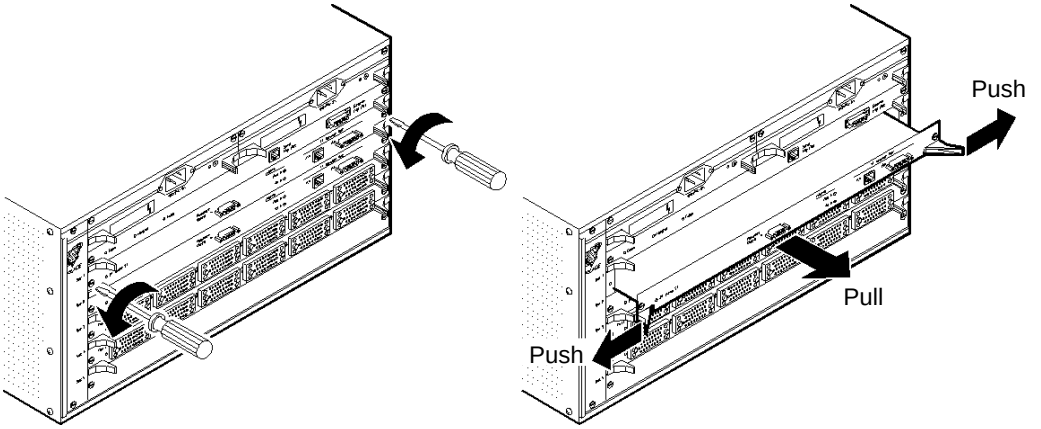


Figure 6-2. Installing or Replacing I/O Modules

To install or replace an I/O module:

1. From the NMS, set the Admin Status of each physical port on the I/O module to Down. For instructions, see the the *NavisCore Physical Interface Configuration Guide*.
2. Using the appropriate static guard measures, disconnect all cables from the back of the existing I/O module. Mark the cables for identification and reconnection.
3. Using a flathead screwdriver, remove each of the *#2* flathead screws located on the I/O module.
4. Simultaneously depress the two ejector tabs to disengage the I/O module from the switch.
5. While holding the ejector tabs, carefully slide the I/O module out of the switch.
6. Line up the replacement I/O module with the card guide in the switch, and slide the I/O module into the chassis.
7. Line up the screw holes on the switch with the screw holes on the I/O card.

8. Install each of the *#2* flathead screws into the I/O module using a flathead screwdriver.
9. Reconnect the cables that you removed in Step 2.
10. From the NMS, reset the Admin status on the I/O card to Up.
11. The LED on the I/O module should remain solid green. If any other condition exists, see Chapter 8.

Installing or Replacing Power Supplies

If the switch has a redundant power supply, you do not have to power down the switch to replace the main power supply.

Before installing or replacing a power supply, see "Product Information and Warnings" on page 2-5 and "Power Cord Requirements" on page 2-7.

Figure 6-3 and Figure 6-4 shows how to remove power supply modules from the switch. Figure 6-3 shows a 120-240 VAC, and Figure 6-4 shows a -48 VDC power supply.

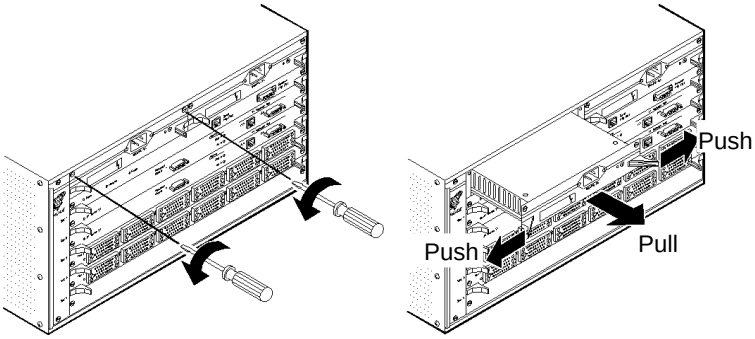


Figure 6-3. Removal of a 120-240 VAC Power Supply Module

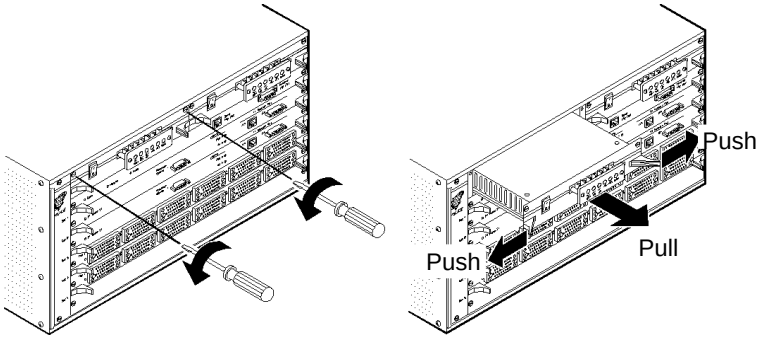


Figure 6-4. Removal of a -48 VDC Power Supply Module

To install or replace a power supply module:

1. If a redundant power supply is installed in the switch, go to Step 2; otherwise, power down the switch before going to Step 2.
2. Using proper static guard measures, disconnect the power cord from the wall outlet. Then disconnect the power cord from the back of the power supply.
3. Using a flathead screwdriver, remove each of the *#2* flathead screws from the power supply module.
4. Simultaneously depress the two ejector tabs to disengage the power supply from the switch.
5. While holding the ejector tabs, carefully slide the power supply module out of the switch.
6. Line up the replacement power supply module with the card guide, and carefully slide the power supply into the chassis.
7. Line up the screw holes on the switch with the screw holes on the power supply module.
8. Using a flathead screwdriver, install each of the *#2* flathead screws into the power supply module.
9. Reconnect the power cord to the power supply module. Then plug the power cord into the wall outlet.
10. If necessary, power the switch back up. The LED on the power supply should remain solid green. If any other condition exists, see Chapter 8.

Installing or Replacing the Cooling Fan Module

You do not have to power down the switch to replace the cooling fan module. The switch can run without the cooling fans for a short time, and can tolerate the temperatures shown in "Environmental Specifications" on page 2-4.

Do not put your fingers anywhere near the fans when removing the fan module from the switch. The fans may still be running.

Figure 6-5 shows the procedure for removing the cooling fan module from the switch. Step-by-step instructions follow the illustration.

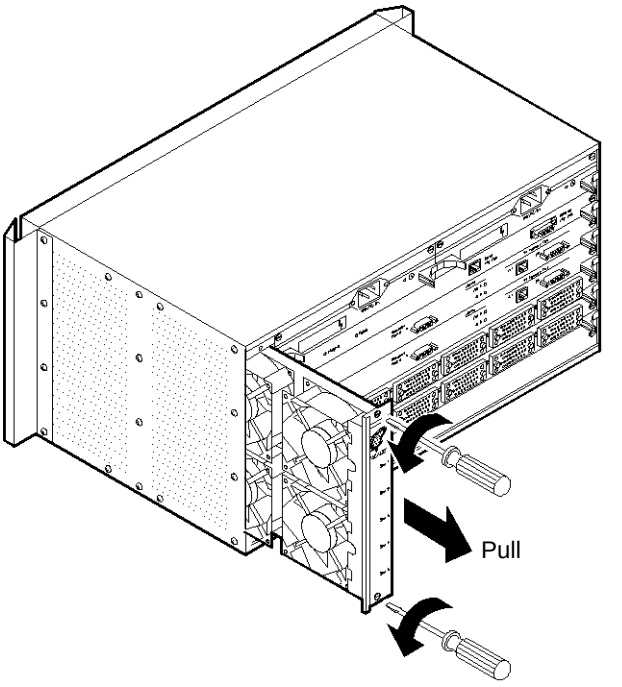


Figure 6-5. Removal of the Cooling Fan Module

To replace the cooling fan module:

1. Using the appropriate static guard measures and a flathead screwdriver, remove each of the *#2* flathead screws from the cooling fan module.
2. While holding onto the fan module handle, carefully slide the cooling fan module out of the switch.
3. Line up the replacement cooling fan module with the card guide, and carefully slide the module into the chassis.
4. Line up the screw holes on the switch with the screw holes on the cooling fan module.
5. Using a flathead screwdriver, install each of the *#2* flathead screws into the cooling fan module.

7

Installing a Redundant STDX

This chapter explains how redundancy works and describes how to set up an STDX 6000 as the redundant partner of another STDX 6000.

About Redundancy

The STDX 6000 supports a redundant one-for-one switch configuration. A pair of identically configured switches are interconnected through redundancy panels, with one switch being the active switch and the other switch being the standby partner. When the active switch fails, the standby switch automatically detects the outage and becomes the active switch. User ports, trunks, and circuits are automatically re-established by the new active switch.

Redundancy and recovery in an STDX 6000 comprises both hardware and software mechanisms that allow the STDX to continue operating after certain types of failures occur. Within an STDX 6000, redundant hardware consists of dual power supplies and dual cooling fans. All other hardware within an STDX (including the PP and I/O modules) is not redundant. Instead, two identical switches can be connected together, where one is the active switch and the other is a standby (redundant partner). The active switch can assess all I/O modules and serial ports; the standby switch cannot. The Ethernet, however, is active on both switches.

From a software perspective, the standby switch is fully operational, except that it never receives any data from the I/O modules or serial ports. For instructions about how to configure the redundant partner of an STDX switch, contact the Ascend Technical Assistance Center (see page 8-3).

Failure of the active STDX causes the redundant partner to become active, thereby taking over full operation and complete control over the I/O modules and serial ports. There is never a partial changeover to a redundant partner. After a successful changeover, a trap is sent to inform the NMS.

The Ethernet interfaces provide the communications path for the periodic redundancy polling between the two switches. The redundancy polling provides a “keep-alive” mechanism, whereby the standby partner continuously monitors the availability of the active switch. If the active switch fails to respond to polling from the standby switch, the standby assumes the active switch has failed and the following events occur:

- The standby switch disables the active switch, performs a warm boot, and takes over control of the I/O modules and serial interfaces.

- The old active node reboots itself and attempts to become the new standby, redundant partner. If no errors are encountered, it becomes the standby switch; otherwise, it remains inactive.

There are two special cases in which the failure of an active switch will not result in the redundant changeover

- When an active switch reboots after a successful Flash download, or warm boots after a successful Parameter RAM (PRAM) synchronization. For more information on downloading the switch configuration, see the *NavisCore NMS Getting Started Guide*.

- When the PRAM configuration of the standby redundant STDX 6000 is kept in synchronization with the active switch. This is accomplished in two ways:
  - All SNMP sets that are received by the active switch from the NMS are forwarded to the redundant switch.
  - Redundancy “keep alive” polls provide a mechanism for exchanging PRAM checksums between the two switches. When the active switch detects a PRAM checksum mismatch, it initiates a transfer of its PRAM to the redundant switch. As a final measure, when the changeover occurs from the active switch to the redundant switch, the NMS computes the current PRAM checksum and compares it to the PRAM checksum reported by the now active switch. If the PRAM checksums do not match, the NMS automatically initiates a PRAM synchronization operation.

Installation Considerations

In a redundant configuration, both switches are identical in all aspects. Each slot on the redundant switches must contain the identical I/O configuration. Also, the optional Ethernet module is required on the PP card of each switch.

The Ethernet interface is used by the pair of switches to exchange the redundancy polling messages. However, during the installation process you should disconnect the Ethernet interface of both switches. It is undesirable for the switches to exchange redundancy information until the installation process is complete.

In a redundant setup, both switches require an additional hardware component called redundancy panels. The two switches are cabled to a common set of redundancy panels that serve two purposes

- They provide the communications paths to external devices. Only the active switch can access the interfaces.
- They provide independent hardware redundancy logic. The redundancy logic provides the ability for the standby partner to disable the active switch.

Because the disabling of the active switch by the redundant partner is performed via the redundancy cables and logic, a minimum of one redundancy cable is required from each of the switches for a successful changeover to occur.

The 24-Bundle T1 and the 30-Bundle E1 cards are equipped with a redundancy control port. However, the multi-interface IOP module (or 6-port Universal I/O, or UIO) does not have an external redundancy control port. The redundancy path for the multi-interface IOP is carried by the same connector used for Ports 1 and 2.

The 8-port and 18-port UIO modules do not support redundancy.

Cabling

I/O modules on redundant switches are not directly attached to external devices, such as routers or modems. Instead, they are connected to one or more redundancy panels.

Redundancy panels provide an additional set of interface ports to which the external devices are connected. In this way, the I/O modules share connectivity to the redundancy panels, and it is the redundancy panels that are connected to the external devices. The redundancy panels ensure that only one switch can communicate with the attached devices.

To simplify the cabling process, it is recommended that you designate one switch as Switch A and the other switch as Switch B. The redundancy panels contain labels for Switch A versus Switch B. The cabling is identical for the 24-Bundle T1 card and the 30-Bundle E1 card; however, the cabling for the multi-interface IOP module varies slightly, as described in the next section.

Cabling the Multi-Interface IOP Module

The multi-interface IOP module has three 80-pin connectors, labeled 1, 2, and 3 (as shown in Figure 7-1). Its ports are split into two ports, each for a total of six ports.

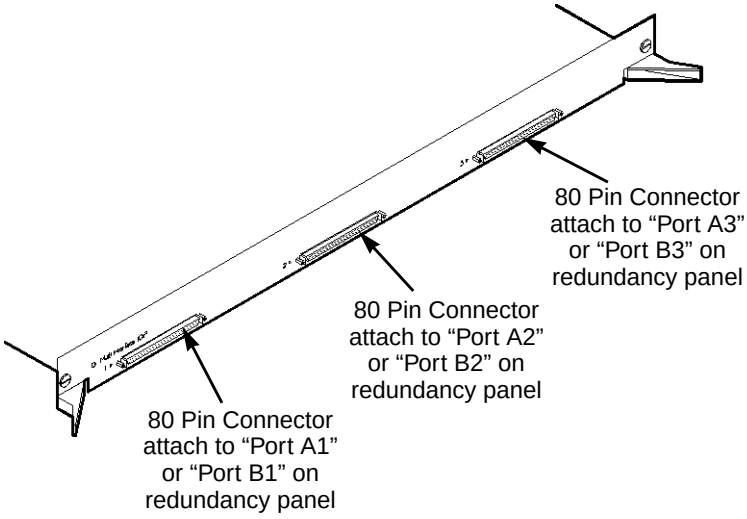


Figure 7-1. Multi-Interface IOP Module

The multi-interface IOP module connects to an EIA 530A Redundancy Panel (shown in Figure 7-2). The bottom half of the redundancy panel contains six interface ports labeled 1 through 6.

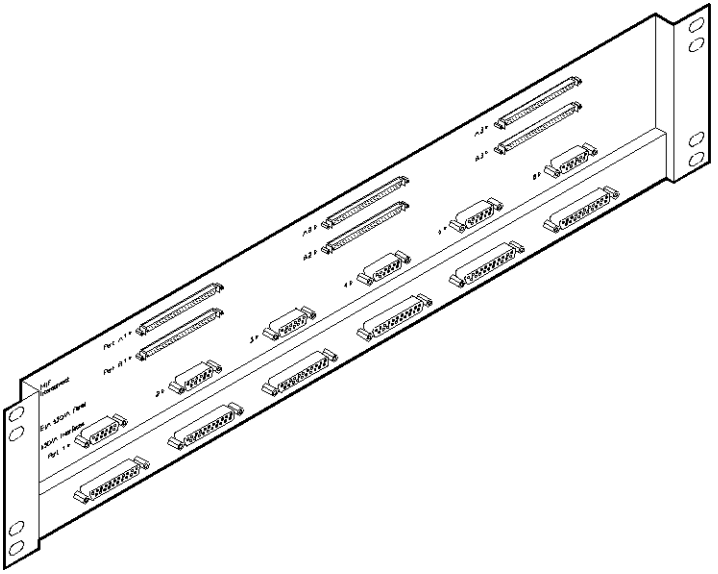


Figure 7-2. EIA 530A Interface Ports 1 Through 6

The multi-interface module should be cabled to the redundancy panels as follows:

- For the switch that you designated as Switch A, connect the multi-interface 80-pin connector labeled “1” to the redundancy panel 80-pin connector labeled “A1.” Connect the multi-interface 80-pin connector labeled “2” to the redundancy panel 80-pin connector labeled “A2.”

- For the switch that you designated as Switch B, connect the multi-interface 80-pin connector labeled “1” to the redundancy panel 80-pin connector labeled “B1.” Connect the multi-interface 80-pin connector labeled “2” to the redundancy panel 80-pin connector labeled “B2.”

When Switch A is active, redundancy connector A1 enables Switch A to access external device ports 1 and 2. When Switch B is active, redundancy connector B1 enables Switch B to access external device ports 1 and 2.

Redundancy connectors A1 and B1 allow access to external ports 3 and 4, while A3 and B3 allow access to external ports 5 and 6.

Redundancy connectors A1 and B1 have an additional property. Besides providing access to external ports 1 and 2, they also contain the redundancy logic needed for the changeover from the standby switch to the active switch. (T1 and E1 cards are equipped with actual redundancy control ports. See the next section, "Cabling T1 and E1 Cards.")

Cabling T1 and E1 Cards

Unlike the EIA 530A redundancy panel shown in Figure 7-2, a single T1 or E1 redundancy panel can accommodate up to four pairs of cards. Figure 7-3 shows the T1/E1 redundancy panel.

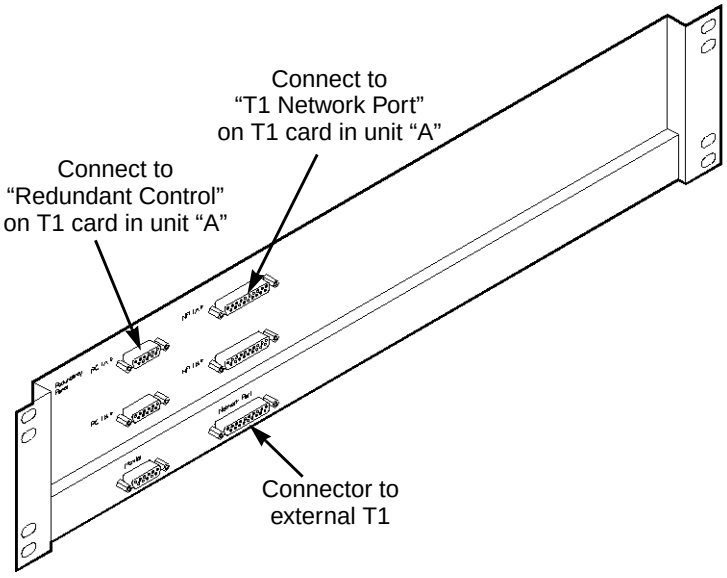


Figure 7-3. T1/E1 Redundancy Panels

The following scenario describes the process for connecting T1 cards to the T1 redundancy panels. Assume that each switch in the redundant pair has a T1 card installed in Slot 2 and Slot 3. Beginning with the T1 card occupying Slot 2, connect the T1 card to the redundancy panels as shown in Table 7-1.

Table 7-1. T1 Cards and Redundancy Panels

	T1 Card Connector Label	Redundancy Panel Label
T1 in Slot 2 of Switch A	Redundant Control “T1 Network Port”	“RC 1A” “NP 1A”
T1 in Slot 2 of Switch B	Redundant Control “T1 Network Port”	“RC 1B” “NP 1B”
T1 in Slot 3 of Switch A	Redundant Control “T1 Network Port”	“RC 2A” “NP 2A”
T1 in Slot 3 of Switch B	Redundant Control “T1 Network Port”	“RC 2B” “NP 2B”

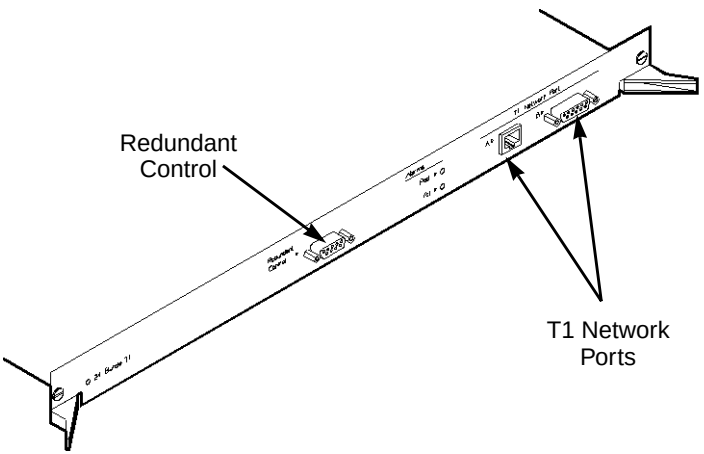


Figure 7-4. 24-Bundle T1 Card

Powering Up the Redundant Configuration

In a redundant configuration, both switches are identical in all aspects. That is, there is no concept of primary and secondary, or of master and slave. The first switch that you power up automatically becomes the active switch and gains access to the external interfaces on the redundancy panels. The second switch to be powered up becomes the standby, or redundant partner, and is thereby prevented from accessing the external interfaces on the redundancy panels.

To power up the redundant configuration:

1. At the NMS, create a configuration for the redundant switch in the same way that you would configure any other switch. This process includes adding an STDX icon to the map and adding I/O module types, physical ports, and logical ports as necessary. For details, see the *NavisCore NMS Getting Started Guide, NavisCore Physical Interface Configuration Guide, NavisCore SMDS Configuration Guide,* and *NavisCore Frame Relay Configuration Guide.*
2. With both switches powered off, make all cable connections for both switches with the exception of the Ethernet modules.
3. Power on the switch that you designated as Switch A. The switch should be installed using the same methods outlined for installing any other switch, including a download of the NMS configuration script and PRAM synchronization. See the *NavisCore NMS Getting Started Guide*.
4. Power off Switch A, and power on Switch B. Perform the installation and verification of Switch B.
5. At this point, both switches should have identical software and configuration information. Connect the Ethernet interface of each PP module to the local Ethernet.
6. Power on Switch A. Provided that Switch B was still powered up, Switch A then becomes the standby switch. The green Good LED on the standby switch should be blinking to indicate its standby status.
7. To test the redundant setup, execute the Switch to Standby Unit command from the NMS and observe the changeover.

8

Troubleshooting

This chapter provides general troubleshooting solutions for the STDX 6000 hardware. Unless otherwise noted, only hardware problems and their solutions are listed in this guide. If you suspect software problems, consult the troubleshooting information in the *NavisCore Diagnostics and Troubleshooting Guide*.

Determining the Operating Status

In most cases, the overall status of the STDX 6000, as well as the status of all installed modules, is indicated by status lights that appear on the Packet Processor, power supplies, and individual I/O modules.

When experiencing hardware problems, check the status lights and compare them to Table 8-1 to determine the problem and appropriate resolution.

Table 8-1. Troubleshooting Tips

Problem	Cause	Solution
All LEDs, Good, Marginal, and Failed, remain solid on the PP module.	One of the following conditions exist. Either: • The card is in reset mode. • The card failed its internal CPU diagnostics. • The 960 boot prom, 8031 boot prom, or processor either failed, is loose, or is missing.	Contact the Ascend Technical Assistance Center (see page 8-3). The module has to be replaced. See "Replacing the Packet Processor" on page 6-3.
Marginal LED remains solid on the PP module.	A marginal error condition exists on the switch.	May indicate failure of a redundant power supply or fan module. Check the background diagnostics.
Failed LED remains solid on the PP module.	Power up diagnostics have failed.	Check the switch for a failed Packet Processor card or a corrupt Flash Operating System.

Table 8-1. Troubleshooting Tips (Continued)

Problem	Cause	Solution
Blinking Red LED appears on the PP module.	Power up diagnostics detected a fatal error on the card.	Contact the Ascend Technical Assistance Center (see page 8-3). The affected module has to be replaced. See "Installing or Replacing I/O Modules" on page 6-4 for replacement instructions.
Solid Red LED appears on the PP module.	The NMS software has detected or reported a fatal error on the card.	Contact the Ascend Technical Assistance Center (see page 8-3).
No LEDs are lit on the switch's power supply or I/O modules.	The switch is not receiving power. The power cord may not be properly attached to the switch or to the wall outlet receptacle.	Check the power cord in the primary receptacle on the switch (and secondary redundant receptacle) to ensure proper seating at the wall outlet and in the switch.
No LED appears lit on an I/O module.	The module may not be seated properly in the chassis, or no PRAM is resident on the card.	Check the seating of the I/O module in the chassis. Ensure that the card is configured with PRAM. For instructions, See the *NavisCore NMS Getting Started Guide.*
Switch continually reboots.	Bad or corrupt Flash Operating System, or bad PRAM.	Put jumper on and reload the Flash software. See the *NavisCore Diagnostic and Troubleshooting Guide*.

Customer Support

Contact the Technical Assistance Center at:

- 1-800-DIAL-WAN (U.S. and Canada)
- 0-800-96-2229 (U.K.)
- 1-978-952-7299 (all other areas)

A

I/O Modules

This appendix contains technical information about each of the hardware I/O modules that are currently available from Ascend Communications. The following modules are described:

- 6-Port Universal I/O Module
- 6-Port V.35 I/O Module
- 8- and 18-Port Universal I/O Modules
- Channelized T1 I/O Module
- Channelized E1 I/O Module

6-Port Universal I/O Module

The 6-Port Universal I/O module is a base module for the STDX 6000. It supports connections to a variety of popular synchronous interfaces, including modern international serial interfaces. The module contains six universal ports that can operate with data rates from 19.2 Kbps to 4.096 Mbps. It provides the STDX 6000 with redundancy for six serial ports, and allows US and new international serial interfaces. There are three panel types, all of which support redundancy.

Users can individually configure each of the physical ports on the 6-Port Universal I/O module as DCE or DTE to provide any frame-based logical port function. Individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device.

For user devices, the connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX 6000 will assemble the data links into Frame Relay format.

Operational Features

The STDX 6000 6-port UIO module:

- Supports redundant node configurations.
- Uses standard interfaces to existing network products without modifications, including international serial interfaces.
- Provides high port density configurations.
- Allows customization of connector types through external I/O assembly.

Specifications

Physical Dimensions

Size: 15.75 in. wide x 1.06 in. high x 9.25 in. deep

Weight: 2 lbs.

Power Requirements

12 Watts

Agency Approvals

Electromagnetic Emissions Certifications:
FCC Part 15 Class A, CISPR EN55022 Class A

Temperature range: 5° to 35°C

Physical Interfaces

- CCIT V.35, 34-pin ISO 2593 (RS-422 drivers for the balanced signal, US only)
- X.21, 15-pin D sub
- EIA530/A, 25-pin D sub and/or 26-pin Mini-D sub
- Timing options: internal clock, external clock or loop timing, independent transmit and receive path timing

Status Indicators

Single green LED:
Normal operation (LED lit)
Initialization (Blinking LED)
Module failure (LED off)

Figure A-2 shows a 6-port UIO I/O module.

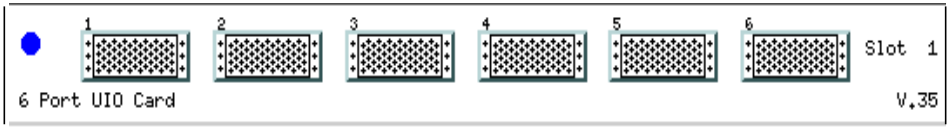


Figure A-1. 6-Port UIO I/O Module Back Panel

6-Port V.35 I/O Module

The 6-Port V.35 I/O module contains six V.35 ports, each of which is capable of data rates from 19.2 Kbps to 4.096 Mbps. Users can individually configure each of the V.35 ports on the module as DCE or DTE to provide any frame-based logical port functions. The individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device.

For user devices, the connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX 6000 will assemble the data links into Frame Relay format.

Operational Features

The STDX 6000 6-Port V.35 I/O module:

- Provides PVC rate monitoring for usage statistics.
- Allows ports to be user or trunk interface.
- Reduces per-port costs of Frame Relay services.
- Provides high port density configurations.
- Allows for configuration flexibility.

Specifications

Physical Dimensions

Size: 15.75 in. wide x 1.06 in. high x 9.25 in. deep

Weight: 2 lbs.

Power Requirements

25 Watts

Agency Approvals

Electromagnetic Emissions Certifications: FCC Part 15 Class A

NEBS TR-NWT-00063, TR-NWT-001089 (pending)

Temperature range: 5° to 45°C

Physical Interfaces

- ISO 2593 V.35 34-pin female connector, optional crossover to male with a cable
- Timing options: internal clock, external clock or loop timing, independent transmit and receive path timing

Status Indicators

Single green LED:
Normal operation (LED lit)
Initialization (Blinking LED)
Module failure (LED off)

Figure A-2 shows the V.35 I/O module back panel.

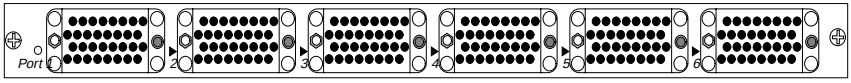


Figure A-2. V.35 I/O Module Back Panel

8- and 18-Port Universal I/O Modules

The UIO module is available in 8-port (UIO-8) and 18-port (UIO-18) models that support X.21 or V.24 communication. Users can configure pairs of the X.21 or V.24, using one of the two external cables types, as DCE or DTE to provide any frame-based logical port functions.

Individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device. For user devices, the connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX assembles the data links into Frame Relay format.

The UIO module enables STDX 6000 switches to provide increased concentration of the outer tier of a network. The UIO module allows aggregation of low-speed connection (2.4 Kbps - 128 Kbps, with 9.6 Kbps being the most common) into an STDX that can provide local Frame Relay switching and channel traffic to backbone network sites via T1 or E1 circuits. The UIO module is capable of saturating all 8 or 18 physical ports at 128 Kbps full duplex. Each port is individually configurable at 2.4, 4.8, 8, 9.6, 12, 16, 24, 32, 38.4, 48, 56, 64, 96, 112, or 128.

The UIO module is specially suited for STDX switches located in private networks, but is also applicable to public networks. The 8- or 18-port density makes the UIO module cost effective for concentrating multiple sites (branch offices, retail stores, banking machines).

Operational Features

The STDX 6000 8- and 18-port UIO modules:

- Provide PVC rate monitoring for usage statistics.
- Allow ports to be user or trunk interface for flexibility.
- Support Frame Relay and SMDS DXI.
- Allow flexibility with non-Frame Relay services via direct FRAD and translated FRAD (PPP to RFC 1490).
- Allow X.21 or V.24 pair configuration via external cable.
- Provides high port density configurations.

Specifications

Physical Dimensions

Size: 15.75 in. wide x 1.06 in. high x 9.25 in. deep

Weight: 2 lbs.

Power Requirements

25 Watts

Agency Approvals

Electromagnetic Emissions Certifications: FCC Part 15 Class A

Temperature range: 5° to 45°C

Physical Interfaces

- ISO 2110 V.24 25-pin female connector

- ISO 4903 X.21 15-pin female connector
- Optional cross-over to male with V.24 or X.21 cable
- Clocking options supported: transmit and receive can be independently timed with internal clock, external clock, or loop timing

Status Indicators

Single green LED:
Normal operation (LED lit)
Initialization (Blinking LED)
Module failure (LED off)

Figure A-3 shows an 18-port UIO I/O module.

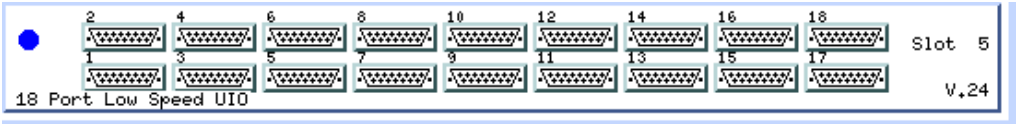


Figure A-3. 18-Port UIO I/O Module

Channelized T1 I/O Module

The Channelized T1 I/O module provides a built-in T1 CSU interface and standard multiplexing D4 channels (DS0). Users can map the DS0 channels on the T1 interface to a maximum of 24 HDLC data links. Contiguous or non-contiguous n x DS0 channels compose each HDLC data link. This makes it easy and economical to interface to multiple customer sites over a single T1 connection by eliminating the complication of numerous cables in “groom and fill” operations.

Users can configure each of the n x DS0 data link channels on the Channelized T1 module as DCE or DTE to provide any frame-based logical port function.

Individual connections can be made to a user device such as a router, bridge, or cluster controller. Individual connections can also be made to a network trunk via a DSU/CSU device. The connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX 6000 will assemble the data links into Frame Relay format.

Operational Features

The STDX 6000 Channelized T1 I/O module:

- Provides PVC rate monitoring for usage statistics.
- Provides up to 24 individual HDLC data links on a single T1.
- Supports contiguous or non-contiguous DS0 channels.
- Allows ports to be user or trunk interface for flexibility.
- Allows users to configure as DTE, DCE, and NNI Frame Relay interfaces.
- Contains an integral T1 CSU/DSU.
- Has T1 and Fractional T1 interfaces.
- Provides for high port density.
- Provides flexibility of configuration.

Specifications

Physical Dimensions

Size: 15.75 in. wide x 1.06 in. high x 9.25 in. deep
Weight: 2 lbs.

Power Requirements

25 Watts

Agency Approvals

Electromagnetic Emissions Certifications: FCC Part 15 Class A
NEBS TR-NWT-00063, TR-NWT-001089 (pending)
Temperature range: 0° to 50°C

Physical Interfaces

- T1 interface: 15-pin Sub-D male connector
- Redundancy connector: 9-pin connector
- Built-in T1 CSU/DSU, supporting:
  - T1 line coding options: D4, ESF
  - Zero encoding options: Jammed bit, B8ZS
- Timing options: loop timing, internal timing

Status Indicators

Single green LED:
Normal operation (LED lit)
Initialization (Blinking LED)
Module failure (LED off)
Red LED (Carrier or synchronization loss)
Yellow LED (Remote alarm detection)

Figure A-4 shows the T1 I/O module back panel.

Figure A-4. Channelized T1 I/O Module Back Panel

Channelized E1 I/O Module

The Channelized E1 I//O module provides standard multiplexing G.704 channels (64 Kbps). Users can map the 64 Kbps channels on the E1 interface to a maximum of 30 HDLC data links or 1.984 Mbps. Contiguous or non-contiguous n x 64 Kbps channels compose each HDLC data link.

Users can configure each of the n x 64 Kbps data link channels on the Channelized E1 module as DCE or DTE to provide any frame-based logical port function. Through any of these channels, network managers can make connections to a user device such as a router, bridge, or cluster controller. Connections can also be made to a network trunk.

For user devices, connections can be Frame Relay or non-Frame Relay. If they are not Frame Relay, the STDX switch will assemble the data links into Frame Relay format.

Operational Features

The STDX 6000 Channelized E1 I/O module:

- Provides PVC rate monitoring for usage statistics.
- Provides up to 30 individual HDLC data links on a single T1.
- Supports contiguous or non-contiguous G.704 channels.
- Allows ports to be user or trunk interface for flexibility.
- Allows users to configure as DTE, DCE, and NNI Frame Relay interfaces.
- Contains an integral E1 CSU/DSU.
- Has E1 and Fractional E1 interfaces.
- Provides for high port density.
- Provides flexibility of configuration.

Specifications

Physical Dimensions

Size: 15.75 in. wide x 1.06 in. high x 9.25 in. deep

Weight: 2 lbs.

Power Requirements

15 Watts

Agency Approvals

Electromagnetic Emissions Certifications: FCC Part 15 Class A, CISPR EN55022 A, Vfg. 243 1991

Temperature range: 5° to 35°C

Physical Interfaces

- E1 interface: G.703 coaxial pair 75 ohm
- Unbalanced, or G.703 Symmetrical Pair 120 ohm Balanced, DB-15 connector
- Redundancy connector: DB-9 connector
- Timing options: loop timing, internal timing

Status Indicators

Single green LED:
Normal operation (LED lit)
Initialization (Blinking LED)
Module failure (LED off)

Red LED: carrier or synchronization loss

Yellow LED: Remote alarm detection

Figure A-5 shows a channelized E1 I/O module.

Figure A-5. 1-Port Channelized E1 I/O Module

B

Cables and Pinout Assignments

This appendix provides cable diagrams and pinout assignments for the following STDX 6000 cables:

- EIA 449 Straight Through Cable
- EIA 449 Crossover Cable
- RS-232 PP1-DCE Shielded Console Cable
- RS-232 PP1-DTE1 Shielded Console Cable
- RS-232 PP1-DTE2 Shielded Console Cable
- V.35 Straight Through Cable
- V.35 Crossover Cable
- X.21 Straight Through Cable
- X.21 Crossover Cable
- T1 Straight Through Cable - DB-15
- T1 Crossover Cable - DB-15
- T1 Straight Through USOC-RJ-48C Connector
- T1 Crossover USOC-RJ-48C Connector

- 8/18-Port UIO X.21 Straight Through Cable
- 8/18-Port UIO V.24 Straight Through Cable

Any of the above-listed cables may be purchased from Ascend Communications. Be sure to use the appropriate product code for ordering. To obtain a current product code/price list, contact your Ascend Account Manager.

In addition to the above-listed cables, the following loopback connectors are also described in this appendix. These connectors *cannot* be ordered from Ascend Communications.

- V.35 Loopback Connector (Male)
- X.21 Loopback Connector (Male)
- T1 Loopback Connector (Male)
- RJ-48 Loopback Connector (Male)

EIA 449 Straight Through Cable

Table B-1. Pinouts for EIA 449 Straight Through Cable

Pin	Connector #1 Signal	Pin	Connector #2 Signal
1	Shield	1	Shield
3	External Receive Clock (P)	3	External Receive Clock (P)
4	Transmit Data (P)	4	Transmit Data (P)
5	Transmit Clock (P)	5	Transmit Clock (P)
6	Receive Data (P)	6	Receive Data (P)
7	Request To Send (P)	7	Request To Send (P)
8	Receive Clock (P)	8	Receive Clock (P)
9	Clear To Send (N)	9	Clear To Send (N)
10	Local Loopback	10	Local Loopback
11	Data Set Ready (P)	11	Data Set Ready (P)
12	Data Terminal Ready (P)	12	Data Terminal Ready (P)
13	Data Carrier Detect (P)	13	Data Carrier Detect (P)
14	Remote Loopback	14	Remote Loopback
17	External Transmit Clock (P)	17	External Transmit Clock (P)
18	Test Mode	18	Test Mode
19	Signal Ground	19	Signal Ground

Table B-1. Pinouts for EIA 449 Straight Through Cable (Continued)

Pin	Connector #1 Signal	Pin	Connector #2 Signal
20	Receive Common	20	Receive Common
21	External Receive Clock (N)	21	External Receive Clock (N)
22	Transmit Data (N)	22	Transmit Data (N)
23	Transmit Clock (N)	23	Transmit Clock (N)
24	Receive Data (N)	24	Receive Data (N)
25	Request To Send (N)	25	Request To Send (N)
26	Receive Clock (N)	26	Receive Clock (N)
27	Clear To Send (P)	27	Clear To Send (P)
29	Data Set Ready (N)	29	Data Set Ready (N)
30	Data Terminal Ready (N)	30	Data Terminal Ready (N)
31	Data Carrier Detect (N)	31	Data Carrier Detect (N)
35	External Transmit Clock (N)	35	External Transmit Clock (N)
37	Send Common	37	Send Common
	Required Twisted Pairs		
	3 & 217&25		
	4 & 228 & 26		
	5 & 239 & 27		

Table B-1. Pinouts for EIA 449 Straight Through Cable (Continued)

Pin	Connector #1 Signal	Pin	Connector #2 Signal
	6 & 2410 & 19		Product Code: 40014X (5 ft.) 40014Y (15 ft.) 40014Z (30 ft.)

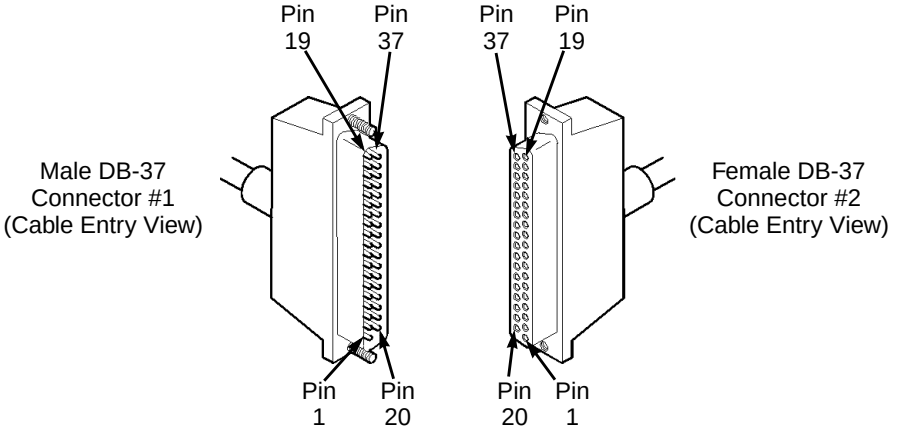


Figure B-1. EIA 449 Straight Through Cable Diagram

EIA 449 Crossover Cable

Table B-2. Pinouts for EIA 449 Crossover Cable

Pin	Connector #1 Signal	Pin	Connector #2 Signal
1	Shield	1	Shield
3	External Receive Clock (P)	5	Transmit Clock (P)
4	Transmit Data (P)	6	Receive Data (P)
5	Transmit Clock (P)	3	External Receive Clock (P)
6	Receive Data (P)	4	Transmit Data (P)
7	Request To Send (P)	13	Data Carrier Detect (P)
8	Receive Clock (P)	17	External Transmit Clock (P)
10	Local Loopback	36	Unbalanced CTS
11	Data Set Ready (P)	12	Data Terminal Ready (P)
12	Data Terminal Ready (P)	11	Data Set Ready (P)
13	Data Carrier Detect (P)	7	Request To Send (P)
14	Remote Loopback	18	Test Mode
17	External Transmit Clock (P)	8	Receive Clock (P)
18	Test Mode	14	Remote Loopback
19	Signal Ground	19	Signal Ground
20	Receive Common	20	Receive Common
21	External Receive Clock (N)	23	Transmit Clock (N)

Table B-2. Pinouts for EIA 449 Crossover Cable (Continued)

Pin	Connector #1 Signal	Pin	Connector #2 Signal
22	Transmit Data (N)	24	Receive Data (N)
23	Transmit Clock (N)	21	External Receive Clock (N)
24	Receive Data (N)	22	Transmit Data (N)
25	Request To Send (N)	31	Data Carrier Detect (N)
26	Receive Clock (N)	35	External Transmit Clock (N)
29	Data Set Ready (N)	30	Data Terminal Ready (N)
30	Data Terminal Ready (N)	29	Data Set Ready (N)
31	Data Carrier Detect (N)	25	Request To Send (N)
35	External Transmit Clock (N)	26	Receive Clock (N)
36	Unbalanced CTS	10	Local Loopback
37	Send Common	37	Send Common
	Required Twisted Pairs		
	3 & 2111 & 29		
	4 & 2212 & 30		
	5 & 2313 & 31		
	6 & 2414 & 18		
	7&2517 & 35		
	8 & 2636 & 20		

Table B-2. Pinouts for EIA 449 Crossover Cable (Continued)

Pin	Connector #1 Signal	Pin	Connector #2 Signal
	10 & 37		Product Code: 40015X (5 ft.) 40015Y (15 ft.) 40015Z (30 ft.)

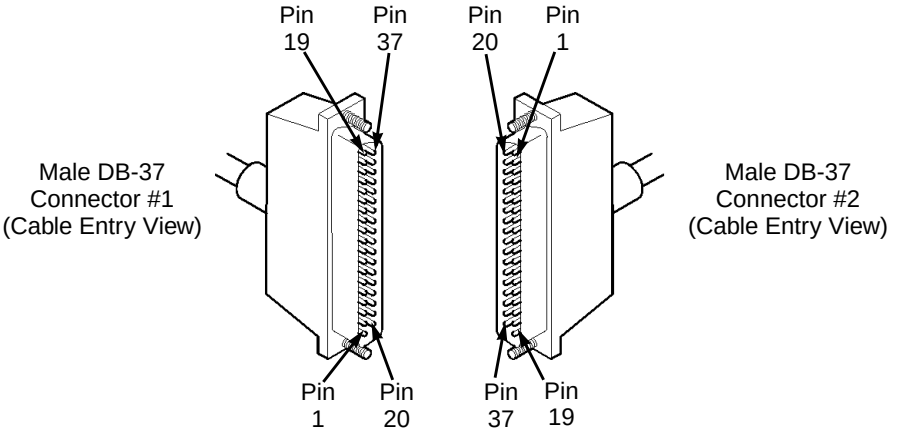


Figure B-2. EIA 449 Crossover Cable Diagram

RS-232 PP1-DCE Shielded Console Cable

Table B-3. Pinouts for RS-232 PP1-DCE Shielded Console Cable

Pin	RJ48 Signal	Pin	DB-25 Signal
1	Request To Send	4	Request To Send
2	Data Terminal Ready	20	Data Terminal Ready
3	Transmit Data	2	Transmit Data
4	Data Set Ready	6	Data Set Ready
5	Receive Data	3	Receive Data
6	Ground	7	Ground
7	Data Carrier Detect	8	Data Carrier Detect
8	Clear To Send	5	Clear To Send
			Product Code: 40005X 40005Y

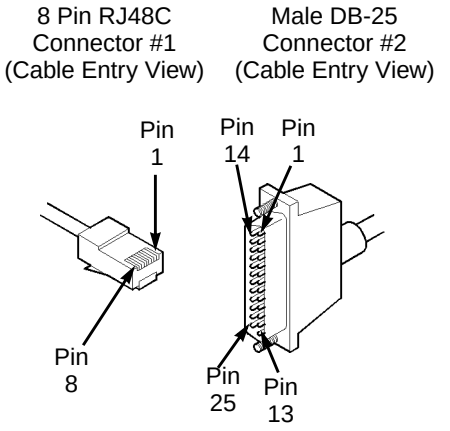


Figure B-3. RS-232 PP1-DCE Shielded Cable Diagram

RS-232 PP1-DTE1 Shielded Console Cable

Table B-4. Pinouts for RS-232 PP1-DTE1 Shielded Console Cable

Pin	RJ48 Signal	Pin	DB-25 Signal
1	Request To Send	5	Clear To Send
2	Data Terminal Ready	6	Data Set Ready
3	Transmit Data	3	Receive Data
4	Data Set Ready	20	Data Terminal Ready
5	Receive Data	2	Transmit Data
6	Ground	7	Ground
7	Data Carrier Detect	8	Data Carrier Detect
8	Clear To Send	4	Request To Send
			Product Code: 40007X

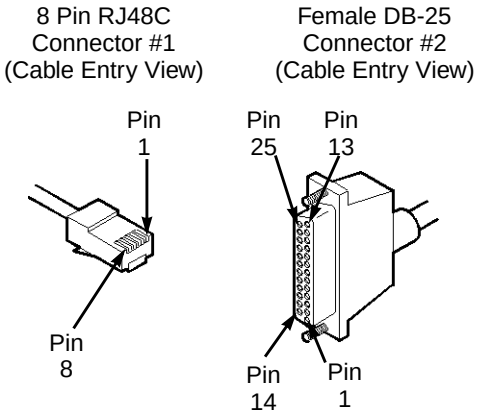


Figure B-4. RS-232 PP1-DTE1 Shielded Cable Diagram

RS-232 PP1-DTE2 Shielded Console Cable

Table B-5. Pinouts for RS-232 PP1-DTE2 Shielded Console Cable

Pin	RJ48 Signal	Pin	DB-9 Signal
1	Request To Send	8	Clear To Send
2	Data Terminal Ready	6	Data Set Ready
3	Transmit Data	2	Receive Data
4	Data Set Ready	4	Data Terminal Ready
5	Receive Data	3	Transmit Data
6	Ground	5	Ground
7	Data Carrier Detect	1	Data Carrier Detect
8	Clear To Send	7	Request To Send
			Product Code: 40035X 40035Y 40035Z

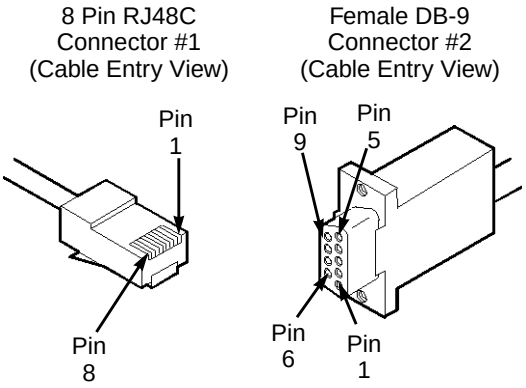


Figure B-5. RS-232 PP1-DTE2 Shielded Cable Diagram

V.35 Straight Through Cable

Table B-6. Pinouts for V.35 Straight Through Cable

Pin	V.35 Connector #1 Signal	Pin	V.35 Connector #2 Signal
A	Earth Ground	A	Earth Ground
B	Signal Ground	B	Signal Ground
C	Request To Send	C	Request To Send
D	Clear To Send	D	Clear To Send
E	Data Set Ready	E	Data Set Ready
F	Data Carrier Detect	F	Data Carrier Detect
H	Data Terminal Ready	H	Data Terminal Ready
L	Local Loopback	L	Local Loopback
N	Remote Loopback	N	Remote Loopback
P	Transmit Data (Signal P)	P	Transmit Data (Signal P)
R	Receive Data (Signal P)	R	Receive Data (Signal P)
S	Transmit Data (Signal N)	S	Transmit Data (Signal N)
T	Receive Data (Signal N)	T	Receive Data (Signal N)
U	External Transmit Clock (Signal P)	U	External Transmit Clock (Signal P)
V	Receive Clock (Signal P)	V	Receive Clock (Signal P)
W	External Transmit Clock (Signal N)	W	External Transmit Clock (Signal N)
X	Receive Clock (Signal N)	X	Receive Clock (Signal N)

Table B-6. Pinouts for V.35 Straight Through Cable (Continued)

Pin	V.35 Connector #1 Signal	Pin	V.35 Connector #2 Signal
Y	Transmit Clock (Signal P)	Y	Transmit Clock (Signal P)
Z	External Receive Clock (Signal P)	Z	External Receive Clock (Signal P)
AA	Transmit Clock (Signal N)	AA	Transmit Clock (Signal N)
BB	External Receive Clock (Signal N)	BB	External Receive Clock (Signal N)
NN	Test Indicator	NN	Test Indicator

Table B-7. Twisted Pairs for V.35 Straight Through Cable

Required Twisted Pairs	Product Code:
P & SV & X	40011X (5 ft.)
R & TY & AA	40011Y (15 ft.)
U & WZ & BB	40011Z (30 ft.)

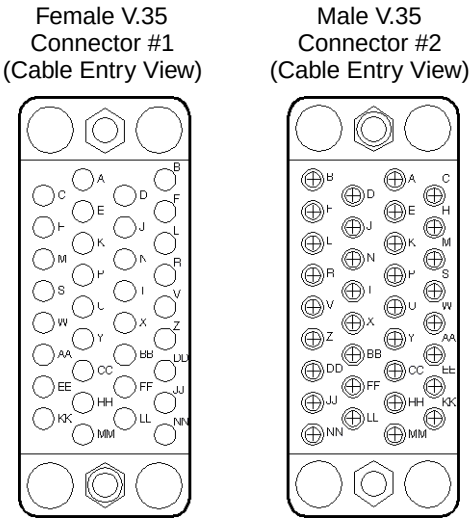


Figure B-6. V.35 Straight Through Cable Diagram

V.35 Crossover Cable

Table B-8. Pinouts for V.35 Crossover Cable

Pin	V.35 Connector #1 Signal	Pin	V.35 Connector #2 Signal
A	Earth Ground	A	Earth Ground
B	Signal Ground	B	Signal Ground
C	Request To Send	F	Data Carrier Detect
D	Clear To Send	L	Local Loopback
E	Data Set Ready	H	Data Terminal Ready
F	Data Carrier Detect	C	Request To Send
H	Data Terminal Ready	E	Data Set Ready
L	Local Loopback	D	Clear To Send
N	Remote Loopback	NN	Test Indicator
P	Transmit Data (Signal P)	R	Receive Data (Signal P)
R	Receive Data (Signal P)	P	Transmit Data (Signal P)
S	Transmit Data (Signal N)	T	Receive Data (Signal N)
T	Receive Data (Signal N)	S	Transmit Data (Signal N)
U	External Transmit Clock (Signal P)	V	Receive Clock (Signal P)
V	Receive Clock (Signal P)	U	External Transmit Clock (Signal P)
W	External Transmit Clock (Sig. N)	X	Receive Clock (Signal N)
X	Receive Clock (Signal N)	W	External Transmit Clock (Sig. N)

Table B-8. Pinouts for V.35 Crossover Cable (Continued)

Pin	V.35 Connector #1 Signal	Pin	V.35 Connector #2 Signal
Y	Transmit Clock (Signal P)	Z	External Receive Clock (Signal P)
Z	External Receive Clock (Signal P)	Y	Transmit Clock (Signal P)
AA	Transmit Clock (Signal N)	BB	External Receive Clock (Signal N)
BB	External Receive Clock (Signal N)	AA	Transmit Clock (Signal N)
NN	Test Indicator	N	Remote Loopback

Table B-9. Twisted Pairs for V.35 Crossover Cable

Required Twisted Pairs	Product Code:
P & SV & X	40010X (5 ft.) 40010Y (15 ft.) 40010Z (30 ft.)
R & TY & AA	
U & WZ & BB	

Pins Z and BB are Ascend-specific. When using customized cables to make DTE connections to a Ascend switch, make sure you map the Transmit Clock to the External Receive Clock.

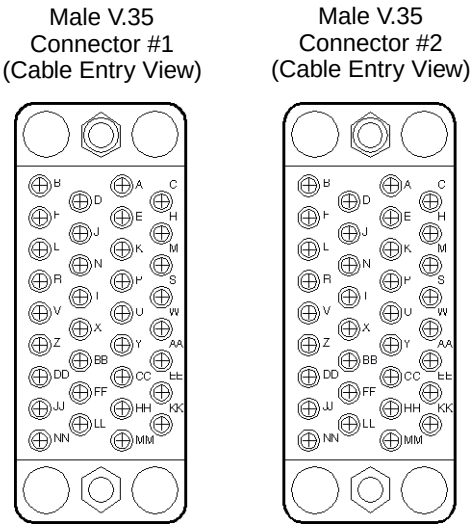


Figure B-7. V.35 Crossover Cable Diagram

X.21 Straight Through Cable

Table B-10. Pinouts for X.21 Straight Through Cable

Pin	X.21 Connector #1 Signal	Pin	X.21 Connector #2 Signal
2	Transmit Data (P)	2	Transmit Data (P)
3	Request To Send (P)	3	Request To Send (P)
4	Receive Data (P)	4	Receive Data (P)
5	Data Carrier Detect (P)	5	Data Carrier Detect (P)
6	Receive Clock (P)	6	Receive Clock (P)
7	External Transmit Clock (P)	7	External Transmit Clock (P)
8	Ground	8	Ground
9	Transmit Data (N)	9	Transmit Data (N)
10	Request To Send (N)	10	Request To Send (N)
11	Receive Data (N)	11	Receive Data (N)
12	Data Carrier Detect (N)	12	Data Carrier Detect (N)
13	Receive Clock (N)	13	Receive Clock (N)
14	External Transmit Clock (N)	14	External Transmit Clock (N)
	Required Twisted Pairs		
	2 & 95 & 12		
	3 & 106 & 13		

Table B-10. Pinouts for X.21 Straight Through Cable (Continued)

Pin	X.21 Connector #1 Signal	Pin	X.21 Connector #2 Signal
	4 & 117 & 14		
			Product Code: 40008X (5 ft.) 40008Y (15 ft.) 40008Z (30 ft.)

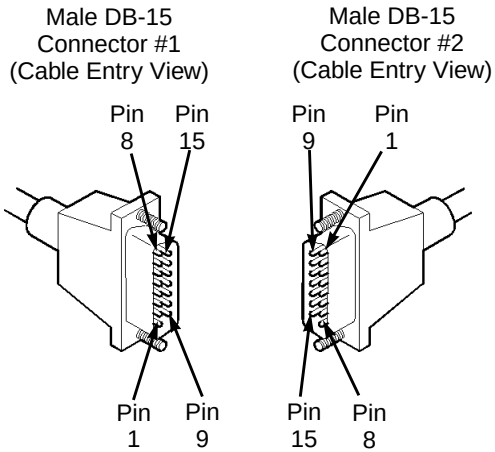


Figure B-8. X.21 Straight Through Cable Diagram

X.21 Crossover Cable

Table B-11. Pinouts for X.21 Crossover Cable

Pin	X.21 Connector #1 Signal	Pin	X.21 Connector #2 Signal
2	Transmit Data (P)	4	Receive Data (P)
3	Request To Send (P)	5	Data Carrier Detect (P)
4	Receive Data (P)	2	Transmit Data (P)
5	Data Carrier Detect (P)	3	Request To Send (P)
6	Receive Clock (P)	7	External Transmit Clock (P)
7	External Transmit Clock (P)	6	Receive Clock (P)
8	Ground	8	Ground
9	Transmit Data (N)	11	Receive Data (N)
10	Request To Send (N)	12	Data Carrier Detect (N)
11	Receive Data (N)	9	Transmit Data (N)
12	Data Carrier Detect (N)	10	Request To Send (N)
13	Receive Clock (N)	14	External Transmit Clock (N)
14	External Transmit Clock (N)	13	Receive Clock (N)
	Required Twisted Pairs		
	2 & 95 & 12		
	3 & 106 & 13		

Table B-11. Pinouts for X.21 Crossover Cable (Continued)

Pin	X.21 Connector #1 Signal	Pin	X.21 Connector #2 Signal
	4 & 117 & 14		
			Product Code: 40009X (5 ft.) 40009Y (15 ft.) 40009Z (30 ft.)

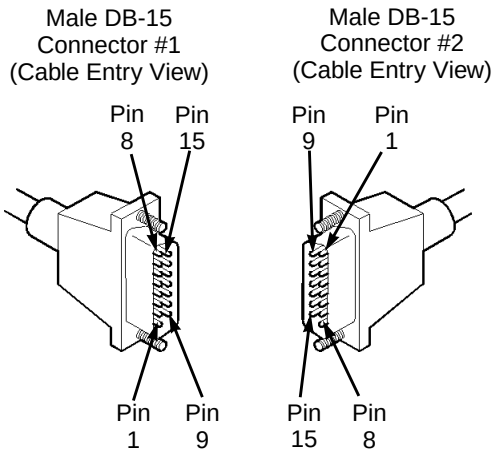


Figure B-9. X.21 Crossover Cable Diagram

T1 Straight Through Cable - DB-15

Table B-12. Pinouts for T1 Straight Through Cable (DB-15)

Pin	Male DB-15 Connector #1 Signal	Pin	Male DB-15 Connector #2 Signal
1	Transmit Tip	1	Transmit Tip
3	Receive Tip	3	Receive Tip
9	Transmit Ring	9	Transmit Ring
11	Receive Ring	11	Receive Ring
	Required Twisted Pairs		
	1 & 9		
	3 & 11		
			Product Code: 40004

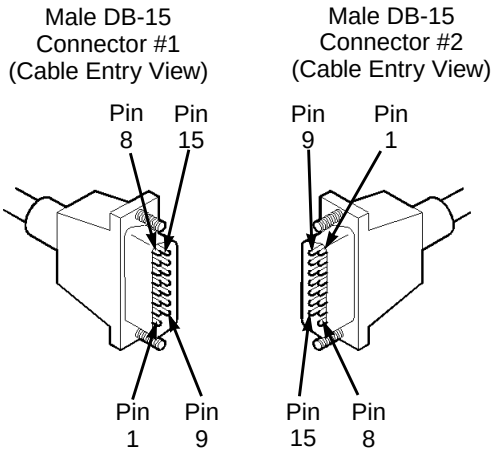


Figure B-10. T1 Straight Through Cable Diagram

T1 Crossover Cable - DB-15

Table B-13. Pinouts for T1 Crossover Cable (DB-15)

Pin	Male DB-15 Connector #1 Signal	Pin	Male DB-15 Connector #2 Signal
1	Transmit Tip	3	Receive Tip
3	Receive Tip	1	Transmit Tip
9	Transmit Ring	11	Receive Ring
11	Receive Ring	9	Transmit Ring
	Required Twisted Pairs		
	1 & 9		
	3 & 11		
			Product Code: 40020

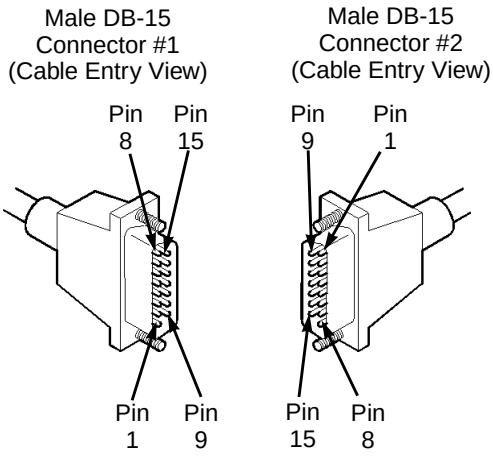


Figure B-11. T1 Crossover Cable Diagram

T1 Straight Through USOC-RJ-48C Connector

Table B-14. Pinouts for T1 Straight Through USOC-RJ-48C Connector

Pin	Signal	Pin	Signal
1	Receive Ring	1	Receive Ring
2	Receive Tip	2	Receive Tip
4	Transmit Ring	4	Transmit Ring
5	Transmit Tip	5	Transmit Tip
			Product Code: 40022X (5 ft.) 40022Y (15 ft.) 40022Z (30 ft.)

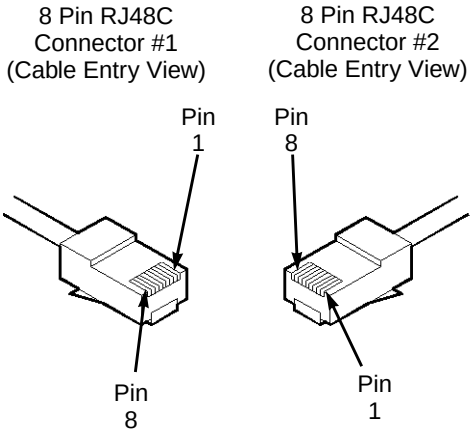


Figure B-12. T1 Straight Through USOC-RJ-48C Connector Diagram

T1 Crossover USOC-RJ-48C Connector

Table B-15. Pinouts for T1 Crossover USOC-RJ-48C Connector

Pin	Signal	Pin	Signal
1	Receive Ring	4	Transmit Ring
2	Receive Tip	5	Transmit Tip
4	Transmit Ring	1	Receive Ring
5	Transmit Tip	2	Receive Tip
			Product Code: 40023X (5 ft.) 40023Y (15 ft.) 40023Z (30 ft.)

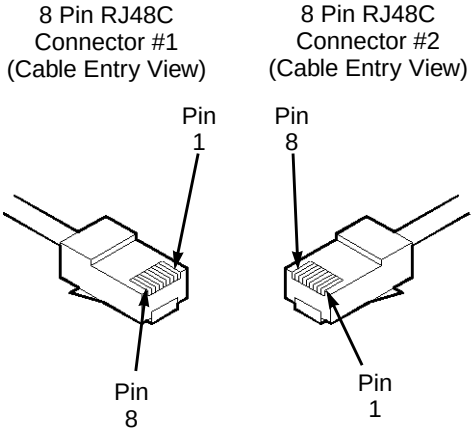


Figure B-13. T1 Crossover USOC-RJ-48C Connector Diagram

8/18-Port UIO X.21 Straight Through Cable

Table B-16. 8/18-Port UIO X.21 Straight Through Cable Pin-Out Assignments

Pin	Male SCSI Connector #1	Pin	Female DB-15 Connector #2
45	Transmit Data <1> (Signal P)	2	Transmit Data <1> (Signal P)
48	Control <1> (Signal P)	3	Control <1> (Signal P)
39	Receive Data <1> (Signal P)	4	Receive Data <1> (Signal P)
42	Indicator <1> (Signal P)	5	Indicator <1> (Signal P)
44	Signal Element Timer <1> (Signal P)	6	Signal Element Timer <1> (Signal P)
50	DT Signal Element Timer <1> (Signal P)	7	DT Signal Element Timer <1> (Signal P)
14	Ground	8	Ground
46	Transmit Data <1> (Signal N)	9	Transmit Data <1> (Signal N)
47	Control <1> (Signal N)	10	Control <1> (Signal N)
40	Receive Data <1> (Signal N)	11	Receive Data <1> (Signal N)
41	Indicator <1> (Signal N)	12	Indicator <1> (Signal N)
43	Signal Element Timer <1> (Signal N)	13	Signal Element Timer <1> (Signal N)
49	DT Signal Element Timer <1> (Signal N)	14	DT Signal Element Timer <1> (Signal N)
		Pin	**Female DB-15 Connector #3**
32	Transmit Data <2> (Signal P)	2	Transmit Data <2> (Signal P)
35	Control <2> (Signal P)	3	Control <2> (Signal P)

Table B-16. 8/18-Port UIO X.21 Straight Through Cable Pin-Out Assignments

Pin	Male SCSI Connector #1 (cont.)	Pin	Female DB-15 Connector #3 (cont.)
26	Receive Data <2> (Signal P)	4	Receive Data <2> (Signal P)
29	Indicator <2> (Signal P)	5	Indicator <2> (Signal P)
31	Signal Element Timer <2> (Signal P)	6	Signal Element Timer <2> (Signal P)
37	DT Signal Element Timer <2> (Signal P)	7	DT Signal Element Timer <2> (Signal P)
12	Ground	8	Ground
33	Transmit Data <2> (Signal N)	9	Transmit Data <2> (Signal N)
34	Control <2> (Signal N)	10	Control <2> (Signal N)
27	Receive Data <2> (Signal N)	11	Receive Data <2> (Signal N)
28	Indicator <2> (Signal N)	12	Indicator <2> (Signal N)
30	Signal Element Timer <2> (Signal N)	13	Signal Element Timer <2> (Signal N)
36	DT Signal Element Timer <2> (Signal N)	14	DT Signal Element Timer <2> (Signal N)
	Required Twisted Pairs Female DB-15 Connectors		
	2 & 95 & 12 3 & 106 & 13 4 & 117 & 14 Ground 8		
			Product Code: 40032X

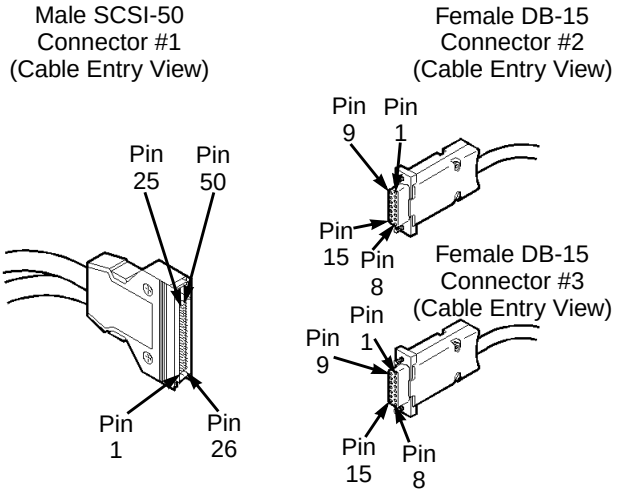


Figure B-14. 8/18-Port UIO X.21 Straight Through Cable Diagram

8/18-Port UIO V.24 Straight Through Cable

Table B-17. Pinouts for 8 and 18 Port UIO V.24 Straight Through Cable

Pin	50 Pin Male SCSI, Connector #1	Pin	Female DB-25, Connector #2
1	Receive Data (2)	2	Transmit Data
2	Transmit Clock (2)	3	Receive Data
3	Receive Clock (2)	4	Request To Send
4	Data Set Ready (2)	5	Clear To Send
5	Received Line Signal Detect (2)	6	Data Set Ready
6	Clear To Send (2)	7	GND
7	Transmit Data (2)	8	Received Line Signal Detect
8	DTE_Transmit Clock (2)	15	Transmit Clock
9	DTE_Receive Clock (2)	16	DTE_Receive Clock
10	Request To Send (2)	17	Receive Clock
12	GND	20	Data Terminal Ready
14	GND	24	DTE_Transmit Clock
			Female DB-25, Connector #3
15	Receive Data (1)	2	Transmit Data
16	Transmit Clock (1)	3	Receive Data
17	Receive Clock (1)	4	Request To Send
18	Data Set Ready (1)	5	Clear To Send

Table B-17. Pinouts for 8 and 18 Port UIO V.24 Straight Through Cable

Pin	50 Pin Male SCSI, Connector #1 (cont.)	Pin	Female DB-25, Connector #3 (cont.)
19	Received Line Signal Detect (1)	6	Data Set Ready
20	Clear To Send (1)	7	GND
21	Transmit Data (1)	8	Received Line Signal Detect
22	DTE_Transmit Clock (1)	15	Transmit Clock
23	DTE_Receive Clock (1)	16	DTE_Receive Clock
24	Request To Send (1)	17	Receive Clock
25	Data Terminal Ready (1)	20	Data Terminal Ready

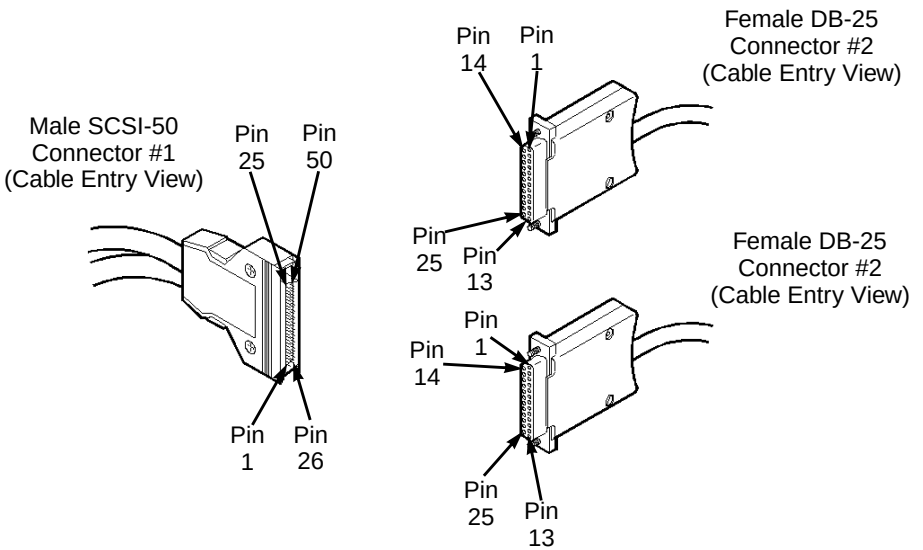


Figure B-15. 8/18-Port UIO V.24 Straight Through Cable Diagram

V.35 Loopback Connector (Male)

Table B-18. Pinouts for V.35 Loopback Connector (Male)

Pin	Signal		Pin	Signal
C	Request To Send	⇒	F	Data Carrier Detect
D	Clear To Send	⇒	L	Local Loopback
E	Data Set Ready	⇒	H	Data Terminal Ready
N	Remote Loopback	⇒	NN	Test Indicator
P	Transmit Data (Signal P)	⇒	R	Receive Data (Signal P)
S	Transmit Data (Signal N)	⇒	T	Receive Data (Signal N)
U	External Receive Clock (Signal P)	⇒	V	Receive Clock (Signal P)
W	External Transmit Clock (Sig. N)	⇒	X	Receive Clock (Signal N)
Y	Transmit Clock (Signal P)	⇒	Z	External Receive Clock (Signal P)
AA	Transmit Clock (Signal N)	⇒	BB	External Receive Clock (Signal N)

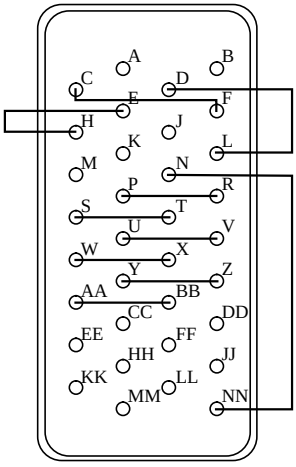


Figure B-16. V.35 Loopback Connector Connection Summary

X.21 Loopback Connector (Male)

Table B-19. Pinouts for X.21 Loopback Connector (Male)

Pin	Signal		Pin	Signal
2	Transmit Data (Signal P)	⇒	4	Receive Data (Signal P)
3	Request To Send (Signal P)	⇒	5	Data Carrier Detect (Signal P)
6	Receive Clock (Signal P)	⇒	7	External Transmit Clock (Signal P)
9	Transmit Data (Signal P)	⇒	11	Receive Data (Signal P)
10	Request To Send (Signal N)	⇒	12	Data Carrier Detect (Signal N)
13	Receive Clock (Signal N)	⇒	14	External Transmit Clock (Signal N)

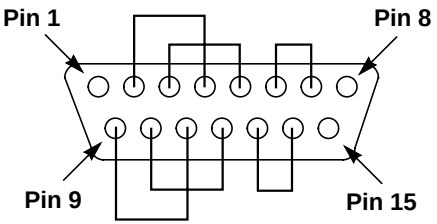


Figure B-17. X.21 Loopback Connector Connection Summary

T1 Loopback Connector (Male)

Table B-20. Pinouts for T1 Loopback Connector (Male)

Pin	Signal		Pin	Signal
1	Transmit Tip	⇒	3	Receive Tip
9	Transmit Ring	⇒	11	Receive Ring

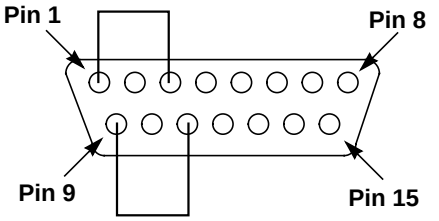


Figure B-18. T1 Loopback Connector Connection Summary

RJ-48 Loopback Connector (Male)

Table B-21. Pinouts for RJ-48 Loopback Connector (Male)

Pin	Signal		Pin	Signal
1	Receive Ring	⇒	4	Transmit Ring
2	Receive Tip	⇒	5	Transmit Tip

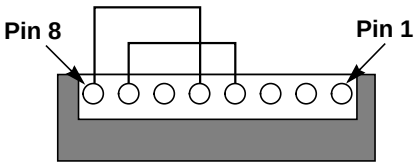


Figure B-19. RJ-48 Loopback Connector Connection Summary

C

Regulatory Information

The following section describes the regulatory requirements of the United Kingdom.

Product Attachment Information

1. According to the requirements of TIS 6328/8.2, the default configuration of the 75Ω G.703 Interface (E1) with regards to the grounding of the outer conductor of the BNC connectors is as follows:

   - Transmit port (XMTR) – connected to earth ground.
   - Receive port (RCVR) – insulated from earth ground.

   To connect the receive port to earth ground:

   a. Remove the BNC retaining nut and metal washers on the RCVR port BNC connector.

   b. Remove and discard the insulating grommet from the BNC connector.

   c. Reinstall the retaining nut and metal washers on the BNC connector. The outer shell of the RCVR port is then positively connected to earth ground.

The default earthing of the G.703 port may result in a violation to the EN55022 Class B EMI specification. Compliance with the EN55022 Class B specification requires that the outer conductor of both the Transmit and Receive ports of the 75Ω G.703 interface must be securely attached to earth ground.

2. The 75Ω G.703 interface has not been tested in a BS6701 configuration and should not be connected to BS6701 approved cabling.
3. The recommended cable specifications for interface to STDX 6000 are summarized in Table C-1.

Table C-1. Cable Specifications

Interface Type	Twisted Pairs	DC Res. Ω/km	Nom. Imp. Ω	Nom. Cap. pf/m
% Shield	Max. Length	V.35	12	78
100	15.5/27.5	90%	50m	X.21
7	78	100	15.5/27.5	90%
50m	G.703 - 75 Ω	N/A	49.2	75
66.7	95%	50m	N/A	N/A

V.35 and X.21 Nominal Capacitance is specified as cond. to cond./cond. to earth.

To comply with the EN55022 EMI specification, it is also recommended that the V.35 cables use the following ISO2593 hood assembly:

- Hood Assembly: CDM, Nickel Plated, Part No. 783.734-90. The V.35 cables that can be ordered from Ascend use this hood assembly.

Environmental Standards Compliance

Ascend's STDX 6000 is approved by the following regulatory agencies to be fully compliant with their environmental standards:

- Network Equipment Building System (NEBS) TR-NWT-00063 Issue 5 and TR-NWT-001089 Issue 1
- British Approval Board for Telecommunications (BABT) — EMC, Safety, and Factory Compliance
- TUV — EMC, Safety, and Factory Compliance
- IEC 950, EN60950
- Canadian Standards Association (CSA) — Safety and Factory Compliance CSA 22.2
- Underwriter's Laboratory (UL) — Safety and Factory Compliance UL 1950
- Federal Communications Commission (FCC) — EMC compliance (Class A, Part 68)

In addition, Ascend's STDX 6000 meets the following Country Standards:

- Australia (Safety)
- New Zealand (EMC and Telecommunications Function)

Example Affidavit

This is an example of the affidavit that needs to be filed with the Telco concerning connection of customer premise equipment (CPE) to 1.544 Mbps services:

For the work to be performed in the certified territory of _____ (name of Telco), State of _____, County of, _____, I, _____ (Name), of _____ (Business Address), _____(phone number) being duly sworn, state the following:

I have responsibility for the operation and maintenance of the terminal equipment to be connected to 1.544 Mbps digital services. The terminal equipment to be connected complies with Part 68 of the FCC rules except for the encoded analog content and billing protection specifications. With respect to the encoded analog content and billing protection:

( ) I attest that all operations associated with the establishment, maintenance of the terminal equipment to be connected to 1.544 Mbps digital services complies with Part 68 of the FCC Rules and Regulations.

( ) The digital CPE does not transmit digital signals containing encoded analog content or billing information which is intended to be decoded within the telecommunications network.

( ) The encoded analog content and billing protection is factory set and is not under control of the customer.

I attest that the operator(s)/maintainer(s) of the digital CPE responsible for the establishment, maintenance and adjustment of the encoded analog content and billing information has (have) been trained to perform these functions by successfully having completed one of the following:

( ) A training course provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) A training course provided by the customer or authorized representative, using training materials and instructions provided by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) An independent training course (e.g. trade school or technical institution) recognized by the manufacturer/grantee of the equipment used to encode analog signals; or

( ) In lieu of the proceeding training requirements, the operator(s)/maintainer(s) is (are) under control of a supervisor trained in accordance with _____ (circle one) above.

I agree to provide _____ (name of Telco) with proper documentation to demonstrate compliance with the information as provided in the preceding paragraph, if so requested.

_____ (Signature)

_____ (Title)

_____ (Date)

Subscribe and sworn to before me, this _____ day of _____, 19__.

_____ Notary Public, my commission expires _____.

D

Console Commands

This appendix provides a list of console commands that you can enter to perform various tasks on the switch or to obtain information from the STDX 6000. For a complete description of the console commands, see the *NavisCore Console Command User's Guide.*

The console remembers the last ten commands that you enter. ^B can be used to recall previous commands as needed.

STDX 6000 Console Commands

The commands listed in this section apply to the STDX 6000 Frame Relay release. STDX 6000 SMDS release 3.1.94 has the same command set as release 4.0.

To display a list of available commands, type '?'

> ?
> CONFIGURATION CONSOLE COMMANDS:
>
> ping <[ip address]><oid>
> bye, end, exit, or quit
> get <oid>
> set <oid>
> next <oid>

For get, set, & next, the following OID shorthand prefixes can be used:
std, system, interface, ip, icmp, udp, snmp, ds1, frx, net, ase, node, pport, lport, ckt

To go into master or debug mode:

> login [master|debug]
>
> **example 1:**
>
> > login debug
> > Password: **[*your debug password*]**
>
> **example 2:**
>
> > login master
> > Password: **[*your debug password*]**

snmp get

get <oid>

example 1: get 1.3.6.1.2.1.1.1.0
example 2: get node.10.0

snmp set

set <oid> <<integer> | <asn.1> | <“string”> | <[ip address]>>

example: set node.1.0 [152.148.100.1]

snmp next

next <oid>

example: next node

change community name

set community<0-7> <“read-only community name”>
set community<0-7> <“master community name”> <[master ip address]>

Only one master community can be specified.

To test reachability of an IP node:

ping <[ip address]>

To exit from the console:

bye, end, exit or quit

To clear the configuration:

reset pram

To restart the system:

reset system

To read directly from and write directly to memory:

mb <address> | <address#bytes>(modify one byte)
modify <address> | <address#words>(modify a 4-byte word)
dump [[address] | [address#length]](dump memory contents)

Glossary

A

absolute congestion

In Frame Relay, a congested condition in the network that occurs when the queue length reaches a third threshold (64 buffers full), and there is no more room on the queue for any packets, regardless of the type of packet.

access rate

The data rate of the user access channel. The speed of the access channel determines how quickly (maximum rate) the end user may inject data into the network. See also *bandwidth*.

active hub

A device that amplifies LAN transmission signals in a network, enabling signals to be sent over a much greater distance than is possible with a passive hub. Compare with *passive hub*.

address

The logical location or identifier of a network node, terminal, pc, peripheral device, or location in memory where information is stored. See also *NavisCore*.

address mask

A bit combination used to describe which portion of an SMDS address refers to the network (or subnet) and which part refers to the host. Sometimes referred to as mask. See also *subnet mask*.

administration tool

A system administration utility, such as Solaris, that allows system administrators to maintain and monitor system database files, printers, user accounts, and hosts through a graphical user interface (GUI).

AIS

See *Alarm Indication Signal*.

alarm

Message notifying an operator or administrator of a network problem.

Alarm Indication Signal

An error or alarm signal transmitted in lieu of the normal signal to maintain transmission continuity to the receiving node indicating that there is a transmission fault located either at the sending node or upstream of the sending node.

Alterable Mark Inversion

A signaling format used in T1 lines that provides for the “one” pulses to have an alternating priority. Thus, if the nth-one bit is represented by a positive pulse, the nth T1 line would be a negative pulse.

alternate path

An optional automatic feature of OSPF (Open Shortest Path First) that reroutes the PVC should a trunk fail within a manually defined path.

amber frames

Ascend's own class of packet frames used to identify packets as they travel through the Frame Relay network. The network forwards amber frames with the Discard Eligible bit set; therefore the packet is eligible for discard if it passes through a congested node.

American National Standards Institute

A private, non-governmental, non-profit organization, which develops US standards required for commerce.

American Standard Code for Information Interchange

A code representing characters in binary form.

AMI

See *Alterable Mark Inversion*.

analog

A method that transmits electrical signals at varying amplitudes. Analog often refers to transmission methods developed to transmit voice signals rather than high speed digital signals. Compare with *digital*.

Annex D

A synchronous polling scheme used for the link management of a Frame Relay channel, where the user polls the network to obtain status information on the PVCs configured on the channel. Annex D exchanges this information using DLCI 0.

ANSI

See *American National Standards Institute*.

area id

See *area number*.

area number

One of two portions of the SMDS address, which can start at any digit and the length can be up to eight digits (4 bytes long for BCD encoding).

ASCII

See *American Standard Code for Information Interchange*.

ASCII text file

A file that contains only text characters from the ASCII character set. An ASCII file can include letters, numbers, and punctuation symbols, but does not contain any hidden text-formatting codes.

asynchronous communications server

A LAN server that enables a network user to dial out of the network into the public-switched telephone system, or to accessed leased lines for asynchronous communications. This device also is called a dial-in/dial-out server or modem server.

Asynchronous Transfer Mode

A method used for transmitting voice, video, and data over high-speed LAN and WAN networks. See also *cell relay*.

AT command set

A set of standard instructions used to activate features on a modem. Originally developed by Hayes Microcomputer Products, most modem manufacturers now use the AT command set.

ATM

See *Asynchronous Transfer Mode*.

ATM Service Interworking Feeder

A service that enables Frame Relay network traffic to be fed into an ATM network, enabling a Frame Relay end user to communicate with an ATM end user.

ATM/DXI trunk

See *OPTimum PVC trunk*.

ATM/DXI trunk interface

An ATM circuit used as a trunk between two Frame Relay networks that are built with Ascend switches.

attenuation

The decrease in power of a signal over distance, measured in decibels (dB).

auto-ranging

The ability for a power supply to detect the correct voltage that is being received from the power source.

B

B8ZS

See *Bipolar with 8 Zero Substitution*.

backbone

The part of a network that carries the bulk of the network traffic, e.g. over Ethernet cabling, fiber-optic cabling.

background diagnostics

Programs that run continuously in the background of the NMS to provide current operating status for all active switches. These programs do not interfere with switch operations.

Backward Explicit Congestion Notification

A bit in the Frame Relay header that indicates the frame has passed through a congested node from traffic traveling in the opposite direction.

balun

A small device used to connect a balanced line (such as a twisted-pair cable) to an unbalanced line (such as a coaxial cable).

bandwidth

The transmission capacity of a computer or a communications channel.

bandwidth-on-demand

A WAN feature that enables users to dial up additional bandwidth as their applications demand.

baud rate

The number of bits per second (bps) on a serial link.

Bc

See *Committed Burst Size*.

Be

See *Excess Burst*.

BECN

See *Backward Explicit Congestion Notification*.

best-effort packets

Packets delivered to the best of the network's ability, after the requirements for delivering the guaranteed packets are met. See also *guaranteed packets*.

Bipolar with 8 Zero Substitution

A T1 encoding scheme where eight consecutive zeros are replaced with the sequence 000-+0+-if the preceding pulse was+, and with the sequence 000-+0+-if the preceding value was-, where+ represents a positive pulse, -represents a negative pulse, and 0 represents no pulse.

bit

A binary unit of measurement, which may be either a one or a zero.

bits per second

The number of bits transmitted every second during a data transfer.

blue alarm

An alarm signal, both on the NMS and switch, indicating that all one pulses are being received.

BNC connector

A small connector with a half-turn locking shell for coaxial cable. Normally used with thin Ethernet cabling.

Boot Programmable Read-Only Memory

A chip mounted on a printed circuit board used to provide executable boot instructions to a computer device.

Boot PROM

See *Boot Programmable Read-Only Memory*.

bps

See *bits per second*.

broadband network

A type of network that allows for the transmitting of large amounts of information, including voice, data, and video over long distances using the same cable.

broadcast

A message that is sent to all users currently logged into the network.

burst mode

A method of data transmission in which information is collected and then sent in a single high-speed transmission, rather than one character at a time.

byte

A series of consecutive binary digits that are operated upon as a unit (for example, an eight-bit byte).

C

Carrier Sense Multiple Access Collision Detect

Media-access mechanism wherein devices ready to transmit data first check the channel for a carrier. If no carrier is sensed for a specific period of time, a device can transmit. If two devices transmit at once, a collision occurs and is detected by all transmitting devices. This collision subsequently delays retransmissions from those devices for some random length of time. CMSA/CD access is used by Ethernet and IEEE 802.3.

CBR

See *Constant Bit Rate*.

cell

Any fixed-length data packet. For example, ATM uses fixed-length, 53-byte cells. See also *cell relay*.

Cell Loss Priority

A field in the ATM cell header that indicates the eligibility of the cell for discard by the network under congested conditions.

cell relay

A form of packet transmission that uses a fixed-length, 53-byte cell over a packet-switched network; also known as Asynchronous Transfer Mode (ATM).

cell switching

An operational feature of cellular networks that enables callers to move from one location to another without losing the call connection. The cellular system is designed to switch calls to a new cell with no noticeable drop in the conversation. Cell switching is sometimes called “handing off.” While not noticeable in voice communications, the approximate 300 milliseconds this switching requires can be a problem in data transmission.

channel

Any connecting path that carries information from a sending device to a receiving device. May refer to a physical medium (e.g., coaxial cable) or a specific frequency within a larger channel.

channel bank

Equipment that converts multiple voice signals to time division multiplexed (TDM) signals for transmission over a T1 or E1 line.

Channel Service Unit

A device that functions as a certified safe electrical circuit, acting as a buffer between the customer’s equipment and a public carrier’s WAN.

CIR

See *Committed Information Rate*.

circuit

A communications channel or path between two devices.

circuit switching

A temporary communications connection that is established as needed between a sending node and a receiving node.

Clear To Send

A hardware signal defined by the RS-232-C standard, indicating that the transmission can proceed.

client

A device that makes use of the services provided by a server.

CLP

See *Cell Loss Priority*.

coldboot

A reboot enabling the user to restart the switch as if it were powered off, then on. Compare with *warmboot*.

collision detection

See *Carrier Sense Multiple Access Collision Detect*.

Committed Burst Size

The maximum amount of data, in bits, that the network agrees to transfer under normal conditions, during a time interval Tc. Committed Burst Size is defined for each PVC.

Committed Information Rate

The rate at which the network agrees to transfer information under normal conditions. The rate is averaged over a minimum increment of time, Tc. See also *bandwidth*.

Committed Rate Measurement Interval

The time interval during which the user is allowed to send only Bc committed amount of data and Be excess amount of data. In general, the duration of Tc is proportional to the burstiness of the traffic. Tc is computed from CIR and Bc as Tc=Bc/CIR.

communications protocol

A standard way of communicating between computers, or computers and terminals; also a hardware interface standard, such as RS-232C for communication between DTE and DCE devices.

community names

The name given to an SNMP community for purposes of identification. A member has associated access rights: read-only or read/write. The Ascend switch has the following default community names: public (read-only) and cascade (read/write).

concentrator

A repeater or hub that joins communications channels from several different network nodes. Concentrator devices provide bridging, routing, and other management functions.

congestion

The point at which devices in the network are operating at their highest utilization. Congestion is handled by employing a congestion avoidance mechanism. See also *mild congestion*, *absolute congestion*, and *severe congestion*.

connectivity

The degree to which any given computer or application can cooperate with other network components in a shared-resource network environment.

console commands

SNMP protocol supports three important commands: Get, Set, and Next. Get enables an NMS to query one or more objects or variables in an agent MIB. Set enables an NMS to modify a value of a MIB object or variable and may be used to boot or reboot devices. Next enables an NMS to query agent MIB tables and lists.

Constant Bit Rate

A Quality of Service class defined by the ATM Forum for ATM networks. CBR is used for connections that depend on precise clocking to ensure undistorted delivery of bits.

Control Processor

A module that makes up the hardware architecture of a B-STDX 9000 switch. A CP provides network and system management and routing functions in support of the real-time switching functions provided by the multiple, IO Processor modules (IOPs).

CP

See *Control Processor*.

CRC

See *Cyclic Redundancy Check*.

CRC error

A condition that occurs when the CRC in a frame does not agree with the CRC frame received from the network.

CSMA/CD

See *Carrier Sense Multiple Access Collision Detect*.

CSU

See *Channel Service Unit*.

CTS

See *Clear To Send*.

Cyclic Redundancy Check

A calculation method used to check the accuracy of digital transmission over a communications link.

D

D4-format

In T1 transmission, 24 channels per T1 line, where channels are assigned sequentially.

daemon

A special type of program that, once activated, starts itself and carries out a specific task without user intervention. Daemons typically handle tasks that run repeatedly, such as printing, mail, and communications.

data bits

In asynchronous transmission, the bits that actually contain the data being sent. Also called “payload” in some transmission methods.

Data Bus (DB) connector

A cable connector used to connect devices to parallel or serial ports. The number following DB indicates the number of pins in the connector (e.g., DB-25 connectors have 25 pins).

Data Carrier Detect

A hardware signal, defined by the RS-232-C standard, that indicates the device is on-line and ready for transmission.

Data Communications Equipment

Any device that connects a computer or terminal to a communications channel or public network.

Data Exchange Interface

A specification, described in RFC 1483, that defines how a network device can be used to convert data for interworking between different network services (i.e., Frame Relay to ATM).

Data Link Connection Identifier

A 10-bit address that identifies PVCs. See also *Local Management Interface* and *globally significant DLCI*.

data-link layer

The second of seven layers of the ISO/OSI model for computer-to-computer communications. This layer ensures data flow and timing from one node to another by synchronizing blocks of data and controlling the flow of data.

data packet

One unit of information transmitted as a discrete entity from one network node to another. In packet-switched networks, a data packet is a transmission unit of a fixed maximum length that contains a header, a set of data, and error control information.

Data Service Unit

A device that connects DTE to digital communications lines. A DSU formats the data for transmission on the public carrier WAN, and ensures that the carrier's requirements for data formats are met.

Data Set Ready

A hardware signal, defined by the RS-232-C standard, that indicates the device is ready to operate.

Data Terminal Equipment

Any device, such as a terminal or computer, that is connected to a communications device, channel, or public network.

Data Terminal Ready

A hardware signal, defined by the RS-232 standard, exchanged between devices. For example, an RS-232-C circuit that alerts a DCE device that the DTE device is ready to send and receive data.

data transfer rate

The speed at which data is transferred, usually measured in megabits per second (Mbps) or megabytes (MB) per second.

datagram

A message unit that contains source- and destination-address information, as well as the data itself, which is routed through a packet-switched network.

DCD

See *Data Carrier Detect*.

DCE

See *Data Communications Equipment*.

D-Channel

The data channel in ISDN used for control signals and customer data. In Primary Rate Interface (PRI) ISDN, the D-Channel operates at 64 Kbps.

DE

See *Discard Eligible (DE)*.

dedicated line

A communications circuit used for one specific purpose, and not used by or shared between other users.

dedicated server

A computer on the network that functions only as a server performing specific network tasks.

define path

A function that allows a manual path to be defined for the PVC, thereby bypassing the OSPF (Open Shortest Path First) algorithm to make PVC routing decisions.

delay

In communications, a pause in activity, representing the time that a message must wait for transmission-related resources to become available.

destination address

The address portion of a packet or datagram that identifies the destination node.

digital

A method of storing, processing, and transmitting information through use of distinct electronic or optical pulses that represent the binary digits (bits) 0 and 1. Digital transmission/switching technologies employ a sequence of discrete, individually distinct pulses to represent information, as opposed to the continuously variable signal of analog technologies. Compare with *analog*.

Digital Signal (Digital Service)

A classification of digital circuits. The DS defines the level of common carrier digital transmission service. DS-0 = 64 Kbps (Fractional T1), DS-1 = 1.544 Mbps (T1), DS-2 = 6.312 Mbps (T2), DS-3 = 44.736 Mbps (T3), and DS-4 =274-176 Mbps (T4).

DIP switch

See *Dual In-line Position switch*.

direct Ethernet

A connection method used by the NMS to the network. The NMS communicates directly to the gateway switch through the Ethernet port on the NMS to the Ethernet port on the switch.

Discard Eligible (DE)

A bit in the Frame Relay header used to indicate that a frame is eligible for discard by a congested node.

disk partitions

A portion of a disk that is configured during software installations on a system or workstation.

DLCI

See *Data Link Connection Identifier*.

domain

A network community of users sharing the same database information.

DS

See *Digital Signal (Digital Service)*.

DS0

A 64-Kbps channel used in T1 transmission. There are 24 DS0 channels in a T1 line.

DS1

A standard digital transmission facility, operating at 1.544 Mbps.

DSR

See *Data Set Ready*.

DSU

See *Data Service Unit*.

DSX-1

A T1 specification that indicates the physical and electrical characteristics of the standard T1 cross-connection.

DTE

See *Data Terminal Equipment*.

DTR

See *Data Terminal Ready*.

Dual In-line Position switch

A small switch used to select the operating mode of a device.

duplex channel

The ability to transmit and receive on the same channel at the same time. Also known as full duplex.

DXI

See *Data Exchange Interface*.

dynamic routing

A routing technique that allows a message's route to change "en route" through the network.

E

E1

The European counterpart to the North American T1 transmission speed. Adopted by the Conference of European Posts and Telecommunications Administrations, the E1 standard carries data at the rate of 2.048 Mbps.

EDAC

See *error detection and correction*.

encapsulation

The wrapping of data in a particular protocol header. For example, Ethernet data is wrapped in a specific Ethernet header before being transmitted. Also, when bridging dissimilar networks, the entire frame from one network is simply placed in the header used by the data link layer protocol of the other network.

environment variable

A system- or user-defined variable that provides information to the UNIX shell about the operating environment.

error detection and correction

A feature used to determine whether transmission errors have occurred, and if so, to correct those errors. See also *Carrier Sense Multiple Access Collision Detect*.

error rate

In communications, the ratio between the number of bits received incorrectly and the total number of bits in the transmission.

ESF

See *Extended Superframe Format*.

Ethernet

A popular LAN protocol and cabling scheme with a transfer rate of 10 Mbps.

Ethernet address

A 48-bit number physical address. Each Ethernet address is unique to a specific network card or PC on a LAN, which forms the basis of a network-addressing scheme. Compare with *Internet Protocol address*.

Ethernet packet

A variable-length unit of data transmitted on an Ethernet LAN.

Excess Burst

The maximum allowed amount of uncommitted data (in bits) in excess of Bc that the network attempts to deliver during time interval Tc. In general, this data (Be) is delivered with a lower probability than Bc.

Extended Superframe Format

In Frame Relay, a frame structure that extends the DS1 superframe structure from 12 to 24 frames, for a total of 4632 bits. This format redefines the 8-Kbps channel consisting of framing bits previously used only for terminal and robbed-bit signaling synchronization.

external testing

A loopback test that tests the ability of the port to send and receive data. This test requires an external loopback connector installed on the physical port.

fail count

A statistic that displays the number of tests that produced an error condition.

failed LED

A red status indicator that indicates a fatal system fault (such as a system crash).

fault-tolerant PVCs

In Frame Relay, a set of backup ports (Permanent Virtual Circuits) on the B-STDX 9000 switch used to restore connections from a failed data center to the backup data center. When enabled, a fault-tolerant PVC automatically reroutes all affected Frame Relay circuits to the set of backup ports.

F

FCS

See *Frame Check Sequence*.

FDDI

See *Fiber Distributed Data Interface*.

FDM

See *Frequency-Division Multiplexing*.

FECN

See *Forward Explicit Congestion Notification bit*.

Fiber Distributed Data Interface

An ANSI standard for fiber-optic links with a data transmission rate up to 100 Mbps.

File Transfer Protocol

A method of transferring information from one computer to another, either over a modem and telephone line, or over a network. FTP is a TCP/IP application utility.

foreground diagnostics

A set of tests used to check for non-fatal errors indicated by background diagnostics or statistics. Foreground tests may also run at start up to test new equipment functions.

Forward Explicit Congestion Notification bit

A bit in the Frame Relay header that indicates the frame has passed through a node that is experiencing congestion in the same direction in which the frame is traveling.

fractional T1

One channel of a T1 circuit. T1 circuits consist of 24, 64-Kbps channels. Customers can lease as many of these channels as needed; they are not required to lease all 24 channels in one circuit.

FRAD

See *Frame Relay Assembler/Disassembler*.

frame

In Frame Relay, a block of data that can be transmitted as a single unit.

Frame Check Sequence

In a frame, a field that contains the standard 16-bit cyclic redundancy check used to detect errors in HDLC and LAPD frames. See also *Cyclic Redundancy Check*.

Frame Relay

A type of data transmission based on a packet-switching protocol, with transmission rates up to 2 Mbps. Frame Relay provides for bandwidth-on-demand.

Frame Relay Assembler/Disassembler

A function that enables a logical port to perform Frame Relay encapsulation/de-encapsulation for HDLC/SDLC-based protocols. The FRAD function encapsulates HDLC/SDLC traffic entering an Ascend Frame Relay network and de-encapsulates it upon exiting the network. This function is restricted to one point-to-point PVC.

Frame Relay RFC1294 Multi-protocol Encapsulation

A specification allowing for a single circuit to be established between two devices.

Frequency-Division Multiplexing

A method of sharing a transmission channel by dividing the total bandwidth of the circuit into several smaller channels. This is accomplished by allocating specific frequency ranges to each channel. All signals are carried simultaneously. Compare with *Time Division Multiplexing*.

FTP

See *File Transfer Protocol*.

full-duplex (FDX)

See *duplex channel*.

full status reporting

In Frame Relay, a link-management message function that provides the user device with a complete status of all PVCs configured on that link.

G

gateway

A shared connection between a LAN and a larger system (such as a mainframe computer), or a large packet-switched network whose communication protocols differ.

Generic Flow Control

The field in the ATM cell that controls the flow of traffic across the User-Network Interface (UNI) and into the network. The mechanisms for using this field are still under development.

GFC

See *Generic Flow Control*.

globally significant DLCI

A feature of the Local (or Link) Management Interface (LMI) enhancement to Frame Relay that enables DLCIs to use the same connection-identification scheme across the network (global values) to specify individual end devices.

good LED

A green status indicator on an Ascend switch that indicates normal system status and operation during the system-boot process.

graceful discard

When enabled, this function turns red frames into best-effort frames. When disabled, this function discards frames.

green frames

Ascend's own class of packet frames used to identify packets as they travel through the network. Green frames are never discarded by the network except under extreme circumstances, such as node or link failure.

group addressing

The ability to send a single datagram/packet to multiple locations.

guaranteed packets

Data delivered according to some time constraint with high reliability.

H

Hayes-compatible modem

Any modem that recognizes commands in the industry-standard AT command set.

HDLC

See *High-level Data Link Control*.

header

The initial part of a data block, packet, or frame, which provides basic information about the handling of the rest of the block, packet or frame.

Header Error Control

In ATM, a feature that provides protection against misdelivery of cells due to addressing errors.

HEC

See *Header Error Control*.

heartbeat polling process

An exchange of sequence numbers between the network and a user device to ensure that both are operational and communicating.

HELLO

A routing protocol used principally by NSFnet nodes (nodes in the National Science Foundation Network). Hello allows trusting packet switches to discover minimal delay routes.

Hello protocol

Protocol used by OSPF systems for establishing and maintaining neighbor relationships.

heterogeneous network

A network that consists of workstations, servers, network interface cards, operating systems, and applications from many different vendors, all operating together as a single unit. Compare with *homogeneous network*.

High-level Data Link Control

An international protocol defined by ISO. In HDLC, messages are transmitted in variable-length units known as frames.

High-Speed Serial Interface

A high-speed interface (up to 52 Mbps full duplex) between a DTE and a DCE. The DCE provides the timing for the interface. HSSI can operate over a 50 ft- (15m) shielded twisted-pair cable.

homogeneous network

A network that consists of one type of workstation, server, network interface card, and operating system, with a limited number of applications, all purchased from a single vendor. All nodes use the same protocol and the same control procedures. Compare with *heterogeneous network*.

hop (count)

The number of links that must be “jumped” to get from a source node to a destination node.

host name

A unique name identifying a host system.

hot swappable

A feature that allows the user to add, replace, or remove interface processors in an Ascend switch without interrupting switch operations.

HP OpenView

The UNIX-based network management application used with NavisCore on an NMS to manage an Ascend switch network.

HSSI

See *High-Speed Serial Interface*.

hub

A wiring device that contains multiple connections of network and internetworking modules. Active hubs amplify or repeat signals to extend a LAN (in terms of distance). Passive hubs do not repeat, but split the transmission signal, allowing the administrator to add users to a LAN.

I

ICMP

See *Internet Control Message Protocol*.

IEEE

See *Institute of Electrical and Electronic Engineers*.

IEEE standards

Various specifications defined by the Institute of Electrical and Electronic Engineers (such as Token Ring, Ethernet) to establish common networking standards among vendors.

indirect Ethernet

A LAN topology or an extended LAN where the NMS and the switch reside on different LANs and must use a router for access.

Input/Output Adapter

A module that connects the various IOP and IOP Plus modules in a switch. IOA configurations vary according to the specific IOP module they support.

Input/Output Processor

A module in a switch that manages the lowest level of a node’s trunk or user interfaces. An IOP performs physical data link and multiplexing operations on external trunks and user links.

Institute of Electrical and Electronic Engineers

Professional organization that defines network standards.

Integrated Services Digital Network

A CCITT standard for a worldwide digital communications network, intended to replace all current systems with a completely digital transmission system.

internal clocking

A hardware function of the Ascend switch that provides the transmit and receive clocks to the user equipment.

internal testing

A hardware diagnostic that performs an internal loopback test on the I/O card and other cards.

International Standards Organization

An international standards group based in Geneva, Switzerland that establishes global standards for communications and information exchange.

International Telecommunication Union Telecommunication Standard Sector

An advisory committee established under the United Nations to recommend worldwide standards for voice and data. One of the four main organizations of the International Telecommunications Union.

Internet Control Message Protocol

The IP portion of TCP that provides the functions used for network layer management and control.

Internet Protocol

The TCP/IP session-layer protocol that regulates packet forwarding. See also *Internet Control Message Protocol*.

Internet Protocol address

A 32-bit address assigned to hosts using TCP/IP. The address is written as four octets separated with periods (dotted decimal format), which are made up of a network section, an optional subnet section, and a host section.

IOA

See *Input/Output Adapter*.

IOP

See *Input/Output Processor*.

IP

See *Internet Protocol*.

IP address

See *Internet Protocol address*.

ISDN

See *Integrated Services Digital Network*.

ISDN call setup

A procedure that establishes an ISDN backup trunk.

ISO

See *International Standards Organization*.

ITU-T

See *International Telecommunication Union Telecommunication Standard Sector*.

J

jitter

A type of distortion found on analog communications lines, resulting in data transmission errors.

K

Kbps

Kilobits per second.

keep-alives

A series of polling messages used in the Local (or Link) Management Interface (LMI) of a Frame Relay port to verify link integrity between devices.

L

LAN

See *Local Area Network*.

LAP

See *Link Access Protocol*.

LAP-B

A bit-oriented data-link protocol used to link terminals and computers to packet-switched networks.

LED

See *Light Emitting Diode*.

Light Emitting Diode

A semiconductor light source that emits light in the optical frequency band (visible light) or the infrared frequency band. A major light source for optical fiber transmission, LEDs are used with multimode optical fiber in applications that require a low-cost light source. See also *good LED*, *marginal LED*, and *failed LED*.

Link Access Protocol

The link-level protocol used for communications between DCE and DTE devices.

Link Management Interface

A set of enhancements to the basic Frame Relay specification. LMI dynamically notifies the user when a PVC is added or deleted. The LMI also monitors each connection to the network through a periodic heartbeat “keep alive” polling process.

Link Management Interface Rev 1

A synchronous polling scheme used for the link management of a Frame Relay channel where the user polls the network to obtain status information of the PVCs configured on the channel. LMI exchanges this information using DLCI 1023.

link-state routing protocol

A sophisticated method of determining the shortest paths through the network. See also *Open Shortest Path First*.

LMI

See *Link Management Interface*.

LMI Rev 1

See *Link Management Interface Rev 1*.

load balancing

A technique that distributes network traffic along parallel paths to maximize the available bandwidth while providing redundancy at the same time.

Local Area Network

Any physical network technology that connects a number of devices and operates at high speeds (10 Mbps through several gigabits per second) over short distances. Compare with *Wide Area Network*.

Local Management Interface

See *Link Management Interface*.

locally significant DLCI

In Frame Relay, an identifier or address that specifies a local router, PVC, SVC, or endpoint device. It is reusable at non-overlapping endpoints and allows for scalability. Compare with *globally significant DLCI*.

logical port

A configured circuit that defines protocol interaction.

loopback test

A diagnostic that directs signals back toward the transmitting source to test a communications path.

loss of frame

A T1 error condition when an out-of-frame condition exists for a normal period of 2 1/2 seconds.

loss of signal

A T1 error condition when j175+_75 consecutive zeros are received.

low level debugger

A state whereby the CP switch is powered on. If both positions on the CP switch are in the OFF position (pointing left), power up diagnostics are bypassed and the system debugger is enabled.

M

management DLCI

A value that specifies a PVC or SVC from a LAN connected via a router to a Ascend switch over a Frame Relay network.

Management Information Base

The set of variables forming a database contained in a CMIP or SNMP-managed node on a network. Network management stations can fetch/store information from/to this database.

marginal LED

An amber status indicator on a switch module that indicates a non-fatal system fault (such as low memory).

Mbps

Megabits per second.

MIB

See *Management Information Base*.

mild congestion

In Frame Relay, the state of a link when the threshold (more than 16 buffers by default) is exceeded.

mount point

A directory in a file hierarchy at which a mounted file system is added to the machine making the mount.

multicast

A type of broadcast transmission that sends copies of the message to multiple stations, but not to all possible stations.

multiplexer (mux)

A device that merges several lower-speed transmission channels into one high-speed channel at one end of the link. Another mux reverses this process at the opposite end.

multiplexing

A technique that transmits several signals over a single communications channel.

N

name server

A server connected to a network that converts network names into network addresses.

name service

A distributed database service that allows a single set of system configuration files to be maintained for multiple systems on a network.

NavisCore

The UNIX-based graphical user interface used to configure and monitor an Ascend switch network.

network address

A network layer address refers to a logical, rather than a physical network device; also called protocol address.

Network Interface Card

A card, usually installed in a pc, that enables you to communicate with other users on a LAN; also called adapter.

Network-to-Network Interface

The standard that defines the interface between ATM switches and between Frame Relay switches. In an SMDS network, an NNI is referred to as Inter-Switching System Interface (ISSI).

NIC

See *Network Interface Card*.

NNI

See *Network-to-Network Interface*.

node

Any device such as a pc, terminal, workstation, etc., connected to a network and capable of communicating with other devices.

node number

A unique number that identifies a device on the network.

noise

Extraneous signals on a transmission channel that degrade the quality or performance of the channel.

O

Open Shortest Path First

A routing protocol that takes into account network loading and bandwidth when routing information over the network. Incorporates least-cost routing, equal-cost routing, and load balancing.

Open Systems Interconnection

An international standard program created by ISO and ITU-T to develop standards for data networking, such as the OSI model, to facilitate multi-vendor operating environments.

OPTimum PVC trunk

A logical port configuration that optimizes interoperability in performance and throughput in networks where both ends are connected by Ascend switches.

OPTimum trunking

A software function that allows public data networks based on Frame Relay, SMDS, or ATM to be used as trunk connections between Ascend switches.

OSI

See *Open Systems Interconnection*.

OSPF

See *Open Shortest Path First*.

out of frame

A T1 error condition where two or three framing bits of any five consecutive frames are in error.

P

packet

Any block of data sent over a network. Each packet contains sender, receiver, and error-control information in addition to the actual message; sometimes called payload or data bits.

Packet Assembler/Disassembler

A device connected to a packet-switched network that converts a serial data stream from a character-oriented device (e.g., a bridge or router) into packets suitable for transmission. It also disassembles packets into character format for transmission to a character device.

packet processor

The Ascend switch module that performs the frame format validation, routing, queuing and protocol conversion for the STDX switch. This module is not hot swappable.

packet-switched network

A network that consists of a series of interconnected circuits that route individual packets of data over one of several routes and services.

packet switching

Type of networking in which nodes share bandwidth with each other by intermittently sending logical information units (packets). In contrast, a circuit-switching network dedicates one circuit at a time to data transmission.

PAD

See *Packet Assembler/Disassembler*.

Parameter Random Access Memory

The PRAM on a switch that contains the module's downloaded configuration file, and which is stored in battery backup.

pass count

A statistic that displays the number of background diagnostic tests that have passed without error.

passive hub

A wiring device used in some networks to split a transmission signal, allowing additional workstations to be added to the network. Compare with *active hub.*

path

The complete location of a directory or file in the file system. See *define path* and *alternate path*.

payload

The portion of a frame that contains the actual data.

PCR

See *Peak Cell Rate*.

Peak Cell Rate

In ATM transmission, the maximum transmission rate that cells are transmitted. Equivalent to Be for Frame Relay, PCR is measured in cells per second and converted internally to bits per second. PCR defines the shortest time period between two cells.

PDN

See *Public Data Network*.

Permanent Virtual Circuit

A logical connection across a packet-switched network that is always in place and always available along a predetermined network path. See also *Virtual Circuit*.

Point-to-Point Protocol

A protocol that provides router-to-router and host-to-network connections.

polling

An access control method in which one master device, such as the NMS, polls or queries other network devices, requesting them to transmit one at a time.

PPP

See *Point-to-Point Protocol*.

PRAM

See *Parameter Random Access Memory*.

PRI

See *Primary Rate Interface*.

primary group

The main group to which associated users belong. The system identifies the primary group by the group field in the user account (stored in the /etc/password file) and by the group ID associated with a new file.

Primary Rate Interface

An ISDN interface to primary rate access, which consists of a single 64-Kbps D channel plus 23 (T1) or 30 (E1) B channels for voice or data.

protocol

A set of rules governing communication between two entities or systems to provide interoperability between services and vendors. Protocols operate at different layers of the network, e.g., data link, network, and session.

proxy service

A management service provided for one or more devices by another. For example, the Ascend SMDS Access Servers/switches are proxy-managed through the SMDS network.

Public Data Network

Any government-owned or controlled commercial packet-switched network, offering WAN services to data processing users.

PVC

See *Permanent Virtual Circuit*.

Q

QoS

See *QoS*.

Quality of Service

A statistical report that specifies certain characteristics of network services, sessions, connections, or links. For example, a NavisCore statistics report describes the lost packets and round-trip delay measurements.

R

Random Access Memory

The main system memory in a computer used for the operating system, applications, and data.

RAM

See *Random Access Memory*.

rate enforcement

A process used to measure the actual traffic flow across a given connection and compare it to the total admissible traffic flow for that connection. Traffic outside of the acceptable level can be tagged and discarded en route if congestion develops. ATM, Frame Relay, and other types of networks use rate enforcement.

reboot

To restart the computer and reload the operating system, usually after a crash.

Receive Data

A hardware signal, defined by the RS-232-C standard, that carries data from one device to another. Compare with *Transmit Data*.

red alarm

A T1 alarm condition indicating a loss of signal or loss of frame at the device's local termination point.

red frames

In Frame Relay, a type of frame to be discarded. Color designators green, amber, and red identify packets as they travel through the network.

redundancy

The duplication of hardware or software within a network to ensure fault-tolerant or back-up operation.

remote connection

A workstation-to-network connection made using a modem and telephone line or other WAN services equipment. Remote connections enable you to send and receive data over greater distances than you can with conventional cabling methods.

repeater

A device that receives data on one communication link and transmits it, bit by bit, on another link as fast as it is received without buffering.

Request For Comment

A series of notes and documents available on-line that describe surveys, measurements, ideas, techniques, and observations, as well as proposed and accepted Internet protocol standards, such as Telnet and FTP.

Request To Send

A hardware signal, defined by the RS-232-C standard, that a device sends to request permission to transmit.

RFC

See *Request For Comment*.

RFC1294

A specification documenting multi-protocol access over Frame Relay.

RIP

See *Routing Information Protocol*.

route recovery

In Frame Relay, an OSPF routing function in the Ascend switch. When a tandem node or trunk is down, new shortest-path routes for those affected PVCs are recalculated immediately at the ingress nodes, due to fast convergence of the link-state updates. The PVCs are then rerouted to the new route. Recovery time is typically under four seconds. The network reports PVC rerouting as an event/alarm.

router

An intelligent LAN-connection device that routes packets to the correct LAN segment destination address(es). The extended LAN segments may or may not use the same protocols. Routers link LAN segments at the ISO/OSI network layer.

routing

The process of directing data from a source node to a destination node.

Routing Information Protocol

A routing protocol that maintains a list of accessible networks and calculates the lowest hop count from a particular location to a specific network.

routing protocol

A protocol that implements routing using a specific routing algorithm. Routing protocols include IGRP, OSPF, and RIP.

RTS

See *Request To Send*.

RXD

See *Receive Data*.

S

SCR

See *Sustainable Cell Rate*.

SEAL

See *Simple and Efficient Adaption Layer*.

Serial Line over Internet Protocol

A protocol that enables point-to-point serial communication over IP using serial lines or telephone connections and modems.

serial management port

A management port on the Packet Processor card in an Ascend switch.

severe congestion

In Frame Relay, a state or condition that occurs when the queue size is greater than a second predetermined threshold (32 buffers full). In this state, the continued forwarding of amber and red packets jeopardize the successful delivery of green packets.

shielded cable

Cable protected against electromagnetic and radio frequency interference.

shortest path routing

A routing algorithm that calculates the path distances to all network destinations. The shortest path is then determined by a cost assigned to each link. See also *OSPF.*

SIG

See *SMDS Interest Group*.

Simple and Efficient Adaption Layer

In ATM, an extension of the Type 3 AAL. It simplifies the SAR portion of the Adaption layer to pack all 48 bytes of the cell information field with data. This AAL makes ATM look like high-speed Frame Relay. It also assumes that only one message is crossing the UNI at a time. That is, multiple end users at one location cannot interleave messages on the same virtual circuit, but must queue them for sequential transmission.

Simple Network Management Protocol

A standard network management protocol used to manage and monitor nodes and devices on a network.

SIP

See *SMDS Interface Protocol*.

SLIP

See *Serial Line over Internet Protocol*.

smart hub

A concentrator with certain network management features built into the firmware. This capability enables the user to manage LAN configurations.

SMDS

See *Switched Multimegabit Data Services*.

SMDS In-Band Network Management

The NMS manages the SMDS network traffic using SMDS In-Band Network Management. To be managed from this NMS, all SMDS Access Servers/Switches must be in the same IP subnet.

SMDS Interest Group

A consortium of vendors and consultants committed to advancing worldwide SMDS as an open, interoperable solution for high-performance data connectivity.

SMDS Interface Protocol

The protocol defined at the network and end-user interface connection.

SNMP

See *Simple Network Management Protocol*.

static route

A route or path that is manually entered into the routing table. Static routes take precedence over routes or paths specified by dynamic routing protocols.

subnet address

An extension of the Internet addressing scheme that allows a site to use a single Internet address for multiple physical networks.

subnet mask

A 32-bit address mask used in IP to specify a particular subnet. See also *address mask*.

superuser (root)

In UNIX, a user (also known as root) with special privileges. Only the superuser, for example, can change the password file and edit major system administration files in the /etc directory.

Sustainable Cell Rate

The average cell transmission rate in ATM transmission. Equivalent to CIR for Frame Relay, SCR is measured in cells per second and converted internally to bits per second Usually, SCR is a fraction of the peak cell rate. Cells are sent at this rate if there is no credit.

SVC

See *Switched Virtual Circuit*.

Switched Multimegabit Data Services

A high-speed WAN service based on the 802.6 standard for use over T1 or T3 circuits.

Switched Virtual Circuit

A logical connection across a packet-switched network providing as-needed connections to any other node in the network. See also *Virtual Circuit*.

synchronization

The timing of separate elements or events to occur simultaneously. In communications, hardware and software must be synchronized so that file transfers can occur.

synchronous transmission

A data transmission method that uses a clock signal to regulate data flow.

T

T1

A long-distance, point-to-point circuit that provides 24 channels at 64 Kbps each (for a total of 1.544 Mbps). See also *E1*.

T3

A long-distance, point-to-point circuit that provides up to 28 T1 channels. T3 can carry 672 channels of 64 Kbps (for a total of 44.736 Mbps).

Tc

See *Committed Rate Measurement Interval*.

TCP

See *Transmission Control Protocol*.

TDM

See *Time Division Multiplexing*.

telnet

The Internet standard protocol for remote terminal-connection services.

throughput

The actual speed of the network.

Time Division Multiplexing

A timing mechanism that allocates bandwidth for multiple channels onto one channel based on preassigned time slots.

time interval “T”

The time interval over which the number of bits used to average the number of bits transmitted, is averaged. To calculate **T,** use the following formula: Bc/CIR=T.

topology

The map or configuration design of a network. Physical topology refers to the location of hardware. Logical topology refers to the paths that messages take to get from one node to another.

traffic shaping

In Frame Relay, a set of rules that describes traffic flow. The sender has a mechanism to ensure that the transmission of its guaranteed packets behaves in a certain way. The network knows what kind of traffic to expect, and can monitor the behavior of the traffic.

transceiver

A device that connects a host interface to a LAN. A transceiver transmits and receives data.

Transmission Control Protocol

The Internet standard, transport-level protocol that provides the reliable, full duplex, stream service on which many application protocols depend.

Transmit Data

A hardware signal, defined by the RS-232-C standard, used by the DTE to transmit data to the DCE. Compare with *Receive Data*.

trap

An unsolicited message generated by an SNMP agent on a network device (e.g. switch) due to a predefined event occurring or alarm threshold being exceeded, which triggers an alarm at the NMS.

trunk

The communications circuit between two switches.

trunk backup

A configuration setting specified by a network operator via the NMS. The network operator can initiate or terminate primary trunk backups at any time via the NMS. Trunk backups take over a connection should the primary trunk fail.

trunk failure

A condition (alarm) that occurs when the Ascend switch status indicates that a trunk is no longer available.

trunk restoration

A process that reroutes the PVCs carried on the backup trunk, and frees up the circuit on the backup trunk.

TXD

See *Transmit Data*.

twisted-pair cable

Cable that consists of two or more pairs of insulated wires twisted together. One wire carries the signal, and the other is grounded.

U

UIO module

See *Universal Input Output Module*.

UDP

See *User Datagram Protocol*.

unshielded cable

Any cable not protected from electromagnetic or radio frequency interference.

UNI

See *User-to-Network Interface*.

UNI DCE

See *User Network Interface Data Communications Equipment*.

UNI DTE

See *User Network Interface Data Terminal Equipment*.

Universal Input Output Module

In the Ascend switch, a module that has three 80-pin connectors and is used for redundancy, and also as an I/O module for X.21, RS449, V.35, EIA530, and EIA530A interfaces.

User Datagram Protocol

An unreliable transport-layer protocol from the TCP/IP protocol suite. It simply acts as an interface to various applications through the use of different ports.

User Network Interface Data Communications Equipment

A device that performs the Frame Relay DCE functions for link management and expects a Frame Relay DTE device (e.g., Ascend switch) to be attached to it.

User Network Interface Data Terminal Equipment

A device that performs the Frame Relay DTE functions for link management. The user specifies this option on the NMS to connect to a Frame Relay DCE, where the Ascend switch acts as the DTE.

User-to-Network Interface

A standard defined by the ATM Forum for public and private ATM network access. UNI connects an ATM end system (such as a router) and an ATM switch, and is also used in Frame Relay. UNI is called SNI (Subscriber Network Interface) in SMDS.

V

V.35

A standard module used for communication between a network access device and a packet network. It provides clocking from 19.2 Kbps to 4.0966 Mbps.

VC

See *Virtual Channel*; *Virtual Circuit*.

VCI

See *Virtual Circuit Identifier*.

virtual bandwidth

Channel capacity calculated to allow for oversubscription of channel usage.

Virtual Channel

A connection between two communicating ATM networks.

Virtual Circuit

A logical circuit set up to ensure reliable communication between two network devices. See also *PVC* and *SVC*.

Virtual Circuit Identifier

A 16-bit field in the ATM cell header that is used as an addressing identifier to route cell traffic.

Virtual Path

A group of VCs carried between two points that provides a way to bundle traffic headed in the same direction.

Virtual Path Identifier

An 8-bit field in the ATM cell header that is used as an addressing identifier to route cell traffic.

VPI

See *Virtual Path Identifier*.

VP

See *Virtual Path*.

W

WAN

See *Wide Area Network*.

warmboot

A reboot performed after the operating system has been running for a period of time. Compare with *coldboot*.

Wide Area Network

A network that usually consists of packet-switching nodes over a large geographical area.

Y

yellow alarm

A T1 alarm that is generated when the interface receives a red alarm signal from the remote end.

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