MAX 6000 Series Hardware Installation Guide

How to obtain technical assistance

You can obtain technical assistance by telephone, email, fax, or modem, or over the Internet.

Enabling Ascend to assist you

If you need to contact Ascend for help with a problem, make sure that you have the following information when you call or that you include it in your correspondence:

- Product name and model.
- Software and hardware options.
- Software version.
- If supplied by your carrier, Service Profile Identifiers (SPIDs) associated with your product.
- Your local telephone company's switch type and operating mode, such as AT&T 5ESS Custom or Northern Telecom National ISDN-1.
- Whether you are routing or bridging with your Ascend product.
- Type of computer you are using.
- Description of the problem.

Calling Ascend from within the United States

In the U.S., you can take advantage of Priority Technical Assistance or an Ascend Advantage Pak service contract, or you can call to request assistance.

Priority Technical Assistance

If you need to talk to an engineer right away, call (900) 555-ASND (2763) to reach Ascend's Priority Call queue. The charge of $2.95 per minute does not begin to accrue until you are connected to an engineer. Average wait times are less than three minutes.

Ascend Advantage Pak

Ascend Advantage Pak is a one-year service contract that includes overnight advance replacement of failed products, technical support, software maintenance releases, and software update releases. For more information, call (800) ASCEND-4 (272-3634), or access Ascend's Web site at `www.ascend.com` and select Services and Support, then Advantage Service Family.

Other telephone numbers

For a menu of Ascend's services, call (800) ASCEND-4 (272-3634). Or call (510) 769-6001 for an operator.

Calling Ascend from outside the United States

You can contact Ascend by telephone from outside the United States at one of the following numbers:

Telephone outside the United States	(510) 769-8027
Asia Pacific (except Japan)	(+61) 3 9656 7000
Austria/Germany/Switzerland	(+33) 492 96 5672
Benelux	(+33) 492 96 5674
France	(+33) 492 96 5673
Italy	(+33) 492 96 5676
Japan	(+81) 3 5325 7397
Middle East/Africa	(+33) 492 96 5679
Scandinavia	(+33) 492 96 5677
Spain/Portugal	(+33) 492 96 5675
UK	(+33) 492 96 5671

For the Asia Pacific Region, you can find additional support resources at `http://apac.ascend.com/contacts.html`.

Obtaining assistance through correspondence

Ascend maintains two email addresses for technical support questions. One is for customers in the United States, and the other is for customers in Europe, the Middle East, and Asia. If you prefer to correspond by fax, BBS, or regular mail, please direct your inquiry to Ascend's U.S. offices. Following are the ways in which you can reach Ascend Customer Service:

- Email from within the U.S.—support@ascend.com
- Email from Europe or the Middle East—EMEAsupport@ascend.com
- Email from Asia Pacific—apac.support@ascend.com
- Fax—(510) 814-2312
- Customer Support BBS (by modem)—(510) 814-2302
- Write to Ascend at the following address:

Attn: Customer Service
Ascend Communications, Inc.
One Ascend Plaza
1701 Harbor Bay Parkway
Alameda, CA 94502-3002

Finding information about new features and products

Ascend is committed to constant product improvement. You can find out about new features and other improvements as follows:

*   For the latest information about the Ascend product line, visit our site on the World Wide Web:

    `http://www.ascend.com`

*   For software upgrades, release notes, and addenda to this manual, visit our FTP site:

    `ftp.ascend.com`

Important safety instructions

The following safety instructions apply to the MAX:

1   Product installation should be performed by trained service personnel only.

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

3   The maximum recommended ambient temperature for MAX models is 104° Fahrenheit (40° Celsius). Take care to allow sufficient air circulation or space between units when the MAX is installed in a closed or multirack assembly, because the operating ambient temperature of the rack environment might be greater than room ambient.

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

5   Installation of the MAX in a rack without sufficient air flow can be unsafe.

6   If installed in a rack, the rack should safely support the combined weight of all equipment it supports. A fully loaded redundant-power MAX weighs 25.5 lbs (56 kg). A fully loaded single-power MAX weighs 13.6 lbs (30 kg).

7   The connections and equipment that supply power to the MAX should be capable of operating safely with the maximum power requirements of the MAX. In the event of a power overload, the supply circuits and supply wiring should not become hazardous. The input rating of the MAX is printed on its nameplate.

8   Models with ac power inputs are intended for use with a three-wire grounding type plug—a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.

9   Before installation, use an outlet tester or a voltmeter to check the ac receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem. Similarly, in the case of dc input power, check the dc ground(s).

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

11 Models with dc power inputs must be connected to an earth ground through the terminal block Earth/Chassis Ground connectors. This is a safety feature. Equipment grounding is vital to ensure safe operation.

12 Before installing wires to the MAX unit's dc power terminal block, verify that these wires are not connected to any power source. Installing live wires (that is, wires connected to a power source) is hazardous.

13 If using dc power, connect the equipment to a 48 Vdc supply source that is electrically isolated from the ac source. The 48 Vdc source should be reliably connected to earth ground.

14 Install only in restricted-access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electrical Code, ANSI/NFPA 70.

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

16 Do not attempt to service this product yourself. Opening or removing covers can expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.

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

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

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

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

• Never install telephone wiring during a lightning storm.

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

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

• Use caution when installing or modifying telephone lines.

  Avoid using equipment connected to telephone lines (other than a cordless telephone) during an electrical storm. There is a remote risk of electric shock from lightning.

• Do not use a telephone or other equipment connected to telephone lines to report a gas leak in the vicinity of the leak.

⚠ **Caution:** The power supply cord plug serves as the main disconnect for the product. The socket outlet must be installed near the product and be readily accessible.

⚠ **Attention:** Le câble d'alimentation électrique permet de déconnecter l'appareil. La prise de courant doit être installée à proximité de l'appareil et doit être facilement accessible.

Achtung: Das Gerät kann durch Herausziehen des Netzsteckers von der Stromquelle getrennt werden. Die Steckdose muß sich in der Nähe des Geräts befinden und leicht zu erreichen sein.

Warning: To reduce the risk of fire, communication cable conductors must be 26 AWG or larger.

Avertissement: Afin de reduire les risques d'incendie, les fils conducteurs du cable de communication doivent etre d'un calibre minimum de 26 AWG (American Wire Gauge), cest-a-dire d'un minimum de 0,404 mm.

Warnung: Um Feuerrisiken zu reduzieren, müssen die Kommunikationskabel-Anschlüße 26 AWG oder größer sein.

Contents

Figures

Tables

About This Guide

How to use this guide

This guide explains how to install and test the MAX 6000 series (referred to as the MAX) hardware. It also explains how to navigate the user interface. When you finish with the instructions in this guide, you will be ready to configure the MAX.

Following is a chapter-by-chapter description of the topics in this guide:

- "Chapter 1, "Getting Acquainted with the MAX," describes the main features of the MAX and provides a list of package contents.
- "Chapter 2, "Setting Up and Testing the MAX Hardware," explains how to install and test the MAX hardware.
- Chapter 3, "Quickstart," explains how to perform a basic configuration of your MAX.
- Chapter 4, "Navigating and Securing the Interface," tells you how to navigate the MAX user interfaces.
- Appendix A, "Provisioning the Switch," gives you information that your T1, E1, or BRI service provider needs to properly provision the Central Office switch.
- Appendix B, "MAX Technical Specifications," lists the technical specifications of the MAX and the pin assignments for each interface.
- Appendix C, "Cables and Connectors," describes specifications for different facets of the MAX, and discusses cabling requirements.
- Appendix D, "FCC and Canadian Notices," shows the FCC and Canadian Notices and Warnings.
- Appendix E, "Warranties," provides the warranty terms.

The guide also includes an index.

What you should know

This guide is for the person who configures and maintains the MAX. To configure the MAX, you need to understand the following:

- Wide area network (WAN) concepts
- Local area network (LAN) concepts, if applicable

Documentation conventions

Following are all the special characters and typographical conventions used in this manual:

Convention	Meaning
`Monospace text`	Represents text that appears on your computer's screen, or that could appear on your computer's screen.
`Boldface mono-space text`	Represents characters that you enter exactly as shown (unless the characters are also in ***`italics`***—see *Italics*, below). If you could enter the characters but are not specifically instructed to, they do not appear in boldface.
Italics	Represent variable information. Do not enter the words themselves in the command. Enter the information they represent. In ordinary text, italics are used for titles of publications, for some terms that would otherwise be in quotation marks, and to show emphasis.
[ ]	Square brackets indicate an optional argument you might add to a command. To include such an argument, type only the information inside the brackets. Do not type the brackets unless they appear in bold type.
|	Separates command choices that are mutually exclusive.
>	Points to the next level in the path to a parameter or menu item. The item that follows the angle bracket is one of the options that appears when you select the item that precedes the angle bracket.
Key1-Key2	Represents a combination keystroke. To enter a combination keystroke, press the first key and hold it down while you press one or more other keys. Release all the keys at the same time. (For example, Ctrl-H means hold down the Control key and press the H key.)
Press Enter	Means press the Enter, or Return, key or its equivalent on your computer.
Note:	Introduces important additional information.
⚠️ **Caution:**	Warns that a failure to follow the recommended procedure could result in loss of data or damage to equipment.
⚡ **Warning:**	Warns that a failure to take appropriate safety precautions could result in physical injury.

Note: In a menu-item path, include a space before and after each ">" character.

MAX 6000 Series documentation set

The MAX 6000 Series documentation set consists of the following manuals:

- *MAX 6000 Series Administration Guide*
- *MAX 6000 Series Hardware Installation Guide*
- *MAX 6000 Network Configuration Guide*
- *MAX Reference Guide*
- *MAX Security Supplement*
- *MAX RADIUS Configuration Guide*
- *MAX Glossary*

Related publications

This guide and documentation set do not provide a detailed explanation of products, architectures, or standards developed by other companies or organizations. Following are some publications that you may find useful:

- *The Guide to T1 Networking*, William A. Flanagan
- *Data Link Protocols*, Uyless Black
- *The Basic Book of ISDN*, Motorola University Press
- *ISDN*, Gary C. Kessler
- *TCP/IP Illustrated*, W. Richard Stevens
- *Firewalls and Internet Security*, William R. Cheswick and Steven M. Bellovin

Getting Acquainted with the MAX

1

This chapter covers the following topics:

What is the MAX?

The MAX is a WAN access router designed for central site remote access applications. It has the following main features:

*   Supports digital WAN access for numerous WAN services.
*   Allows digital and analog modems to dial in over channelized T1/PRI and E1/PRI access lines.
*   Provides IP and IPX routing, bridging, and terminal-server functions.
*   Aggregates multiple calls for Bandwidth-on-Demand.
*   Supports multiple security methods.
*   Has various management and control features.

The items in your MAX package

All MAX models ship with the same set of accessories. Expansion cards might be preinstalled or packaged separately, depending on how you ordered them.

Checking the MAX base unit

Open the shipping package and make sure you have received the base MAX unit that you ordered. Figure 1-1 shows the ac MAX base unit. Figure 1-2 shows the ac Redundant MAX base unit and Figure 1-3 shows the dc MAX base unit (with a dc power source).

Figure 1-1. MAX base unit
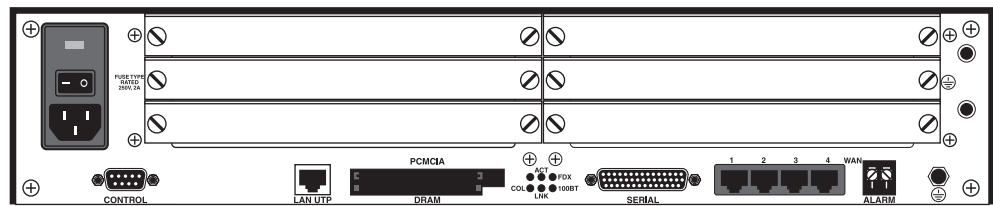
Figure 1-2. Redundant MAX base unit
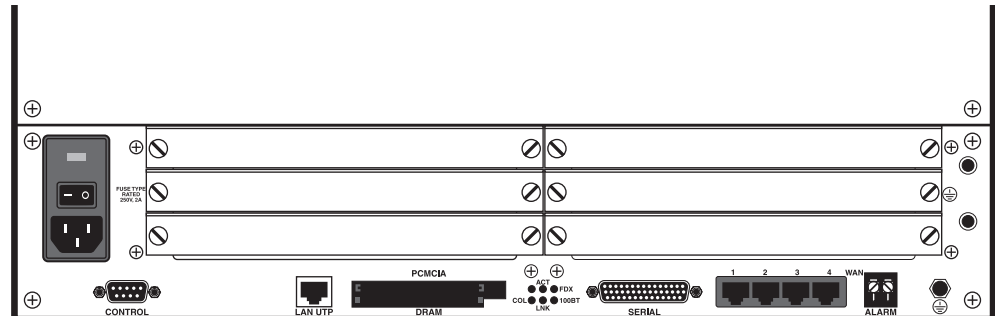
Figure 1-3. DC power source on the MAX 6000 and the Redundant MAX 6000
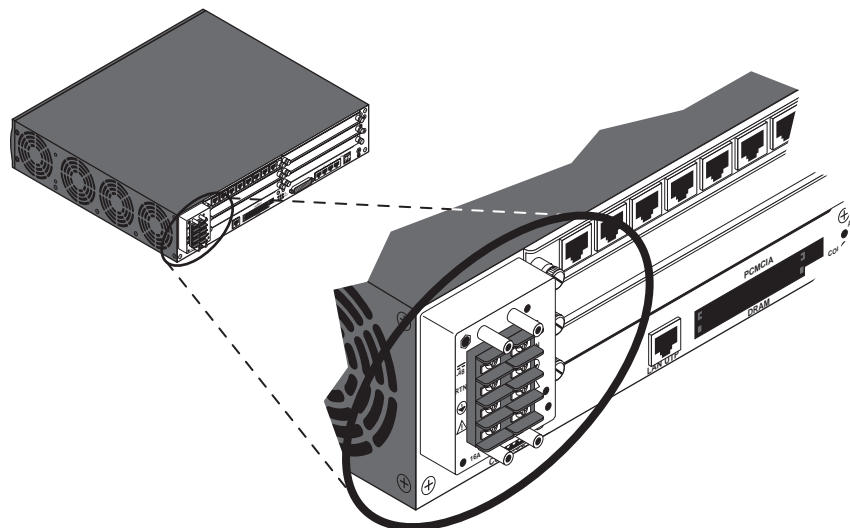
Checking other package contents

After you verify that you have received the correct base unit, make sure your package contains the following items:

- A console cable (null-modem)

- Two adapters

- A power cable

- A rack-mounting kit

- Separately packaged expansion modules, (if you ordered them separately)

If you are missing any items, contact your MAX distributor.

Checking the expansion cards

The MAX accommodates up to six expansion cards (also referred to as *expansion modules* or *slot cards*). The figures in this section will help you to identify your expansion cards.

Host/6 card

The Host/6 card (Figure 1-4), also known as the AIM/6 card, supports six V.35 host ports. A Host/6 card supports 32 active channels. You can install a maximum of two Host/6 cards in the MAX.

Figure 1-4. Host/6 card
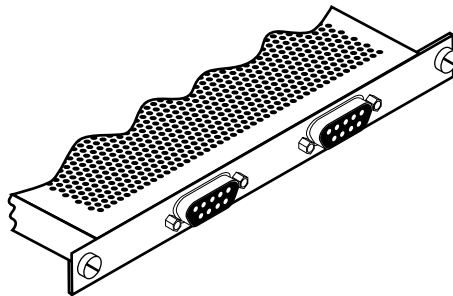
ISDN BRI network-interface and terminal-interface cards

The ISDN BRI network-interface card and ISDN terminal-interface card each have eight ISDN BRI ports. (Figure 1-5.) You can install a maximum of four ISDN BRI network-interface cards in the MAX.

Figure 1-5. ISDN BRI network-interface or terminal-interface card
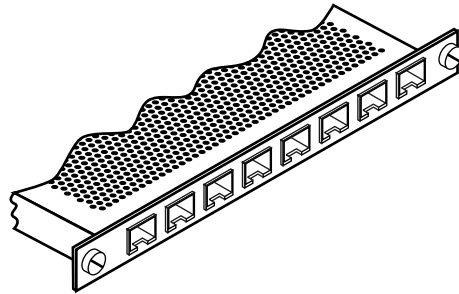
Note: Not all Ascend units support all Ascend slot cards. You must install a slot card in a unit that supports that specific card. Ascend's slot cards are only supported in Ascend devices.

Multiband inverse-multiplexing card

The Multiband inverse-multiplexing card (Figure 1-6) has two or six user-selectable RS-449, V.35, or X.21 serial host ports with inverse-multiplexing and RS-366 capability, V.25bis, or control-lead signaling.

Figure 1-6. Multiband inverse-multiplexing two-port card
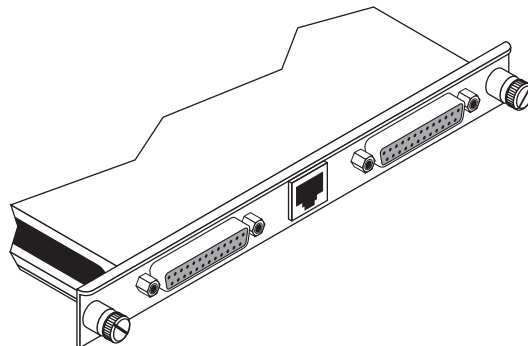
Series56 digital modem card

The Series56 digital modem card (Figure 1-7) supports eight, twelve, or sixteen digital modems per card. Digital modems support V.90, K56flex, V.34 and all lower modulations. You can install a maximum of 96 digital modems in the MAX.

Figure 1-7.   Series56 Digital modem card
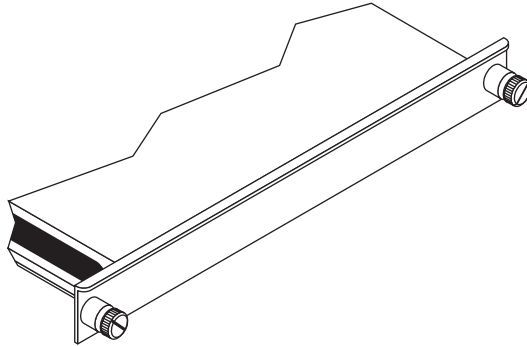
V.110 card

The V.110 card (Figure 1-8) supports up to eight V.110 WAN sessions. You can install a maximum of six V.110 cards in the MAX.

Figure 1-8.   V.110 card
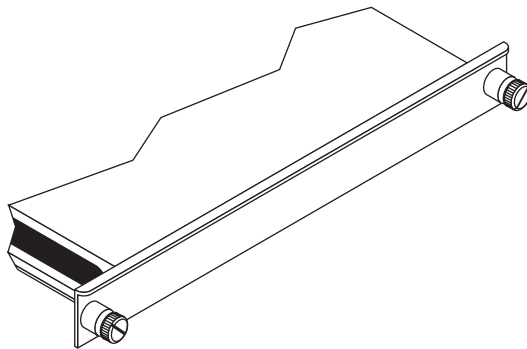
PIAFS-16 card

The PIAFS-16 card (Figure 1-9) provides up to 16 PIAFS WAN sessions. You can install a maximum of six PIAFS-16 cards in the MAX.

Figure 1-9. PIAFS card
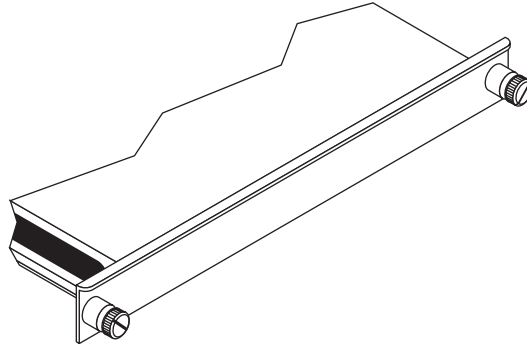
IDSL card

Ascend's ISDN Digital Subscriber Line (IDSL) card (Figure 1-10) appears as BRI/LT in the VT100 menu screen and supports incoming and outgoing voice calls. To support outgoing voice calls, the connected Terminal Equipment (TE) must use Q.931 en-bloc dialing to send all dialed digits to the MAX in one block (the ISDN Call Setup message), rather than send one digit at a time.

The MAX receives outgoing call requests from attached ISDN TE and routes voice calls to the Public Switched Telephone Network (PSTN) over a T1 line or ISDN PRI line. The MAX receives incoming voice calls and uses Dialed Number Identification Service (DNIS) to route them to TEs connected to IDSL cards.

Figure 1-10. IDSL card
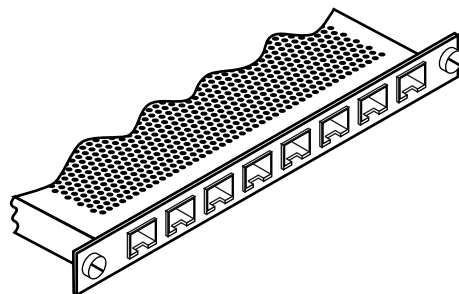
DRAM card

The DRAM card is a proprietary Ascend card (Figure 1-11). It is *not* hot-swappable and should not be removed while the MAX is running. The DRAM card attaches directly to the CPU bus, and damage might occur if you attempt to remove it.

Figure 1-11. DRAM card

88 pins in two
staggered rows
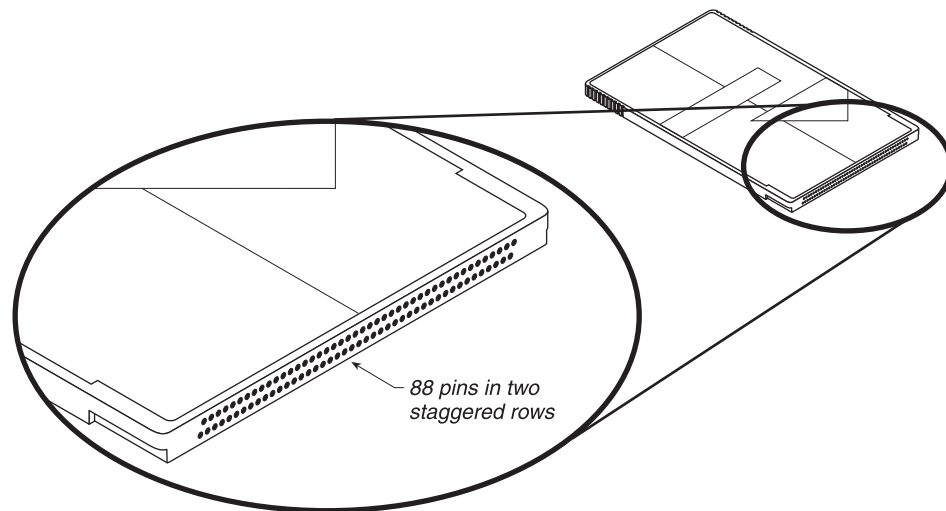
PCMCIA flash card

The PCMCIA flash card (Figure 1-12) is a standard card that extends existing flash memory.

Figure 1-12. PCMCIA card

68 pins in two
parallel rows
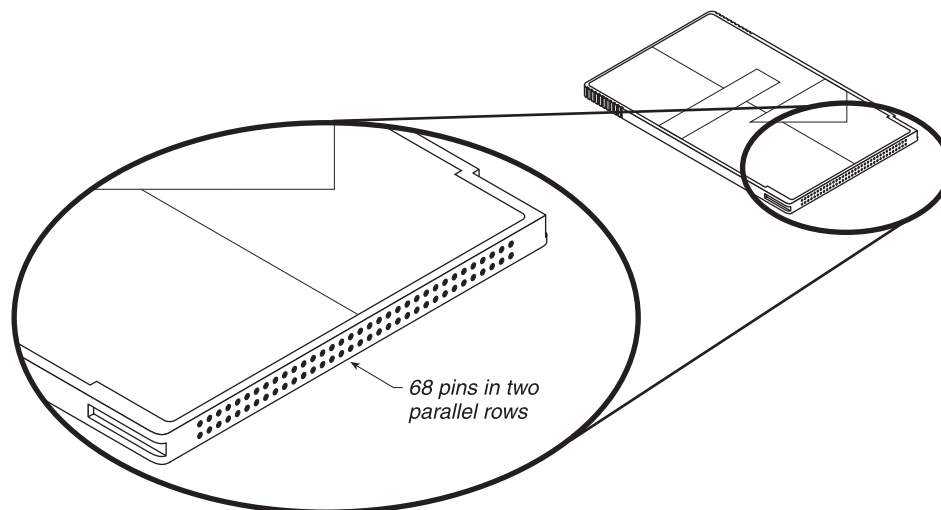
Interfaces

The MAX has a number of interfaces on the base unit, and others are available on expansion cards.

Interfaces on the base unit

Figure 1-1 on page 1-2 and Figure 1-2 on page 1-2 show the physical interfaces on the MAX base unit.

POWER

The MAX accepts ac or dc power, depending on the model you purchased. Figure 1-1 on page 1-2 and Figure 1-2 on page 1-2 show ac power sockets. Figure 1-3 on page 1-2 shows the dc power socket. (For further details, see Appendix B, "MAX Technical Specifications.")

CONTROL

The control port connects to a VT100 terminal or a modem to provide the menu-driven user interface to the MAX. The interface runs at 9600 bps (configurable through the user interface), 8 bits per character, no parity, no flow control, 1 stop bit. (For details about cables that connect to this port, see "User interface specifications" on page C-1.)

LAN UTP

The LAN UTP port connects the MAX to an unshielded twisted pair 10/100 Base-T (UTP) LAN. (For details about cables that connect to this port, see "Ethernet interface specifications" on page C-4.)

PCMCIA

The PCMCIA interface accepts a plug-in PCMCIA card. (For an illustration, see Figure 1-12 on page 1-7.)

DRAM

The DRAM interface accepts a plug-in DRAM card. (For an illustration, see Figure 1-11 on page 1-7.)

SERIAL V.35 DTE port

The Serial V.35 DTE port provides a point-to-point connection between the MAX and another device. In the MAX manuals, this port is called the Serial WAN port. (For details about cables that connect to the serial V.35 DTE port, see "Serial WAN cabling specifications" on page C-41.)

WAN (1 to 4)

The WAN ports are a group of either four T1 or four E1 ports providing point-to-point T1/E1 connections between the MAX and other devices. In the MAX manuals, these ports are called Net/T1 and Net/E1 ports. (For details about cables that connect to the WAN ports, see "T1/PRI interface specifications" on page C-4 and "E1/PRI interface specifications" on page C-13.

ALARM

The Alarm interface is a two-connector terminal block that provides warning of alarm conditions. (For further information about the alarm relay, see Appendix B, "MAX Technical Specifications.")

Interfaces on expansion cards

AIM/BONDING

The DCE interfaces in Figure 1-4 on page 1-3 and Figure 1-6 on page 1-4 provide AIM/BONDING inverse-multiplexing services to devices connected to them. (For details about cables that connect to these ports, see "Serial host interface specifications" on page C-21.)

PALMTOP

The palmtop port connects to a hand-held *palmtop* control terminal, although it can also connect to a VT100 terminal. The palmtop port provides access to the menu-driven user interface of the MAX. It runs at 9600 bps (configurable through the user interface), 8 bits per character, no parity, no flow control, 1 stop bit. (For details about cables that connect to these ports, see "Cables and Connectors" on page C-1.)

ISDN BRI

ISDN BRI ports (Figure 1-5 on page 1-4) are a group of either eight DTE or eight DCE ports providing point-to-point ISDN BRI connections between the MAX and other devices. Int he MAX manuals, these ports are called the Net/BRI and Host/BRI ports for the DTE and DCE interfaces, respectively. From the point of view of the MAX, pins 3 and 6 transmit on the Net/BRI interface and receive on the Host/BRI interface. Pins 4 and 5 receive on the Net/BRI interface and transmit on the Host/BRI interface. (For details about cables that connect to these ports, see "ISDN BRI interface specifications" on page C-20.)

IDSL

The IDSL ports (Figure 1-10 on page 1-6) are a group of eight DCE ports providing point-to-point IDSL connections between the MAX and other devices. An IDSL port has the same pinouts as a Host/BRI port. (For further information, see "IDSL specifications" on page C-43.)

Setting Up and Testing the MAX Hardware

2

This chapter covers the following topics:

Planning the hardware installation

Before you begin installation of the MAX hardware, make sure that you have the items you need and that you are aware of the requirements regarding installation of digital modems and installation of MAX units in a rack.

What you need before you start

Before you install the MAX, make sure that you have the following items:

- A suitable location in which to install the MAX hardware. (If installing the hardware in a rack, see "Guidelines for installing MAX units in a rack" on page 2-2.)

- One or more active line(s), with at least one line set for bidirectional calling. (Bidirectional calling allows you to test the MAX hardware by having the MAX dial out on one channel and answer on another channel.)

- One or more active BRI lines, if applicable.

- An Ethernet interface. Also, if the MAX connects to an Ethernet LAN, you need the appropriate cables and connectors to set up an Ethernet interface.

- A locally connected host or workstation that can Telnet or Ping to the MAX.

- A VT100 terminal or a workstation with a communications program that supports VT100 emulation.

- Or, alternatively, a hand-held palmtop terminal and associated cable less than 10 feet (3 meters) in length.

- A remote Ascend or compatible unit to which you can telnet or which you can Ping over a dial-up Point-to-Point Protocol (PPP) connection.

- Any expansion modules that were shipped separately.

Guidelines for installing digital modems

- The Series56 architecture requires that all modem modules within a MAX chassis be homogeneous. That is, Series56 modules must not be mixed with non-Series56 digital modem modules.

- The Series56 architecture also requires that the modem density be homogeneous. Modem modules with mixed densities (for example, 8-port and 12-port modem modules) must not be combined in a single chassis.

- The MAX can support a total of 96 digital modems.

Guidelines for installing MAX units in a rack

Figure 2-1 shows an example of MAX units installed in a rack.

Figure 2-1. MAX units installed in a rack.

Allow 4" between units
for air circulation
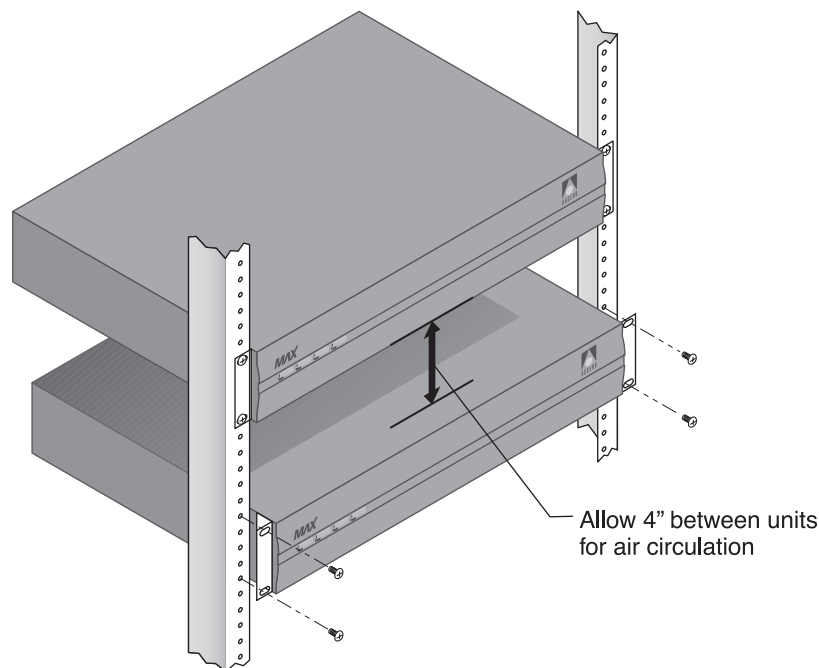
- Leave approximately four inches of vertical space between MAX units to allow adequate air flow and leave room for handling the units if they need to be removed.

- Leave approximately one foot between the racks of MAX units for adequate air flow.

- Stair-step MAX units in adjacent open racks, so that hot air from one unit is not being blown into an adjacent unit. The intake fans are on the right (as viewed from the front), and the exhaust fans are on the left.

- Ensure adequate cooling in the room.

- Install racks with open sides, if possible, because the MAX fans vent on the side of the unit. If you use enclosed racks:

  – Make sure that there are openings to the air conditioning system in the floor beneath each cabinet.

  – Preferably use exhaust fans at the top of the cabinet. At a minimum, however, the cabinets must be ventilated at the top.

If you ordered MAX expansion cards separately, continue with the next section. If all of your expansion cards are preinstalled, skip to "Setting up the hardware" on page 2-5.

Inserting an expansion card

Caution: When installing any expansion card, be sure to follow proper procedures (such as using a grounding mat and a wrist strap) to prevent buildup of static electricity.

If your MAX package includes expansion modules that are not already installed in your MAX, insert the modules now. Perform the following steps:

1 Make sure the MAX power is off and the power cord is unplugged.

Warning: Failure to turn off the MAX power and unplug the power cord could result in bodily injury.

2 Hold the expansion card with the network ports facing you, and insert the card into a back panel slot as shown in Figure 2-2. Do not handle the slot cards from both ends. Be sure to insert the card into guides that are in the same plane.

Figure 2-2. Inserting an expansion card into a MAX slot
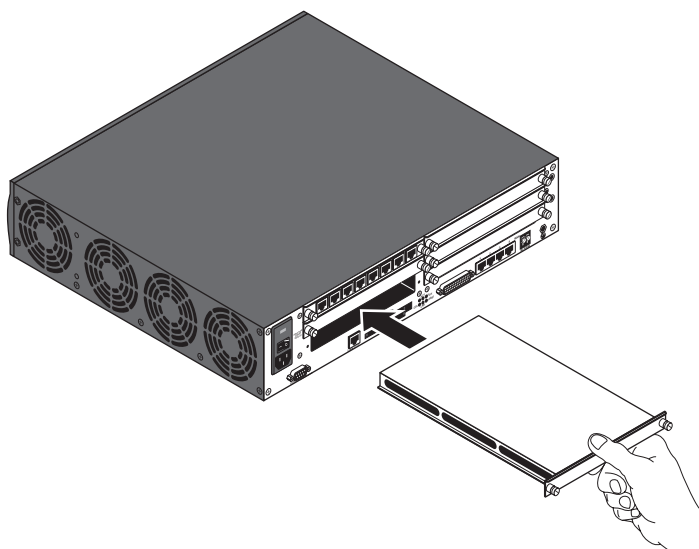
3 Push the card along the internal guides until it is secure. The face plate of the expansion card should touch the back-panel of the MAX.

⚠️ **Caution:** Do not force the expansion card into the slot. Doing so can damage the card or slot connector.

4 Tighten the screws on either side of the module as shown in Figure 2-3. Now you are ready to set up the hardware.

Figure 2-3. Tightening slot card thumbscrews
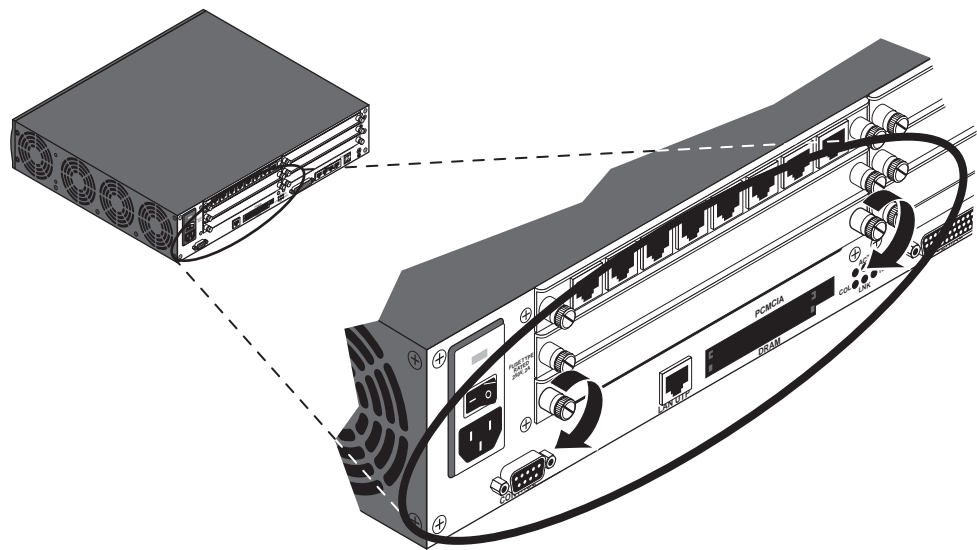
Setting up the hardware

Before you set up the MAX hardware, you need to make sure you have the appropriate space. You can install the MAX in a 19-inch or 23-inch rack.

The following illustrations show the dimensions of both base MAX units: the single power supply unit and the redundant power supply unit.

Figure 2-4. Dimensions of the single power supply unit
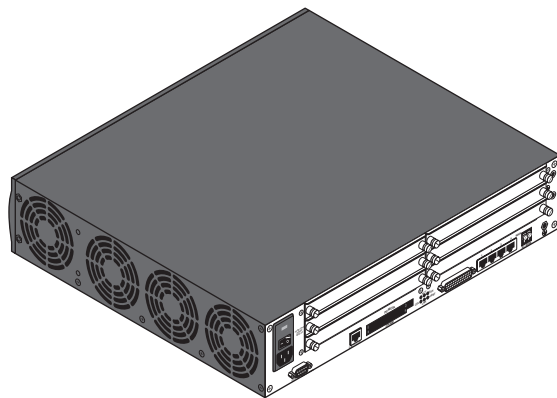
Figure 2-5. Dimensions of the redundant power supply unit
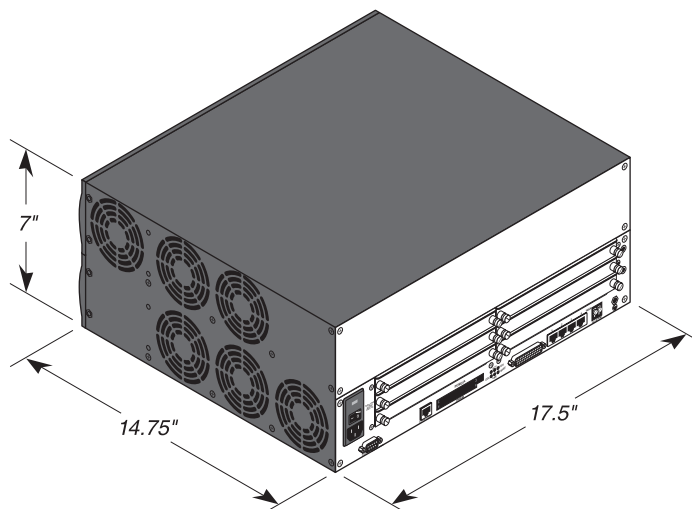
To set up the MAX hardware, proceed as follows:

1 Either place the MAX in a rack and secure it, as shown in Figure 2-6, or place the unit where you can have full access to the front- and back-panels.

Figure 2-6. Mounting the MAX in a rack

Allow 4" between units for air circulation
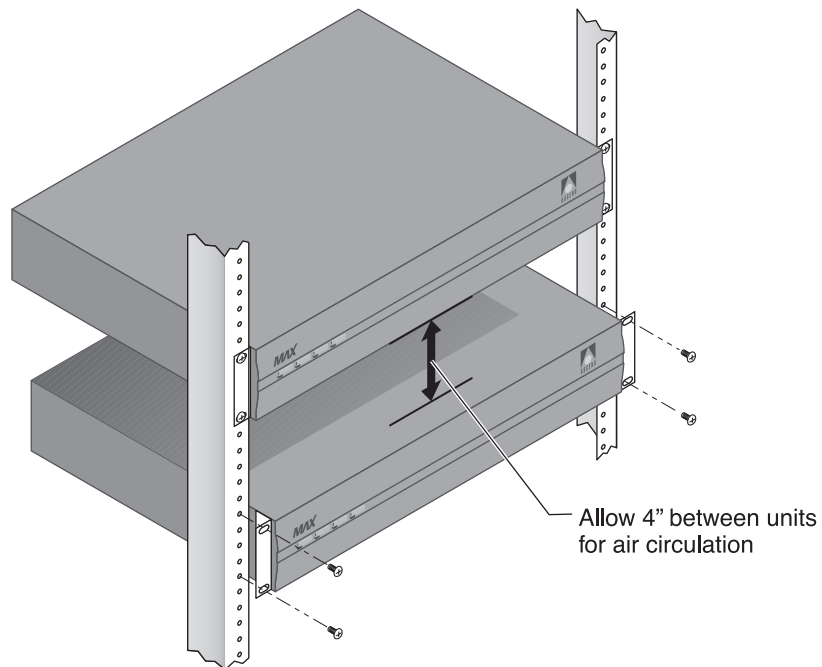
2 Use the null-modem cable provided in your package to connect your VT100 terminal, or your workstation with VT100 terminal-emulation software, to the MAX control port.

3 If applicable, connect your hand-held palmtop terminal to the palmtop port.

Connecting to input power

Your power sources can be ac or dc, or a combination of both. You plug the ac source into an outlet. (A dc source receives its power from either an ac outlet or a battery). If your unit uses ac power, attach the power cable to the connector at the back of the unit.

(For power requirements, see Appendix B, "MAX Technical Specifications.")

Figure 2-7. DC power source
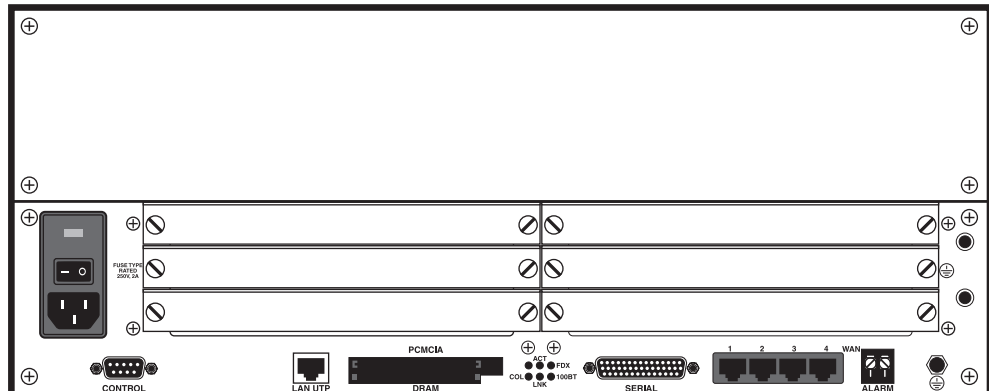
As shown in Figure 2-7, the power source on the MAX 6000 or the Redundant MAX 6000 has a terminal block with two separate input sources. (For an expanded view, see Figure 1-3.) The input power is identical for both terminal columns. Connect to two different sources if you want source redundancy. (If one source dies, the other backs up the power and the MAX unit sees no interruption in functioning.) Following are descriptions of the terminal block connectors:

Connectors	Use for
-48 Vdc	Connection to a source (or sources)
-48 V return	Return connection to a source (battery)
Earth/chassis ground	Earth/safety ground for your chassis
Alarm	Connection to your Alarm Relay circuit

Connecting to the LAN

To connect the MAX to the LAN, connect your Ethernet LAN cable to the Ethernet interface on the MAX. The MAX 6000 has a 10/100Base-T Ethernet port. You will need an adapter if you have a different type of Ethernet LAN.

Connecting the MAX to the T1 Line

To connect your MAX to the T1 line:

1   Connect the MAX either directly to the T1/PRI line or through other network interface equipment.

Note: To connect to the demarcation point, where the T1/PRI line's metallic interface connects to other equipment, the MAX T1/PRI ports must be configured to utilize the unit's internal Channel Service Units (CSUs). Otherwise, you must install external CSUs or other network (WAN) interface equipment between the MAX and the demarcation point.

Enable the internal CSU by setting the Net/T1 > Line Config > Line *N* > Front End parameter to CSU. Disable the internal CSU by setting Front End to DSX.

2   Inform your T1/PRI service provider that your equipment is connected, so that they can bring up the line.

Before you start up the MAX, familiarize yourself with the indicator lights (LEDS). (See "Interpreting the MAX LEDs" on page 2-9.)

Connecting the MAX to an E1 Line

The MAX can connect to any DPNSS access point on a Private Branch Exchange (PBX) or directly to E1 digital services. Use a cable that is specifically constructed for transmission of E1/PRI signals (CCITT G700 series recommended). The MAX can also connect to G.704 framed leased (non–switching) services for 75 ohm lines. (Use cable 2510-0272-001 with 75 ohm E1 lines.) Unless connecting to your PBX, connect your MAX to the E1 PRI network interface (TA) equipment supplied by your PTT.

Grounding

The screen (shield) of the transmit and receive coaxial cable must be earthed at one end of the line only. Links (jumpers) inside the MAX chassis earth the coaxial screens. The default position of the grounding links on the network line interface, when used with coaxial cable adapter, is on the transmit side (Tx) for 1680 Kbps network operations.

Figure 2-8.   One set of links for each E1 port
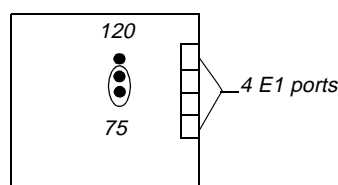
For a daisy chain connection of the MAX E1/PRI unit, only line 1 needs an earth link (jumper), because line 1 is the only port connected to the telecommunications network.

Cable length and characteristics

The maximum distance between the E1/PRI WAN interface equipment and the MAX should not introduce attenuation of more than 6dB, when measured at half the maximum data rate (1024 Kbps). Also, the cable must have a root F characteristic.

Interpreting the MAX LEDs

Before you start up the MAX, you need to understand the indicator lights (LEDs) on the number front- and back-panels of the MAX.

MAX front-panel

Figure 2-9 shows the location of LEDs on the MAX front-panel, and Figure 2-10 shows the location of the LEDs on the Redundant MAX front-panel.

Figure 2-9. Location of the MAX LEDs
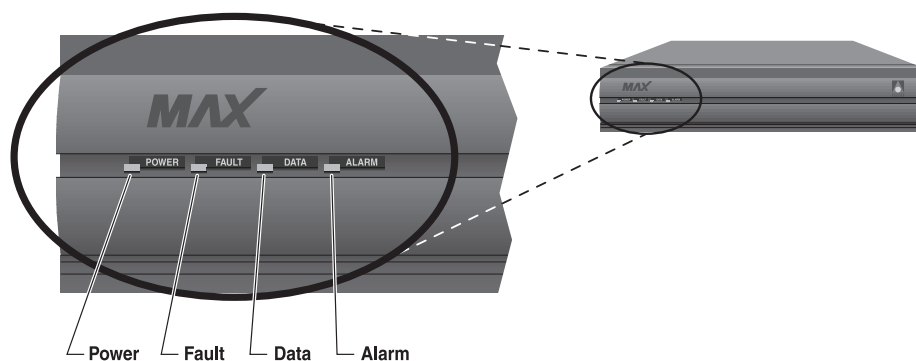
Table 2-1 lists the LEDs on the front-panel of the MAX and describes the function each LED performs.

Table 2-1. MAX front-panel LEDs

LED	Description
Power	On when the MAX power is on.
Fault	On in one of two cases: A hardware self-test in progress or a hardware failure.
	At system start-up, when the MAX performs its Power On Self Test (POST), the LED is on. If any type of hardware failure occurs, the LED flashes. If the failure is isolated to an expansion card, the MAX might continue to function without the card.
Data	On when calls are active.
Alarm	On indicates a WAN alarm or a trunk out of service (for example, during line loopback diagnostics.) WAN alarms include Loss of Sync, Red Alarm, Yellow Alarm, and All Ones (or AIS).

Figure 2-10. Location of the LEDs on the Redundant MAX
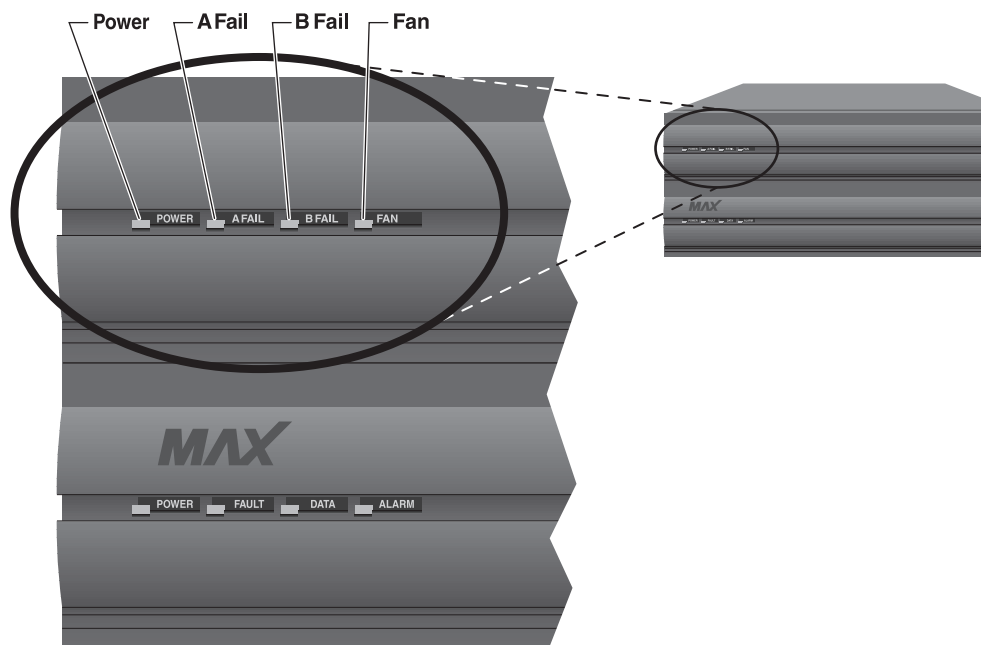
Table 2-2 lists and describes each LED on the front-panel of the Redundant MAX. This is supplemental information for the redundant ac or dc power supply.

Table 2-2. Redundant MAX LEDs

LED	Description
Power	On when the Redundant MAX power supply is on.
A Fail	On only if one or more of the voltages from side A of the power supply (+12, +5, +3.3, -12, -5) has failed.
B Fail	On only if one or more of the voltages from side B of the power supply (+12, +5, +3.3, -12, -5) has failed.
Fan	On when the fans are functioning properly (if +12 VDC from either A or B is good). This LED goes off in the event of a fan failure.

MAX back-panel

Figure 2-11 shows the MAX back-panel LEDs, which display the status of the Ethernet–interface.

Figure 2-11. Ethernet interface LEDs on MAX back-panel
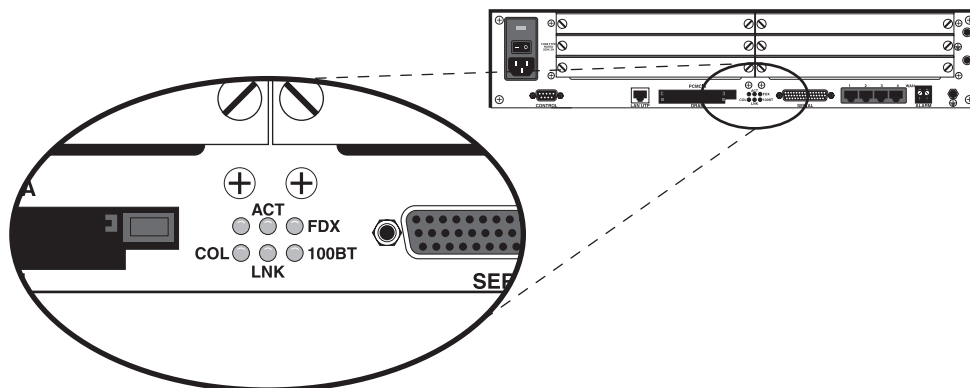
Note: The MAX Classic back-panel has similar LEDs on the Ethernet expansion card if one is installed. The MAX Classic has one LED for each possible Ethernet interface (10Base-T, and COAX (10Base-2), which illuminate when the interface is in use. The ACT and COL LEDs are the same as those on the MAX 6000.

Table 2-3 describes the Ethernet-interface LEDs.

Table 2-3. Ethernet-interface LEDs on back-panel

LED	Description
ACT (Activity)	On when the MAX is detecting activity (network traffic) on its Ethernet interface.
COL (Collisions)	On when the MAX detects packet collisions on the Ethernet.
FDX	On indicates full duplex on the Ethernet.
100BT	On, indicates 100BT. Off indicates 10BT.
LINK (Link integrity)	On when the Ethernet interface is functional.

Once you are familiar with the MAX LEDs, you are ready to start up the MAX.

Starting up the MAX

To start up the MAX, perform the following steps:

1   If you are using a PC, configure the terminal-emulation function in your communications software as follows:

–   9600 bps

–   8 data bits

–   No parity

–   1 stop bit

–   No flow control

–   Direct connect

2   Make sure that you can see the LEDs on the front-panel of the MAX while you view the VT100 or palmtop display.

3   Connect one end of the ac power cord to a power source and the other end to the MAX.

The Power-On Self-Test (POST) begins and finishes within one minute.

4   While the POST is running, watch the LEDs.

If the Power LED is on and the Fault LED is off, the MAX is operating properly. You can continue with the next step.

If either the Power LED is off or the Fault LED is on, remove the power cord and do not continue. Contact your Ascend distributor.

5   Watch the VT100 or palmtop display during the POST. When the POST is successful, the following screen appears:

```
|------------- EDIT-----------|  |-------------------|  |-------------------|
|          MAX           ??|  |                ??|  |                ??|
|      Power-On Self Test     | |                 | |                 | |
|          PASSED.            | |                 | |                 | |
|        Press any key...     | |                 | |                 | |
|                             | |-------------------|  |-------------------|
|                             | |                ??|  |                ??|
|                             | |                 | |                 | |
|                             | |                 | |                 | |
|                             | |                 | |                 | |
|                             | |-------------------|  |-------------------|
|                             | |                ??|  |                ??|
|                             | |                 | |                 | |
|                             | |                 | |                 | |
|                             | |                 | |                 | |
|                             | |-------------------|  |-------------------|
|                             | |                ??|  |                ??|
|                             | |                 | |                 | |
|                             | |                 | |                 | |
|                             | |                 | |                 | |
 Press Ctrl-n to move cursor to the next menu item. Press return to select it.
 Press Tab to move to another window --- thick border indicates active window.
```

6 Press any key.

The following reminder screen appears, instructing you to edit your line configuration before you dial:

```
Edit Line Config
before dialing
Press any key...
```

Press any key again to display the MAX Main Edit menu as shown.

```
Main Edit Menu
  >00-000 System
  10-000 Net/T1
  20-000 Host/Dual
  30-000 Ethernet
  40-000 Empty
  50-000 Empty
  60-000 Host/Dual
  70-000 Empty
  80-000 Empty
```

Continue with Chapter 3, "Quickstart," to get your MAX up and running with a basic configuration.

Continue with Chapter 4, "Navigating and Securing the Interface," to learn how to navigate the MAX user interface before performing more advanced configuration as explained in the *Network Configuration Guide* for your MAX.

Quickstart

3

This chapter explains how to perform a basic configuration of your MAX. This chapter covers the following topics:

Quickstart for T1 MAX units

Before you begin basic configuration of your T1 MAX, make sure that all required hardware components are available and that you have a good idea of what is involved in configuring the MAX for T1 operations. Gather all the necessary configuration information, and make sure that you know how to use the MAX VT100 interface. Then configure the MAX and test your LAN and WAN connections.

Setting up your hardware

Before you begin, make sure you have installed the MAX as described in Chapter 2, "Setting Up and Testing the MAX Hardware." Also verify that you have available:

• One or more active and installed T1 lines accessible from the MAX. These lines must provide switched data service on at least two channels. For more information, see "Provisioning the Switch" on page A-1.

• An active Ethernet LAN with appropriate cables and connectors.

• A remote unit (an Ascend unit or other compatible equipment) that you can Telnet to or Ping over a dial-up PPP encapsulated link across the WAN.

• A local host or workstation, on the same subnet as the MAX, that can Telnet to or Ping the MAX.

Figure 3-1 illustrates the hardware setup required for this Quickstart.

Figure 3-1. Quickstart setup
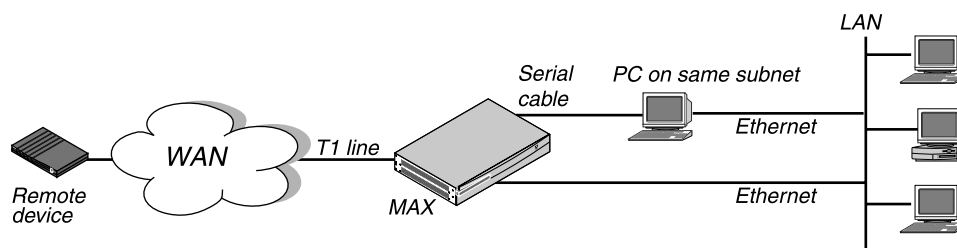
Overview of T1 line configuration

Figure 3-2 illustrates incoming call routing using inband signaling. The example shows two hunt groups: one for digital calls and one for analog calls. Each hunt group contains 12 channels. Analog callers use the phone number 555-1111 to call in and are routed to the digital modems in slot 5. Digital callers use the phone number 555-2222, and are routed to the MAX bridge/router module in slot 9. To set up call routing, you configure two Ch *N* Slot parameters in the T1 line's profile.

Inband signaling is less flexible than ISDN D-channel signaling, because you must preallocate the number of T1 channels used for voice calls and for data calls. If 12 analog callers are connected, subsequent analog callers are rejected because there are no more channels available for analog calls, even though there are 12 unused channels in the other hunt group.

Figure 3-2. Incoming call routing using inband signaling and hunt groups
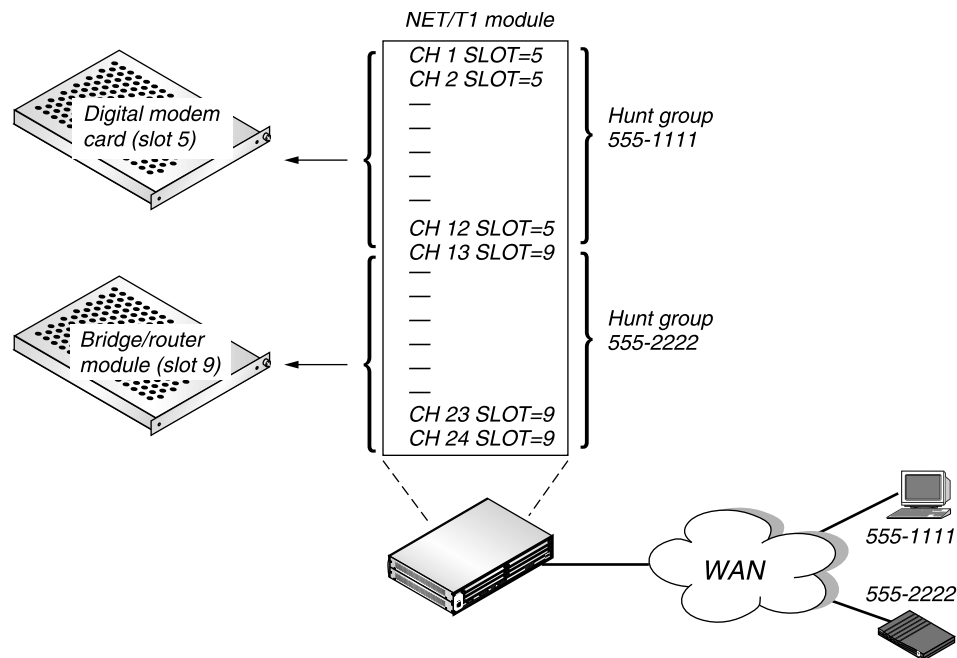
With ISDN signaling, the hunt groups *overlap* the T1 channels, allowing each channel to answer either voice calls or data calls. Figure 3-3 illustrates the use of ISDN D-channel signaling. In this example, each hunt group includes all 24 channels. Analog callers call in to the phone number 555-1111 and are routed to the digital modems in slot 5. Digital callers call in using the phone number 555-2222 and are routed to the MAX bridge/router module in slot 9. To route the calls, you configure the Ans# parameter in both the Modem profile and the Ethernet Mod Config profile.

Incoming ISDN calls contain information about whether the call is an analog voice call (from a modem) or a digital data call. The MAX can automatically route voice calls to the digital modem card and digital calls to the bridge/router module.

Figure 3-3. Incoming call routing using ISDN signaling and hunt groups
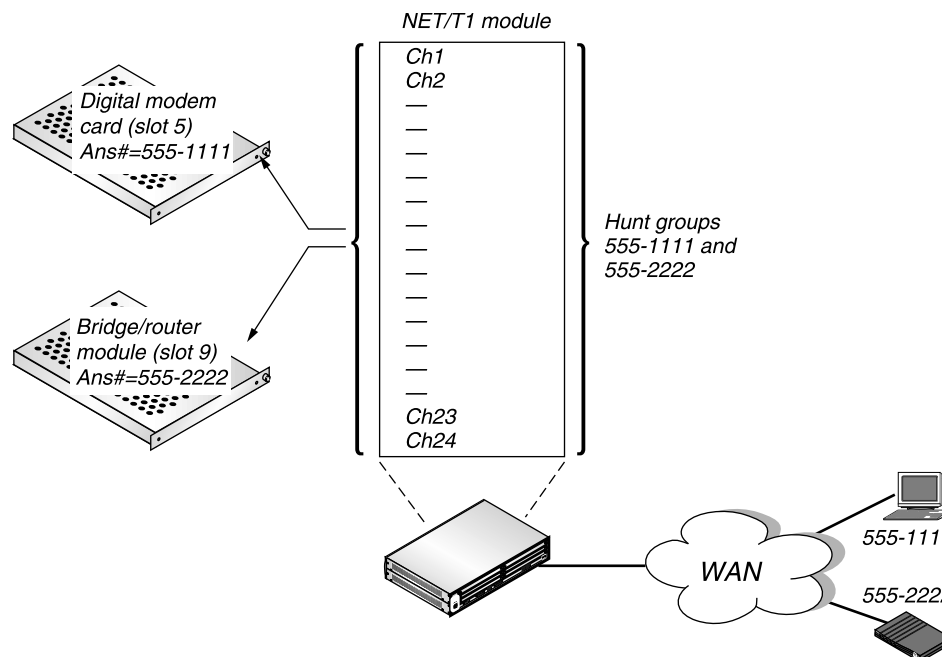
Gathering configuration information

Before you start configuring the MAX, gather the following configuration information about your network setup:

- T1 line information
- Connection profile information
- Ethernet profile information

T1 line information

Table 3-1 lists the parameters you use for configuring the MAX T1 line. As you gather the necessary information, you can record your settings in the middle column. The parameters are in the Net/T1 > Line Config > *slot profile* > Line *N* subprofile. For this Quickstart configuration, you can leave all other Line Config parameters at their default values.

For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-1. T1 line configuration information

Parameters	Your setting	Comments
Sig Mode		Enter the type of signaling your line uses: inband, ISDN, or ISDN_NFAS. Get this information from your service provider.
Rob Ctl		For every line using inband signaling, enter the robbed-bit call control mechanism. Get this information from your service provider.
Switch Type		For each line using ISDN signaling, enter the type of switch that provides the ISDN service. In a Net/T1 profile, specify one of the following values: • AT&T—the default • NT1—Northern Telecommunications, Inc. • Japan • GloBanD—Q.931W GloBanD data service Although GloBanD can appear in the list of switch types available under ISDN, it is currently not supported on any T1/PRI switches in the U.S. However, some T1/PRI switches do support MultiRate, which is a service like GloBanD that enables data service bandwidths higher than 64 Kbps. Contact your T1/PRI service provider for specific information. • NI-2—National ISDN-2
Framing Mode		For each line, enter D4 or ESF. Get this information from your service provider.
Encoding		For each line, enter AMI or B8ZS. Get this information from your service provider.
FDL		For each line using ISDN signaling, enter the Facilities Data Link (FDL) protocol the MAX uses. Get this information from your service provider.
Length		If your MAX does not have an internal CSU, enter the cable length from the CSU or other network interface to the MAX.

Table 3-1. T1 line configuration information (continued)

Parameters	Your setting	Comments
Buildout		If your MAX has an internal CSU, enter the amount of attenuation the MAX should apply to the line's network interface to match the cable length from the MAX to the next repeater. Get this information from your service provider.

Connection profile information

To define a connection to a remote device, you configure a Connection profile. Connection profiles are in the Ethernet > Connections menu. To test the system, you can set up two kinds of connections:

*   A Connection profile for a remote device (such as an Ascend Pipeline) that dials in with its own IP address.

*   A Connection profile for a remote device (such as a modem) that accepts a dynamically assigned address.

Table 3-2 lists the parameters you use for creating a connection to a remote device. As you gather the necessary information, you can record your settings in the middle column. For this Quickstart, you can leave all other parameters in the Connection profile at their default values. For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-2. Connection profile settings

Parameters	Your setting	Explanation
Station		A name for the remote device. Needed if you are going to require authentication of remote callers.
Encaps		Type of encapsulation used for this remote connection.
PRI # Type		Type of PRI service your MAX uses.
Dial #		Dial number used to reach the remote unit.
Encaps Options > Send Auth		Type of authentication required for this connection. Must match the Recv Auth parameter in the Answer profile.
Encaps Options > Send PW		Password for this connection.

Table 3-2. Connection profile settings (continued)

Parameters	Your setting	Explanation
IP Options > LAN Adrs		IP address of the remote device. Not required if you are assigning addresses dynamically.
IP Options > WAN Alias		IP address of the link's remote interface to the WAN. Applies only if the remote end of a link uses a PPP implementation that requires that both ends of a WAN connection be on the same subnet.
IP Options > IF Adrs		IP address of the device at the near end of a link. Applies only if you want to use interface-based routing.

Ethernet profile information

Table 3-3 lists the parameters you use for configuring the MAX for your Ethernet LAN. As you gather the necessary information, you can record your settings in the middle column. The parameters are in the Ethernet > Mod Config profile. For this Quickstart configuration, you can leave all other parameters in that profile at their default values. For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-3. Ethernet configuration

Parameters	Your setting	Explanation
Ether Options > IP Adrs/subnet mask		IP address and subnet mask of the MAX. A slash (/) separates the mask from the address. For example, 198.5.248.40/29 indicates that 29 bits of the IP address will be interpreted as network bits.
WAN Options > Pool#1 Start (for dynamic IP addressing)		The first IP address in an IP address pool. The MAX chooses an address from the pool and assigns it to an incoming call if Assign Adrs=Yes in the Answer profile (the default) or if the calling station requests an address assignment.
WAN Options > Pool#1 Count (for dynamic IP addressing)		The number of IP addresses in the IP address pools. The MAX chooses an address from these pools and assigns it to an incoming call if Assign Adrs=Yes in the Answer profile (the default) or if the calling station requests an address assignment.

Table 3-3. Ethernet configuration (continued)

Parameters	Your setting	Explanation
WAN Options > Pool Only (for dynamic IP addressing)		With a setting of Yes, the MAX requires the calling station to accept an IP address from an IP address pool.

Using the MAX VT100 interface

The MAX VT100 interface provides access to the configuration menus. For complete information about using this interface, see Chapter 4, "Navigating and Securing the Interface." To set up the interface, see "Starting up the MAX" on page 2-13.

After communication has been established between the MAX and your console, your screen displays the MAX configuration interface screen Figure 3-4, which comprises an Edit menu and eight status displays. You use the Edit menu to configure the MAX, and you can use the status windows to monitor its activities. (If the configuration screen does not appear, press Ctrl-L.)

Note that the items listed in the Main Edit Menu differ, depending on the system configuration. In Figure 3-4, the Net/T1 menu items provide access to the line-configuration submenus.

Figure 3-4. MAX T1 configuration interface

```
|-------- MAX EDIT ------------  |--------------------|  |--------------------|
|Main Edit Menu               |  |10-100 1234567890   |  |10-200 1234567890   |
| 00-000 System               |  | L1/LA nnnnnnnnnn   |  | L2/RA ..........   |
| 10-000 Net/T1               |  |   12345678901234   |  |   12345678901234   |
| 20-000 Net/T1               |  |   nnnnnnnnnnnnnn   |  |   ..............   |
| 30-000 LAN Modem            |  |--------------------|  1--------------------|
| 40-000 Host/BRI             |  |90-100 Sessions     |  |00-200 15:10:34     |
| 50-000 Host/Dual            |  |>  1 Active         |  |>M31  Line    Ch    |
| 60-000 Empty                |  | O slc-lab-236      |  | LAN session up     |
| 70-000 Empty                |  |                    |  | slc-lab-236        |
| 80-000 V.34 Modem           |  |--------------------|  |--------------------|
|>90-000 Ethernet             |  |90-300 WAN Stat     |  |90-400 Ether Stat   |
| A0-000 Ether Data           |  |>Rx Pkt:     184318^|  |>Rx Pkt:    3486092 |
| B0-000 Reserved             |  | Tx Pkt:     159232 |  | Tx Pkt:      10056 |
|                             |  |    CRC:         0v |  |    Col:       3530 |
|                             |  |--------------------|  |--------------------|
|                             |  |00-100 Sys Option   |  |Main Status Menu    |
|                             |  |>Security Prof: 1  ^|  |>00-000 System     ^|
|                             |  | Software +5.0A+    |  | 10-000 Net/T1      |
|                             |  | S/N: 5210003      v|  | 20-000 Net/T1     v|
Press Ctrl-n to move cursor to the next menu item. Press return to select it.
Press Tab to move to another window --- thick border indicates active window.
```

Table 3-4 provides a quick reference for navigating the MAX user interface.

Table 3-4.   Navigating the MAX user interface

If you want to:	Do this:
Make a menu or status window active	Press the Tab key until the window has a thick double line around it. Back-Tab or Ctrl-O moves you in the opposite direction.
Select a menu or a text field	Press the Down-Arrow key (or Control-N) or the Up-Arrow key (or Control-P).
Open a menu or a text field	Press Enter or the Right-Arrow key.
Exit a menu or a text field	Press the Left-Arrow or Escape key.
Refresh the screen display	Press Ctrl-L.
Access the Do menu to change your security level or dial a connection	Press Control-D.

Implementing a basic configuration

A basic configuration provides enough functionality to verify that the MAX is up and running, connected, and able to perform basic functions. The procedures described in this chapter assume that you have not configured the MAX. Therefore, all parameters initially are at their factory default settings. Do not turn the MAX off before you have completed all of the procedures. You must perform the configuration tasks in the order in which they are presented.

The Quickstart configuration involves modifying the following profiles:

Profile	**Parameters that apply**
Line *N*	One of the T1/PRI lines
Ethernet	The MAX unit's Ethernet address and protocols
Connection	Establishment of a WAN link and to the routing and bridging of data packets across the link
Answer	All incoming calls. The MAX uses the parameters in the Answer profile to determine what to do with incoming calls. Note that similar parameters that appear in Connection profiles take precedence over Answer profile parameters.

Note: The question marks (??) that might appear in the upper right-hand corner of the Edit screens and status windows indicate that there is no link to the T1/PRI line. They disappear once you have configured the T1/PRI line.

Configuring the T1/PRI lines

To configure a T1 line with the information you recorded in Table 3-1 on page 3-5, select the line's profile and specify the signaling mode. Then set the parameters that configure the signaling mode you have specified, and set the other required parameters. If you use inband signaling, configure incoming call routing for the line before you save the settings you have entered. If you use ISDN signaling, you set additional parameters after you have saved the Line *N* profile. When finished, check the line's status.

Specify signaling mode

1   From the Main Edit Menu, select the slot that contains your Net/T1 card (for example, 10-000).

The slot's menu appears:

```
10-000 Net/T1
  >10-100 Line Config
  10-200 Line Diag
```

2   Select Line Config.

The Line Config menu appears:

```
10-100 Line Config
  >10-1** Factory
  10-102
  10-103
  10-104
```

3   Select the currently active slot profile, 10-1** Factory.

The selected slot profile appears:

```
10-1** Factory
  >Name=
  1st Line=Trunk
  2nd Line=Disabled
  Line 1...
  Line 2...
```

4   Select Line 1.

The Line 1 subprofile appears:

```
10-1** Factory
  Line 1...
    >Sig Mode=Inband ^
     NFAS ID num=N/A
     Rob Ctl=Wink-Start
     Switch Type=N/A
     Framing Mode=D4
     Encoding=AMI
     FDL=N/A
     Length=N/A
     Buildout=0 dB
     Clock Source=Yes
     Pbx Type=N/A
     Delete Digits=N/A
     Add Number=N/A
     Call-by-Call=N/A
     Ans #=N/A
```

5   Set the appropriate signaling mode for the Sig Mode parameter. The selections are:

–   ISDN

–   ISDN_NFAS

–   Inband

Configure your specified signaling mode

If you have selected ISDN_NFAS, enter the NFAS ID for your line. If you have selected Inband, select the type of robbed bit control for the Rob Ctl parameter. The selections are:

N/A (appropriate for Sig Mode=ISDN)
Wink-Start
Idle-Start
Inc-W-200
Inc-W-400
Loop-Start

If you selected ISDN, select the type of WAN switch used at the line's point-of-presence. The selections are:

N/A (appropriate for Sig Mode=Inband)
AT&T
NTI
NI-2
GloBanD
Japan

Continue specifying line parameters

Once you have configured the signaling mask:

1   Select the type of framing this line uses (D4 or ESF).

2   Set the encoding used on this line. The selections are:

–   None (identical to AMI, but without density enforcement)

–   AMI

–   B8ZS

3   Set the Facility Data Link (FDL) used on this line. The selections are:

–   N/A (appropriate for Framing Mode=D4)

–   None

–   AT&T

–   ANSI

–   Sprint

4   Specify the cable distance between the MAX and the WAN interface equipment.

If the MAX has an internal CSU, select the N/A settings. Otherwise, select the correct cable distance in feet between MAX and the CSU or other network (WAN) interface unit to which it is connected. The default is 1–133.

5   Specify the amount of attenuation to add to the line's network interface.

If the MAX does not have an internal CSU, select the N/A settings. Otherwise, select the Buildout value to provide the proper line attenuation. The default is 0dB.

6 If you cannot accept the default channel–type setting of `switched` for every channel on the line, set the Ch *N* parameter as required.

– Switched (the default)

– Nailed (dedicated)

– Unused (not in service)

Note: To test the line later, you must have at least two switched channels. If you plan to use a channel for drop-and-insert (D&I), you can enter it as Switched for the Quickstart and then change it to D&I for the final installation.

For inband signaling, route incoming calls

If you using inband signaling, configure incoming call routing for the T1 line by setting the Ch *N* # and Ch *N* Slot parameters as follows:

1 For each Ch *N* # parameter, enter the unique digits of the phone number used to reach this channel.

   For example, if your line is set up as illustrated in Figure 3-2 on page 3-3, enter 1111 for the first 12 channels, and 2222 for the last 12 channels.

2 For each T1 channel that will answer analog calls, set the Ch *N* Slot parameters to the number of the slot that contains the modem card.

   For example, if the modem card is in slot 5, set Ch 1 Slot=5, Ch 2 Slot=5, and so on, up to the total number of analog calls you want the MAX to accept on this T1 line. These settings tell the MAX to route incoming analog calls to the digital modem card.

3 For each T1 channel that will answer digital calls, set the Ch *N* Slot parameters to 9, the default number of the slot that contains the MAX unit's bridge/router module. These settings tell the MAX to route incoming digital calls to the bridge/router module, to be bridged or routed to their destination.

Save the Line N profile

At this point, you have configured a line and are ready to save its profile, as follows:

1 Press the Left-Arrow or Escape key to exit the Line 1 profile.

   A confirmation menu appears:

```
EXIT?
  >0=ESC (Don't exit)
  1=Exit and discard
  2=Exit and accept
```

2 Press 2 to save and exit.

For ISDN signaling, route incoming modem calls

If you are using ISDN signaling, you must perform the following steps to configure incoming call routing:

1 To tell the MAX how to route incoming modem calls, from the Main Edit Menu select the slot that contains the digital modem cards–for example, 50-000 V.34 Modem.

The slot's menu appears:

```
50-000 V.34 Modem
50-100 Mod Config
50-200 Modem Diag
```

2   Select Mod Config.

The Mod Config submenu appears:

```
50-000 Mod Config
  Module Name=
  Ans 1#=
  Ans 2#=
  Ans 3#=
  Ans 4#=
```

3   Set the Ans *N* # parameters by entering the unique digits of the telephone numbers dialed by callers who use analog devices. For example, **Ans 1#=1111**. This setting tells the MAX to route all calls coming in from phone number 555-1111 (the hunt group for analog callers) to the digital modems.

4   Press the Left-Arrow or Escape key to exit the current Modem profile.

5   In the confirmation menu, press 2 to save and exit.

6   Press the Left-Arrow or Escape key to return to the Main Edit Menu so that you can configure routing for MAX incoming modem calls. From the Main Edit Menu select Ethernet > Mod Config > WAN Options.

The WAN Options profile appears:

```
90-C00 Mod Config
  WAN options...
    Dial Plan=N/A
    Ans 1#=
    Ans 2#=
    Ans 3#=
    Ans 4#=
    Pool#1 start=0.0.0.0
    Pool#1 count=0
    Pool#2 start=0.0.0.0
    Pool#2 count=0
    Pool only=No
    Pool Summary=No
```

7   Set the Ans *N* # parameters by entering the unique digits of the telephone numbers by callers who use analog devices. For example, set **Ans 1#=2222**. This setting tells the MAX to route all calls coming in from phone number 555-2222 (the hunt group for digital callers) to the MAX Ethernet module.

8   If you are going to dynamically assign addresses to incoming callers, set the following parameters:

  –   Pool#1 Start–The first IP address in the pool

  –   Pool#1 Count–The number of IP addresses in the pool

9   Press the Left-Arrow or Escape key to exit the Ethernet Mod Config profile.

In the confirmation menu, press 2 to save and exit.

You have now set all the parameters necessary for your T1 line configuration.

Check the line's status

After the T1/PRI provider has established service, observe the MAX unit's front-panel indicator lights (LEDs) as illustrated in Figure 3-5.

Figure 3-5. Front-panel indicator lights
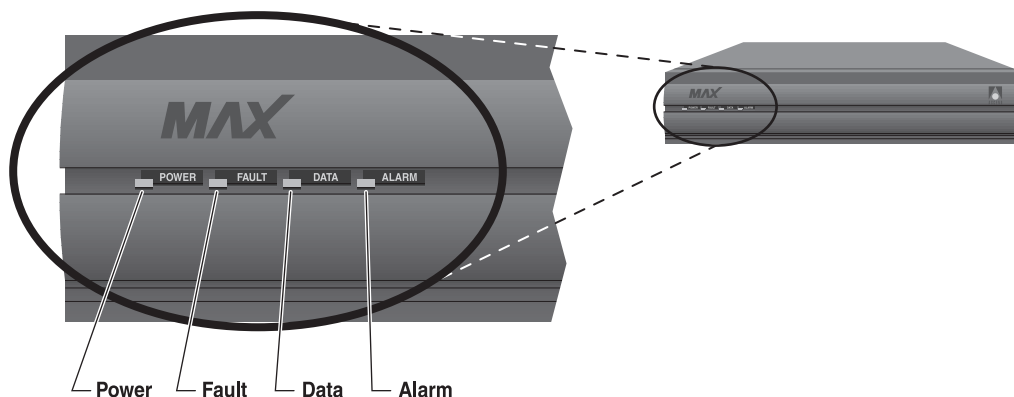
Is the Power LED on and are the Fault, Data, and Alarm LEDs off?

- If Yes: Continue on to "Configuring the Ethernet profile."

- If No: The connection to the T1/PRI line has failed. If the Alarm LED is on, check your cabling. Also verify with your T1/PRI line provider that you have the correct Framing Mode, Encoding, Length, and Buildout values.

Re-entering T1 line parameters

If you must re-enter the parameters for your T1 line, make sure you have Full Access privileges and return all parameter values to their defaults as listed in the following steps:

1 At the Main Edit Menu, press Ctrl-D.
The Main Edit Menu's DO menu appears.

2 Select P (Password).

3 Press Enter or the Right-Arrow key.
The Security Profile menu appears.

4 Select Full Access.

5 Press Enter or the Right-Arrow key.
A password entry field appears.

6 Enter your password within the brackets.

7 Press Enter or the Right-Arrow key.
If your password is accepted, you have Full Access privileges.

8 Press Enter.
The Main Edit Menu reappears.

Returning all values to their defaults

1   At the Main Edit Menu, press Ctrl-D.

The Main Edit Menu's DO menu appears.

2   Select D (Diagnostics).

The Diagnostics screen appears.

3   Type **fclear**.

This command clears flash memory. Flash memory stores a copy of the configuration.

4   Type **nvramclear**.

This command clears nvram and resets the box. Nvram stores the current configuration. The MAX comes up in the default configuration.

Configuring the Ethernet profile

To configure the Ethernet profile, proceed as follows:

1   From the Main Edit Menu, select Ethernet > Mod Config.

The Mod Config menu appears:

```
90-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW=
  RIP Policy=Poison Rvrs
  RIP Summary=Yes
  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

2   Select Ether Options.

The following list of parameters appears:

```
90-C00 Mod Config
  >IP Adrs=10.9.8.7
  2nd Adrs=0.0.0.0/0
  RIP Recv-v1
  Ignore Def Rt=Yes
  Proxy Mode=Off
  Filter=0
  IPX Frame=None
  IPX Enet#=N/A
  IPX Pool#=N/A
  IPX SAP Filter=N/A
  Handle IPX Type20=N/A
```

3 Set the IP address and subnet mask of this MAX.

4 Set the IP Adrs parameter.

5 Press Enter to return to the list of parameters.

6 Set the RIP parameter to specify how you want the MAX to handle RIP packets on its Ethernet interface.

– Off (the default)—The MAX does not transmit or receive RIP updates.

– Recv-v1—The MAX receives RIP-v1 updates, but does not transmit RIP updates.

– Send-v1—The MAX transmits RIP-v1 updates, but does not receive RIP updates.

– Both-v1—The MAX transmits and receives RIP-v1 updates.

– Send-v2—The MAX transmits RIP-v2 updates, but does not receive RIP updates.

– Recv-v2—The MAX receives RIP-v2 updates, but does not transmit RIP updates.

– Both-v2—The MAX transmits and receives RIP-v2 updates.

7 Press the Left-Arrow or Escape key to exit Ether Options submenu.

A confirmation menu appears:

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

8 Press 2 to save your changes.

9 Press Escape until you return to the Main Edit Menu.

Configuring the Answer profile

The MAX uses the parameters in the Answer profile to build incoming calls. Note that settings in Connection profiles take precedence over the same settings in the Answer profile.

To configure the Answer profile, proceed as follows:

1 From the Main Edit Menu, select Ethernet > Answer.

The Answer profile appears:

```
90-800 Answer
  >Use Answer as Default=No
  Force 56=No
  Profile Reqd=Yes
  Clid Auth=Ignore
  Assign Adrs=No
  Encaps...
  Ip options...
  PPP options...
  COMB options...
  V.120 options...
  Session options...
  DHCP options...
```

2 To be able to dynamically assign addresses to incoming callers, make sure that Assign Adrs=Yes.

3 Select PPP Options.

The PPP Options submenu appears:

```
90-700 Answer
  PPP options...
  Route IP=Yes
  Route IPX=No
  Bridge=Yes
  Recv Auth=CHAP
  MRU=1524
  LQM=No
  LQM Min=600
  LQM Max=600
  Link Comp=Stac
  VJ Comp=Yes
  Dyn Alg=Quadratic
  Sec History=15
  Add Pers=5
  Sub Pers=10
  Min Ch Count=1
  Max Ch Count=1
```

4 Make sure Route IP=Yes.

5 Set the Recv Auth parameter to the authentication you are going to require for incoming calls:

– None (the default)—The MAX does not use an authentication protocol to validate incoming calls.

– PAP—Password Authentication Protocol, a PPP authentication protocol.

– CHAP—Challenge Handshake Authentication Protocol, a more secure PPP authentication protocol.

– MS-CHAP—Enter description of MS-CHAP.

– Either—The MAX can use either CHAP, PAP, or MS-CHAP. The MAX first requests CHAP authentication. If the dial-in call rejects the request (or does not acknowledge it), the MAX requests PAP authentication, then MS-CHAP.

6 Press the Escape or Left-Arrow key until the confirmation menu appears.

7 Press 2 to save your changes.

8 Press the Left-Arrow or Escape key until you return to the Main Edit Menu.

Creating Connection profiles

Connection profiles define connections to remote users.

To create a Connection profile, proceed as follows:

1 From the Main Edit Menu, select Ethernet > Connections.

The Connection menu appears. Initially, the Connection profiles are identified only by numbers:

```
90-100 Connections
90-101
90-102
90-103
```

```
90-104
90-105
90-106
90-107
90-108
90-109
90-110
90-111
90-111
```

2   Select the first profile.

A list of parameters appears:

```
90-101
  Station=
  Active=No
  Encaps=MPP
  PRI # Type=National
  Dial #=
  Calling #=
  Called #=
  Route IP=Yes
  Route IPX=N/A
  Bridge=N/A
  Dial brdcast=
  Encaps options...
  Ip options...
  Ipx options...
  Session options...
  Telco options...
```

3   Modify or verify the settings of the following parameters:

–   Station. Enter a name, such as *Remote-Call* which becomes the name of the profile and acts as the login name of the remote user.

–   Active. Set to Yes.

–   Encaps. Set the encapsulation method you want to use for this connection. However , the default setting (MPP) is probably the best choice for this test. If the remote device does not support MPP, the MAX will attempt to negotiate an MP session. If the remote device does not support MP, the MAX will attempt to negotiate a PPP session.

–   Route IP. Make sure that Route IP = Yes.

4 Select Encaps Options.

The Encaps menu appears:

```
90-101
Encaps options...
  Send Auth=None
  Send PW=N/A
  Aux Send PW=N/A
  Recv PW=
  DBA Monitor=Transmit
  Base Ch Count=1
  Min Ch Count=2
  Inc Ch Count=1
  Dec Ch Count=1
  MRU=1524
  LQM=No
  LQM Min=600
  LQM Min=600
  Link Comp=Stac
```

5 These parameters can remain at their default settings.

6 Select IP Options.

The IP Options subprofile appears:

```
90-101
 Ip options...
  LAN Adrs=0.0.0.0/0
  WAN Alias=0.0.0.0/0
  IF Adrs=0.0.0.0/0
  Preference=100
  Metric=7
  Private=No
  RIP=Off
  Pool=0
  Multicast Client=No
  Multicast Rate Limit=100
  Client Pri DNS-0.0.0.0
  Client Sec DNS=0.0.0.0
  Client Assign DNS=Yes
```

7 If you are configuring a Connection profile for a device with its own IP address, set the following parameters:

– LAN Adr —Enter the IP address including any subnet mask, of the remote unit, then press Enter to return to the list of parameters.

– WAN Alias—If the far-end device is non-Ascend and requires numbered interfaces with PPP encapsulation, enter the IP address of the remote unit's WAN interface (not its Ethernet interface), then press Enter to return to the list of parameters.

– IF Adrs—If you are implementing interfaced-based routing on the MAX, enter the IP address of the port used on the MAX side of the link.

8 If you are configuring a Connection profile for dynamic address assignment, set the following parameter:

– Pool—The IP address pool from which you want to assign this client an address. IP address pools are configured in the Ethernet > Mod Config > WAN Options submenu.

9   Using the RIP parameter, specify how you want the MAX to handle RIP packets on this WAN interface:

– Off (the default)—The MAX does not transmit or receive RIP updates.

– Recv-v1—The MAX receives RIP-v1 updates, but does not transmit RIP updates.

– Send-v1—The MAX transmits RIP-v1 updates, but does not receive RIP updates.

– Both-v1—The MAX transmits and receives RIP-v1 updates.

– Send-v2— The MAX transmits RIP-v2 updates, but does not receive RIP updates.

– Recv-v2—The MAX receives RIP-v2 updates, but does not transmit RIP updates.

– Both-v2—The MAX transmits and receives RIP-v2 updates.

10 Press the Escape or Left-Arrow key until the confirmation menu appears, then press 2 to save your changes.

11 Press the Left-Arrow key until you return to the Main Edit Menu.

Testing the connections

When you have successfully configured the MAX as described in the previous section, you are ready to test the connections. To verify that everything is working:

• Test the LAN connection by using Ping or Telnet to reach the MAX from a workstation or host on the same LAN as the unit.

• Test the T1/PRI line by placing and answering a test call from the MAX to itself over the T1/PRI interface. This procedure tests the T1 lines to verify that they are active and that the phone numbers are correct.

• Test the WAN connection by using Ping or Telnet to reach a remote unit from a workstation or host on the same LAN as the MAX. This procedure also tests the processing of data packets through the MAX.

Testing the LAN connection

To test the LAN connection, you must be able to run Ping or Telnet from a host or workstation on the same subnet as your MAX.

If you open a Telnet session with the MAX, the MAX user interface display should appear. If you have configured a Telnet password in the Ethernet > Mod Config > Telnet PW parameter, the MAX prompts for it before you can access the MAX user interface.

If you Ping the MAX, you should get a message saying that you are immediately receiving a return packet for every packet you are sending to the MAX. If you are not getting the proper response, the cause might be a problem with the LAN, entry of the wrong IP address, or misconfiguration of either the subnet mask or IP Adrs parameter in the Ethernet profile. If the host or workstation is on a different network than the MAX, make sure your IP routing configurations allow the host or workstation to reach the MAX.

Testing the T1/PRI line

To test whether the MAX T1/PRI line is functioning normally, use the Test command from the MAX terminal server. The command causes the MAX to place a call to itself over the WAN, and to send a number of packets over the connection. This procedure tests the MAX unit's ability to initiate and receive calls, and demonstrates whether the connection over the digital access line is functional.

The terminal-server Test command uses one channel to dial out and another channel to answer, as shown in Figure 3-6. Consequently, you must set the T1/PRI line for bidirectional calling and have two channels available for the test.

Note: The Test command is a basic test of connectivity. Receiving fewer packets than are sent is normal. For example, if the command sends 1000 packets, and receives 994 packets, the test is successful.

To perform the test:

1 From the Main Edit Menu, select System:

The System menu appears:

```
00-200 System
  00-100 Sys Config
 >00-200 Sys Diag
  00-300 Security
  00-400 Destinations
  00-500 Dial Plan
```

2 Select Sys Diag.

The Sys Diag menu appears:

```
00-200 Sys Diag
 >00-201 Restore Cfg
  00-202 Save Config
  00-203 Use MIF
  00-204 Sys Reset
  00-205 Term Serv
  00-206 Upd Rem Cfg
```

3 Select Term Serv.

The Terminal Server screen appears:

```
** Ascend Pipeline Terminal Server **

ascend%
```

4 Enter the Test command: **test *phone-number***

where ***phone-number*** is the phone number of the MAX T1 line.

Note: The most frequent cause for failing to connect is an incorrect phone number.

5 If the test is unsuccessful, verify that you have entered all the T1 line parameters correctly and that your line is correctly provisioned as explained in Appendix A, "Provisioning the Switch." If you cannot correct the problem, contact your carrier.

6 Enter the Quit command to exit the terminal-server interface.

7 Press the Left-Arrow or the Escape key to return to the Main Edit Menu.

Testing the WAN connection

To test the WAN connection either Ping a remote unit or establish a telnet session with it, over a dial-up connection. The procedure assumes that:

- You can run Telnet or Ping from a host or workstation on the same LAN segment as MAX.

- There is a remote unit (MAX-compatible) to which you can route data packets over a dial-up link.

Note: The remote unit should be configured for the route back to your MAX. Otherwise, you might bring up the connection and send packets but fail to receive anything back.

Figure 3-6. Testing the WAN by dialing into and out from the MAX

To test the WAN connection, proceed as follows:

1 Configure the routes of a host that is on the same LAN as your MAX so that your MAX is the gateway to the remote unit. The most common method is to add static routes.

For example, if the remote unit address is 167.34.9.23, and the your MAX address is 165.3.45.8, the gateway configuration on the remote unit would be:

- Address: `167.34.9.23`

- Gateway address: `165.3.45.8`

You can also make your MAX the default router.

2 From the local host, enter the Telnet or Ping command with an argument specifying the remote unit.

If you use Telnet, and the remote unit's user interface display appears, the MAX is functioning properly and you are finished with this chapter.

If you use Ping, and a message informs you that you are immediately receiving a return packet for every packet you are sending to the remote unit, the MAX is functioning properly and you are finished with the chapter.

If you are not getting the proper response, the procedure has failed. The problem might be with the LAN or with your configuration. Verify the configuration of the Ethernet profile. You can also refer to the Troubleshooting chapter of the *Administration Guide* for your MAX.

3 Terminate the Telnet or Ping session.

Where to go next

Table 3-5 explains where to find further information about configuring and operating your MAX.

Table 3-5.   Where to go next

To do this:	Go to this document:
Find the MAX technical specifications	*MAX 6000 Series Hardware Installation Guide*
Change the MAX hardware configuration	*MAX 6000 Series Hardware Installation Guide*
Configure the MAX WAN interfaces	*MAX 6000 Series Network Configuration Guide*
Configure the MAX networking protocols	*MAX 6000 Series Network Configuration Guide*
Administer the MAX	*MAX 6000 Series Network Configuration Guide*
Define and apply filters	*MAX 6000 Series Network Configuration Guide*
Configure Connection profiles and Frame Relay connections	*MAX 6000 Series Network Configuration Guide*
Get detailed reference information about the MAX parameters and status windows	*MAX Reference Guide*
Configure MAX security	*MAX Security Supplement*
Configure RADIUS profiles	*MAX RADIUS Configuration Guide*
Use MIF	*MAX 6000 Series Administration Guide*

Quickstart for E1 MAX units

Before you begin basic configuration of your E1 MAX, make sure that all required hardware components are available and that you have a good idea of what is involved in configuring the MAX for E1 operations. Gather all the necessary configuration information, and make sure that you know how to use the MAX VT100 interface. Then configure the MAX and test your LAN and WAN connections.

Setting up your hardware for E1

Before you begin, make sure you have installed the MAX as described in Chapter 2, "Setting Up and Testing the MAX Hardware." Also verify that you have available:

*   One or more active and installed E1 lines accessible from the MAX. These lines must provide switched data service on at least two channels. For more information, see "Provisioning the Switch" on page A-1.

*   An active Ethernet LAN with appropriate cables and connectors.

*   A remote unit (an Ascend unit or other compatible equipment) that you can Telnet to or Ping over a dial-up PPP encapsulated link across the WAN.

*   A local host or workstation, on the same subnet as the MAX, that can Telnet to or Ping the MAX.

Figure 3-7 illustrates the hardware setup required for this Quickstart.

Figure 3-7. Quickstart set up
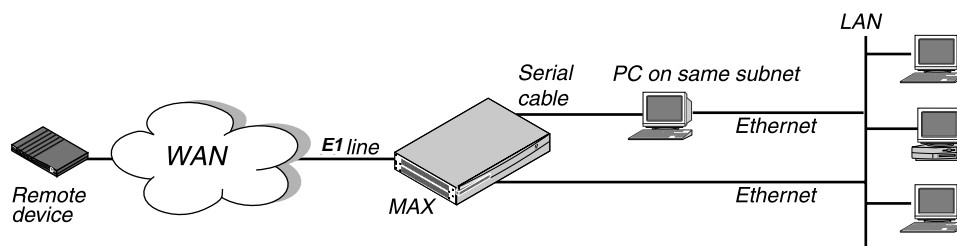
Overview of E1 line configuration

Figure 3-8 illustrates incoming call routing using R2 signaling. The example shows two hunt groups: one for digital calls and one for analog calls. Each hunt group contains 12 channels. Analog callers use the phone number 555-1111 to call in and are routed to the digital modems in slot 5. Digital callers use the phone number 555-2222, and are routed to the MAX bridge/router module in slot 9. To set up call routing, you configure two Ch *N* Slot parameters in the E1 line's profile.

R2 signaling is less flexible than ISDN D-channel signaling, because you must preallocate the number of E1 channels used for voice calls and for data calls. If 12 analog callers are connected, subsequent analog callers are rejected because there are no more channels available for analog calls, even though there are 12 unused channels in the other hunt group.

Figure 3-8. Incoming call routing using R2 signaling and hunt groups
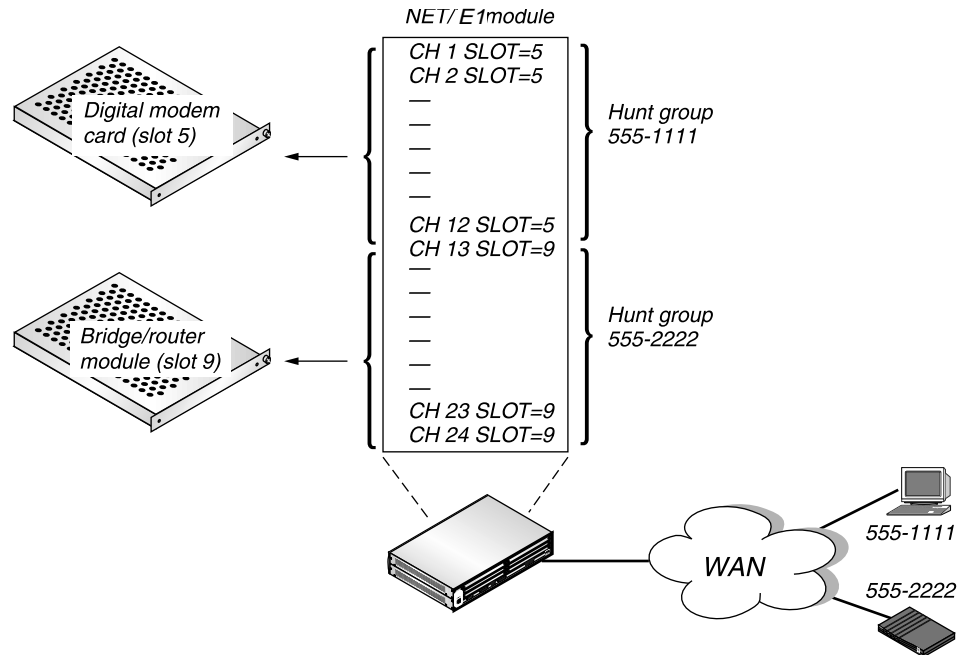
With ISDN signaling, the hunt groups *overlap* the E1 channels, allowing each channel to answer either voice calls or data calls. Figure 3-9 illustrates the use of ISDN D-channel signaling. In this example, each hunt group includes all 24 channels. Analog callers call in to the phone number 555-1111 and are routed to the digital modems in slot 5. Digital callers call in using the phone number 555-2222 and are routed to the MAX bridge/router module in slot 9. To route the calls, you configure the Ans# parameter in both the Modem profile and the Ethernet Mod Config profile.

Incoming ISDN calls contain information about whether the call is an analog voice call (from a modem) or a digital data call. The MAX can automatically route voice calls to the digital modem card and digital calls to the bridge/router module.

Figure 3-9. Incoming call routing using ISDN signaling and hunt groups
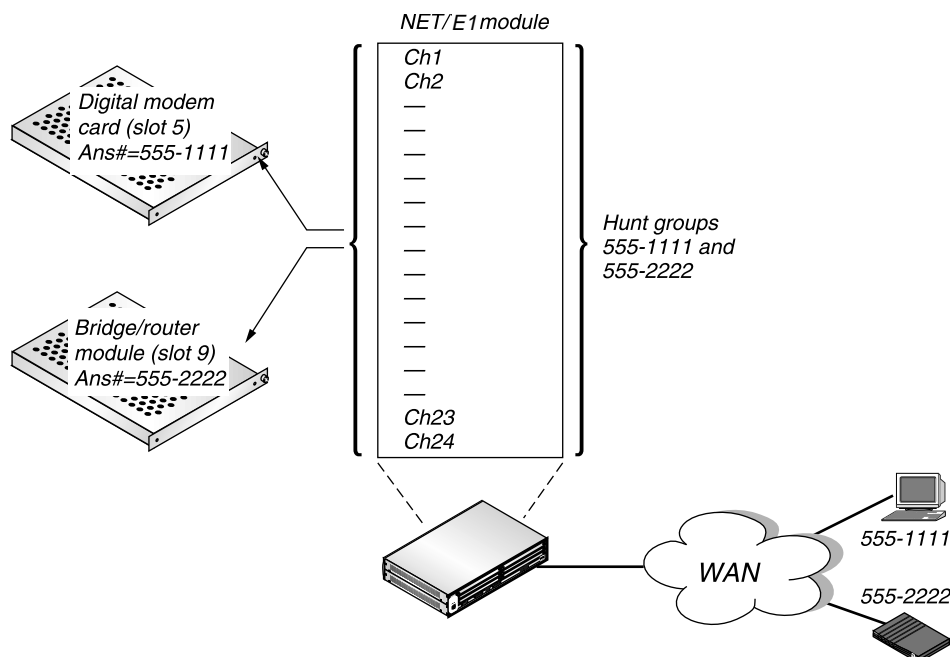
Gathering configuration information

Before you start configuring the MAX, gather the following configuration information about your network setup:

- E1 line information
- Connection profile information
- Ethernet profile information

E1 line information

Table 3-6 lists the parameters you use for configuring the MAX E1 line. As you gather the necessary information, you can record your settings in the middle column. The parameters are in the Net/E1 > Line Config > *slot profile* > Line *N* subprofile. For this Quickstart configuration, you can leave all other Line Config parameters at their default values.

For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-6. E1 line configuration information

Parameters	Your setting	Comments
Sig Mode		Enter the type of signaling your line uses: • None—A leased line. • ISDN—ISDN signaling using the D channel. The 32nd channel of the E1 line must be designated as the D channel. • DPNSS—The interface supports DPNSS or DASS 2 signaling. • R2—R2 signaling. • Metered—Metered R2 signaling protocol, used in Brazil and South Africa. • Chinese— A version of the R2 signaling protocol specified for use in China. • Malaysia indicates a version of the R2 signaling protocol with CLID processing specified for use in Malaysia. Get this information from your service provider.
Switch Type		In a Net/E1 profile, specify one of the following values: • GloBanD—Q.931W GloBanD data service • NI-1—National IDSN-1 • Net 5—Euro ISDN services in Belgium, the Netherlands, Switzerland, Sweden, Denmark, and Singapore • DASS 2—U.K. only • ISLX—DPNSS switch type • ISDX—DPNSS switch type • Mercury—DPNSS switch type • Australian—Australia only • French—VN3 ISDN PRI • German—1TR6 • CAS—New Zealand
Framing Mode		For each line, select G.703 (the default) or 2DS. Get this information from your service provider. If you select G.703, the MAX provides CRC-4 checking. If you select 2DS, it does not.

Table 3-6. E1 line configuration information (continued)

Parameters	Your setting	Comments
Length		If your MAX does not have an internal CSU, enter the cable length from the CSU or other network interface to the MAX.

Connection profile information

The To define a connection to a remote device, you configure a Connection profile. Connection profiles are in the Ethernet > Connections menu. To test the system, you can set up two kinds of connections:

- A Connection profile for a remote device (such as an Ascend Pipeline) that dials in with its own IP address.
- A Connection profile for a remote device (such as a modem) that accepts a dynamically assigned address.

Table 3-7 lists the parameters you use for creating a connection to a remote device. As you gather the necessary information, you can record your settings in the middle column. For this Quickstart, you can leave all other parameters in the Connection profile at their default values. For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-7. Connection profile settings

Parameters	Your setting	Explanation
Station		A name for the remote device. Needed if you are going to require authentication of remote callers.
Encaps		Type of encapsulation used for this remote connection.
Dial #		Dial number used to reach the remote unit.
Encaps Options > Send Auth		Type of authentication required for this connection. Must match the Recv Auth parameter in the Answer profile.
Encaps Options > Send PW		Password for this connection.
IP Options > LAN Adrs		IP address of the remote device. Not required if you are assigning addresses dynamically.

Table 3-7. Connection profile settings (continued)

Parameters	Your setting	Explanation
IP Options > WAN Alias		IP address of the link's remote interface to the WAN. Applies only if the remote end of a link uses a PPP implementation that requires that both ends of a WAN connection be on the same subnet.
IP Options > IF Adrs		IP address of the device at the near end of a link. Applies only if you want to use interface-based routing.

Ethernet profile information

Table 3-8 lists the parameters you use for configuring the MAX for your Ethernet LAN. As you gather the necessary information, you can record your settings in the middle column. The parameters are in the Ethernet > Mod Config profile. For this Quickstart configuration, you can leave all other parameters in that profile at their default values. For detailed information about the parameters in the following table, see the *Reference Guide* for your MAX.

Table 3-8. Ethernet configuration

Parameters	Your setting	Explanation
Ether Options > IP Adrs/subnet mask		IP address and subnet mask of the MAX. A slash (/) separates the mask from the address. For example, 198.5.248.40/29 indicates that 29 bits of the IP address will be interpreted as network bits.
WAN Options > Pool#1 Start (for dynamic IP addressing)		The first IP address in an IP address pool. The MAX chooses an address from the pool and assigns it to an incoming call if Assign Adrs=Yes in the Answer profile (the default) or if the calling station requests an address assignment.
WAN Options > Pool#1 Count (for dynamic IP addressing)		The number of IP addresses in the IP address pools. The MAX chooses an address from these pools and assigns it to an incoming call if Assign Adrs=Yes in the Answer profile (the default) or if the calling station requests an address assignment.
WAN Options > Pool Only (for dynamic IP addressing)		With a setting of Yes, the MAX requires the calling station to accept an IP address from an IP address pool.

Using the MAX VT100 interface

The MAX VT100 interface provides access to the configuration menus. For complete information about using this interface, see Chapter 4, "Navigating and Securing the Interface." To set up the interface, see "Starting up the MAX" on page 2-13.

After communication has been established between the MAX and your console, your screen displays the MAX configuration interface screen Figure 3-10, which comprises an Edit menu and eight status displays. You use the Edit menu to configure the MAX, and you can use the status windows to monitor its activities. (If the configuration screen does not appear, press Ctrl-L.)

Note that the items listed in the Main Edit Menu differ, depending on the system configuration. In Figure 3-10, the Net/E1 menu items provide access to the line-configuration submenus.

Figure 3-10. MAX E1 configuration interface

```
|-------- MAX EDIT ------------- |-------------------| |-------------------|
|Main Edit Menu                  | |10-100 1234567890 | |10-200 1234567890  |
| 00-000 System                  | | L1/LA nnnnnnnnnn | | L2/RA ..........  |
| 10-000 Net/E1                  | |   12345678901234 | |   12345678901234  |
| 20-000 Net/E1                  | |   nnnnnnnnnnnnnn | |   ..............  |
| 30-000 LAN Modem               | |-------------------| l-------------------|
| 40-000 Host/BRI                | |90-100 Sessions   | |00-200 15:10:34    |
| 50-000 Host/Dual               | |>  1 Active       | |>M31  Line    Ch   |
| 60-000 Empty                   | | O slc-lab-236    | | LAN session up    |
| 70-000 Empty                   | |                  | | slc-lab-236       |
| 80-000 V.34 Modem              | |-------------------| |-------------------|
|>90-000 Ethernet                | |90-300 WAN Stat   | |90-400 Ether Stat  |
| A0-000 Ether Data              | |>Rx Pkt:   184318^| |>Rx Pkt:   3486092 |
| B0-000 Reserved                | | Tx Pkt:   159232 | | Tx Pkt:     10056 |
|                                | |    CRC:        0v| |    Col:      3530 |
|                                | |-------------------| |-------------------|
|                                | |00-100 Sys Option | |Main Status Menu   |
|                                | |>Security Prof: 1 ^| |>00-000 System    ^|
|                                | | Software +5.0A+  | | 10-000 Net/E1     |
|                                | | S/N: 5210003    v| | 20-000 Net/E1    v|
Press Ctrl-n to move cursor to the next menu item. Press return to select it.
Press Tab to move to another window --- thick border indicates active window.
```

Table 3-9 provides a quick reference for navigating the MAX user interface.

Table 3-9.   Navigating the MAX user interface

If you want to:	Do this:
Make a menu or status window active	Press the Tab key until the window has a thick double line around it. Back-Tab or Ctrl-O moves you in the opposite direction.
Select a menu or a text field	Press the Down-Arrow key (or Control-N) or the Up-Arrow key (or Control-P).
Open a menu or a text field	Press Enter or the Right-Arrow key.
Exit a menu or a text field	Press the Left-Arrow or Escape key.
Refresh the screen display	Press Ctrl-L.
Access the Do menu to change your security level or dial a connection	Press Control-D.

Implementing a basic configuration

A basic configuration provides enough functionality to verify that the MAX is up and running, connected, and able to perform basic functions. The procedures described in this chapter assume that you have not configured the MAX. Therefore, all parameters initially are at their factory default settings. Do not turn the MAX off before you have completed all of the procedures. You must perform the configuration tasks in the order in which they are presented.

The Quickstart configuration involves modifying the following profiles:

Profile	Parameters that apply
Line *N*	One of the E1/PRI lines
Ethernet	The MAX unit's Ethernet address and protocols
Connection	Establishment of a WAN link and to the routing and bridging of data packets across the link
Answer	All incoming calls. The MAX uses the parameters in the Answer profile to determine what to do with incoming calls. Note that similar parameters that appear in Connection profiles take precedence over Answer profile parameters.

Note: The question marks (??) that might appear in the upper right-hand corner of the Edit screens and status windows indicate that there is no link to the E1/PRI line. They disappear once you have configured the E1/PRI line.

Configuring the E1/PRI lines

To configure a E1 line with the information you recorded in Table 3-6 on page 3-27, select the line's profile and specify the signaling mode. Then set the parameters that configure the signaling mode you have specified, and set the other required parameters. If you use R2 signaling, configure incoming call routing for the line before you save the settings you have entered. If you use ISDN signaling, you set additional parameters after you have saved the Line *N* profile. When finished, check the line's status.

Specify signaling mode

1 From the Main Edit Menu, select the slot that contains your Net/E1 card (for example, 10-000).

The slot's menu appears:

```
10-000 Net/E1
  >10-100 Line Config
  10-200 Line Diag
```

2 Select Line Config.

The Line Config menu appears:

```
10-100 Line Config
  >10-1** Factory
  10-102
  10-103
  10-104
```

3 Select the currently active slot profile, 10-1** Factory.

The selected slot profile appears:

```
10-1** Factory
  >Name=
  1st Line=Trunk
  2nd Line=Disabled
  Line 1...
  Line 2...
```

4 Select Line 1.

The Line 1 subprofile appears:

```
10-1** Factory
  Line 1...
    >Sig Mode=R2 ^
     NFAS ID num=N/A
     Rob Ctl=Wink-Start
     Switch Type=N/A
     Framing Mode=D4
     Encoding=AMI
     FDL=N/A
     Length=N/A
     Buildout=0 dB
     Clock Source=Yes
     Pbx Type=N/A
     Delete Digits=N/A
     Add Number=N/A
     Call-by-Call=N/A
     Ans #=N/A
```

Configure your specified signaling mode

With the Line 1 profile selected, set the appropriate signaling mode for the Sig Mode parameter to:

- None—A leased line.

- ISDN—ISDN signaling using the D channel. The 32nd channel of the E1 line must be designated as the D channel.

- DPNSS—The interface supports DPNSS or DASS 2 signaling.

- R2—R2 signaling.

- Metered—Metered R2 signaling protocol, used in Brazil and South Africa.

- Chinese—A version of the R2 signaling protocol specified for use in China.

If you have selected the ISDN setting, set the Switch Type parameter to the type of WAN switch used at the line's point-of-presence:

N/A (appropriate for Sig Mode=R2)
AT&T
NTI
NI-2
GloBanD
Japan

Setting the remaining Line N parameters

After you have set the required parameter or parameters for your signaling mode, set the remaining parameters for the line:

1 Select the type of framing this line uses (G.703 or 2DS).

   Note: If you select G.703, the MAX provides CRC-4 checking. If you select 2DS, it does not.

2 Set the encoding used on this line: The selections are:

   – None: This is identical to AMI, but without density enforcement.

   – AMI

   – B8ZS

3 Set the Facility Data Link (FDL) used on this line. The selections are:

   – N/A (appropriate for Framing Mode=D4)

   – None

   – AT&T

   – ANSI

   – Sprint

4 Specify the cable distance between the MAX and the WAN interface equipment.

   If the MAX has an internal CSU, select the N/A settings. Otherwise, select the correct cable distance in feet between MAX and the CSU or other network (WAN) interface unit to which it is connected. The default is 1–133.

5   Specify the amount of attenuation to add to the line's network interface.

If the MAX does not have an internal CSU, select the N/A settings. Otherwise, select the Buildout value to provide the proper line attenuation. The default is 0dB.

6   If you cannot accept the default channel-type setting of `switched` for every channel on the line, set the Ch *N* parameter as required.

–   Switched (the default)

–   Nailed (dedicated)

–   Unused (not in service)

Note: To test the line later, you must have at least two switched channels. If you plan to use a channel for drop-and-insert (D&I), you can enter it as Switched for the Quickstart and then change it to D&I for the final installation.

For R2 signaling, route incoming calls

If you using R2 signaling, configure incoming call routing for the E1 line by setting the Ch *N* # and Ch *N* Slot parameters as follows:

1   For each Ch *N* # parameter, enter the unique digits of the phone number used to reach this channel.

For example, if your line is set up as illustrated in Figure 3-8 on page 3-25, enter 1111 for the first 12 channels, and 2222 for the last 12 channels.

2   For each E1 channel that will answer analog calls, set the Ch *N* Slot parameters to the number of the slot that contains the modem card.

For example, if the modem card is in slot 5, set Ch 1 Slot=5, Ch 2 Slot=5, and so on, up to the total number of analog calls you want the MAX to accept on this E1 line. These settings tell the MAX to route incoming analog calls to the digital modem card.

3   For each E1 channel that will answer digital calls, set the Ch *N* Slot parameters to 9, the default number of the slot that contains the MAX unit's bridge/router module. These settings tell the MAX to route incoming digital calls to the bridge/router module, to be bridged or routed to their destination.

Save the Line N profile

At this point, you have configured a line and are ready to save its profile, as follows:

1   Press the Left-Arrow or Escape key to exit the Line 1 profile.

A confirmation menu appears:

```
EXIT?
  >0=ESC (Don't exit)
  1=Exit and discard
  2=Exit and accept
```

2   Press 2 to save and exit.

For ISDN signaling, route incoming modem calls

If you are using ISDN signaling, you must perform the following steps to configure incoming call routing:

1 To tell the MAX how to route incoming modem calls, from the Main Edit Menu select the slot that contains the digital modem cards–for example, 50-000 V.34 Modem.

The slot's menu appears:

```
50-000 V.34 Modem
50-100 Mod Config
50-200 Modem Diag
```

2 Select Mod Config.

The Mod Config submenu appears:

```
50-000 Mod Config
  Module Name=
  Ans 1#=
  Ans 2#=
  Ans 3#=
  Ans 4#=
```

3 Set the Ans *N* # parameters by entering the unique digits of the telephone numbers dialed by callers who use analog devices. For example, **Ans 1#=1111**. This setting tells the MAX to route all calls coming in from phone number 555-1111 (the hunt group for analog callers) to the digital modems.

4 Press the Left-Arrow or Escape key to exit the current Modem profile.

5 In the confirmation menu, press 2 to save and exit.

6 Press the Left-Arrow or Escape key to return to the Main Edit Menu so that you can configure routing for MAX incoming modem calls. From the Main Edit Menu select Ethernet > Mod Config > WAN Options.

The WAN Options profile appears:

```
90-C00 Mod Config
  WAN options...
    Dial Plan=N/A
    Ans 1#=
    Ans 2#=
    Ans 3#=
    Ans 4#=
    Pool#1 start=0.0.0.0
    Pool#1 count=0
    Pool#2 start=0.0.0.0
    Pool#2 count=0
    Pool only=No
    Pool Summary=No
```

7 Set the Ans *N* # parameters by entering the unique digits of the telephone numbers by callers who use analog devices. For example, set **Ans 1#=2222**. This setting tells the MAX to route all calls coming in from phone number 555-2222 (the hunt group for digital callers) to the MAX Ethernet module.

8 If you are going to dynamically assign addresses to incoming callers, set the following parameters:

– Pool#1 Start–The first IP address in the pool

– Pool#1 Count–The number of IP addresses in the pool

9 Press the Left-Arrow or Escape key to exit the Ethernet Mod Config profile.

In the confirmation menu, press 2 to save and exit.

You have now set all the parameters necessary for your E1 line configuration.

Check the line's status

After the E1/PRI provider has established service, observe the MAX unit's front-panel indicator lights (LEDs) as illustrated in Figure 3-5.

Figure 3-11. Front-panel indicator lights
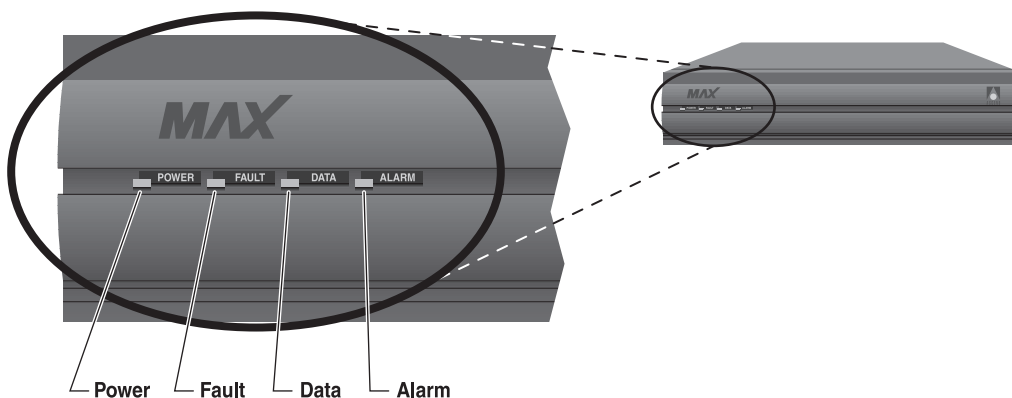
Is the Power LED on and are the Fault, Data, and Alarm LEDs off?

• If Yes: Continue on to "Configuring the Ethernet profile."

• If No: The connection to the E1/PRI line has failed. If the Alarm LED is on, check your cabling. Also verify with your E1/PRI line provider that you have the correct Framing Mode, Encoding, Length, and Buildout values.

Re-entering E1 line parameters

If you must re-enter the parameters for your E1 line, make sure you have Full Access privileges and return all parameter values to their defaults as listed in the following steps:

1 At the Main Edit Menu, press Ctrl-D.

The Main Edit Menu's DO menu appears.

2 Select P (Password).

3 Press Enter or the Right-Arrow key.

The Security Profile menu appears.

4 Select Full Access.

5 Press Enter or the Right-Arrow key.

A password entry field appears.

6 Enter your password within the brackets.

7 Press Enter or the Right-Arrow key.

If your password is accepted, you have Full Access privileges.

8 Press Enter.

The Main Edit Menu reappears.

Returning all values to their defaults

1 At the Main Edit Menu, press Ctrl-D.

The Main Edit Menu's DO menu appears.

2 Select D (Diagnostics).

The Diagnostics screen appears.

3 Type **fclear**.

This command clears flash memory. Flash memory stores a copy of the configuration.

4 Type **nvramclear**.

This command clears nvram and resets the box. Nvram stores the current configuration. The MAX comes up in the default configuration.

Configuring the Ethernet profile

To configure the Ethernet profile, proceed as follows:

1 From the Main Edit Menu, select Ethernet > Mod Config.

The Mod Config menu appears:

```
90-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW=
  RIP Policy=Poison Rvrs
  RIP Summary=Yes
  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

2 Select Ether Options.

The following list of parameters appears:

```
90-C00 Mod Config
  >IP Adrs=10.9.8.7
  2nd Adrs=0.0.0.0/0
  RIP Recv-v1
  Ignore Def Rt=Yes
  Proxy Mode=Off
  Filter=0
  IPX Frame=None
  IPX Enet#=N/A
  IPX Pool#=N/A
  IPX SAP Filter=N/A
  Handle IPX Type20=N/A
```

3 Set the IP address and subnet mask of this MAX.

4   Set the IP Adrs parameter.

5   Press Enter to return to the list of parameters.

6   Set the RIP parameter to specify how you want the MAX to handle RIP packets on its Ethernet interface.

–   Off (the default)—The MAX does not transmit or receive RIP updates.

–   Recv-v1—The MAX receives RIP-v1 updates, but does not transmit RIP updates.

–   Send-v1—The MAX transmits RIP-v1 updates, but does not receive RIP updates.

–   Both-v1—The MAX transmits and receives RIP-v1 updates.

–   Send-v2—The MAX transmits RIP-v2 updates, but does not receive RIP updates.

–   Recv-v2—The MAX receives RIP-v2 updates, but does not transmit RIP updates.

–   Both-v2—The MAX transmits and receives RIP-v2 updates.

7   Press the Left-Arrow or Escape key to exit Ether Options submenu.

A confirmation menu appears:

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

8   Press 2 to save your changes.

9   Press Escape until you return to the Main Edit Menu.

Configuring the Answer profile

The MAX uses the parameters in the Answer profile to build incoming calls. Note that settings in Connection profiles take precedence over the same settings in the Answer profile.

To configure the Answer profile, proceed as follows:

1   From the Main Edit Menu, select Ethernet > Answer.

The Answer profile appears:

```
90-800 Answer
  >Use Answer as Default=No
  Force 56=No
  Profile Reqd=Yes
  Clid Auth=Ignore
  Assign Adrs=No
  Encaps...
  Ip options...
  PPP options...
  COMB options...
  V.120 options...
  Session options...
  DHCP options...
```

2   To be able to dynamically assign addresses to incoming callers, make sure that Assign Adrs=Yes.

3 Select PPP Options.

The PPP Options submenu appears:

```
90-700 Answer
  PPP options...
  Route IP=Yes
  Route IPX=No
  Bridge=Yes
  Recv Auth=CHAP
  MRU=1524
  LQM=No
  LQM Min=600
  LQM Max=600
  Link Comp=Stac
  VJ Comp=Yes
  Dyn Alg=Quadratic
  Sec History=15
  Add Pers=5
  Sub Pers=10
  Min Ch Count=1
  Max Ch Count=1
```

4 Make sure Route IP=Yes.

5 Set the Recv Auth parameter to the authentication you are going to require for incoming calls:

– None (the default)—The MAX does not use an authentication protocol to validate incoming calls.

– PAP—Password Authentication Protocol, a PPP authentication protocol.

– CHAP—Challenge Handshake Authentication Protocol, a more secure PPP authentication protocol.

– MS-CHAP—Enter description of MS-CHAP.

– Either—The MAX can use either CHAP, PAP, or MS-CHAP. The MAX first requests CHAP authentication. If the dial-in call rejects the request (or does not acknowledge it), the MAX requests PAP authentication, then MS-CHAP.

6 Press the Escape or Left-Arrow key until the confirmation menu appears.

7 Press 2 to save your changes.

8 Press the Left-Arrow or Escape key until you return to the Main Edit Menu.

Creating Connection profiles

Connection profiles define connections to remote users.

To create a Connection profile, proceed as follows:

1 From the Main Edit Menu, select Ethernet > Connections.

The Connection menu appears. Initially, the Connection profiles are identified only by numbers:

```
90-100 Connections
90-101
90-102
90-103
```

```
90-104
90-105
90-106
90-107
90-108
90-109
90-110
90-111
90-111
```

2 Select the first profile.

A list of parameters appears:

```
90-101
  Station=
  Active=No
  Encaps=MPP
  PRI # Type=National
  Dial #=
  Calling #=
  Called #=
  Route IP=Yes
  Route IPX=N/A
  Bridge=N/A
  Dial brdcast=
  Encaps options...
  Ip options...
  Ipx options...
  Session options...
  Telco options...
```

3 Modify or verify the settings of the following parameters:

– Station. Enter a name, such as *Remote-Call* which becomes the name of the profile and acts as the login name of the remote user.

– Active. Set to Yes.

– Encaps. Set the encapsulation method you want to use for this connection. However , the default setting (MPP) is probably the best choice for this test. If the remote device does not support MPP, the MAX will attempt to negotiate an MP session. If the remote device does not support MP, the MAX will attempt to negotiate a PPP session.

– Route IP. Make sure that Route IP = Yes.

4 Select Encaps Options.

The Encaps menu appears:

```
90-101
Encaps options...
  Send Auth=None
  Send PW=N/A
  Aux Send PW=N/A
  Recv PW=
  DBA Monitor=Transmit
  Base Ch Count=1
  Min Ch Count=2
  Inc Ch Count=1
  Dec Ch Count=1
  MRU=1524
```

```
               LQM=No
               LQM Min=600
               LQM Min=600
               Link Comp=Stac
```

5 These parameters can remain at their default settings.

6 Select IP Options.

The IP Options subprofile appears:

```
90-101
 Ip options...
  LAN Adrs=0.0.0.0/0
  WAN Alias=0.0.0.0/0
  IF Adrs=0.0.0.0/0
  Preference=100
  Metric=7
  Private=No
  RIP=Off
  Pool=0
  Multicast Client=No
  Multicast Rate Limit=100
  Client Pri DNS-0.0.0.0
  Client Sec DNS=0.0.0.0
  Client Assign DNS=Yes
```

7 If you are configuring a Connection profile for a device with its own IP address, set the following parameters:

– LAN Adr —Enter the IP address including any subnet mask, of the remote unit, then press Enter to return to the list of parameters.

– WAN Alias—If the far-end device is non-Ascend and requires numbered interfaces with PPP encapsulation, enter the IP address of the remote unit's WAN interface (not its Ethernet interface), then press Enter to return to the list of parameters.

– IF Adrs—If you are implementing interfaced-based routing on the MAX, enter the IP address of the port used on the MAX side of the link.

8 If you are configuring a Connection profile for dynamic address assignment, set the following parameter:

– Pool—The IP address pool from which you want to assign this client an address. IP address pools are configured in the Ethernet > Mod Config > WAN Options submenu.

9 Using the RIP parameter, specify how you want the MAX to handle RIP packets on this WAN interface:

– Off (the default)—The MAX does not transmit or receive RIP updates.

– Recv-v1—The MAX receives RIP-v1 updates, but does not transmit RIP updates.

– Send-v1—The MAX transmits RIP-v1 updates, but does not receive RIP updates.

– Both-v1—The MAX transmits and receives RIP-v1 updates.

– Send-v2— The MAX transmits RIP-v2 updates, but does not receive RIP updates.

– Recv-v2—The MAX receives RIP-v2 updates, but does not transmit RIP updates.

– Both-v2—The MAX transmits and receives RIP-v2 updates.

10 Press the Escape or Left-Arrow key until the confirmation menu appears, then press 2 to save your changes.

11 Press the Left-Arrow key until you return to the Main Edit Menu.

Testing the connections

When you have successfully configured the MAX as described in the previous section, you are ready to test the connections. To verify that everything is working:

• Test the LAN connection by using Ping or Telnet to reach the MAX from a workstation or host on the same LAN as the unit.

• Test the E1/PRI line by placing and answering a test call from the MAX to itself over the E1/PRI interface. This procedure tests the E1 lines to verify that they are active and that the phone numbers are correct.

• Test the WAN connection by using Ping or Telnet to reach a remote unit from a workstation or host on the same LAN as the MAX. This procedure also tests the processing of data packets through the MAX.

Testing the LAN connection

To test the LAN connection, you must be able to run Ping or Telnet from a host or workstation on the same subnet as your MAX.

If you open a Telnet session with the MAX, the MAX user interface display should appear. If you have configured a Telnet password in the Ethernet > Mod Config > Telnet PW parameter, the MAX prompts for it before you can access the MAX user interface.

If you Ping the MAX, you should get a message saying that you are immediately receiving a return packet for every packet you are sending to the MAX. If you are not getting the proper response, the cause might be a problem with the LAN, entry of the wrong IP address, or misconfiguration of either the subnet mask or IP Adrs parameter in the Ethernet profile. If the host or workstation is on a different network than the MAX, make sure your IP routing configurations allow the host or workstation to reach the MAX.

Testing the E1/PRI line

To test whether the MAX E1/PRI line is functioning normally, use the Test command from the MAX terminal server. The command causes the MAX to place a call to itself over the WAN, and to send a number of packets over the connection. This procedure tests the MAX unit's ability to initiate and receive calls, and demonstrates whether the connection over the digital access line is functional.

The terminal-server Test command uses one channel to dial out and another channel to answer, as shown in Figure 3-12. Consequently, you must set the E1/PRI line for bidirectional calling and have two channels available for the test.

Note: The Test command is a basic test of connectivity. Receiving fewer packets than are sent is normal. For example, if the command sends 1000 packets, and receives 994 packets, the test is successful.

To perform the test:

1 From the Main Edit Menu, select System:

The System menu appears:

```
00-200 System
  00-100 Sys Config
  >00-200 Sys Diag
  00-300 Security
  00-400 Destinations
  00-500 Dial Plan
```

2 Select Sys Diag.

The Sys Diag menu appears:

```
00-200 Sys Diag
  >00-201 Restore Cfg
  00-202 Save Config
  00-203 Use MIF
  00-204 Sys Reset
  00-205 Term Serv
  00-206 Upd Rem Cfg
```

3 Select Term Serv.

The Terminal Server screen appears:

```
** Ascend Pipeline Terminal Server **

ascend%
```

4 Enter the Test command: **test *phone-number***

where ***phone-number*** is the phone number of the MAX T1 line.

Note: The most frequent cause for failing to connect is an incorrect phone number.

5 If the test is unsuccessful, verify that you have entered all the T1 line parameters correctly and that your line is correctly provisioned as explained in Appendix A, "Provisioning the Switch." If you cannot correct the problem, contact your carrier.

6 Enter the Quit command to exit the terminal-server interface.

7 Press the Left-Arrow or the Escape key to return to the Main Edit Menu.

Testing the WAN connection

To test the WAN connection either Ping a remote unit or establish a telnet session with it, over a dial-up connection. The procedure assumes that:

• You can run Telnet or Ping from a host or workstation on the same LAN segment as MAX.

• There is a remote unit (MAX-compatible) to which you can route data packets over a dial-up link.

Note: The remote unit should be configured for the route back to your MAX. Otherwise, you might bring up the connection and send packets but fail to receive anything back.

Figure 3-12. Testing the WAN by dialing into and out from the MAX

To test the WAN connection, proceed as follows:

1 Configure the routes of a host that is on the same LAN as your MAX so that your MAX is the gateway to the remote unit. The most common method is to add static routes.

For example, if the remote unit address is 167.34.9.23, and the your MAX address is 165.3.45.8, the gateway configuration on the remote unit would be:

– Address: `167.34.9.23`

– Gateway address: `165.3.45.8`

You can also make your MAX the default router.

2 From the local host, enter the Telnet or Ping command with an argument specifying the remote unit.

If you use Telnet, and the remote unit's user interface display appears, the MAX is functioning properly and you are finished with this chapter.

If you use Ping, and a message informs you that you are immediately receiving a return packet for every packet you are sending to the remote unit, the MAX is functioning properly and you are finished with the chapter.

If you are not getting the proper response, the procedure has failed. The problem might be with the LAN or with your configuration. Verify the configuration of the Ethernet profile. You can also refer to the Troubleshooting chapter of the *Administration Guide* for your MAX.

3 Terminate the Telnet or Ping session.

Where to go next

Table 3-10 explains where to find further information about configuring and operating your MAX.

Table 3-10. Where to go next

To do this:	Go to this document:
Find the MAX technical specifications	*MAX 6000 Series Hardware Installation Guide*
Change the MAX hardware configuration	*MAX 6000 Series Hardware Installation Guide*
Configure the MAX WAN interfaces	*MAX 6000 Series Network Configuration Guide*
Configure the MAX networking protocols	*MAX 6000 Series Network Configuration Guide*
Administer the MAX	*MAX 6000 Series Network Configuration Guide*
Define and apply filters	*MAX 6000 Series Network Configuration Guide*
Configure Connection profiles and Frame Relay connections	*MAX 6000 Series Network Configuration Guide*
Get detailed reference information about the MAX parameters and status windows	*MAX Reference Guide*
Configure MAX security	*MAX Security Supplement*
Configure RADIUS profiles	*MAX RADIUS Configuration Guide*
Use MIF	*MAX 6000 Series Administration Guide*

Navigating and Securing the Interface

4

This chapter covers the following topics:

Configuration menus

You can access the MAX configuration menus in a VT100 emulation window from a computer or palmtop-controller connected to the control port as described in "Starting up the MAX" on page 2-13. When you establish the VT100 console session, the Main Edit Menu and eight status window appear. You can also establish a console session from any Telnet workstation by opening a Telnet session with the MAX. In a Telnet session you can perform all of the configuration, diagnostic, management, and other functions that could be performed from a computer connected to the MAX control port. In either case, access is controlled by Security profiles, as described in "Security profiles" on page 4-6 for related information.

You can also use the Rem Mgmt command to enable a caller at the far end of an AIM or MPP call to access the MAX configuration menus.

The Main Edit Menu

The configuration interface consists of the Main Edit Menu and eight status windows. You can configure the MAX with the Main Edit Menu which is located on the left side of the screen. The items listed in the Main Edit Menu differ depending on the system configuration. The Empty items represent expansion slots that do not contain cards as described in "Understanding menu numbers" on page 4-9.

Figure 4-1. MAX 6000 Series configuration menus

```
|-------- MAX EDIT ------------- |--------------------| |--------------------|
|Main Edit Menu                  | |10-100 1234567890   | |10-200 1234567890   |
| 00-000 System                  | | L1/LA nnnnnnnnnn   | | L2/RA ..........   |
| 10-000 Net/T1                  | |   12345678901234   | |   12345678901234   |
| 20-000 Net/T1                  | |   nnnnnnnnnnnnnn   | |   ..............   |
| 30-000 LAN Modem               | |--------------------| |--------------------|
| 40-000 Host/BRI                | |90-100 Sessions     | |00-200 15:10:34     |
| 50-000 Host/Dual               | |>  1 Active         | |>M31  Line    Ch    |
| 60-000 Empty                   | | O slc-lab-236      | | LAN session up     |
| 70-000 Empty                   | |                    | | slc-lab-236        |
| 80-000 V.34 Modem              | |--------------------| |--------------------|
|>90-000 Ethernet                | |90-300 WAN Stat     | |90-400 Ether Stat   |
| A0-000 Ether Data              | |>Rx Pkt:     184318^| |>Rx Pkt:    3486092 |
| B0-000 Reserved                | | Tx Pkt:     159232 | | Tx Pkt:      10056 |
|                                | |    CRC:         0v | |    Col:       3530 |
|                                | |--------------------| |--------------------|
|                                | |00-100 Sys Option   | |Main Status Menu    |
|                                | |>Security Prof: 1  ^| |>00-000 System    ^ |
|                                | | Software +5.0A0+   | | 10-000 Net/T1      |
|                                | | S/N: 5210003     v | | 20-000 Net/T1    v |
 Press Ctrl-n to move cursor to the next menu item. Press return to select it.
 Press Tab to move to another window --- thick border indicates active window.
```

For an organizational overview of the MAX menus and profiles, see the *Reference Guide* for your MAX.

Making a menu or status window active

You can interact with only one window at a time. The active window has a thick, double-line border on the left, right, and top sides.

If you press the Tab key, the thick double lines move to 00-200, the next screen to the right. If you continue pressing the Tab key, you successively activate each window from left to right and down, until you reach the last window in the lower right-hand corner. Back-Tab or Ctrl-O moves you in the opposite direction.

Opening menus and profiles

The Main Edit Menu contains a list of menus, each of which can contain profiles and submenus. In the menu that is currently open, the cursor character (>) points to one item in the menu. For example, in the following Main Edit Menu, the cursor points to as Net/T1 menu item.

```
Main Edit Menu
     00-000 System
     >10-000 Net/T1
     20-000 Net/T1
     30-000 Empty
     40-000 Empty
     50-000 V.34 Modem
     60-000 V.34 Modem
     70-000 Net/T1
     80-000 V.34 Modem
     90-000 Ethernet
```

```
A0-000 Ether Data
b0-000 Serial WAN
```

To move the cursor down, press Ctrl-N (next). To move it up, press Ctrl-P (previous).
Depending on your VT100 emulator, you might be able to press the Down-Arrow key instead
of Ctrl-N and the Up-Arrow key instead of Ctrl-P. (For a complete list of key combinations to
navigate the interface, see Table 4-1 on page 4-8.)

To open a menu, move the cursor to the menu's name and press Enter. For example, press
Ctrl-N until the cursor points to 90-000 Ethernet, then press Enter. The Ethernet menu appears:

```
90-000 Ethernet
90-100 Connections
90-200 Names/Passwords
90-300 Bridge Adrs
90-400 Static Rtes
90-500 Filters
90-600 Firewalls
90-700 Frame Relay
90-800 Answer
90-900 SNMP Traps
90-A00 IPX Routes
90-B00 IPX SAP Filters
90-C00 Mod Config
```

The Ethernet menu contains submenus and profiles related to network functions, such as
bridging, routing, and WAN connections. The last menu item opens the Mod Config profile
which relates to the configuration of the Ethernet interface itself. Not all of the Mod Config
profile appears at the same time. Following is the initial display.

```
90-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW=
  RIP Policy=Poison Rvrs
  RIP Summary=Yes
  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

Note: With the exception of parameters designated N/A (not applicable), you can edit all
parameters in any profile. A profile is a group of parameters listed under a particular menu
entry. N/A means that a parameter does not apply within the context of how some other
parameter(s) or profiles have been set.

Opening edit fields

To open an edit field for a text-based parameter (such as a password):

1 Press Ctrl-N (next) or the Down-Arrow key and move the cursor to that parameter (for example, Telnet PW).

2 Press Enter.

An edit field opens, delimited by brackets, as shown under the Telnet PW parameter in the following example:

```
90-B00 Mod Config
  Module Name=
  Ether options...
  WAN options...
  SNMP options...
  OSPF options...
  OSPF global options...
  Route Pref...
  TServ options...
  Bridging=No
  Shared Prof=No
  Telnet PW:
  [ ]

  ICMP Redirects=Accept
  BOOTP Relay...
  DNS...
```

A blinking text cursor within the brackets indicates that you can start typing text. If the field already contains text, it is cleared when you type a character.

3 To modify only a few characters of existing text, use the arrow keys to position the cursor, then delete or overwrite the characters. To close the edit field and accept the new text, press Enter.

For related information, see "Security profiles" on page 4-6.

Setting enumerated parameters

An enumerated parameter has a set of predefined values. You modify it by simply placing the cursor beside the parameter and pressing the Enter, Return, or the Right-Arrow key until the proper value appears.

Saving your changes

When you exit a profile after changing any of its settings, a message prompt asks if you want to save the changes.

```
EXIT?
>0=ESC (Don't exit)
 1=Exit and discard
 2=Exit and accept
```

You can save the profile values by choosing the Exit and Accept option and pressing Enter, or by pressing the 2 key.

Using the palmtop-controller

If you have a standard MAX unit, or if you purchased the palmtop-controller expansion card, you can establish a console session by plugging in the palmtop-controller, which has a four-line LCD display.

In the palmtop-controller, each menu displays only four lines, and each line displays a maximum of 20 characters. The palmtop-controller screen contains a single display. For example:

```
Main Edit Menu
>00-000 System
 10-000 Net/...
 20-000 Host/...
```

The process of editing from the palmtop controller is nearly identical to the process of editing from the control-monitor, except that the Right-Arrow key replaces the functions of the Enter/Return key. Proceed as follows:

1 Press Ctrl-N or the Down-Arrow key and move the cursor to the Name parameter.

```
21-101 Albuquerque+ O
>Name=Mark
 Dial #=555-1212
 Call Type=AIM
```

2 Press the Right-Arrow key to begin to edit.

When you press the Right-Arrow key, an edit field opens, and the current value appears within the brackets:

```
21-101 Albuquerque+ O
Name:
 [Mark]
```

3 If you want to clear the text, begin typing, overwriting the existing value.

4 To modify only a few characters of existing text, use the arrow keys to position the cursor, then delete or overwrite the characters.

5 To close the edit field and accept the new text, press Enter.

Security profiles

The MAX has nine security profiles, which you can configure to provide up to nine levels of security. When you first receive your MAX, none of the profiles implements any restrictions.

To see the list of Security profiles:

1 From the Main Edit Menu, move the cursor to the System menu and press Enter.

2 Move the cursor to Security and press Enter.

The Security menu appears:

```
00-300 Security
>00-301 Default
 00-302
 00-303
 00-304
 00-305
 00-306
 00-307
 00-308
 00-309 Full Access
```

Assigning privileges

Powering on the MAX activates the Default profile, which is the first Security profile in the Security menu. Default profile has no password. As an administrator, you should reset the privileges in the Default profile to restrict the functions for users accessing the MAX configuration menus. You should also change the password of the Full Access profile. Do not change any other settings in the Full Access profile. Proceed as follows:

1 Open the Default profile.

2 Select Operations and set this privilege to No.

3 Press the Left-Arrow or Escape key to save your change.

4 Press 2 (Exit and Accept).

A confirmation message appears.

5 Press the Enter key.

6 Move the cursor to Full Access in the Security profile menu and press enter.

7 Select the password parameter, and enter a new password.

8 Press the Left-Arrow or Escape key to save your change.

9 Press 2 (Exit and Accept).

A confirmation message appears.

10 Press the Enter key.

11 Proceed to configuring the MAX.

12 Reset or power-cycle the MAX to activate the new, restrictive Default profile. Make sure that you remember the password for the Full Access profile, and that you have not restricted any privileges in that profile.

You can also assign various levels of access to the as yet unnamed Security profile. For detailed information about modifying Security profiles and assigning passwords, see the *Network Configuration Guide* for your MAX.

Activating the Full Access Security Profile

You have to activate and supply the password for the Full Access profile. To perform configuration tasks, the default password for the Full Access profile is Ascend.

To activate the Full Access Security profile:

1   Press Ctrl-D.

The DO menu, a context-sensitive menu, appears:

```
90-C00 Mod Config
DO...
  >0=Esc
  P=Password
  C=Close TELNET
  E=Termsrv
  D=Diagnostics
```

2   In the DO menu, press P (or select P=Password).

The list of Security profiles appears.

3   Select Full Access and press Enter.

The MAX prompts for that profile's password:

```
00-300 Security
Enter Password:
 []
  Press > to accept
```

4   Type the password and press Enter to accept it.

Note: You should modify the Full Access profile to assign a password other than the default (Ascend) as soon as possible.

A message states that the password was accepted and the MAX is using the new security level. Or, if the password you entered is incorrect, you are prompted again to enter the password.

Note: For a console session established through Telnet, the caller must first supply the Telnet password to establish a Telnet session that uses the Default security level. To configure the MAX, the Telnet user must then activate the appropriate Security profile.

Special display characters and keys

The following characters have special meaning within the displays:

*   The plus character (+) indicates that an input entry is too long to fit onto one line, and that the MAX is truncating it for display purposes.

*   An ellipsis (...) means that a submenu displays the details of a menu option.
    The MAX displays the submenu when you select the menu option.

Table 4-1 lists the special-purpose keys and key combinations you can use in the palmtop-controller and the control-monitor displays.

Table 4-1. Special keys for palmtop-controller and control-monitor displays

Palmtop-controller	Control-monitor	Operation
>	Right-Arrow, Return, Enter, Ctrl-Z, Ctrl-F	Enumerated parameter: Select the next value. String value: Move one character to the right or enter the current input. Menu: Open the current selection.
<	Left-Arrow, Ctrl-X, Ctrl-B	Enumerated parameter: Select the previous value. String value: Move left one character or exit the current input. Menu: Close the current selection.
v	Down-Arrow, Ctrl-N	Move down to the next selection.
^	Up-Arrow, Ctrl-U, Ctrl-P	Move up to the previous selection.
N/A	Ctrl-V	Move to the next page of the list.
N/A	Tab, Ctrl-I	Move to the next window.
	Back-Tab, Ctrl-O	Move to the previous window.
TOGGLE STAT	N/A	Toggle to a status menu from the edit menu and vice versa.
Shift->	Delete	Delete the character under the cursor.
Shift-<	Backspace	Delete the character to the left of the cursor.
Shift-^	N/A	Overwrite the character under the cursor with a space.
DO	Ctrl-D	Open the DO menu.
N/A	Ctrl-T	Return from or go to the Simplified Menus.
N/A	Ctrl-L	Refresh the VT100 screen.
N/A	Ctrl-C	Return from the MIF to the normal menus.
D	D	Dial from the currently selected profile.

Note: You always use the Control and Shift keys in combination with other keys. This document represents key combinations as two characters separated by a hyphen, such as Shift-T, which types the capital letter T. On the palmtop-controller, the main character associated with the key is large and white, and the Shift- character associated with the key is small and yellow.

Understanding menu numbers

The MAX has four built-in T1 or E1 lines and a V.35 serial port for WAN access. It also has six expansion slots, which support additional bandwidth (BRI lines), AIM-port modules to support videoconferencing, or digital modems to support analog modem connections over digital lines.

Figure 4-2. Slot and port numbering in the MAX 6000 series
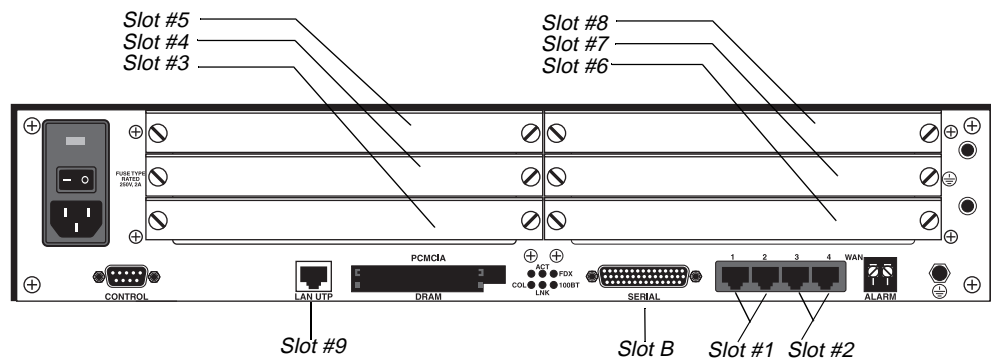
The numbers in the VT100 menus relate to slot numbers in the MAX unit, which correspond to actual expansion slots or *virtual* slots on the MAX unit's motherboard. Following are the slot assignments.

System slot

The system itself is assigned slot number 0 (menu 00-000). The System menu contains the following profiles and submenus that are related to systemwide configuration and maintenance:

```
00-000 System
    00-100 Sys Config
    00-200 Sys Diag
    00-300 Security
    00-400 Destinations
    00-500 Dial Plan
```

E1 slots

The built-in T1 or E1 lines are slot 1 and slot 2 (menu 10-000 and 20-000). Each T1 or E1 slot includes two lines. The menus for configuring and testing the lines are organized as follows:

```
10-000 Net/T1 (Net/E1)
    10-100 Line Config
    10-200 Line Diag

20-000 Net/T1 (Net/E1)
    20-100 Line Config
    20-200 Line Diag
```

Expansion slots

The six expansion slots are slots 3 through 8 (menus 30-000 through 80-000), numbered as shown in Figure 4-2.

Ethernet and WAN slots

Slot 9 is Ethernet slot menu 90-000. The Ethernet menu contains submenus and profiles related to the local network, routing and bridging, and WAN connections.

Slot A is the EtherData slot menu A0-000. For the MAX with built-in Ethernet, this menu is not applicable.

The serial WAN port is slot B (menu B0-000).

Main Edit Menu example

Following is an example of a Main Edit Menu for a unit with expansion modules installed in slots 3 through 8. (Note that the menu item for slot A is not applicable to the MAX with built-in Ethernet.)

```
Main Edit Menu
    00-000 System
    10-000 Net/T1
    20-000 Net/T1
    30-000 Host/Dual
    40-000 Host/BRI
    50-000 Net/BRI
    60-000 BRI/LT
    70-000 V.34 Modem
    80-000 V.110
    90-000 Ethernet
    A0-000 Ether Data
    B0-000 Serial WAN
```

Now that you understand the MAX user interface, you can proceed to the *Network Configuration Guide* for your MAX.

Provisioning the Switch

This appendix provides the information necessary for properly provisioning a switch for T1 access, T1 PRI access, E1 access, E1 PRI access and ISDN BRI access to the WAN. This appendix covers the following topics:

Provisioning the switch for T1 access

If you use an inband-signaling line, the T1 circuit at the Point-of-Presence (POP) must support the translations listed in Table A-1 for compatibility with the MAX.

Table A-1. T1 access provisioning information

Translation	Optional or required
Two-state DTMF (Dual-Tone Multifrequency) dialing	Required.
Outgoing wink start	Required.
Incoming immediate seizure	Optional for a switch. Does not apply on T1 lines to a PBX.
Incoming wink start	Optional for a switch. Required on T1 lines to a PBX.
Incoming digits suppressed	Required, except when a PBX is connected to T1 line supplied by the MAX through PRI-to-T1 conversion.
Answer supervision	Required.

Table A-1. T1 access provisioning information (continued)

Translation	Optional or required
Switched data	Required. No voice/digital loss plan is allowed, but the drop-and-insert channels to a PBX and the channels to digital modems can be voice channels.

Four-state A-bit signaling, four-state B-bit signaling, and pulse dialing are not supported. However, lines using these types of signaling are passed through transparently when the MAX performs drop-and-insert between lines #1 and #2.

(For further information about wink-start and inband-signaling, see the description of the Rob Ctl parameter in the *Reference Guide* for your MAX.)

Provisioning the switch for T1/PRI access

Request the following information from your WAN provider about your WAN interface:

- Whether the line uses inband or ISDN D-channel signaling.

- Whether the line uses B8ZS or AMI line encoding.

- Whether the line uses ESF or D4 framing.

- Each phone number assigned to the line on a channel-by-channel or service-by-service basis.

- The number of nailed-up channels, if any.

- The number of unused channels, if any.

- The types of call-by-call services (also called NSF identifiers) on the switched channels.

- Whether the line uses B channel, H0 channel, or H11 channel provisioning.

- The D-channel assignment.

- The NFAS ID number (if the T1/PRI line is provisioned for NFAS).

Keep the following additional information in mind:

- In general, ESF framing and B8ZS line encoding are both recommended for T1/PRI-based applications. In addition, channel 24 must be the D channel, except for applications using Non-Facility Associated Signaling (NFAS).

- Applications that require NFAS must be connected to an AT&T or Northern Telecom switch provisioned with NFAS.

  The service provider supplies guidelines for NFAS ID assignments and D-channel assignments. Note that the MAX must have D-channel signaling functionality and at least two WAN ports to use NFAS.

- The MAX can receive multichannel calls using Combinet or MP encapsulation only if all channels of the call share a common phone number (namely, a hunt group).

  You can request that your service provider supply you with a hunt group.

What you need from your E1/PRI service provider

You need the following information from your E1/PRI service provider:

- The phone numbers assigned to your E1/PRI interface, channel-by-channel

- Nailed-up channels (also called private WAN), if any

- Unused channels, if any

- Switch type (or emulation)—DPNSS only

- Switch layers 2 and 3 configuration—DASS 2 and DPNSS only (A/B end, X/Y end)

- Rate adaption protocol—DASS 2 and DPNSS only (X.30 and V.110)

Note: The MAX can receive multichannel calls using Combinet or MP encapsulation only if all channels of the call share a common phone number (namely, a hunt group). You can request that your service provider supply you with a hunt group.

Supported WAN switched services

The MAX E1/PRI supports the following WAN switched services:

- 56 Kbps and 64 Kbps data services

- GloBanD (and GVPN in CCITT countries) PRI network services—multiples of 64 Kbps

When ordering a data service, make sure it is available end-to-end. Otherwise, the data carried by the call will be corrupted or the carrier will reject the call. For example, a GloBanD 512 Kbps call made at a PRI interface is rejected when the called end is BRI, because GloBanD does not support BRI.

Provisioning the switch for ISDN BRI access

When ordering ISDN BRI service, make sure you understand the settings for BRI-specific provisioning parameters and the information the carrier gives you about the BRI line.

Parameters on the MAX

The tables that follow supply provisioning information for the ISDN BRI interface when a Net/BRI module (MX-SL-8BRIN) is installed. These requirements vary by switch type. Table A-2 provides information for AT&T 5ESS® switches operating in Point-to-Point (PTP), Multi-Point (MP), or National ISDN-1 (NI-1) mode.

Table A-2. AT&T 5ESS provisioning information

Element	Value	Comments
Terminal Type	A	

Table A-2. AT&T 5ESS provisioning information (continued)

Element	Value	Comments
Number of Circuit Switched Data (CSD)	2	Except when it handles calls to digital modems, the MAX is a data device, and you can substitute voice service for data service only if end-to-end data integrity is guaranteed. Voice service is required if digital modems are installed.
Number of Circuit Switched Voice (CSV)	1	Except when it handles calls to digital modems, the MAX is a data device, and you can substitute voice service for data service only if end-to-end data integrity is guaranteed. Voice service is required if digital modems are installed.
Number of Call Appearances	1	Not relevant for proper operation of the MAX.
Ringing/Idle Call Appearances	Idle	The default for Terminal Type A.
Autohold is Y/N	No	The default for Terminal Type A.
Onetouch is Y/N	No	The default for Terminal Type A.

Table A-3 provides provisioning information for Northern Telecom switches.

Table A-3. Northern Telecom provisioning information

Element	Value	Comments
Signaling	Functional	
Protocol Version Control (PVC)	1 or 2	1 is NTI custom. 2 is NI-1 (National ISDN-1), which requires a TID to be assigned as a suffix to the SPID.
TEI assignment	Dynamic	
Release Key	No	Not relevant for proper operation of the MAX.
Ringing Indicator	No	Not relevant for proper operation of the MAX.
EKTS (Electronic Key Telephone System)	Off	

Note: The MAX can receive multichannel calls using Combinet or MP encapsulation only if all channels of the call share a common phone number (namely, a hunt group). You can request that your service provider supply you with a hunt group.

Information required from the ISDN BRI provider

If a Net/BRI module (MX-SL-8BRIN) is installed, your ISDN BRI provider must provide you with the following information:

- The phone number assigned to your ISDN BRI line.

- The SPIDs assigned to your ISDN BRI line (for lines running in any mode other than AT&T Point-to-Point). In countries outside the United States, SPIDs might or might not be required. Check with your carrier.

- Which channels are nailed up or unused, if any.

SPIDs for AT&T 5ESS switches

If your ISDN BRI line comes from an AT&T 5ESS switch operating in Multi-Point (MP) or National ISDN-1 (NI-1) mode, each SPID has the following format:

```
01 NNNNNNN 0 TT
```

where:

- *NNNNNNN* is the 7-digit phone number of the ISDN BRI line.

- *TT* is the 2-digit TID (required only for NI-1).

  The TID can be a value from 00 to 62. It is assigned by your carrier. Ascend recommends that you use 00 as the TID for all SPIDs.

For example, suppose that 555-1212 is the 7-digit phone number of an ISDN BRI line using Multi-Point mode. The telephone company gives you the following SPID:

```
0155512120
```

Note: Because Multi-Point mode is not an NI-1-compliant, no 2-digit TID is required.

Now, suppose that 555-6001 and 555-6002 are the 7-digit phone numbers of an ISDN BRI line using NI-1 mode. You choose TID=00 for both numbers and the telephone company gives you the following SPIDs:

```
015556001000
```

```
015556002000
```

If your ISDN BRI line operates in Point-to-Point (PTP) mode, SPIDs are not required.

SPIDs for Northern Telecom DMS-100 switches

If your ISDN BRI line comes from a Northern Telecom (NTI DMS-100) switch, each SPID has the following format:

```
AAANNNNNNN SS TT
```

where:

- *AAA* is the 3-digit area code of your ISDN BRI line.

- *NNNNNNN* is the 7-digit phone number of your ISDN BRI line.

- *SS* is the SPID suffix, which can contain zero, one, or two digits as follows:

  – Empty

> – 1 and 2 for each ISDN BRI line
>
> – 01 and 02 for each ISDN BRI line

- *TT* is the 2-digit TID (required only for NI-1 [PVC=2]).

  The TID can be a value from 00 to 62. It is assigned by your carrier. Ascend recommends that you use 00 as the TID for all SPIDs.

For example, suppose you are using Northern Telecom in NTI Custom mode [PVC=1]). The phone number of your ISDN BRI line, including the area code, is 415-555-1212. The telephone company gives you the following SPID:

```
415555121201
```

Now suppose you are using Northern Telecom in NI-1 mode [PVC=2]). 510-555-6001 and 510-555-6002 are the phone numbers of your ISDN BRI line. You choose TID=00 for both numbers and the telephone company gives you the following SPIDs:

```
5105550010100
```

```
5105550020200
```

MAX Technical Specifications

B

This appendix covers the following topics:

Battery

The MAX contains an internal 3V lithium battery. The normal operating life of the battery exceeds five years.

Only trained engineers authorized by Ascend should open the MAX unit's case for testing, maintenance, installation, or any other purpose. Furthermore, only trained engineers should replace MAX components.

Warning: The battery can explode if incorrectly replaced. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

ATTENTION: IL Y A DANGER D'EXPLOSION S'IL Y A REMPLACEMENT INCORRECT DE LA BATTERIE. REMPLACER UNIQUEMENT AVEC UNE BATTERIE DU MÉME TYPE OU D'UN TYPE RECOMMANDEÉ PAR LE CONSTRUCTEUR. METTRE AU RÉBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS DU FABRICANT.

Power requirements

Table B-1 describes the ac source power requirements for the MAX 6000.

Table B-1. MAX 6000 ac source power requirements

Element	Value
Input Voltage	100-240 Vac
Input Power	450W maximum
Fuse	250 V, 6.3 A, Type T, 5 x 20 mm
Frequency	50/60 Hz
Current	5 A

Table B-2 describes the dc power requirements for the MAX 6000.

Table B-2. MAX 6000 dc source power requirements

Element	Value
Input Voltage	-48 Vdc
Input Power	450 W maximum
Fuse	15A, slow-blow, 250 V (two fuses, one per input)
Current	8.3 A

The MAX stores its configuration profiles in battery-protected memory. When you power off the MAX, the profiles remain in tact.

Note: Use a protected ac power source, or add surge protection between the power source and the MAX.

Environmental requirements

For best results, you should house the MAX in a room with constant temperature and humidity. In general, cooler environments are better. An operating temperature of 32° to 104° Fahrenheit (0° to 40° Celsius) is recommended. Storage temperatures of -40° to 176° Fahrenheit (-71.4° to 80° Celsius) are acceptable.

Humidity should be high enough to prevent accumulation of static electricity, but low enough to prevent condensation. An operating relative humidity of up to 90% is acceptable.

You can operate the MAX at altitudes of 0 to 14800 ft. (0-4500 m).

The MAX base system weighs 15 lbs (6.81 kg). A fully loaded system weighs 30 lbs (13.6 kg). The MAX has these dimensions: 3.0" x 17" x 12" (8.9 cm x 43.2 cm x 30.5 cm).

The base system of a redundant power standard MAX or MAX 6000 weighs 41 lbs (18.6 kg); a fully loaded system weighs 56 lbs (25.5 kg). The redundant power MAX has the dimensions 7.0" x 17.5" x 14.75" (17.8 cm x 44.5 cm x 36.875 cm).

Alarm relay operating specifications

On the back panel of the Ascend unit is a pair of alarm-relay terminal-block contacts that remain open during normal operation. The contacts close during loss of power, hardware failure, or reset.

The maximum rated load for the alarm relay is:

*   1 amp at 30 Vdc
*   0.6 amp at 60 Vdc
*   0.6 amp at 60 Vac

Caution: To reduce the risk of electric shock, do not connect the alarm circuit to a device with an output exceeding 30 Vrms, 42.4 Vpeak, or 60 Vdc.

Cables and Connectors

<div style="text-align: right">**C**</div>

This appendix describes specifications for different facets of the MAX, and discusses cabling requirements. This appendix covers the following topics:

User interface specifications

The interface for the control-monitor, palmtop-controller, and MIF each has its own cabling pinout specifications. The MAX supports control-monitor, palmtop-controller, and MIF interfaces.

Control port and cabling pinouts for the control-monitor and MIF

The control-port uses a standard DE-9 female connector that conforms to the EIA RS-232 standard for serial interfaces. Table C-1 applies to all MAX models that use the RS-232 pinouts.

Table C-1. Control-monitor and MIF control-port and cabling pinouts

DE-9 pin number	RS-232 signal name	Function	I/O
1	DCD	Data Carrier Detect	O
2	RD	Serial Receive Data	O
3	SD	Serial Transmit Data	I
4	DTR	Data Terminal Ready	I

Table C-1. Control-monitor and MIF control-port and cabling pinouts (continued)

DE-9 pin number	RS-232 signal name	Function	I/O
5	GND	Signal Ground	
6	DSR	Data Set Ready	O
7	RTS	Request to Send	I
8	CTS	Clear to Send	O
*9	*RI	*Ring Indicator	*O

Pin 9 is not active. (Ring Indication signal not supplied.)

Pinouts for the palmtop-controller

Table C-2 specifies the pins and corresponding functions of the palmtop-controller jacks.

Table C-2. Palmtop-controller pinouts

MAX RJ–12 pin	Function	I/O
1	Power to Palmtop, +5V	O
2	Control Out	O
3	Control In	I
4	Serial Transmit Data	O
5	Serial Receive Data	I
6	Ground	

In the I/O column, O (Out) is from the MAX toward the palmtop.

Palmtop port and cabling pinouts for a control-monitor

Figure C-1 illustrates the MIF palmtop port and cabling pinouts for a control-monitor.

Figure C-1. Control-monitor and MIF palmtop port and cable

1 Power
2 Control Out
3 Control In
4 Serial Tx Data
5 Serial Rx Data
6 Ground

Ground 5
Control In 4
Serial Rx Data 3
Serial Tx Data 2
Control Out 1

*Male RJ-12
(front view)*
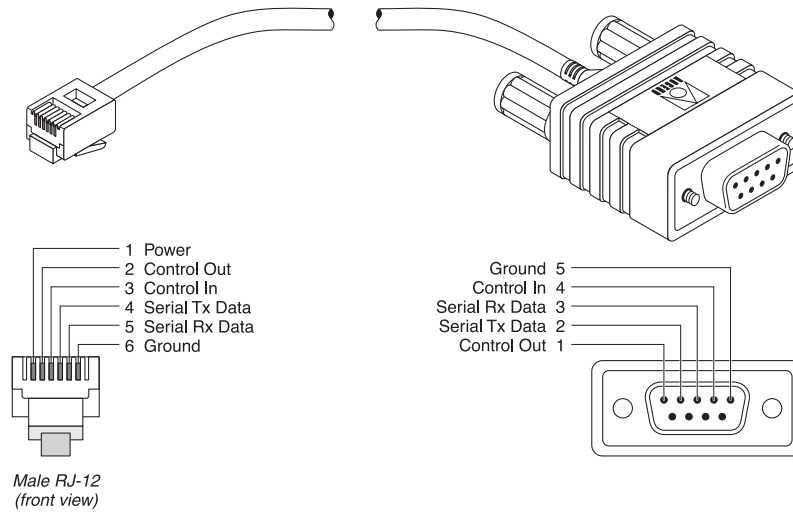
Table C-3 lists the specifications you need to adapt the palmtop port for use as a control-monitor or MIF interface through a VT100 terminal.

Table C-3. Control-monitor and MIF palmtop port and cabling pinouts

Model number HHT-VT100 Part number 2510-0088-001		
Signal (MAX)	**MAX RJ-12 pin number**	**VT100 female DE-9 pin number**
Power (+5V)	1	not connected
Control Out	2	1
Control In	3	4
Serial Transmit Data	4	2
Serial Receive Data	5	3
Ground	6	5

Ethernet interface specifications

The base unit of a MAX has an Ethernet interface that supports the physical specifications of IEEE 802.3 and IEEE 802.14 with Ethernet 2 (Ethernet/DIX) framing. The unit provides a single Ethernet interface that auto-senses the Ethernet type to which it is connected. It supports the following types of Ethernet interfaces:

- 10Base-T (Unshielded Twisted Pair): Twisted pair Ethernet and IEEE 802.3 (10Base-T) with an RJ-45 connector, labeled LAN UTP.
- 100 Base-T: 100 Mbps Baseband Modulation on Twisted Pair

The Ethernet address used to identify the Ethernet interface resides in the MAX unit's motherboard.

To install the Ethernet interface, you must have the cables described in either of the following two sections.

10Base-T cables

To install a 10Base-T interface, you need a twisted-pair Ethernet cable and a dual twisted-pair cable terminated with RJ-45 modular jacks.

Use an EIA/TIA 568 or IEEE 802.3 10Base-T cable.

100Base-T cables

To install a 100Base-T interface, you need a twisted-pair Ethernet cable and a dual twisted-pair cable terminated with RJ-45 modular jacks.

Use one of the following cables: 100BASE-T2, 100BASE-T4 (not very popular), 100BASE-TX, or 100BASE-FX.

T1/PRI interface specifications

Specifications for the MAX unit's T1/PRI interface include Channel Service Unit (CSU) requirements, specifications for the cables and plugs available for the unit's WAN interfaces, the pins to be used on the WAN ports, and the WAN switched services that are available to the MAX.

T1/PRI CSU requirements

CSU requirements depend on whether or not you enable the internal CSU on each T1/PRI port on the MAX. To enable the internal CSU, set the Net/T1 > Line Config > *slot* Line *N* > Front End parameter to CSU. To disable the internal CSU set Front End to DSX.

Port with internal CSU

If you enable the internal CSU on a T1/PRI port, you can connect the port directly to the metallic interface of the WAN. To avoid harming the WAN, you must contact your carrier for approval before installation. Once you install the MAX, you must notify the carrier before disconnecting the MAX from the WAN. If you disconnect or turn off the MAX without prior notification, the carrier might temporarily discontinue your T1/PRI service. The MAX unit's internal CSUs are compatible with dry-loop T1/PRI lines, and with span-powered or wet-loop powered T1/PRI lines.

Port without internal CSU

If you disable the internal CSU on a T1/PRI port, you cannot connect directly to the WAN. You must connect the port to other equipment that provides the interface to the WAN (for example, an external CSU). Your carrier determines the correct value for the line buildout setting of the CSU. You configure this parameter during installation. (For detailed information about each parameter, see the *Reference Guide* for the MAX.)

Table C-4 lists CSU specifications.

Table C-4. CSU specifications

Information	Value
CSU Registration	2CZUSA-74421-DE-N
Critical Circuitry Power Source	Dry Loop from local ac power source
Line Capture Frequency	1.544 Mbps +/- 200 bps
Line Code	AMI or B8ZS
Line Framing	D4 or ESF
Line Input/Output Impedance	100 Ohms +/- 5%
Received Signal Level Range	DSX-1 level to -27.5 dB
Transmitted Signal Level	DSX-1 level into 100 ohms
Line Buildout	0.0, 7.5, 15.0, or 22.5 dB
Pulse Density and Consecutive Zeros Enforcement	In accordance with requirements of AT&T Pub 62411
Line Loopback (LLB) Set Inband Code	(10000) repeating binary pattern
Line Loopback (LLB) Reset Inband Code	(100) repeating binary pattern

Note: During loss of power or whenever the MAX restarts, a relay closure returns the T1/PRI signal to the WAN. That is, the T1/PRI line is looped back. However, if you configure the MAX for framing-compatible drop-and-insert functionality, all channels of line #1 are passed to line #2. Note that line #1 and line #2 of a MAX expansion module always loop back upon loss of power, regardless of how they are configured.

T1/PRI cable specifications

The maximum cable distance between the T1/PRI WAN interface equipment and the MAX should not exceed 655 feet (200 m) for a MAX without CSUs. Measure the line length and record it when you install the MAX. You must specify this length when you configure the Line *N* profile parameters. (For detailed information about parameters, see the *Reference Guide* for the MAX.)

Use only cables specifically constructed for transmission of T1/PRI signals. The cables should meet standard T1 attenuation and transmission requirements. The following specifications are recommended:

*   100 Ω
*   Two twisted pairs, Category 3 or better

The WAN interface cables and plugs described in the following sections are available for the MAX unit's WAN interfaces.

T1/PRI crossover cable: RJ-48C/RJ-48C

Install the RJ-48C/RJ-48C crossover cable when the WAN interface transmits on pins 5 and 4 and receives on pins 2 and 1. Figure C-2 and Table C-5 show the pinouts.

Figure C-2. RJ-48C/RJ-48C crossover cable
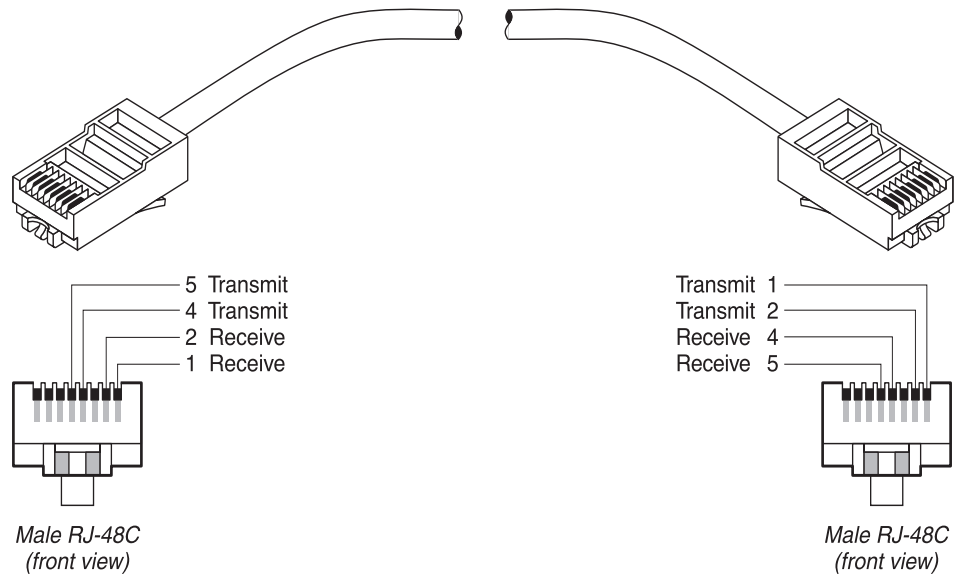
Table C-5. RJ-48C/RJ-48C crossover cable specifications

Model number RJ-48C-X Part number 2510-0059/0323-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male RJ-48C (remote)**
1	Receive	2 1	5 4
2	Transmit	5 4	2 1

T1/PRI straight-through cable: RJ-48C/RJ-48C

Before installing the RJ-48C/RJ-48C straight-through cable, verify that the WAN interface transmits on pins 2 and 1 and receives on pins 5 and 4. Figure C-3 and Table C-6 show the pinouts.

Figure C-3. RJ-48C/RJ-48C straight-through cable specifications
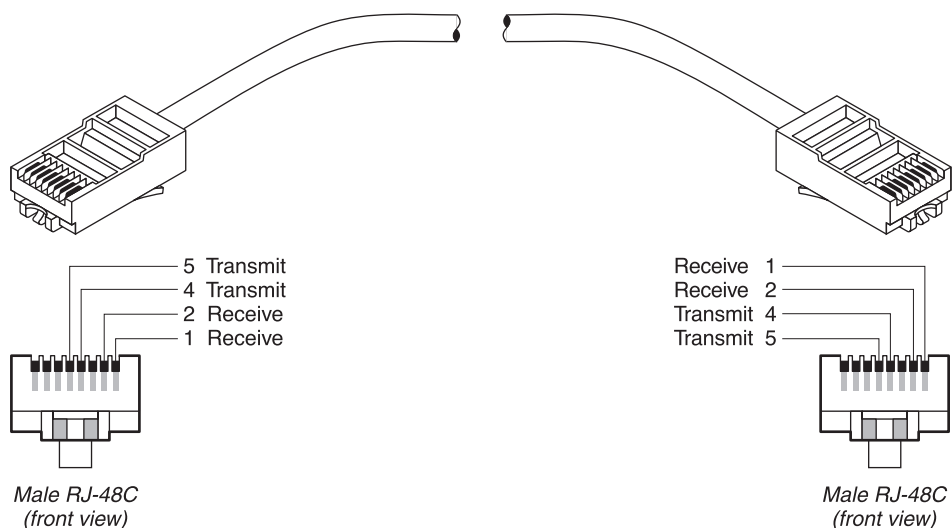
Table C-6. RJ-48C/RJ-48C straight-through cable specifications

Model number RJ-48C-S Part number 2510-0064-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male RJ-48C (remote)**
1	Receive	1 2	1 2
2	Transmit	5 4	5 4

T1/PRI straight-through cable: RJ-48C/DA-15

Before installing the RJ-48C/DA-15 straight-through cable, verify that the WAN interface transmits on pins 3 and 11 and receives on pins 1 and 9. Figure C-4 and Table C-7 show the pinouts.

Figure C-4. RJ-48C/DA-15 straight-through cable
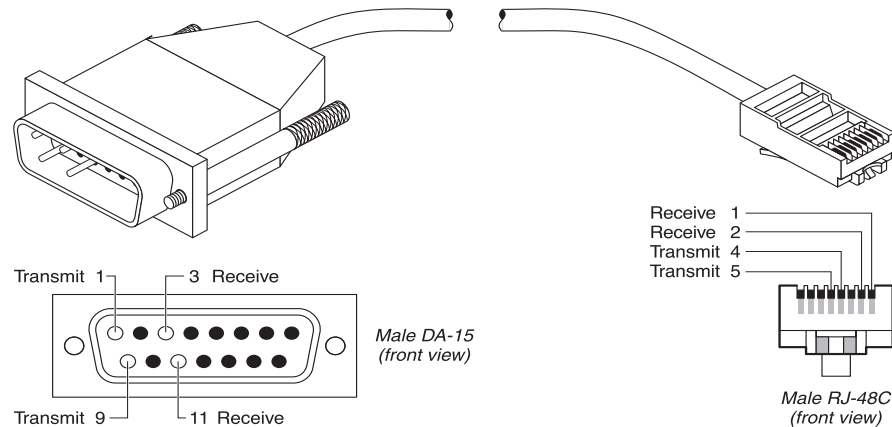
Table C-7. RJ-48C/DA-15 straight-through cable specifications

Model number DA15-X Part number 2510-0082-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male DA-15P (remote)**
1	Receive	1 2	3 11
2	Transmit	5 4	1 9

T1/PRI crossover cable: RJ-48C/DA

Before installing the RJ-48C/DA crossover cable, verify that the WAN interface transmits on pins 1 and 9 and receives on pins 3 and 11. Figure C-5 and Table C-8 show the pinouts.

Figure C-5. RJ-48C/DA crossover cable
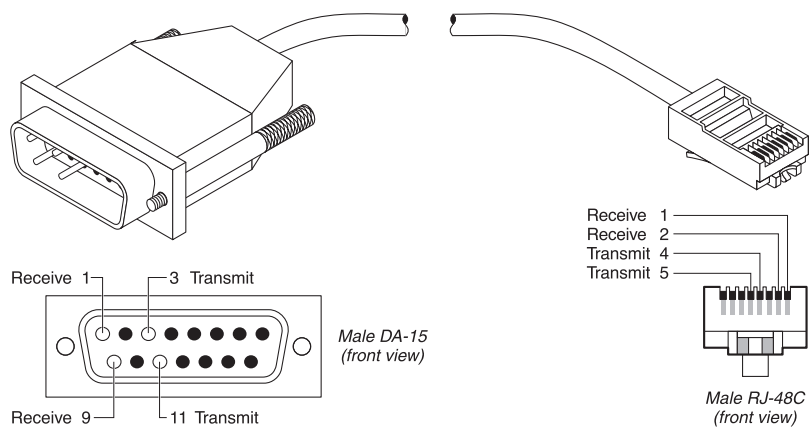
Table C-8. RJ-48C/DA crossover cable specifications

Model number DA15-S Part number 2510-0065-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male DA-15P (remote)**
1	Receive	1 2	1 9
2	Transmit	5 4	3 11

T1/PRI straight-through cable: RJ-48C/Bantam

The WAN side of the RJ-48C/Bantam straight-through cable connects to dual bantam jacks. Figure C-6 and Table C-9 show the pinouts.

Figure C-6. RJ-48C/Bantam straight-through cable
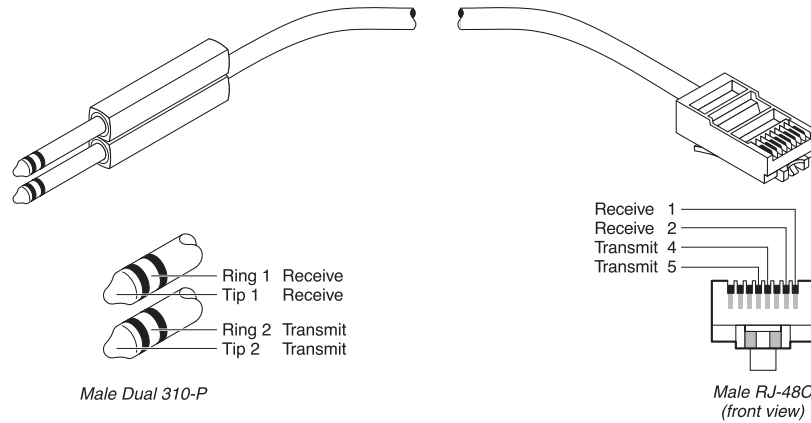
Table C-9. RJ-48C/Bantam straight-through cable specifications

Model number DBNT-RJ45 Part number 2510-0066-001			
Pair #	**Signal (MAX)**	**Male RJ-48 (MAX)**	**Male Dual-310- P (remote)**
1	Receive	1 2	Tip 1 Ring 1
2	Transmit	5 4	Tip 2 Ring 2

T1 RJ-48C-Loopback plug

This plug loops the transmit signal back to the MAX.

Table C-10. RJ-48C-Loopback plug specifications

Pair #	Signal	Male RJ-48C
1	Receive	1 (connects to 5)
		2 (connects to 4)
2	Transmit	5 (connects to 1)
		4 (connects to 2)

T1/PRI WAN ports

Table C-11 lists the pins on RJ-48C sockets on the MAX used for T1/PRI WAN interface. Only pins 1, 2, 4, and 5 are used. The remaining pins are not connected.

Table C-11. Transmit and Receive pins

MAX T1/PRI interface	RJ-48C DTE
Receive (input) pair, Tip (T1)	Position 2
Receive (input) pair, Ring (R1)	Position 1
Transmit (output) pair, Tip (T)	Position 5
Transmit (output) pair, Ring (R)	Position 4

WAN switched services available to the MAX

The MAX is compatible with both AT&T and Northern Telecom central office switches, and can access all T1/PRI switched digital services offered by AT&T's ACCUNET Switched Digital Services:

- MCI 56 Kbps and 64 Kbps services

- Sprint Switched-56 (Kbps) and 64 Kbps services

- MultiRate and GloBanD (and GVPN in CCITT countries) PRI network services

Note: The MAX can access only Switched-56 Kbps services on a T1 access line or a Switched-56 line.

For a listing of the compatible switch types, see the Switch Type parameter in the *Reference Guide* for the MAX. In addition to switched circuits, the MAX can connect to nailed-up circuits and to aggregate nailed-up and switched circuits.

E1/PRI interface specifications

The MAX unit's E1/PRI interface has cabling and port specifications. During loss of power or whenever the MAX restarts, a relay closure returns the E1/PRI signal to the WAN. That is, the E1/PRI line is looped back. However, if you configure the MAX for framing-compatible drop-and-insert functionality, all channels of line #1 are passed to line #2. Note that line #1 and line #2 of a MAX Net/E1 expansion module always loop back upon loss of power, regardless of how they are configured.

E1/PRI cable specifications

The WAN interface cables and plugs described in this section are available for the MAX unit's WAN interfaces. Use only the cable specifically constructed for transmission.

E1/PRI crossover cable: RJ-48C/RJ-48C

Install the RJ-48C/RJ-48C crossover when the WAN interface transmits on pins 5 and 4 and receives on pins 2 and 1. Figure C-7 and Table C-12 show the pinouts.

Figure C-7. RJ-48C/RJ-48C crossover cable

Table C-12. RJ-48C/RJ-48C crossover cable specifications

Model number RJ-48C-X Part number 2510-0059/0323-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male RJ-48C (remote)**
1	Receive	2 1	5 4
2	Transmit	5 4	2 1

E1/PRI straight-through cable: RJ-48C/RJ-48C

Before installing the RJ-48C/RJ-48C straight-through cable, verify that the WAN interface transmits on pins 2 and 1 and receives on pins 5 and 4. Figure C-8 and Table C-13 show the pinouts.

Figure C-8. RJ-48C/RJ-48C straight-through cable specifications
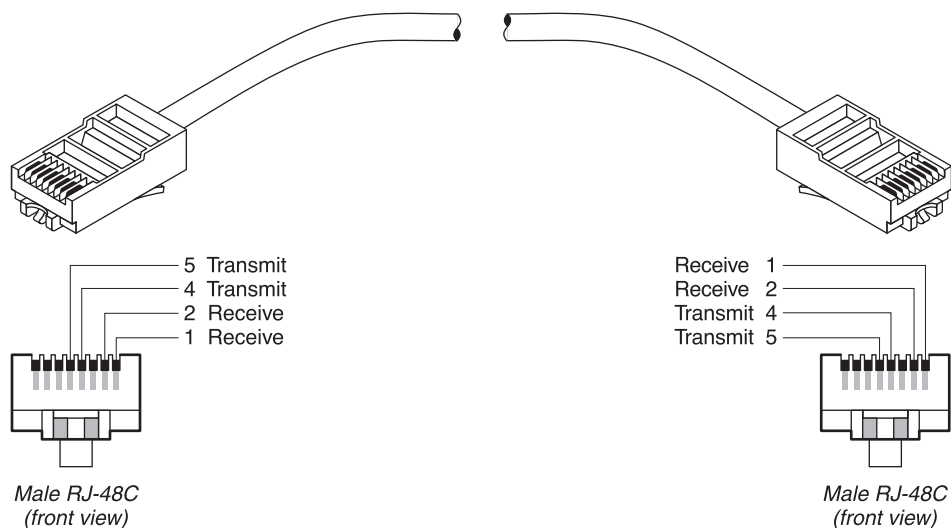
Table C-13. RJ-48C/RJ-48C straight-through cable specifications

Model number RJ48C-S Part number 2510-0064-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male RJ-48C (remote)**
1	Receive	1 2	1 2
2	Transmit	5 4	5 4

E1/PRI straight-through cable: RJ-48C/DA-15

Before installing the RJ-48C/DA-15 straight-through cable, verify that the WAN interface transmits on pins 3 and 11 and receives on pins 1 and 9. Figure C-9 and Table C-14 show the pinouts.

Figure C-9. RJ-48C/DA-15 straight-through cable
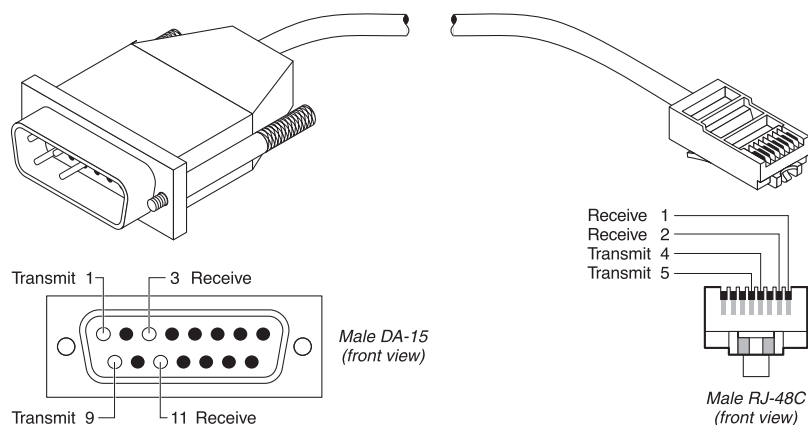
Table C-14. RJ-48C/DA-15 straight-through cable specifications

Model number DA15-X Part number 2510-0082-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male DA-15P (remote)**
1	Receive	1 2	3 11
2	Transmit	5 4	1 9

E1/PRI crossover cable: RJ-48C/DA

Before installing the RJ-48C/DA cable, verify that the WAN interface transmits on pins 1 and 9 and receives on pins 3 and 11. Figure C-10 and Table C-15 show the pinouts.
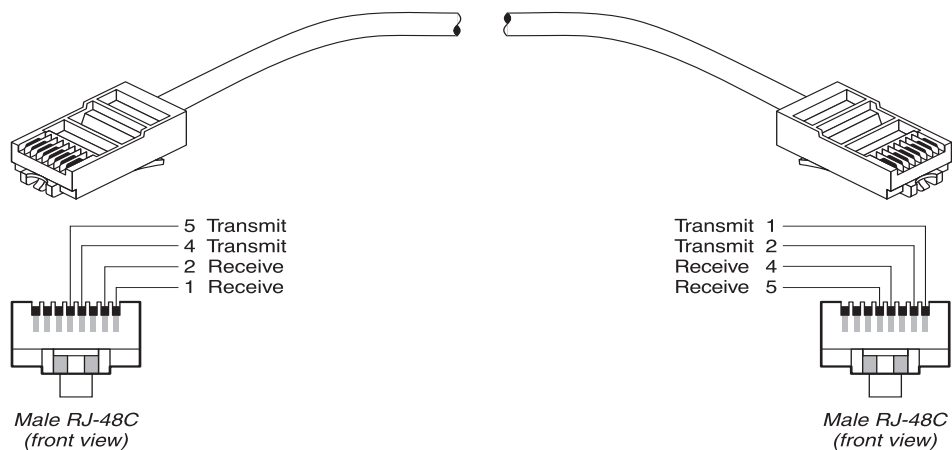
Figure C-10. RJ-48C/DA crossover cable
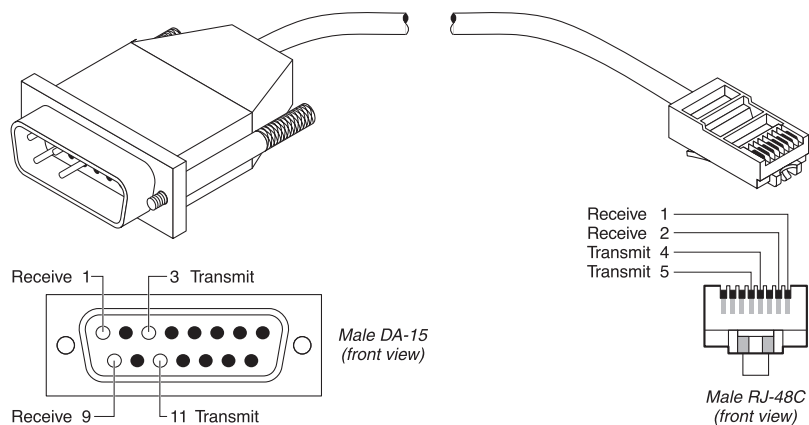
Table C-15. RJ-48C/DA crossover cable specifications

Model number DA15-S Part number 2510-0065-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male DA-15P (remote)**
1	Receive	1 2	1 9
2	Transmit	5 4	3 11

E1/PRI straight-through cable: RJ-48C/Bantam

The WAN side of the RJ-48C/Bantam straight-through cable connects to dual bantam jacks. Figure C-11 and Table C-16 show the pinouts.

Figure C-11. RJ-48C/Bantam straight-through cable
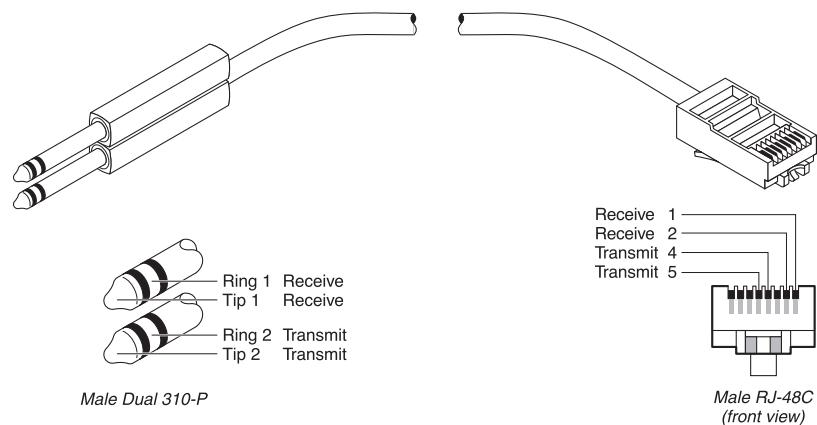
Table C-16. *RJ-48C/Bantam straight-through cable specifications*

Model number DBNT-RJ-45 Part number 2510-0066-001			
Pair #	**Signal (MAX)**	**Male RJ-48 (MAX)**	**Male Dual-310-P (remote)**
1	Receive	1	Tip 1
		2	Ring 1
2	Transmit	5	Tip 2
		4	Ring 2

E1/PRI straight-through cable: MAX 6000 BNC to RJ-48C

The MAX 6000 BNC to RJ-48C cable adapts a modular E1 port on the MAX to coaxial cable E1 lines. You must also set the jumpers within the MAX for 50 ohm service. Figure C-12 and Table C-17 show the pinouts.

Figure C-12. MAX 6000 BNC to RJ-48C straight-through cable
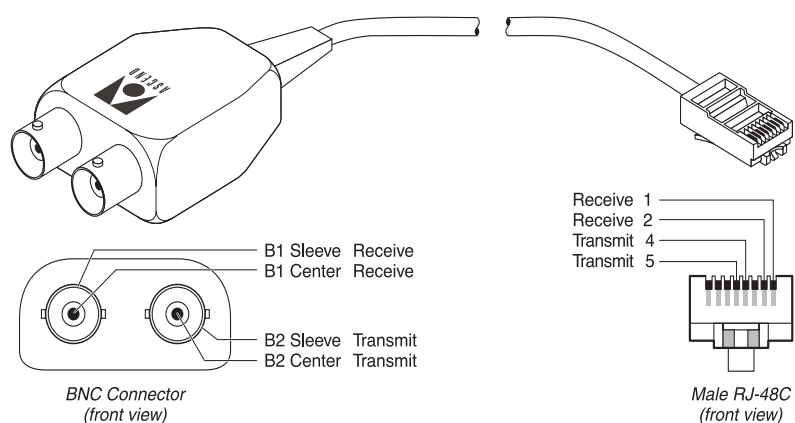
Table C-17. MAX 6000 BNC to RJ-48C straight-through cable specifications

Part number 2510-0272-001			
Pair #	**Signal (MAX)**	**Male RJ-48C (MAX)**	**Male Dual-BNC (remote)**
1	Transmit	4	B1 Sleeve
		5	B1 Center
2	Receive	1	B2 Sleeve
		2	B2 Center

E1/PRI WAN ports

Table C-18 lists the pins on RJ-48C sockets on the MAX used for E1/PRI WAN interface. Only pins 1, 2, 4, and 5 are used. The remaining pins are not connected.

Table C-18. Transmit and Receive pins

MAX E1/PRI interface	RJ-48C DTE
Receive (input) pair, Tip (T1)	Position 2
Receive (input) pair, Ring (R1)	Position 1
Transmit (output) pair, Tip (T)	Position 5
Transmit (output) pair, Ring (R)	Position 4

Note: E1/PRI models are also equipped with BNC connectors.

ISDN BRI interface specifications

The MAX unit's ISDN BRI interface has specifications for the Net/BRI module and the Host/BRI module.

Warning: To reduce the risk of fire, communication cable conductors must be 26 AWG or larger.

Attention: Afin de reduire les risques d'incendie, les fils conducteurs du cable de communication doivent etre d'un calibre minimum de 26 AWG (American Wire Gauge), c'est-a-dire d'un minimum de 0,404 mm.

Warnung: Um Feuerrisiken zu reduzieren, müssen die Kommunikationskabel-Anschlüße 26 AWG oder größer sein.

For the Net/BRI module

The Net/BRI module (MX-SL-8BRIN) connects to the WAN through a network termination (NT1) device. You must install a cable from the NT1 that ends in a 100Ω termination. The maximum distance between the NT1 and its termination is 3280 feet (1000 m). You can install the Net/BRI module anywhere along the length of the cable. Use only cable specifically constructed for ISDN BRI interfaces.

Note: In Belgium, install 10 m of cable between the Net/BRI module and the NT1. Significant data errors can result from use of shorter cables.

For the Host/BRI module

Each ISDN BRI line provided by the Host/BRI module (MX-SL-8BRIT) must end in a 100Ω termination. The maximum cable distance between the Host/BRI and its termination is 3280 feet (1000 m). You can install the local ISDN BRI device anywhere along the length of the cable. Use only cable specifically constructed for ISDN BRI S interfaces.

Serial host interface specifications

Specifications for the serial host ports on the MAX include cabling requirements, timing requirements, and interface types.

The MAX unit's serial host ports are compatible with the following three electrical standards:

- RS-449/422
- V.35
- X.21

The MAX also supports the following dialing/answering protocols at any of its serial host ports:

- V.25 bis
- RS-366
- X.21

Selection of the proper cable between a serial host port and the serial device ensures:

- The proper mapping of pinouts from the MAX to the application equipment
- Proper voltage levels

In the cable wiring tables that follow, the MAX is the Data Circuit-Terminating Equipment (DCE) device, while the host equipment is the Data Terminal Equipment (DTE) device. The serial host interface cabling tables use the abbreviations listed in Table C-19. Note that the MAX supplies the Send Timing and Receive Timing clocks to the host.

Table C-19. Serial host interface cabling abbreviations

Abbreviation	Explanation
FGND	Chassis Ground
SGND	Receive Common Ground
SD+	Send Data +
SD-	Send Data -
RD+	Receive Data +
RD-	Receive Data -
ST+	Send Timing +

Table C-19. Serial host interface cabling abbreviations (continued)

Abbreviation	Explanation
ST-	Send Timing -
RT+	Receive Timing +
RT-	Receive Timing -
TT+	Terminal Timing +
TT-	Terminal Timing -
DSR	Data Set Ready
DCD (CD)	Data Carrier Detect
RTS	Request to Send
RI	Ring Indicate
DTR	Data Terminal Ready
DPR	RS-366 Call Digit or Tone
ACR	Abandon Call/Retry
CRQ	Call Request
PND	Present Next Digit
DLO	Data Line Occupied
NB1	RS-366 Call Digit or Tone
NB2	RS-366 Call Digit or Tone
NB4	RS-366 Call Digit or Tone
NB8	RS-366 Call Digit or Tone
RX/SEL	Select Interface Jumper (not a signal to or from host)

V.35 cabling

You can use V.35 cabling to connect the MAX to some Cisco routers, to a wide variety of serial hosts, and to CLI and PictureTel codecs.

V.35/V.25 bis cable to Cisco

The V.35/V.25 bis cable connects the MAX to the V.35 port of a Cisco router that uses V.25 bis dialing. Figure C-13 and Table C-20 show the V.35/V.25 bis cable pinouts.

Figure C-13. V.35/V.25 bis cable to Cisco

Male DB-44
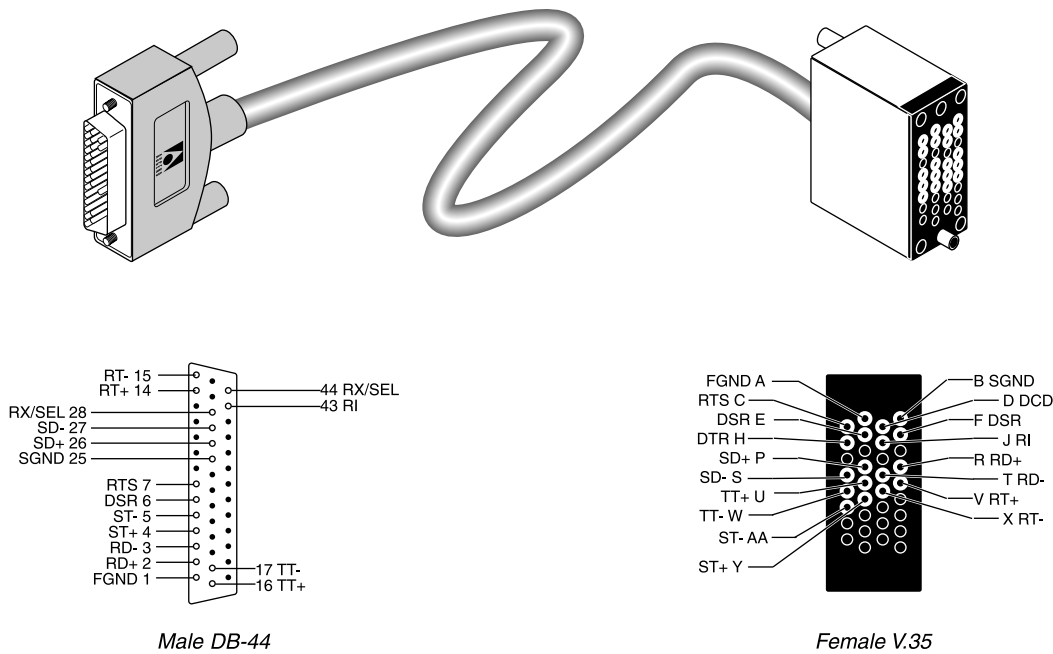
Female V.35

Table C-20. Pinouts for V.35/V.25 bis cable to Cisco

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female V.35
1	FGND	1	A
2	SD+	26	P
	SD-	27	S
3	RD+	2	R
	RD-	3	T
4	ST+	4	Y
	ST-	5	AA

Table C-20. Pinouts for V.35/V.25 bis cable to Cisco (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female V.35
5	RT+	14	V
	RT-	15	X
6	DSR	6	E, F*
	DCD	36	D
7	RTS	7	C
	RI	43	J
8	DTR	8	H
	SGND	25	B
9	TT+	16	U
	TT-	17	W
10	RX/SEL	28, 44*	

Pin positions separated by commas are jumped to each other.

V.35 cable to generic serial host

The V.35 cable for connection to generic serial hosts connects the MAX to the V.35 ports of a wide variety of equipment. A female-to-male V.35 gender changer is included when you order the cable. Figure C-14 and Table C-21 show the V.35 cable pinouts.

Figure C-14. V.35 cable to generic serial host

Male DB-44
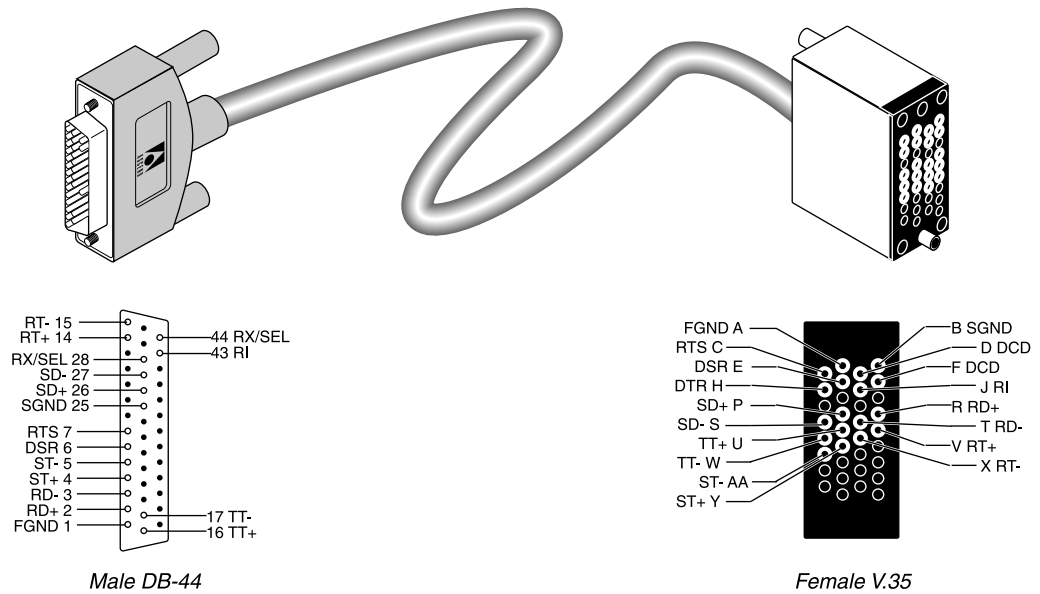
Female V.35

Table C-21. Pinouts for V.35 cable to generic serial host

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female V.35
1	FGND	1	A
2	SD+	26	P
	SD-	27	S
3	RD+	2	R
	RD-	3	T
4	ST+	4	Y
	ST-	5	AA
5	RT+	14	V
	RT-	15	X

Table C-21. Pinouts for V.35 cable to generic serial host (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female V.35
6	DSR DCD	6 36	E D, F*
7	RTS RI	7 43	C J
8	DTR SGND	8 25	H B
9	TT+ TT-	16 17	U W
10	RX/SEL	28, 44*	

Pin positions separated by commas are jumped to each other.

V.35/RS-366 cable to generic serial host

The V.35/RS-366 cable connects the MAX to the V.35 ports of a wide variety of equipment that uses RS-366 dialing. A female-to-male V.35 gender changer is included when you order the cable. Figure C-15 and Table C-22 show the V.35/RS-366 cable pinouts.

Figure C-15. V.35/RS-366 cable to generic serial host

Male DB-44		Female V.35	Female DB-25

Table C-22. Pinouts for V.35/RS-366 cable to generic serial host

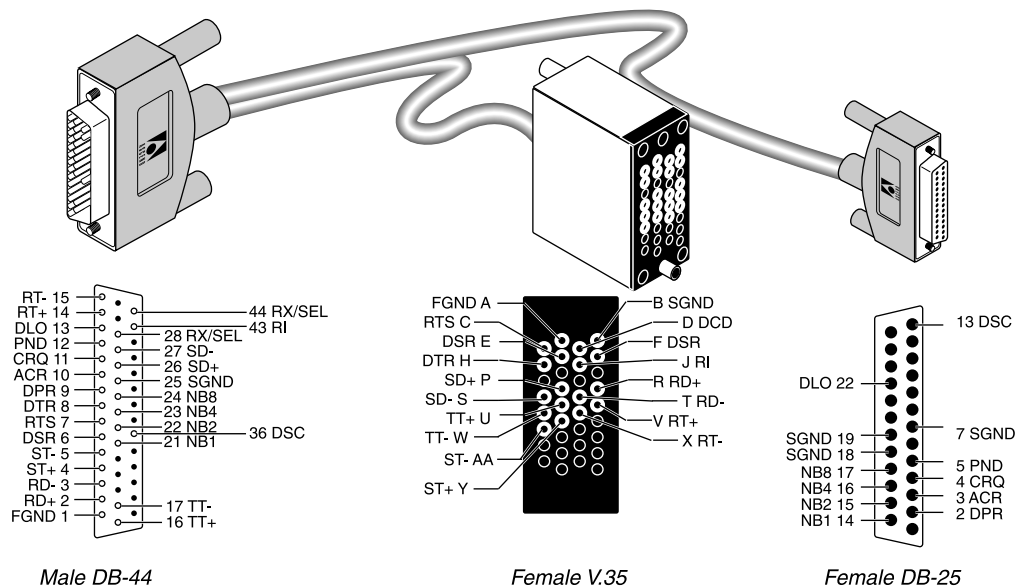| **Model number MBHD-V35-366** **Part number 2510-0077-001**				
Pair #	**Signal (MAX)**	**MAX male DB-44 (MAX)**	**Host female V.35**	**RS-366 female DB-25**
1	FGND	1	A	
2	SD+ SD-	26 27	P S	
3	RD+ RD-	2 3	R T	
4	ST+ ST-	4 5	Y AA	

Table C-22. Pinouts for V.35/RS-366 cable to generic serial host

Model number MBHD-V35-366 Part number 2510-0077-001				
Pair #	**Signal (MAX)**	**MAX male DB-44 (MAX)**	**Host female V.35**	**RS-366 female DB-25**
5	RT+ RT-	14 15	V X	
6	DSR DCD/CTS	6 36	E D, F*	
7	RTS RI	7 43	C J	
8	DTR SGND	8 25	H B	
9	TT+ TT-	16 17	U W	
10	DPR ACR	9 10		2 3
11	CRQ PND	11 12		4 5
12	DLO SGND	13 25		22 7, 18, 19*
13	NB1 NB2	21 22		14 15
14	NB4 NB8	23 24		16 17
15	DSC	36		13
16	RX/SEL	28, 44*		

* Pin positions separated by commas are jumped to each other.

V.35/RS-366 cable to CLI

The V.35/RS-366 cable connects the MAX to the V.35 port of the Compression Labs Rembrandt II codec with support for RS-366 dialing. Figure C-16 and Table C-23 show the V.35/RS-366 cable pinouts.

Figure C-16. V.35/RS-366 cable to CLI codec
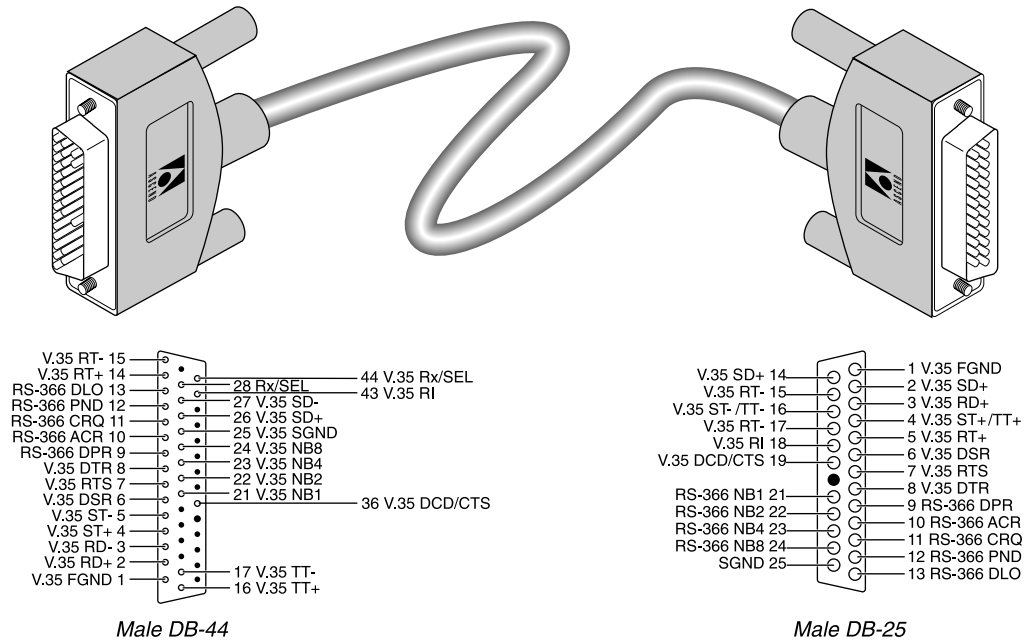
Male DB-44   Male DB-25

Table C-23. Pinouts for V.35/RS-366 cable to CLI

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host V.35/RS-366 male DB-25
1	V.35 FGND	1	1
	V.35 DTR	8	8
2	V.35 SD+	26	2
	V.35 SD-	27	14
3	V.35 RD+	2	3
	V.35 RD-	3	15
4	V.35 ST+	4	4
	V.35 ST-	5	16
5	V.35 RT+	14	5
	V.35 RT-	15	17

Table C-23. Pinouts for V.35/RS-366 cable to CLI (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host V.35/RS-366 male DB-25
6	V.35 DSR V.35 DCD/CTS	6 36	6 19
7	V.35 RTS V.35 RI	7 43	7 18
8	V.35 TT+ V.35 TT-	16 17	4 16
9	RS-366 DPR RS-366 ACR	9 10	9 10
10	RS-366 CRQ RS-366 PND	11 12	11 12
11	RS-366 DLO SGND	13 25	13 25
12	RS-366 NB1 RS-366 NB2	21 22	21 22
13	RS-366 NB4 RS-366 NB8	23 24	23 24
14	RX/SEL	28, 44*	

* Pin positions separated by commas are jumped to each other.

V.35/RS-366 cable to PictureTel

The V.35/RS-366 cable connects the MAX to the V.35 port of the PictureTel codec with support for RS-366 dialing. Figure C-17 and Table C-24 show the V.35/RS-366 cable pinouts.
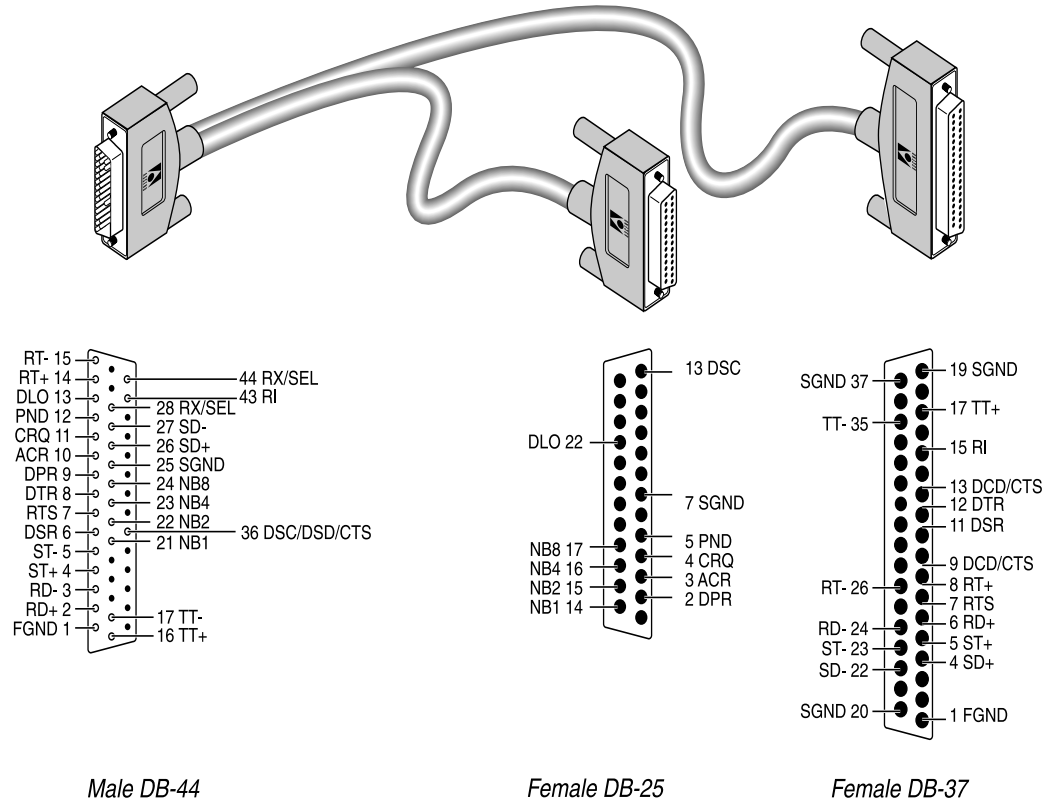
Figure C-17. V.35/RS-366 cable to PictureTel

Male DB-44   Female DB-25   Female DB-37

Table C-24. Pinouts for V.35/RS-366 cable to PictureTel

Model number MBHD-449PT Part number 2510-0093-001				
Pair #	**Signal (MAX)**	**MAX male DB-44 (MAX)**	**Host female DB-37**	**RS-366 female DB-25**
1	FGND	1	1	
2	SD+ SD-	26 27	4 22	
3	RD+ RD-	2 3	6 24	

Table C-24. Pinouts for V.35/RS-366 cable to PictureTel (continued)

Model number MBHD-449PT				
Part number 2510-0093-001				
Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female DB-37	RS-366 female DB-25
4	ST+	4	5	
	ST-	5	23	
5	RT+	14	8	
	RT-	15	26	
6	DSR	6	11	
	DCD/CTS	36	9, 13*	
7	RTS	7	7	
	RI	43	15	
8	DTR	8	12	
	SGND	25	19, 20, 37*	
9	TT+	16	17	
	TT-	17	35	
10	DPR	9		2
	ACR	10		3
11	CRQ	11		4
	PND	12		5
12	DLO	13		22
	SGND	25		7
13	NB1	21		14
	NB2	22		15
14	NB4	23		16
	NB8	24		17
15	DSC	36		13
16	RX/SEL	28, 44*		

*Pin positions separated by commas are jumped to each other.

RS-366 cabling

Ascend supplies a variety of RS-366 cables which you can use to connect the MAX to Video Telecom and to a wide variety of serial hosts.

RS-449/RS-366/DB-37 cable to Video Telecom

The RS-449/RS-366/DB-37 cable connects the MAX to the RS-449 port of a Video Telecom codec with support for RS-366 dialing. Figure C-18 and Table C-25 show the RS-449/RS-366/DB-37 cable pinouts.

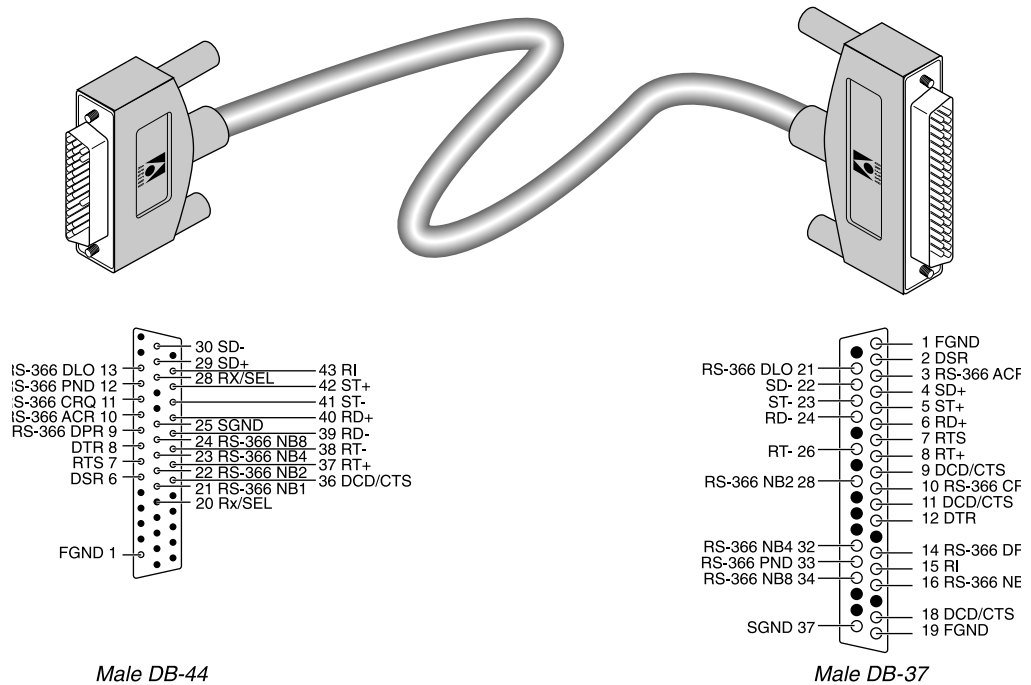*Figure C-18. RS-449/RS-366/DB-37 cable to Video Telecom codec*

Male DB-44   *Male DB-37*

Table C-25. Pinouts for RS-449/RS-366/DB-37 cable to VTC

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host RS-449/RS-366 male DB-37
1	FGND	1	1
	FGND	1	19
2	SD+	29	4
	SD-	30	22
3	RD+	40	6
	RD-	39	24

Table C-25. Pinouts for RS-449/RS-366/DB-37 cable to VTC (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host RS-449/RS-366 male DB-37
4	ST+	42	5
	ST-	41	23
5	RT+	37	8
	RT-	38	26
6	DSR	6	2
	DCD/CTS	36	9, 11, 18*
7	RTS	7	7
	RI	43	15
8	DTR	8	12
	SGND	25	37
9	RS-366 DPR	9	14
	RS-366 ACR	10	3
10	RS-366 CRQ	11	10
	RS-366 PND	12	33
11	RS-366 DLO	13	21
12	RS-366 NB1	21	16
	RS-366 NB2	22	28
13	RS-366 NB4	23	32
	RS-366 NB8	24	34
14	RX/SEL	20, 28*	

Pin positions separated by commas are jumped to each other. This cable does not support terminal timing.

RS-449/RS-366 cable to generic serial host

The RS-449/RS-366 cable connects the MAX to the RS-449 ports of a wide variety of equipment that uses RS-366 dialing. A female-to-male DB-37 gender changer is included when you order the cable. Figure C-19 and Table C-26 show the RS-449/RS-366 cable pinouts.

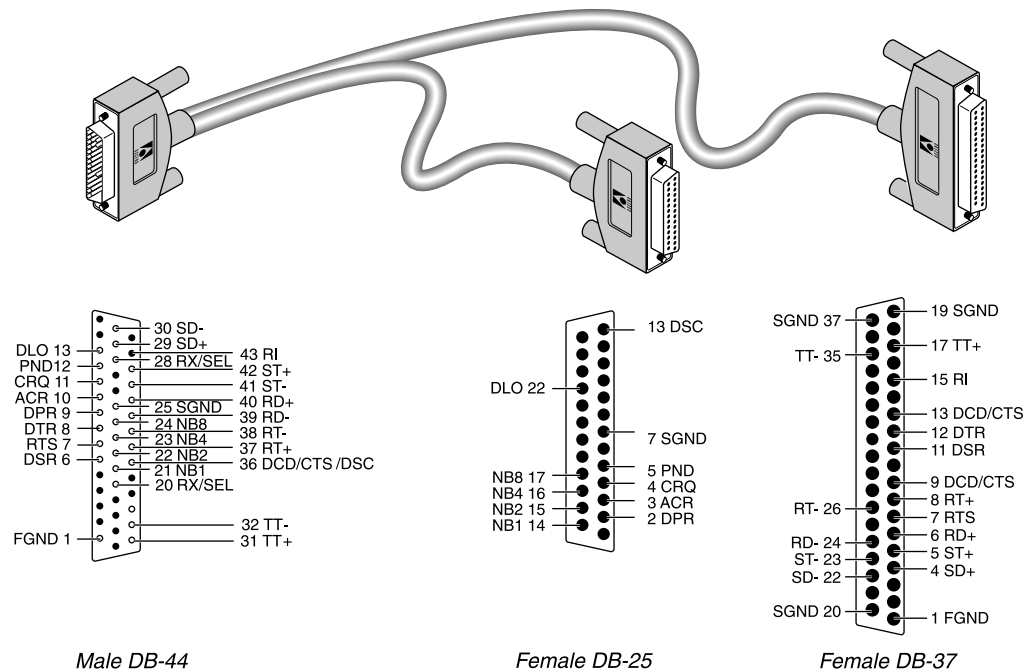*Figure C-19. RS-449/RS-366 cable to generic serial host*

Male DB-44   Female DB-25   Female DB-37

Table C-26. Pinouts for RS-449/RS-366 cable to generic serial host

Model number MBHD-449-366 Part number 2510-0078-001				
Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female DB-37	RS-366 female DB-25
1	FGND	1	1	
2	SD+	29	4	
	SD-	30	22	
3	RD+	40	6	
	RD-	39	24	

Table C-26. Pinouts for RS-449/RS-366 cable to generic serial host (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female DB-37	RS-366 female DB-25
Model number MBHD-449-366 **Part number 2510-0078-001**				
4	ST+ ST-	42 41	5 23	
5	RT+ RT-	37 38	8 26	
6	DSR DCD/CTS	6 36	11 9, 13*	
7	RTS RI	7 43	7 15	
8	DTR SGND	8 25	12 19, 20, 37*	
9	TT+ TT-	31 32	17 35	
10	DPR ACR	9 10		2 3
11	CRQ PND	11 12		4 5
12	DLO SGND	13 25		22 7
13	NB1 NB2	21 22		14 15
14	NB4 NB8	23 24		16 17
15	DSC	36		13
16	RX/SEL	20, 28*		

Pin positions separated by commas are jumped to each other.

RS-449 cable to generic serial host

The RS-449 cable for connection to generic serial hosts connects the MAX to the RS-449 ports of a wide variety of equipment. A female-to-male DB-37 gender changer is included when you order the cable. Figure C-20 and Table C-27 show the RS-449 cable pinouts.
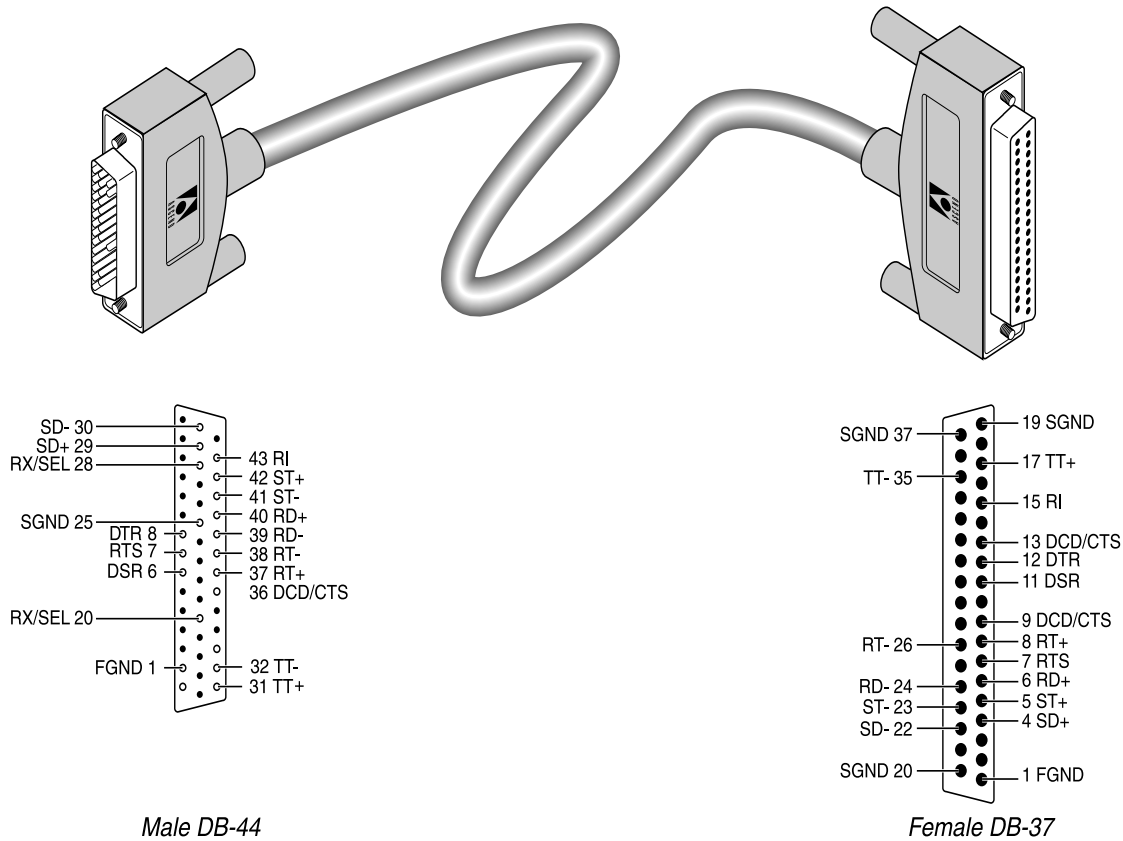
Figure C-20. RS-449 cable to generic serial host

Male DB-44   Female DB-37

.

Table C-27. RS-449 cable to generic serial host pinouts

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female DB-37
1	FGND	1	1
2	SD+ SD-	29 30	4 22
3	RD+ RD-	40 39	6 24
4	ST+ ST-	42 41	5 23
5	RT+ RT-	37 38	8 26
6	DSR DCD/CTS	6 36	11 9, 13*
7	RTS RI	7 43	7 15
8	DTR SGND	8 25	12 19, 20, 37*
9	TT+ TT-	31 32	17 35
10	RX/SEL	20, 28*	

*   Pin positions separated by commas are jumped to each other.

Note: To manufacture an RS-449 cable for Cisco routers, use the wiring list shown in Table C-27 and connect the following DB-37 pins to SGND:

•   DSR-(pin 29)

•   CD-(pin 31)

•   CTS-(pin 27)

X.21 cabling

Ascend supplies a single X.21 cable. You can use the X.21 cable for connecting to generic serial hosts. If your host is equipped with an X.21 interface, Figure C-21 and Table C-28 show the pinouts for the host cable.

Figure C-21. X.21 cable to generic serial host
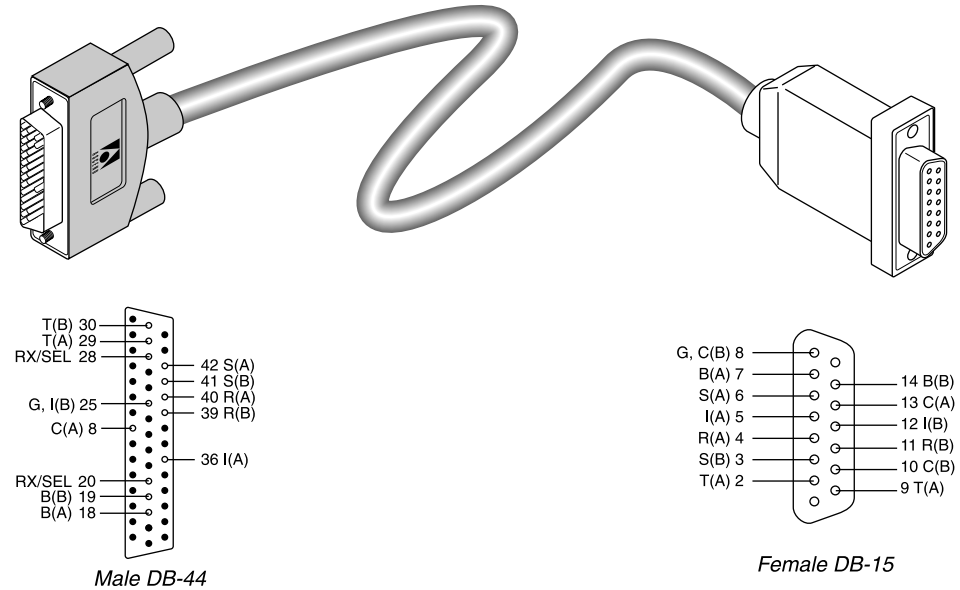
Male DB-44

Female DB-15

Table C-28.   Pinouts for X.21 cable to generic serial host

Model Number MBHD-X21 Part number 2510-0098-001				
Pair #	X.21 signal name (MAX)	Equivalent V.35/RS-449 signal name (MAX)	MAX male DB-44 (MAX)	Host female DA-15
1	G*	SGND*	25*	8
2	T(A) T(B)	SD+ SD-	29 30	2 9
3	R(A) R(B)	RD+ RD-	40 39	4 11
4	S(A) S(B)	ST+ ST-	42 41	6 13
5	C(A) I(A)	DTR DCD	8 36	3 5

Table C-28.   Pinouts for X.21 cable to generic serial host (continued)

Model Number MBHD-X21 Part number 2510-0098-001				
Pair #	X.21 signal name (MAX)	Equivalent V.35/RS-449 signal name (MAX)	MAX male DB-44 (MAX)	Host female DA-15
6	RX/SEL I(B)*	RX/SEL SGND*	20, 28** 25***	12***
7	B(A) B(B)	BT+ BT-	18 19	7 14
8	C(B)			8, 10****

    *   Both I (B) and G connect to SGND, pin 25 on DB-44.

   **   Pins 20 and 28 on the DB-44 interface are jumped together.

  ***   Connect pin 25 (DB-44) to pin 12 (DA-15) through a 200 ohm resistor.

****   Connect pin 8 (DA-15) to pin 10 (DA-15) through a 200 ohm resistor.

Cable length requirements

Table C-29 specifies the recommended maximum length of the cable between the MAX and the serial host equipment. Longer distances at the specified data rates are possible when you use terminal timing. If you require still longer distances you can install the Ascend RPM, a hardware device that provides an extended-distance high-speed link between the MAX and the serial host equipment.

Table C-29. Cable length requirements

MAX cable length	Serial data rate
25 feet	3 Mbps
75 feet	2 Mbps
150 feet	512 Kbps

Serial WAN cabling specifications

The MAX unit's serial WAN interface supports nailed-up connections to the WAN. Data packets from the MAX unit's bridge/router module can use this interface, but bit streams from devices connected to the MAX unit's serial host ports cannot.

The MAX unit's serial WAN port is compatible with the following two electrical standards:

V.35
RS-449/422

In the cable wiring tables that follow, the MAX is the Data Terminal Equipment (DTE) that connects to a Data Circuit-Terminating Equipment (DCE) device through its serial WAN port. The MAX receives the Send Timing and Receive Timing clocks from the DCE device.

V.35 cable to WAN

You can connect a V.35 cable to the V.35 port of a DCE device. Table C-30 describes the V.35 cable pinouts.

Table C-30. V.35 cable pinouts

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host male V.35
1	FGND	1	A
	RI	8	J
2	SD+	39	P
	SD-	40	S
3	RD+	30	R
	RD-	29	T
4	ST+	41	Y
	ST-	42	AA
5	RT+	32	V
	RT-	31	X
6	TT+	38	U
	TT-	37	W
7	DTR	6	H
	DSR	11	E
8	DCD	9	F
	SGND	25	B

Table C-30. V.35 cable pinouts (continued)

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host male V.35
9	CTS	7	D
	RTS	36	C

RS-449 cable to WAN

You can connect the RS-449 cable to the RS-449 port of a DCE device. Table C-31 describes the RS-449 pinouts.

Table C-31. RS-449 cable pinouts

Pair #	Signal (MAX)	MAX male DB-44 (MAX)	Host female DB-37
1	FGND	1	1
	RI	8	15
2	SD+	39	4
	SD-	40	22
3	RD+	30	6
	RD-	29	24
4	ST+	41	5
	ST-	42	23
5	RT+	32	8
	RT-	31	26
9	TT+	38	17
	TT-	37	35
8	DTR	6	12
	DSR	11	11
6	DCD	9	13
	SGND	25	19, 20, 37*
7	CTS	7	9
	RTS	36	7

Pin positions separated by commas are jumped to each other.

IDSL specifications

Check with your provider regarding the network-interface specifications for the ISDN Digital Subscriber Line (IDSL) card. The card supports loopback testing. It includes an RS-449 cable for connection to a DCE device.

General specifications

Following are the general specifications for the IDSL card:.

Voice Channels	2
Transfer rate	128 Kbps (symmetric)
Transmission distance	18,000 feet
Interfaces per card	8 ports per card, up to 6 cards per system
Physical connectors	RJ-45
Connector requirements	Must meet JIS C 5973 standards
Card dimensions	5.6 in high x 10.7 in long (14.2 cm x 27 cm)
Card weight	~2 pounds (0.9 kg)
Operating humidity	0-90%, noncondensing
Operating temperature	32–104° F (0–40° C)

Network-interface specifications

Specifications for the IDSL network interface are as follows:

- 18,000 feet over copper twisted pair
- AT&T Point-to-Point
- 2B1Q signaling compatible
- Data only at 128 Kbps (symmetric)

The network interface is compatible with:

- ANSI T1.601-1991
- CNET specification technique ST/LAA/ELR/DNP/822
- ETSI DTR/TM 3002
- Recommendation CCITT G961
- Most of the commercially available 2B1Q band ISDN BRI terminal adapters, bridges, and routers

Loopback testing

IDSL provides the following types of loopback testing:

- Line loopback test
- Corrupt CRC test
- Request corrupt CRC test
- Monitoring

FCC and Canadian Notices

D

This appendix covers the following topics:

FCC Part 15 Notice

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

Warning: The authority to operate this equipment is conditioned by the requirement that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Ascend Communications, Inc.

FCC Part 68 Notice

Ascend Communications MAX models: MAX-DSX/DSX, MAX-CSU/CSU, and MAX-CSU/DSX, have been tested to comply with Part 68 of FCC Rules. Please note the following:

1   Upon request of the telephone company, you should provide the FCC registration number of the equipment that is connected to your line. The MAX unit's registration number for the CSU interface(s) of the MAX-CS/DSU and MAX CSU/DSX is 2CZUSA-74422-XD-N. The MAX unit's registration number for the DSX interface(s) of the MAX DSX/DSX and MAX-CSU/DSX models is 2CZUSA-74421-DE-N.

2   The MAX operates with a 1.544 Mbps digital channel, using RJ48 USOC jacks. The service code is 6.0N. The Facility Interface Code is 04DU9-BN for lines using the Superframe Format (SF); 04DU9-DN for lines using the SF with B8ZS; 04DU9-1SN for lines using Extended Superframe Format (ESF) with B8ZS; and 04DU9-1KN for lines

using ESF format with AMI. The MAX connects to the network using eight-pin modular plugs, wired per FCC Part 68, USOC RJ48C.

3 The telephone company must be notified before removal of a MAX connected to 1.544 Mbps digital service. If the telephone company notes a problem, they may temporarily discontinue service and will notify you 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.

If trouble is experienced with this equipment, please contact:

Ascend Communications, Inc.
1701 Harbor Bay Parkway
Alameda, CA 94502

If the trouble is causing harm to the telephone network, the telephone company may request 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 damage to the equipment caused by local lightening strikes and other electrical surges.

This equipment uses the following USOC jacks and codes:

Model Name	Facility Interface Code	Service Order Code	Jack Type
MAX 6000 T1	04DU9-BN	6.0N	RJ48C
MAX 6000 T1	04DU9-DN	6.0N	RJ48C
MAX 6000 T1	04DU9-1KN	6.0N	RJ48C
MAX 6000 T1	04DU9-1SN	6.0N	RJ48C
MAX 6000 T1	04DU9-1ZN	6.0N	RJ48C

IC CS-03 Notice

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 document(s). The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be coordinated by a representative designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

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

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

Canadian Notice

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

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

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

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

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

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

This equipment does not support line loopbacks.

⚡ **Warning:** THE DIGITAL APPARATUS DOES NOT EXCEED THE CLASS A LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATIONS OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA CLASSE A PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

Warranties

E

The MAX has a twelve-month conditional warranty.

Product warranty

1 Ascend warrants that the MAX will be free from defects in material and workmanship for a period of twelve (12) months from date of shipment.

2 Ascend shall incur no liability under this warranty if:

- The allegedly defective goods are not returned prepaid to Ascend within thirty (30) days of the discovery of the alleged defect and in accordance with Ascend's repair procedures; or

- Ascend's tests disclose that the alleged defect is not due to defects in material or workmanship.

3 Ascend's liability shall be limited to either repair or replacement of the defective goods, at Ascend's option.

4 Ascend MAKES NO EXPRESS OR IMPLIED WARRANTIES REGARDING THE QUALITY, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE BEYOND THOSE THAT APPEAR IN THE APPLICABLE Ascend USER'S DOCUMENTATION. Ascend SHALL NOT BE RESPONSIBLE FOR CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGE, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS OR DAMAGES TO BUSINESS OR BUSINESS RELATIONS. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES.

Warranty repair

1 During the first three (3) months of ownership, Ascend will repair or replace a defective product covered under warranty within twenty-four (24) hours of receipt of the product. During the fourth (4th) through twelfth (12th) months of ownership, Ascend will repair or replace a defective product covered under warranty within ten (10) days of receipt of the product. The warranty period for the replaced product shall be ninety (90) days or the remainder of the warranty period of the original unit, whichever is greater. Ascend will ship surface freight. Expedited freight is at customer's expense.

2 The customer must return the defective product to Ascend within fourteen (14) days after the request for replacement. If the defective product is not returned within this time period, Ascend will bill the customer for the product at list price.

Out-of warranty repair

Ascend will either repair or, at its option, replace a defective product not covered under warranty within ten (10) working days of its receipt. Repair charges are available from the

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Repair Facility upon request. The warranty on a serviced product is thirty (30) days measured from date of service. Out-of-warranty repair charges are based upon the prices in effect at the time of return.

Index

A

AIM/BONDING interface, 1-9
Alarm interface, 1-9
alarm relay operating specifications, B-3
AT&T 5ESS, provisioning, A-3

B

back-panel
   dc power source, 2-7
back-panel LEDs
   standard MAX, 2-12
battery specifications, B-1

C

cable
   100Base-T, C-4
   10Base-T, C-4
   length requirements, C-40
   See also pinouts, E1/PRI, T1/PRI
Channel Service Unit (CSU), C-4
   internal, 2-8
   requirements, C-4
   specifications, C-5
command
   fclear, 3-15, 3-38
   nvramclear, 3-15, 3-38
control port interface, 1-8
control-monitor, C-3
   special keys, using, 4-8

D

dc power source, 1-2, 2-7
   terminal block connectors, 2-7
default settings, restoring, 3-15, 3-38
digital modem card, 1-5
digital modem, installing, 2-2
DO menu, 4-7

DRAM card, 1-7
DRAM interface, 1-8

E

E1 line configuration
   Quickstart, 3-24
E1/PRI
   service provider information, A-3
   WAN connector specifications, C-20
   WAN switches supported, A-3
edit
   fields, 4-4
   main menu, 4-2
enumerated parameters, 4-4
environmental requirements, B-3
Ethernet
   interface specifications, C-4
   menu, 4-3
   required equipment, C-4
expansion cards. *See* slot cards

F

fclear command, 3-15, 3-38
flash memory, 3-15, 3-38
front-panel LEDs, 2-9
   MAX, 2-9
   Redundant MAX, 2-11
Full Access privileges, 3-14, 3-37

H

hardware
   power supply, illustrated, 2-5
   redundant power supply, illustrated, 2-5
hardware installation, 2-1, 2-5, 2-6
Host/6 (AIM/6) card, 1-3
Host/BRI port, C-21

VT100 interface
  DO menu, 4-7
  edit fields, 4-4
  enumerated parameters, 4-4
  Ethernet menu, 4-3
  Main Edit Menu, 4-1
  menu numbers, 4-9
  menu window, to make active, 4-2
  Mod Config menu, 4-3, 4-7
  saving your changes, 4-5
  status window, 4-2

W

WAN
  (1 to 4) ports, C-6, C-13
  (1-4) ports, 1-9
  E1/PRI connector specifications, C-20
  switched services, C-12
window
  DO, 4-7
  Ethernet, 4-3
  menu, 4-2
  Mod Config, 4-3, 4-7
  status, 4-2
wink-start, A-2

X

X.21 cabling specifications, C-39