DIGITAL RouteAbout Access ES and RouteAbout Access ISDN

Installation and Configuration

Part Number: ER-RDEX1-IN. B01

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This guide describes how to install and configure the RouteAbout Access ES and the RouteAbout Access ISDN.

Revision Information: This is a revised document.

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This equipment complies with Part 68 of the Federal Communications Commission (FCC) rules for the United States.

A label is located on the underside of the base unit containing the FCC registration number. You must, upon request, provide the following information to your local telephone company: **Facility Interface Code: 02IS5; Service Order Code: 6.0N; USOC Jack Type: RJ48C.**

If you experience trouble with this equipment RouteAbout Access ISDN for repair or warranty information, contact Digital Equipment Corporation @ 1-800-DIGITAL. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

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This equipment cannot be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs.

Your telephone company may discontinue your service if your equipment causes harm to the telephone network. They will notify you in advance of disconnection, if possible. During notification, you will be informed of your right to file a complaint to the FCC.

Occasionally, your telephone company may make changes in its facilities, equipment, operation, or procedures that could affect the operation of your equipment. If so, you will be given advance notice of the change to give you an opportunity to maintain uninterrupted service.

FCC Notice — Class B Computing Device:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. Any modifications to this device - unless expressly approved by the manufacturer - can void the user's authority to operate this equipment under part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and (2) This device must accept any interference that may cause undesirable operation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

VCCI Notice — Class 2 Computing Device (Japan Class B)

This equipment is in the 2nd Class category (information equipment to be used in residential area or an adjacent area) and conforms to the standards set by the Voluntary Control Council for interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in such residential area.

When used near a radio or TV receiver, it may become the cause of radio interference. Read instructions for correct handling.

CE Notice — Class B Computing Device:

Warning!

This is a Class B product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Achtung!

Dieses ist ein Gerät der Funkstörgrenzwertklasse B. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in welchen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Avertissement!

Cet appareil est un appareil de Classe B. Dans un environnement résidentiel cet appareil peut provoquer des brouillages radioélectriques. Dans ce cas, il peut être demandé à l'utilisateur de prendre les mesures appropriées.

Canadian Standards Association (CSA) Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the interference-causing equipment standard entitled: *Digital Apparatus*. CES-003 of Industry Canada.

Cet appareil numérique respecte les limites de bruits radioélectriques applicables aux appareils numérique de Classe B prescrites dans la norme sur le matériel brouiller: *Appareil numérique*, NMB-003 édictée par Industrie Canada.

U.K. Safety Approval

The RouteAbout Access ISDN is manufactured to the International Safety Standard EN 60950 and as such is approved in the U.K. under General Approval number NS/G/1234/J/10003 for indirect connection to the public telecommunication network.

European Community (EC) Mark of Conformity Statement

This product is in conformity with the protection requirements of EC Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Proteon cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-Proteon option cards.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment.

This product bears the Telecom CE Mark (CE 168 X) for WAN complying with i-CTR1 and i-CTR2 (Bridging measures) per the European Directive 91/263/EEC (TTE Directive).

This product also complies with the Low Voltage Directive 73/23/EEC.

A signed copy of the Declaration of Conformity is on file and available from Digital Equipment Corporation, U.S.A.

This product has been tested and found to comply with the limits for Class B Information Technology Equipment according to CISPR 22/European Standard EN 55022. The limits for Class B equipment were derived for typical residential environments to provide reasonable protection against interference with licensed communication devices.

Dieses Gerät erfüllt die Bedingungen der EN 55022 Klasse B.

The safety status of interconnection ports is as follows:

Host Connection Port	Safety Extra Low Voltage (SELV)
NTP Port	Telecom Network Voltage (TNV)
Console (maintenance)	SELV

Preface

Overview

This guide contains information on installing and configuring the RouteAbout Access ES and RouteAbout Access ISDN routers. You can configure your RouteAbout Access router by using either the RouteAbout Access Configuration Tool, an interactive graphical configuration utility shipped with your router, the Quick Config process, or the command line interface.

Intended Audience

This guide is intended for the inexperienced or moderately experienced user who has the responsibility for installing and configuring the RouteAbout Access ES or RouteAbout Access ISDN on your local area network.

Organization

This guide is organized as follows:

Chapter/ Appendix	Description
1	Provides an overview of the RouteAbout Access ES and RouteAbout Access ISDN routers.
2	Provides information on the installation of the RouteAbout Access ES router.
3	Provides information on the installation of the RouteAbout Access ISDN router
4	Provides information on configuring the RouteAbout Access routers.
5	Provides information on troubleshooting the RouteAbout Access routers.
A	Provides information on using the command line interface to configure the RouteAbout Access routers.
B	Provides information on using the Quick Config to configure the RouteAbout Access routers.
C	Provides product specifications for the RouteAbout Access ES and RouteAbout Access ISDN routers.
D	Provides cable specifications for the RouteAbout Access ES and RouteAbout Access ISDN routers.

Associated Documents

DIGITAL provides the following related sources of information for the RouteAbout Access ES and RouteAbout Access ISDN routers. All of the documents are available on the DIGITAL Network Products Home Page on the World Wide Web.

Title	Description
RouteAbout Access ES and RouteAbout Access ISDN Bridging Guide	Describes the configuration and monitoring procedures for bridging methods, along with bridging features that enhance system performance.
RouteAbout Access ES and RouteAbout Access ISDN Event Logging System Messages Guide	Describes how events are logged and their interpretation. It also provides a description for each event logging system (ELS) message and the corresponding corrective action.
RouteAbout Access ES and RouteAbout Access ISDN LAN/WAN Interface Guide	Describes how to configure and monitor LAN and WAN interfaces and features.
RouteAbout Access ES and RouteAbout Access ISDN Protocol Guide	Describes how to configure and monitor the IP, ARP, IPX, AppleTalk Phase 2, and SNMP protocols. It also provides information on the MIBs that DIGITAL supports.
RouteAbout Access ES and RouteAbout Access ISDN System Software Guide	Provides information on the software operating environment of the RouteAbout Access routers.

Conventions

Overview

This section describes the conventions and symbols used in this guide.

Convention	Description
Bold	Used for commands and user input. For example: Use the **talk** command to switch to other router menus. Clear statistics? (Yes or No): `yes`
`Courier font`	Used for screen displays. For example: `BOOT information`
Italics	Used for emphasis and for variables. For example: Do *not* answer yes. *xxxxxxxx* will be an eight-digit hexadecimal value.
Enter, Esc, Ctrl p	Keys that you press appear like this.

Correspondence

Documentation Comments

If you have comments or suggestions about this document, send them to DIGITAL Network Products.

Attn.: Documentation Project Manager
E-MAIL: doc_feedback@lkg.mts.dec.com

Online Services

Further product information is available on the DIGITAL Network Products World Wide Web Sites. All sites maintain the same, rich set of up-to-date information on products, technologies, and programs.

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Americas:	http://www.networks.digital.com
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By Mail (Canada)	DIGITAL EQUIPMENT of CANADA LTD. 940 Belfast Road Ottawa, Ontario, Canada K1G 4C2 Attn.: A&SG Business Manager
Internationally	DIGITAL EQUIPMENT CORPORATION Attn.: A&SG Business Manager c/o local DIGITAL subsidiary or approved distributor
Internally	U.S. Software Supply Business (SSB) DIGITAL EQUIPMENT CORPORATION 8 Cotton Road Nashua, New Hampshire 03063

Safety

Overview

Any warning or caution that appears in this guide is defined as follows. The cautions that must be observed for the hardware described in this guide are listed below in English, German, French, and Spanish.

WARNING	Contains information to prevent personal injury.
CAUTION	Contains information to prevent damage to equipment.
VORSICHT	Enthält Informationen, die beachtet werden müssen um den Benutzer vor Schaden zu bewahren.
ACHTUNG	Enthält Informationen, die beachtet werden müssen um die Gerate vor Schaden zu bewahren.
DANGER	Signale les informations destinées à prévenir les accidents corporels.
ATTENTION	Signale les informations destinées à prévenir la détérioration du matériel.
AVISO	Contiene información para evitar daños personales.
PRECAUCIÓN	Contiene información para evitar daños al equipo.

General Safety Information

CAUTION

For your personal safety, follow these guidelines before installation.

- Do not remove the covers. The unit is self-contained with no user-serviceable parts.
- Use only indoors. The unit is not intended for any other use.
- Disconnect power supply cord in case of emergency.
- Plug the unit directly into a grounded outlet.
- Be sure you have the required power. The RouteAbout Access ES and the RouteAbout Access ISDN both require 100-240 VAC/50-60 Hz power.
  - For 110 Volt Operation: Use a UL Listed/CSA labelled cord set consisting of a minimum 18 AWG, Type SVT or SJT three-conductor cord terminating in a molded connector body that has an IEC CEE-22 female configuration on one end and a molded-on parallel blade grounding type attachment plug rated 15A, 125V configuration (5-15P) at the other end.
  - For 230 Volt Operation (North America): Use a UL Listed/CSA labelled cord set consisting of a minimum 18 AWG, Type SVT or SJT three-conductor cord terminating in a molded connector body that has an IEC CEE-22 female configuration on one end and a molded-on tandem blade grounding type attachment plug rated 15A, 250V configuration (6-15P) at the other end.
  - For 230 Volt Operation (other than North America): Use a cord set, marked HAR, consisting of a minimum HO5VV-F cord that has a minimum 0.75 square millimeter diameter conductors provided with an IEC 320 receptacle and a male plug suitable for the country of installation.

Allgemeine Sicherheitshinweise

ACHTUNG

Beachten Sie im Interesse Ihrer eigenen Sicherheit unbedingt die nachstehenden Richtlinien, bevor Sie mit der Installation beginnen.

- Nehmen Sie auf keinen Fall die Abdeckungen ab. Die Einheit enthält keine Teile, die vom Benutzer gewartet oder repariert werden können.
- Einheit nur in geschlossenen Räumen betreiben. Die Einheit ist nur für den vorgesehen Einsatzweck zu verwenden.
- Bei Störfällen oder Fehlfunktionen Netzstecker ziehen.
- Netzstecker der Einheit direkt in eine geerdete Steckdose stecken.
- Achten Sie darauf, daß die Stromversorgung den technischen Daten der Einheit entspricht. RouteAbout Access ES und RouteAbout Access ISDN werden mit 100-240 Volt Wechselstrom und 50-60 Hz betrieben.
  - — Betrieb mit 110 Volt: Verwenden Sie eine UL-zugelassene Leitungsschnur mit CSA-Kennzeichnung und einem Drahtdurchmesser von mindestens 18 AWG, Typ SVT, oder eine SJT-Dreileiterschnur mit einem anvulkanisierten IEC CEE-22 Buchsenstecker an der einen Seite und einem anvulkanisierten Stiftstecker mit Schutzkontakt für 15 A, 125 V auf der anderen Seite (5-15P).
  - — Betrieb mit 230 Volt (Nordamerika): Verwenden Sie eine UL-zugelassene Leitungsschnur mit CSA-Kennzeichnung und einem Drahtdurchmesser von mindestens 18 AWG, Typ SVT, oder eine SJT-Dreileiterschnur mit einem anvulkanisierten IEC CEE-22 Buchsenstecker an der einen Seite und einem anvulkanisierten Stiftstecker mit Schutzkontakt für 15 A, 250 V auf der anderen Seite (6-15P).
  - — Betrieb mit 230 Volt (außerhalb Nordamerikas): Verwenden Sie eine Leitungsschnur mit HAR-Kennzeichnung und dem Typenkurzzeichen HO5VV-F, die einen Durchmesser von mindestens 0,75 mm2 hat sowie mit einer IEC 320-Steckbuchse und einem im Vertriebsland passenden Stecker ausgestattet ist.

Sécurité générale

ATTENTION

Pour votre propre sécurité, observez les précautions suivantes avant l'installation.

- Ne pas retirer les capots. L'unité est intégrée, aucune pièce ne pouvant être remplacée par l'utilisateur.
- Ne pas utiliser en extérieurs. L'unité n'y est pas préparée.
- Débrancher le cordon d'alimentation en cas d'urgence.
- Brancher le cordon d'alimentation sur une prise de terre.
- Vérifiez la tension. RouteAbout Access ES et RouteAbout Access ISDN requièrent 100-240 V CA/50-60 Hz.
  - 110 volts : Utilisez des cordons UL/CSA comprenant au minimum un cordon triple 18 AWG, type SVT ou SJT logé dans un corps de connecteur moulé avec une configuration IEC CEE-22 femelle d'un côté, et une prise de connexion parallèle moulée avec mise à la terre de 15A, 125V (5-15P) de l'autre côté.
  - 230 volts (Amérique du nord) : Utilisez des cordons UL/CSA comprenant au minimum un cordon triple 18 AWG, type SVT ou SJT logé dans un corps de connecteur moulé avec une configuration IEC CEE-22 femelle d'un côté, et une prise de connexion parallèle moulée avec mise à la terre de 15A, 250V (6-15P) de l'autre côté.
  - 230 volts (autres pays) : Utilisez des cordons, marqués HAR, comprenant au minimum un cordon HO5VV-F avec des conducteurs de 0,75 mm2 de diamètre minimum, logés dans un réceptacle IEC 320, et une prise mâle adaptée au pays concerné.

Información sobre seguridad general

PRECAUCION

Para su seguridad personal, siga los pasos siguientes antes de realizar la instalación.

- No retire las cubiertas. La unidad no cuenta con piezas a las que el usuario pueda dar mantenimiento.
- Utilice la unidad sólo en el interior. La unidad no debe tener ningún otro uso.
- Desconecte el cable de fuente de alimentación en caso de emergencia.
- Conecte la unidad directamente en una toma provista de una conexión a tierra.
- Asegúrese de tener la alimentación requerida. Tanto RouteAbout Access ES como RouteAbout Access ISDN requieren una alimentación de 100-240 VCA/50-60 Hz.
  - — Para el funcionamiento en 110 voltios: utilice cables que tengan la etiqueta UL/CSA de calibre AWG 18 mínimo, cable de tres conductores tipo SVT o SJT que termine en un cuerpo de conector moldeado que tenga una configuración hembra IEC CEE-22 en un extremo y una clavija de conexión de cuchillas paralelas con contacto a tierra moldeada con configuración de 15A, 125V (5-15P) en el otro extremo.
  - — Para el funcionamiento en 230 voltios (América del Norte): utilice cables que tengan la etiqueta UL/CSA de calibre AWG 18 mínimo, cable de tres conductores tipo SVT o SJT que termine en un cuerpo de conector moldeado que tenga una configuración hembra IEC CEE-22 en un extremo y una clavija tándem con contacto a tierra moldeada con configuración de 15A, 250V (6-15P) en el otro extremo.
  - — Para el funcionamiento en 230 voltios (que no sea en América del Norte): utilice cables marcados con HAR, que consten de un cable HO5VV-F mínimo, con conductores de un diámetro mínimo de 0,75 mm² con un receptáculo IEC 320 y un enchufe macho adecuado para el país de instalación.

Chapter 1

Product Features

Overview

This chapter introduces you to the RouteAbout Access ES and the RouteAbout Access ISDN routers. This chapter covers the following topics:

Introduction

The RouteAbout Access ES is a remote access router that gives you inexpensive asynchronous and synchronous access between your Ethernet Local Area Network (LAN) and a Wide Area Network (WAN). It is an internetworking router that forwards (or routes) data along the most efficient network-to-network paths. It enables the PCs and workstations on your LAN to become part of the Internet or another WAN.

The RouteAbout Access ISDN router is a remote access router that provides connectivity between your Ethernet LAN and an ISDN network. The RouteAbout Access ISDN router comes in two models: U and S/T. The U model has a Network Termination (NT1) device built into the router. The S/T model does not have an NT1 device built into the router.

Any reference to the RouteAbout Access ISDN router refers to both the /IP and the /MP versions unless specified otherwise. The RouteAbout Access ISDN/IP router provides IP networking capability. The RouteAbout Access ISDN/MP router provides multi-protocol networking capability for Bridging, IP, IPX, and AppleTalk 2.

There is no need to load any software on your RouteAbout Access routers. The RouteAbout Access routers come preloaded with software. Refer to your *RouteAbout Access ES and RouteAbout Access ISDN Release Notes* for a list of specific features and protocols.

To communicate over LANs and WANs, including the Internet, you must assign IP network addresses. Your Internet Service Provider (ISP) or your network manager can supply you with the IP network addresses and other information that may be pertinent, such as static routes or filters to be enabled.

For RouteAbout Access ISDN routers, you must also configure ISDN on your router. For ISDN details, refer to the ISDN Overview on page 1-8.

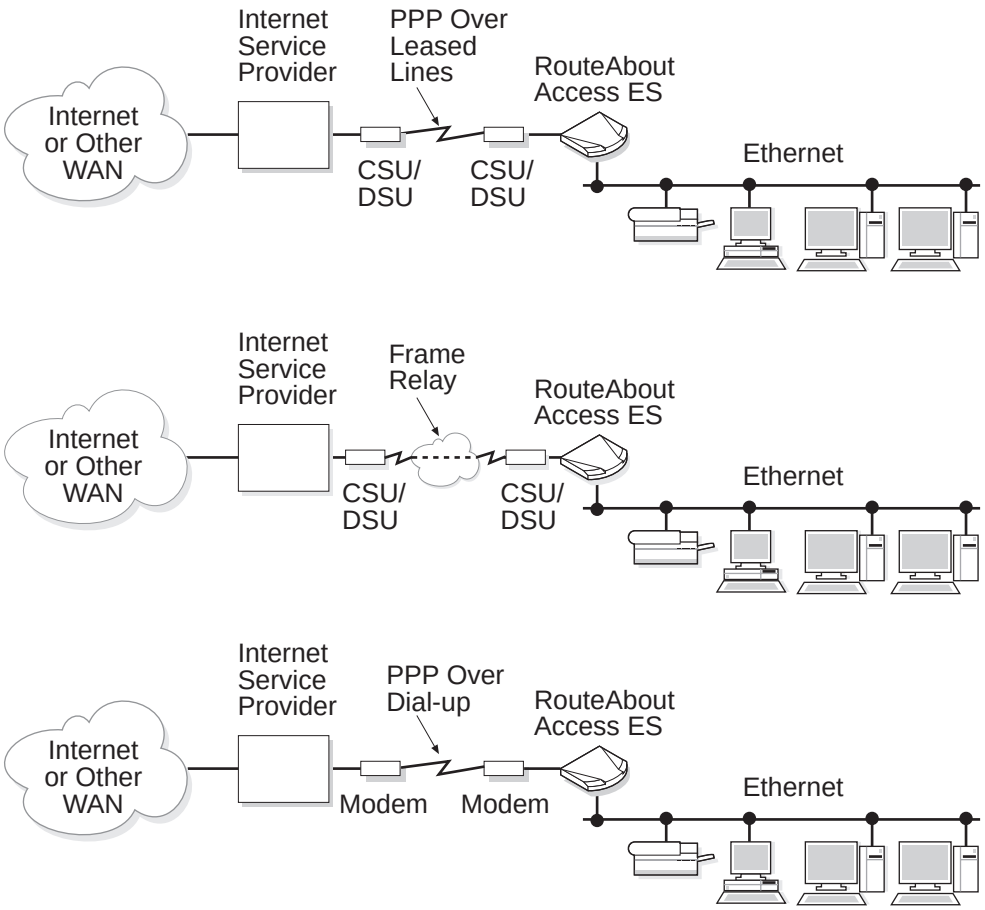
RouteAbout Access ES Hardware Capabilities

Your RouteAbout Access ES comes equipped with an RJ-45 connector for an Ethernet 10BaseT (twisted pair) LAN connection and a WAN connector. These connectors allow you to link to Ethernet segments and to connect to a WAN in order to access the Internet or another remote network. You can connect your router to a WAN using PPP over a leased line, Frame Relay, or PPP over dial-up.

DIGITAL also offers an alternate model of the RouteAbout Access ES that has an Ethernet BNC connector that provides LAN connectivity using 10Base2 (ThinWire) cabling.

Figure 1-1 illustrates various ways of using your RouteAbout Access ES to connect your Ethernet LAN to the Internet or another WAN.

Figure 1-1: RouteAbout Access ES Configurations



RouteAbout Access ISDN Hardware Capabilities

The RouteAbout Access ISDN routers come equipped with an RJ-45 connector for an Ethernet 10BaseT (Unshielded Twisted Pair) LAN connection and an RJ-45 ISDN connector to connect to the WAN.

The only hardware difference between the RouteAbout Access ISDN/IP and the RouteAbout Access ISDN/MP is that the memory of the RouteAbout Access ISDN/MP is double that of the RouteAbout Access ISDN/IP.

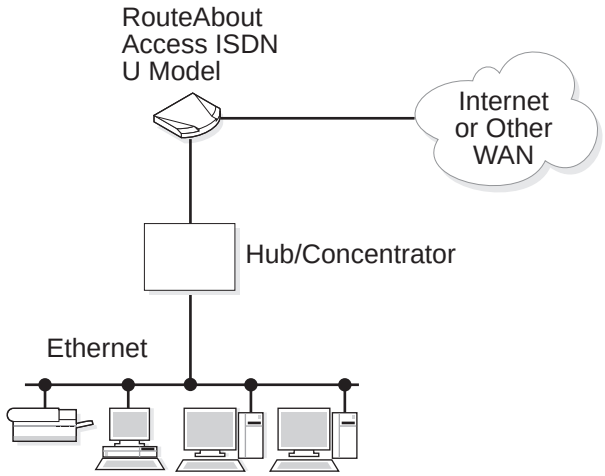
	/IP	/MP
Memory DRAM	2 MB	4 MB
Flash	1 MB	2 MB

The RouteAbout Access ISDN routers provide ISDN connectivity through two different models: the U model and the S/T model.

U Model

The U model has a Network Termination (NT1) device built into the router. It provides the power and function for operating the ISDN line. When you use the U model, you cannot use any other ISDN device on the ISDN line. There is no port on the back of the U model for any other ISDN device. Figure 1-2 shows a configuration for connecting the RouteAbout Access ISDN U model to the Internet.

Figure 1-2: Connecting the RouteAbout Access ISDNU to the Internet



S/T Model

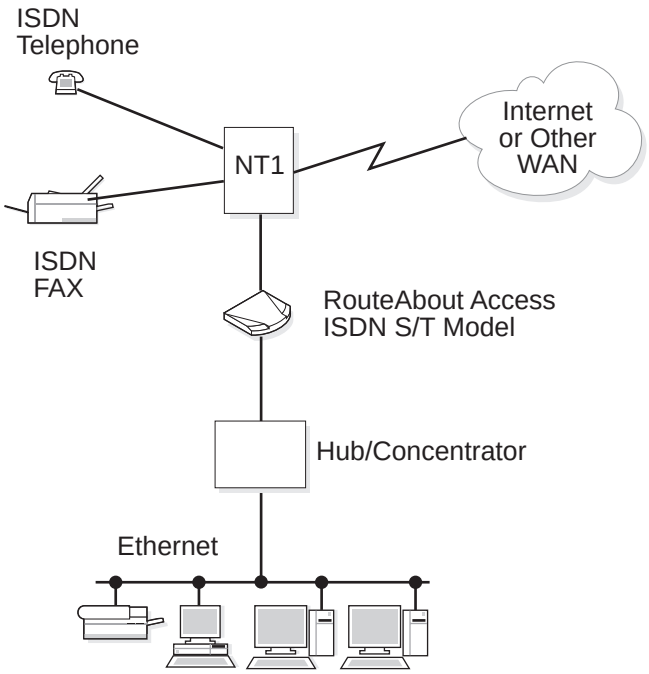
The S/T model does not have an NT1 device built into the router. You must provide an external NT1 device on the ISDN line.

CAUTION

DIGITAL recommends that you purchase an NT1 device that has adequate power surge protection.

The S/T model can co-exist with other ISDN equipment using the same ISDN line. Figure 1-3 shows a configuration for connecting the S/T model to the Internet.

Figure 1-3: Connecting RouteAbout Access ISDN S/T to the Internet



ISDN Overview

NOTE

This section applies to RouteAbout Access ISDN routers only.

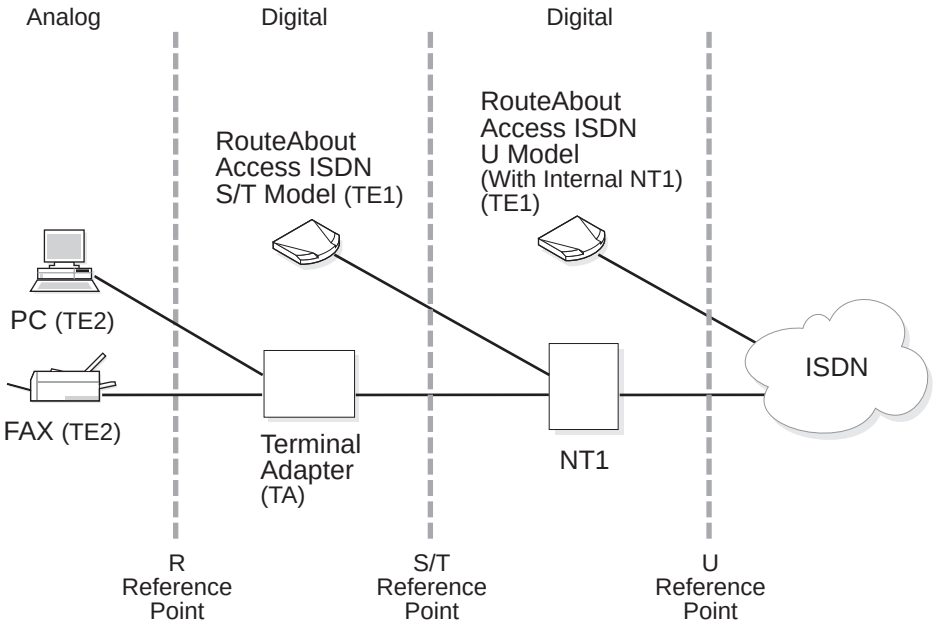
Integrated Services Digital Network (ISDN) is a switched digital technology that upgrades an ordinary analog telephone network to an all-digital, end-to-end network. Using ISDN, you can transmit all types of information, such as voice, data, and video. With ISDN, you no longer need to incur the expense of leasing an all-digital line to receive the high-speed benefits of digital technology.

This section introduces you to ISDN and assists you with ordering ISDN from your telephone service.

Functional Devices and Reference Points

Figure 1-4 defines the ISDN connection. It shows the ISDN functional devices and reference points.

Figure 1-4: ISDN Functional Devices and Reference Points



Functional devices are pieces of hardware that perform tasks on an ISDN (Table 1-1). The PC and FAX machine are Terminal Equipment 2 (TE2) functional devices that are not capable of connecting to an ISDN without using the Terminal Adapter (TA). The combination of a TE2 and a TA has the same functionality as a Terminal Equipment 1 (TE1).

The ISDN line between the TA and the NT1 can support up to eight devices. You need to bus the devices together.

The RouteAbout Access ISDN routers are TE1 devices that are ISDN-ready. The RouteAbout Access ISDN U models are devices that can carry out more than one function. They combine a TE1 and an NT1. The RouteAbout Access ISDN S/T models are TE1s that require an external NT1.

Table 1-1 describes the functional device tasks each performs in an ISDN connection.

Table 1-1: Functional Devices

Functional Device	Description
TE1	Any ISDN-ready device that connects directly to ISDN or connects to ISDN via an NT1. For example: a digital telephone, a RouteAbout Access ISDN router.
TE2	Any non-ISDN device that needs to be used with a Terminal Adapter (TA) to work with ISDN. For example: an analog FAX, PC, or analog telephone.
TA	A device that converts non-ISDN communication to ISDN to allow non-ISDN devices to work with ISDN.
NT1	A device located between the S/T and U reference points that allows communication between functional devices.

Device-to-device interfaces are called reference points. Table 1-2 explains the location of the reference points in an ISDN connection.

Table 1-2: Reference Points

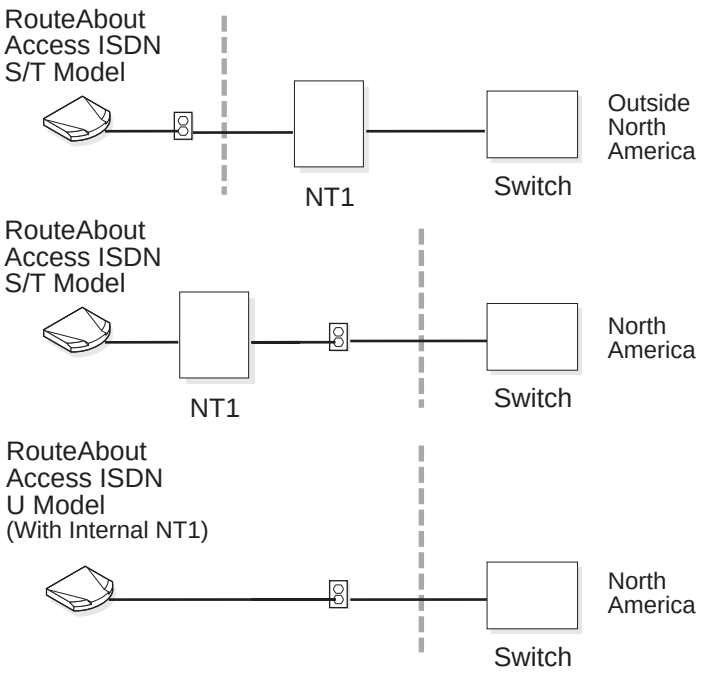
Reference Point (Interface)	Location
R	Non-ISDN Terminal Equipment (TE2) and a Terminal Adapter (TA)
S/T	ISDN user equipment and Network Termination (NT1) equipment
U	NT1 equipment and an ISDN central office

Network Termination (NT1) Devices

An NT1 is the boundary to the ISDN network from the end-user side. It includes the physical and electrical termination functions of ISDN. It provides an interface between the twisted-pair wires used by the telephone company in the BRI and the eight-wire cables used by ISDN equipment. It is located between the S/T and U reference points and is the termination point before the ISDN switch.

Figure 1-5 shows the RouteAbout Access ISDN S/T and U models in relation to the switch within North America and outside North America.

Figure 1-5: Function of NT1



Outside North America, NT1 is provided as part of the telephone company equipment. Inside North America, customers must provide NT1 equipment. The U model has an internal NT1. The S/T model does not come with an NT1; you must provide it. In North America, where the NT1 is not built into the wall, using an integrated piece of equipment, such as the RouteAbout Access ISDN U model, is convenient.

Switch Variants

The telephone company's switch variant, or type of switch, determines the capabilities of your ISDN service. It is your primary connection into the ISDN network. The switch variant determines how many ISDN devices you can handle, as well as what different configuration options you can have. Some switch variants support eight different devices, others limit you to two devices. The switch also determines which B channels support voice, video, data, or both. Most telephone companies provide a switch variant from one of the following ISDN switch variants.

Table 1-3 lists the supported ISDN switch variants for the RouteAbout Access ISDN routers support.

Table 1-3: ISDN Switch Variants Supported

Location	If you want this switch standard . . .	Set the software to . . .
North America	United States National ISDN-1 United States National ISDN-2 AT&T 5ESS Custom Northern Telecom DMS-100 Custom	USNI1 USNI2 5ESS DMS-100
Europe	European ETSI NET3, VN4 VN3	NET3 VN3
Japan	INSNet64	INS64
Australia	TS013	AUS

NOTE

As of October 18, 1996, VN3 is obsolete in Europe.

When you call your telephone company, you must ask for the switch variant they use. When you configure the RouteAbout Access ISDN, you need to provide the switch variant.

ISDN Telephone Numbers

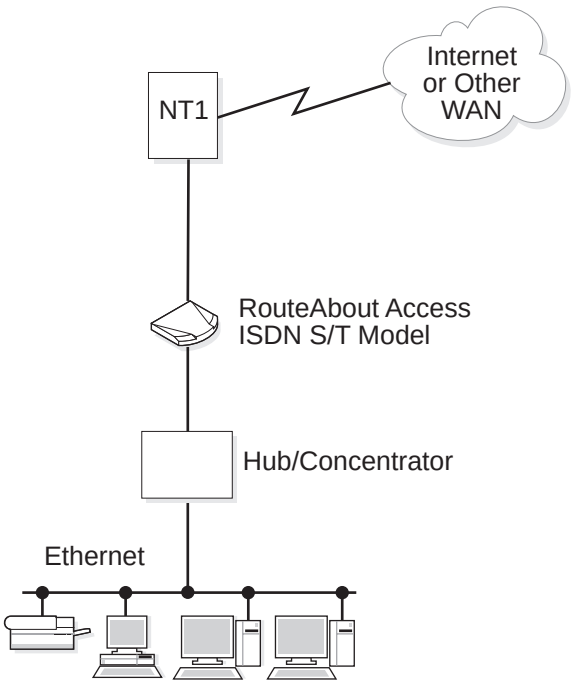
When you order ISDN, you need a telephone number (directory number) for the ISDN line assigned to you by the telephone company. Depending on the switch variant your telephone company has, you may need only one for both B channels or one for each B channel. These numbers do not have a direct association with any one of the B channels, but can be used for either.

When you configure the RouteAbout Access ISDN for ISDN, you need to define the ISDN telephone number(s) assigned to the B channels.

Point-to-point and Multipoint Configurations

In the ISDN configuration in Figure 1-6, the RouteAbout Access ISDN S/T model is in a point-to-point configuration, where there is one router on the ISDN line. A point-to-point configuration for the U model would look the same except the NT1 would be inside the RouteAbout Access ISDN itself.

Figure 1-6: ISDN Point-to-point Configuration

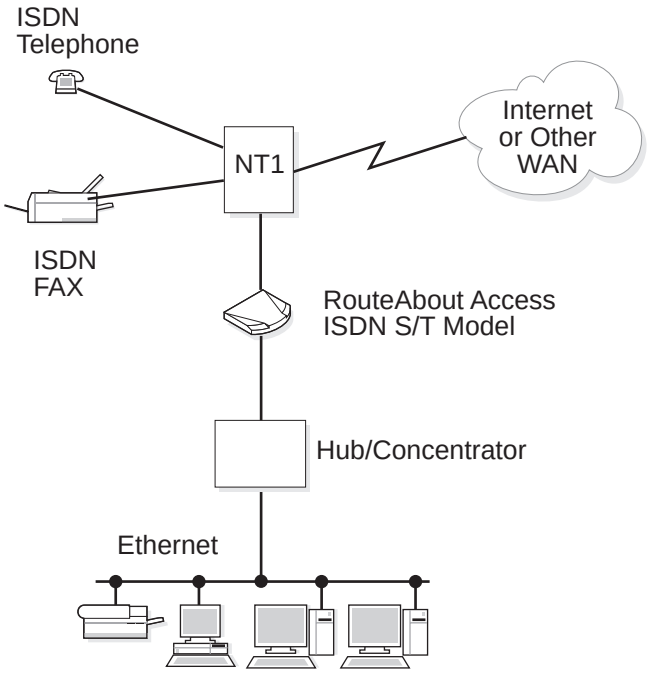


In Figure 1-7, the RouteAbout Access ISDN S/T model is sharing the ISDN line with other devices in a multipoint configuration.

NOTE

When the RouteAbout Access ISDN is the only device at the end of an ISDN line, you are not sharing the line with other physical pieces of equipment. However, you may need to configure the line for multipoint, if your telephone company uses a switch variant that requires multipoint configuration, regardless of the number of pieces of equipment you have on your ISDN line.

Figure 1-7: ISDN Multipoint Configuration



Terminal Endpoint Identifier (TEI)

Terminal equipment refers to any device you have that is connected to an ISDN line. The Terminal Endpoint Identifier (TEI) is a number that identifies your equipment. In Figure 1-4, the RouteAbout Access ISDN, S/T and U models, as well as the Terminal Adapter, have TEIs. The Terminal Adapter has the TEI for non-ISDN terminal equipment.

The telephone company either automatically assigns TEIs or gives you a pre-assigned value to enter in the configuration of your RouteAbout Access ISDN. When you configure your RouteAbout Access ISDN, you either enter the assigned TEI(s) or select automatic, as directed by your telephone company. TEIs always exist.

Service Profile Identifier (SPID)

A SPID is a number that lets the telephone company know what kinds of ISDN services a given device can access. If your telephone company uses SPIDs, you need a unique SPID for every device you have on the ISDN line or one for each B channel. A SPID is usually a 10-, 12-, or 14-digit number containing the telephone number of the line and a prefix or suffix, or both. For example, 31466699990000. Whether or not your telephone company uses SPIDs depends on the kind of switch in use. The switch variants in North America use SPIDs.

When you configure the RouteAbout Access ISDN, you need to specify the SPIDs used. You can configure up to two SPIDs on the RouteAbout Access ISDN, one for each B channel.

Ordering ISDN

When you configure your RouteAbout Access ISDN, you must know the switch variant your telephone company has, your ISDN telephone number, TEIs, and possibly SPIDs. You can get this information from your telephone company. Be sure to save this information.

To order an ISDN line:

1) Call your telephone company.

2) If you are using Data Over Speech Bearer Service (DOSBS), you need to order ISDN Ordering Code (IOC) EZ-ISDN-1. This provides data and voice capabilities on one or both B channels.

3) If you are using circuit switched data only on both B channels, it may be cost effective to order ISDN Ordering Code (IOC) package R. This provides data only capabilities on both B channels.

4) Ask for their ISDN switch variant.

The telephone company must make certain provisions to ensure that ISDN can work for your needs and configuration. The telephone company's switch (refer to Switch Variants on page 1-12) must be provisioned to supply the services you need.

You may want to use a Centrex switch, if your local telephone company provides it. Centrex provides switching applications like an on-site Private Branch Exchange (PBX) but all your connections go back to the telephone company office. For Centrex, the telephone company charges an installation and monthly fee and operates much like a leased-line connection so you can use it for your own internal network. The lines remain up all the time and there is no per call usage charge.

5) Get an ISDN telephone number (directory number).

Depending on the switch variant, you may need only one number for both B channels or one for each B channel. The telephone company tells you.

6) Find out how many digits you need to use to dial out.

Your telephone company will tell you the number of digits you need to dial out. Sometimes you need the area code and telephone number, such as for long-distance calls, other times just a seven-digit number, or a 9 + seven digits, or just four digits as in an extension number. The number of digits may vary depending on the call destination.

7) Find out whether you need to configure your ISDN line as point-to-point or multipoint.

Some switches require you to configure your line as multipoint (having multiple devices using the same BRI line) regardless of how many devices you have at the end of your ISDN line.

8) Get a TEI for each device connected to your ISDN line.

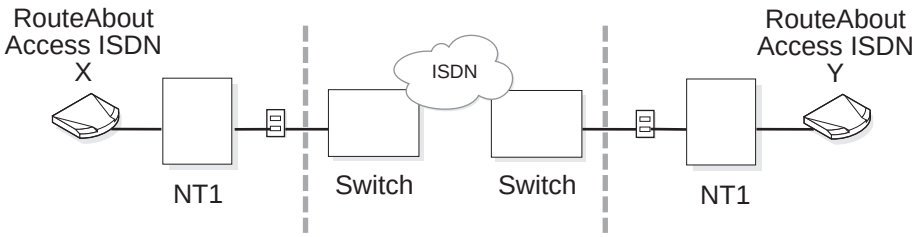
Generally, the telephone company tells you to use Automatic TEIs, where the switch assigns the TEI value automatically when the router initializes the ISDN line. However, in some circumstances, the telephone company assigns you a fixed TEI, a number between 0 and 63, which is permanently assigned to the ISDN line.

9) In North America only, find out whether or not your telephone company uses SPID numbers. If so, you need to know the SPIDs associated with this line and should have at least one SPID for each B channel.

ISDN Call Setup and Teardown

Figure 1-8 illustrates what happens physically when two RouteAbout Access ISDN S/T models initiate a connection.

Figure 1-8: Call Setup and Teardown



When you place a call using ISDN equipment, the following steps occur from setup to teardown:

1) A physical/electrical connection is made between each RouteAbout Access ISDN and their local switch.

2) Using the D channel, the switch and each RouteAbout Access ISDN exchange TEI messages so that each RouteAbout Access ISDN ends up with an identifier.

3) Using the D channel, each RouteAbout Access ISDN sends SPIDs up to the switch for initialization. This typically happens for North American switches that are configured for multipoint operation. If TEIs are assigned and SPIDs are successfully initialized, you are ready to receive or make calls over one or both of the B channels, simultaneously.

4) The control information, which the D channel carries, sets up one or two calls on the B channels, one call per B channel.

5) The two devices pass data back and forth on the B-channel calls.

6) Suppose RouteAbout Access ISDN X requests to shut down a call.

7) Using the D channel, the switches disconnect the B channel carrying that call between the two routers. (If two calls are up, the other B channel remains up.)

8) The call is terminated and the B channel is then available for another call. One or both calls can set up or tear down in this manner.

Chapter 2

Installation of the RouteAbout Access ES

Overview

The RouteAbout Access ES provides communication from one LAN to another LAN or to a WAN (including the Internet). This chapter describes the step-by-step procedures for setting up the necessary connections. It includes the following topics:

Introduction

The RouteAbout Access ES does not require any special environment. It operates at normal room temperature and humidity and can co-exist with the usual computing equipment and electronic devices found in offices, homes, and classrooms.

For complete information about the RouteAbout Access ES operating environment, refer to Appendix C.

The following sections show how to connect your RouteAbout Access ES to:

- an Ethernet
- a WAN
- a PC console

Figure 2-1 illustrates the back panel of a RouteAbout Access ES that has an RJ-45 connector for 10BaseT cable connections to an Ethernet network.

Figure 2-1: RouteAbout Access ES Back Panel

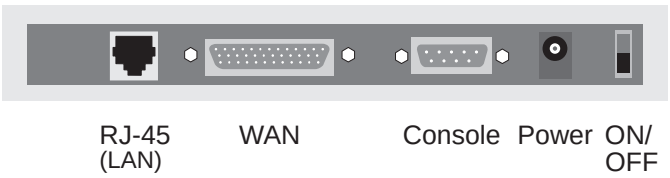
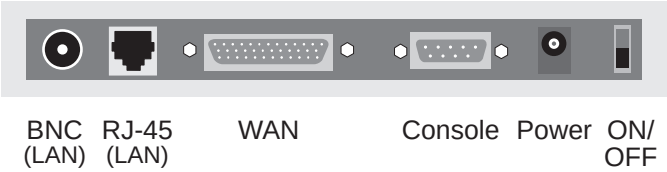


Figure 2-2 illustrates the back panel of a RouteAbout Access ES that has both a BNC and an RJ-45 connector for 10Base2 and 10BaseT cable connections to an Ethernet network, respectively.

Figure 2-2: RouteAbout Access ES With a BNC Connector



NOTE

If you have a RouteAbout Access ES that has both a BNC and an RJ-45 connector, your RouteAbout Access ES does not support using both Ethernet LAN connections at the same time.

CAUTION

For your personal safety, follow the safety guidelines in the Safety section in the front of this guide before installing your RouteAbout Access ES.

Connecting Your RouteAbout Access ES to an Ethernet

You can connect your RouteAbout Access ES to an Ethernet by using 10BaseT (Twisted Pair) cable. If your RouteAbout Access ES is a model that also has a 10Base2 (BNC) connector, you can connect it to an Ethernet by using 10Base2 (ThinWire) cable.

NOTE

The RouteAbout Access ES does not support using both Ethernet LAN connections at the same time.

Using 10BaseT Cable

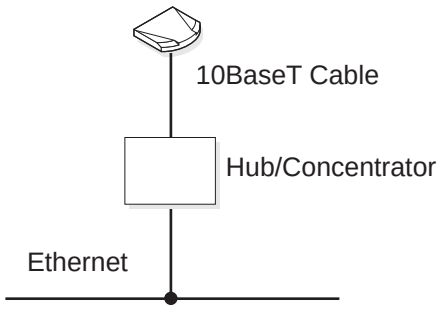
To connect the RouteAbout Access ES to an Ethernet using a 10BaseT cable, do the following:

1) Connect one end of the twisted pair (10BaseT) Ethernet cable to the RJ-45 connector on the RouteAbout Access ES.

2) Connect the other end of the cable to a 10BaseT concentrator or hub.

Figure 2-3 illustrates using 10BaseT (twisted pair) cable to connect your RouteAbout Access ES to the Ethernet LAN.

Figure 2-3: 10BaseT Connection



NOTE

The maximum cable length for 10BaseT cable is 100 meters (approximately 328 feet).

Using 10Base2 Cable

To connect a RouteAbout Access ES to an Ethernet by using 10Base2 cable, do the following:

1) Attach a BNC T-connector to your RouteAbout Access ES BNC connector.

NOTE

DIGITAL does not include the T-connector in your RouteAbout Access ES package, but you may purchase this and other equipment from DIGITAL. Refer to the following table:

Equipment	Part Number
BNC T-connector	H8223
BNC barrel connector	H8224
BNC terminator	H8225

1) Connect one end of a ThinWire (10Base 2) coaxial cable to the BNC T-connector attached to your RouteAbout Access ES.

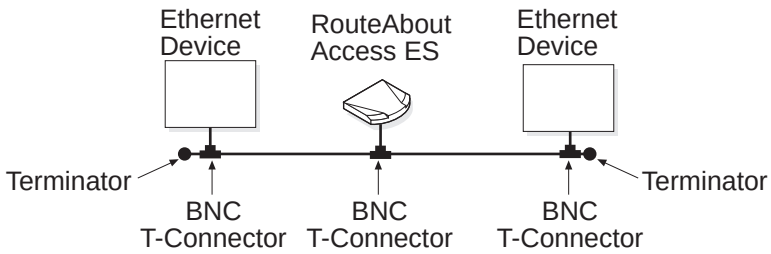
2) Connect the other end of the coaxial cable to the BNC T-connector attached to the Ethernet device.

NOTE

If either your RouteAbout Access ES or the Ethernet device is an end node, attach a BNC terminator to the open connector on the BNC T-connector.

Figure 2-4 illustrates using 10Base2 cable to connect your RouteAbout Access ES to an Ethernet.

Figure 2-4: 10Base2 Connection



NOTE

The maximum cable length for 10Base2 cable is 185 meters (approximately 600 feet).

Connecting Your RouteAbout Access ES to a Wide Area Network (WAN)

To connect your RouteAbout Access ES to the Internet or any other WAN, connect the WAN cable to the WAN connector on the RouteAbout Access ES.

To be sure that you are using the proper cable for each connection, check the part number on the cable with the information in the following table. To purchase cables, order by the DIGITAL part number.

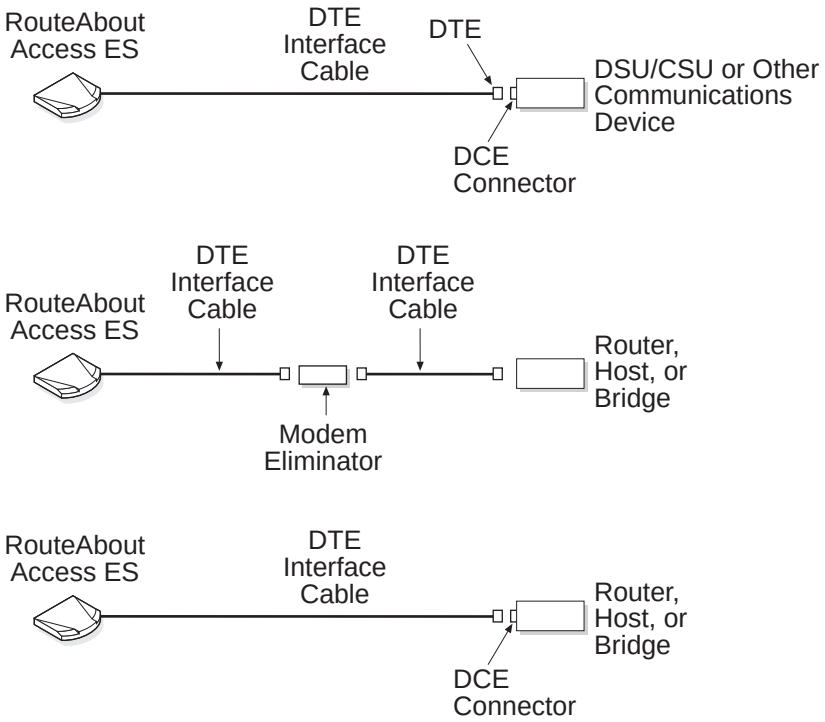
Part Number on Cable	Type of Cable	DIGITAL Part Number
P4730-08	V.35 DTE	BN37D-02
P4730-09	RS-232 DTE	BN37E-02
P4730-10	X.21 DTE	BN37F-02
P4730-11	V.35 DCE	BN37G-02
P4730-12	RS-232 DCE	BN37H-02
P4730-13	X.21 DCE	BN37J-02

NOTE

The RouteAbout Access ES model that does not have a BNC connector for 10Base2 cable connections does not support X.21.

To connect a WAN cable from the RouteAbout Access ES to a Digital Switching Unit/ Channel Switching Unit (DSU/CSU) or other Digital Communications Equipment (DCE) device, the DCE device must be full-duplex and provide clocking for both transmitting and receiving. Figure 2-5 shows various Data Terminal Equipment/ Digital Communications Equipment (DTE/DCE) connections.

Figure 2-5: WAN Connection Example

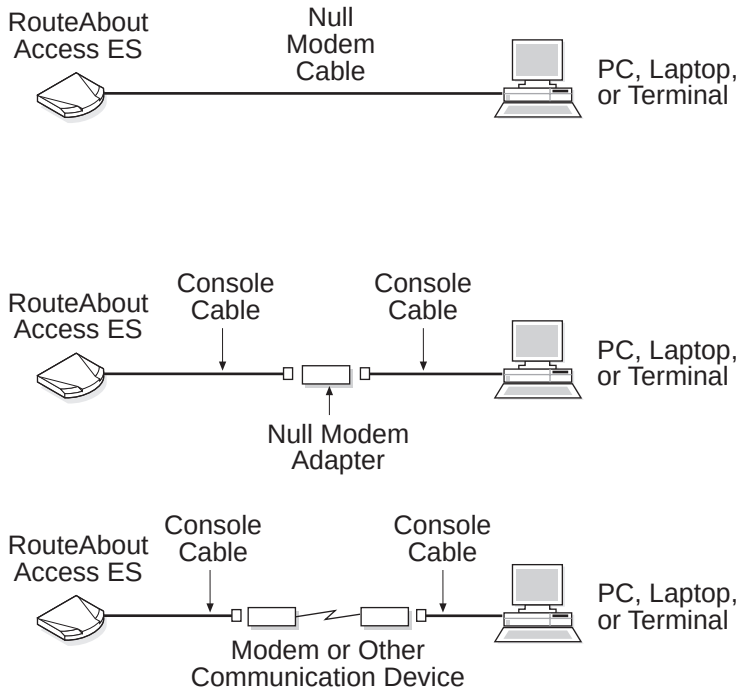


Connecting Your RouteAbout Access ES Console Port to a PC

In order to set up the network interface for the RouteAbout Access ES, you must initially configure your RouteAbout Access ES from a PC connected to the RouteAbout Access ES Console port. You can use either the RouteAbout Access Configuration Tool, Quick Config, or the Command Line Interface to do this initial configuration. For more information, refer to Chapter 4, Configuration.

Use the cable supplied with the RouteAbout Access ES to connect a PC to the Console port. Figure 2-6 shows three ways to connect a PC to the RouteAbout Access ES.

Figure 2-6: Console Connections



Chapter 3

Installation of the RouteAbout Access ISDN

Overview

Your RouteAbout Access ISDN routers provide communication between a LAN and WAN (ISDN). This chapter describes the step-by-step procedures for setting up the necessary connections. It includes the following topics:

Introduction

The RouteAbout Access ISDN routers do not require any special environment. They operate at normal room temperature and humidity and can co-exist with the usual computer equipment and electronic devices found in offices, homes, and classrooms. For complete information about the RouteAbout Access ISDN operating environment, refer to Appendix C, Hardware Specifications.

The following sections show how to connect your RouteAbout Access ISDN to

- An Ethernet network
- An ISDN line
- A PC (console)
- A power supply

The RouteAbout Access ISDN/IP and /MP both come in two models, the U model and the S/T model. To assist you with your setup, Figure 3-1 displays the back panel of the U model and Figure 3-2 displays the back panel of the S/T model.

Figure 3-1: RouteAbout Access ISDN U Back Panel

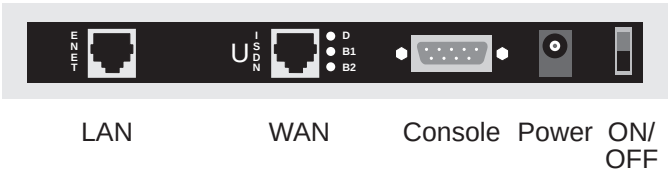
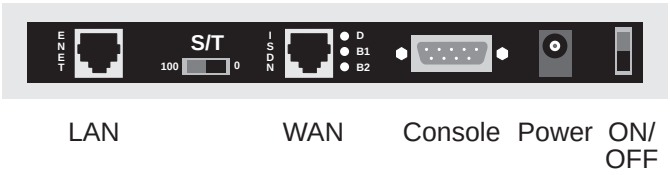


Figure 3-2: RouteAbout Access ISDN S/T Back Panel



Before You Begin

Before installing your RouteAbout Access ISDN, you should have the following available:

- Ethernet 10BaseT cable

  This is also known as Unshielded Twisted Pair (UTP) cable. It is not supplied with your RouteAbout Access ISDN but is readily available at a computer store.

- RJ-45 ISDN cable

  This is supplied with your RouteAbout Access ISDN. The part number is 12-003120-03.

- Console cable and 9-pin to 25-pin console adapter

  This is supplied with your RouteAbout Access ISDN. The part number is 12-003130-02.

- A PC or terminal to be used as a console

CAUTION

For your personal safety, follow the safety guidelines in the Safety section in the front of this guide before installing your RouteAbout Access ISDN.

Connecting Your RouteAbout Access ISDN to an Ethernet

You can connect your RouteAbout Access ISDN to an Ethernet network by using a 10BaseT (UTP) cable and a hub or by using an Ethernet crossover cable.

Using a 10BaseT Cable and a Hub

1) Connect one end of the UTP (10BaseT) Ethernet cable to the RJ-45 ENET connector on the RouteAbout Access ISDN.

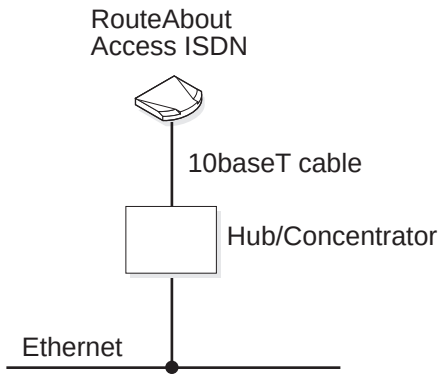
CAUTION

Do *not* connect this cable to your ISDN port.

2) Connect the other end of the cable to a 10BaseT concentrator or hub.

Figure 3-3 illustrates how to use a 10BaseT cable to connect your RouteAbout Access ISDN to the Ethernet LAN.

Figure 3-3: 10BaseT Connection



NOTE

The maximum cable length for 10BaseT cable is 100 meters (approximately 328 feet).

Using an Ethernet Crossover Cable

If you want to connect a single PC or terminal directly to your RouteAbout Access ISDN, you can use an Ethernet crossover cable. For pinout information, see Appendix D, Cable Specifications.

1) Connect one end of an Ethernet crossover cable to the RJ-45 ENET connector on the RouteAbout Access ISDN.

CAUTION

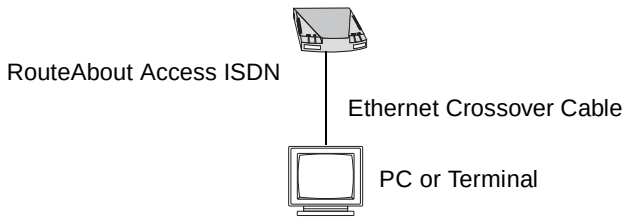
Do *not* connect this cable to your ISDN port.

---

2) Connect the other end of the cable to the Ethernet port on your PC or terminal.

Figure 3-4 is an example of connecting a PC to a RouteAbout Access ISDN with an Ethernet crossover cable.

Figure 3-4: Crossover Cable Connection



Connecting Your RouteAbout Access ISDN to an ISDN Line

How you make the connection from your RouteAbout Access ISDN to an ISDN line depends on whether you have a RouteAbout Access ISDN U or S/T model.

For RouteAbout Access ISDN U Model

1) Connect one end of the DIGITAL-supplied RJ-45 ISDN cable to the RJ-45 ISDN connector on the RouteAbout Access ISDN (Figure 3-1).

2) Connect the other end of the DIGITAL-supplied ISDN cable directly into an ISDN wall jack (Figure 1-5).

CAUTION

An RJ-11 cable, which is used with a regular telephone, can also be used to connect the RouteAbout Access ISDN to the wall jack. DIGITAL discourages this because you may inadvertently plug the RouteAbout Access ISDN into a normal telephone jack. This may damage the RouteAbout Access ISDN.

For RouteAbout Access ISDN S/T Model

1) Connect one end of the DIGITAL-supplied RJ-45 ISDN cable to the RJ-45 ISDN connector on the RouteAbout Access ISDN (Figure 3-2).

NOTE

Because the S/T model does not contain an internal NT1 device, you need an external NT1 device to attach to your ISDN line. A typical NT1 device looks like a small modem and has S/T port(s) and a U interface on the back of it. All the ports use RJ-45 jacks (Figure 1-5).

2) Connect the other end of the DIGITAL-supplied ISDN cable to the S/T port on the NT1 device.

3) Set the S/T terminator switch to the appropriate position.

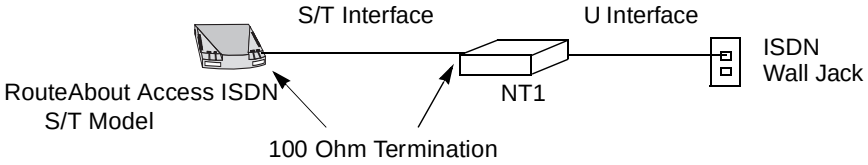
4) Connect one end of an ISDN cable into the NT1 U interface port and the other end into the ISDN wall jack. The ISDN cable for this connection is dependent on your NT1 device.

Setting the S/T Switch

There is an S/T switch on the back of the RouteAbout Access ISDN S/T models (Figure 3-2). You can slide the switch to 100 or 0. Setting the switch to 0 means that no terminating resistor is in use. Setting the switch to 100 means that the RouteAbout Access ISDN S/T model terminates the ISDN cable with a 100-ohm resistor.

For point-to-point connections (Figure 3-5), set the switch to 100. For all other configurations, consult your NT1 device manual for the proper settings. In a point-to-point connection, there is one ISDN device on an ISDN line.

Figure 3-5: Point-to-point Connection



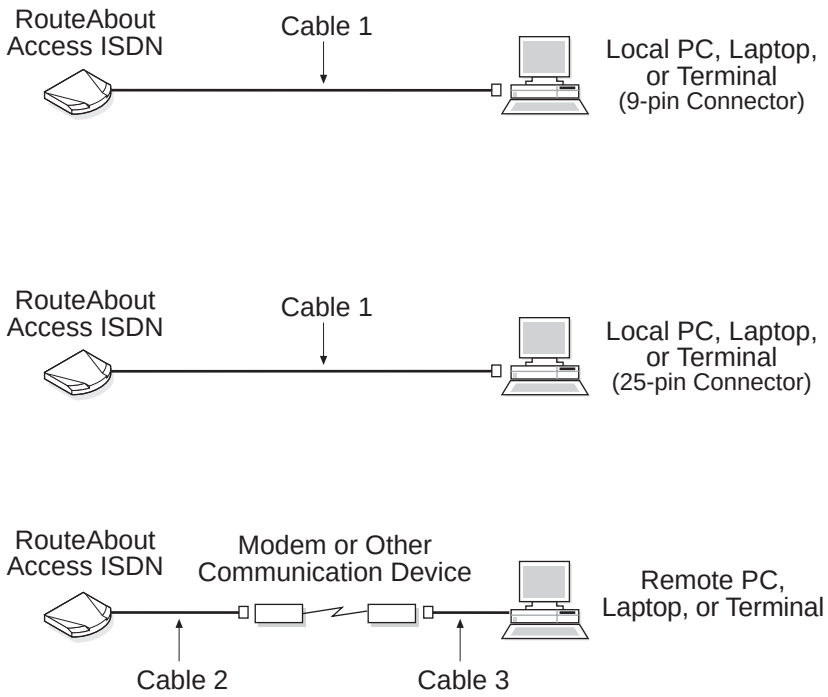
Connecting Your RouteAbout Access ISDN to a PC

In order to set up the network interface for the RouteAbout Access ISDN routers, you must initially configure your RouteAbout Access ISDN from a PC (or terminal) connected to the RouteAbout Access ISDN console port. You can use either the RouteAbout Access Configuration Tool, Quick Config, or the Command Line Interface to do this initial configuration.

Use the DIGITAL-supplied console cable and 9-pin to 25-pin console adapter to directly connect a local PC or terminal to the console port. If your PC or terminal has a 9-pin connector, you do not need the adapter.

Figure 3-6 shows three ways to connect a PC to the RouteAbout Access ISDN, as well as a legend that describes the cables and adapter.

Figure 3-6: Console Connections

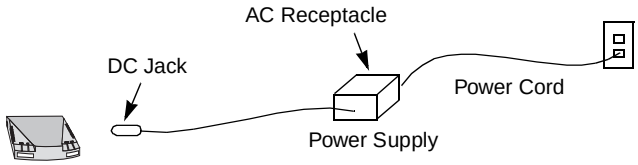


Cable	Part Number	Description
Cable 1	DIGITAL-supplied P/N 12-003130-02	9-pin to 9-pin null modem cable
Cable 2	DIGITAL-orderable BC29P-10	9-pin to 25-pin straight-through cable
Cable 3	N/A (Available at a computer store)	Dependent on your modem and PC
Adapter	DIGITAL-supplied P/N 12-003130-02	9-pin to 25-pin console adapter

Plugging In the Power Supply

There is a +5V connector in the back of your RouteAbout Access ISDN. Follow these steps to connect the DIGITAL-supplied power supply (PN 40-000200-00):

Figure 3-7: Connecting the Power Supply



1) Connect the dc jack end of the DIGITAL-supplied 5 V dc power supply to the +5 V connector on the back of your RouteAbout Access ISDN (Figure 3-1 and Figure 3-2).

2) Connect one end of your power cord into the ac receptacle of the power supply.

3) Plug the power cord into the wall outlet.

Powering Up the RouteAbout Access ISDN

After you have secured all your connections, you are ready to power up your RouteAbout Access ISDN. There is a power switch, which is marked 1/0, on the back panel of both models of the RouteAbout Access ISDN that controls the power to the router (Figure 3-1 and Figure 3-2). Once you move the power switch to the "1" position, (switch up for ON), POST (Power-On Self-Test) begins. POST takes from 10 to 30 seconds, depending on the size of the RouteAbout Access ISDN memory (DRAM).

During the execution of POST, the OK light flashes at approximately three times per second. Following a successful pass of POST, the RouteAbout Access ISDN starts to boot and the OK light flashes approximately every second.

If POST detects a catastrophic failure, the OK light turns off and the RouteAbout Access ISDN powerup sequence halts.

If POST detects a noncatastrophic failure, the RouteAbout Access ISDN continues to boot and reports a diagnostic failure code on the attached terminal or PC.

If POST fails, restart the powerup sequence. If the RouteAbout Access ISDN continues to fail, contact DIGITAL customer service.

For more information about the status lights, refer to Chapter 5, Troubleshooting.

Chapter 4

Configuration

Overview

This chapter discusses the tools available for configuring your RouteAbout Access ES and RouteAbout Access ISDN routers. It focuses on one of those tools, the RouteAbout Access Configuration Tool. It includes the following topics:

Configuration Tools

The RouteAbout Access ES and RouteAbout Access ISDN routers are shipped with software preinstalled; however, some configuration is required.

To configure your RouteAbout Access router, use one of the following tools:

Tool	Description
RouteAbout Access Configuration Tool	A Microsoft Windows-based graphical configurator shipped with your RouteAbout Access router. It runs under Windows 3.1, Windows for Workgroups 3.11, Windows NT, and Windows 95.
Command Line Interface	A command line interface that allows you to configure and monitor your RouteAbout Access router by entering commands at a terminal or PC (refer to Appendix A, Using the Command Line Interface).
Quick Config	A question and answer script that allows you to configure basic device, bridging, routing, and booting information without having to enter and exit the different configuration processes. It is part of the Command Line Interface (refer to Appendix B, Using Quick Configuration).

NOTE

You can use the RouteAbout Access Configuration Tool or Quick Config to configure, but not monitor your RouteAbout Access router. You can use the Command Line Interface for both configuring and monitoring your router.

Installing the RouteAbout Access Configuration Tool

This section explains how to install the RouteAbout Access Configuration Tool on your PC.

To install the RouteAbout Access Configuration Tool, perform the following steps:

1) Insert the RouteAbout Access Configuration Tool disk in your PC floppy drive (either A or B).
2) For Windows 95 and Windows NT 4.0, click the **Start** button and then select **Run** from the menu.
3) Enter the following command in the text box: **a:\setup** or **b:\setup**
4) Click **OK** to run the setup program.
5) Follow the instructions on the screen to complete the installation.

Under Windows 95 and Windows NT, the RouteAbout Access Configuration Tool is installed on your C: drive (or another location that you choose) as follows:

```
c:\program files\digital equipment corporation\routeabout
access configuration tool
```

NOTE

You can create a shortcut that points to the executable file as part of the setup.

Running the RouteAbout Access Configuration Tool

This section explains how to run the RouteAbout Access Configuration Tool.

NOTE

If you created a shortcut, click the RouteAbout Access Configuration Tool icon on your desktop.

To run the RouteAbout Access Configuration Tool, perform the following steps:

1) For Windows 95 and Windows NT 4.0, click the **Start** button and then select **Run** from the menu.

2) Enter the following command in the text box:

c:\program files\digital equipment corporation\routeabout access configuration tool\ractool.exe

3) Click **OK** to run the RouteAbout Access Configuration Tool.

Once the RouteAbout Access Configuration Tool is running, use it to configure your RouteAbout Access router. There are three configuration methods that you can use: basic, intermediate, and advanced. These configuration methods are explained in the following table:

Configuration	Description
Basic Configuration	Essential parameters and options needed to configure your RouteAbout Access router.
Intermediate Configuration	Parameters that you need for your RouteAbout Access router in greater detail than the Basic Configuration.
Advanced Configuration	More complex protocols and features.

Most parameters have default values that you can use for typical installations. These defaults appear in the windows.

Configuring Your RouteAbout Access Router

The following section provides information for configuring your RouteAbout Access routers.

Before You Begin

To configure your RouteAbout Access router for the first time, you need to do the following:

1) For RouteAbout Access ISDN routers only, you need to know the appropriate ISDN information. For a list of information you need, refer to Ordering ISDN on page 1-16.

2) If do not have an IP address on your RouteAbout Access router, use a PC or a dumb terminal connected to the RouteAbout Access router console port to set up your IP address. (Without the IP address, the RouteAbout Access has no way to communicate with the network.)

3) Perform the initial configuration in either of the following ways:

— Run a terminal emulation application to access one of the command line interfaces (the Command Line Interface or Quick Config). For information on terminal emulators, refer to Using Quick Config or the Command Line Interface on page 4-7.

— Run the RouteAbout Access Configuration Tool and select one of the configuration methods — Basic, Intermediate, or Advanced — and choose the Next> button at the bottom of the window. Three buttons are at the bottom of each window:

Button	Description
<Back	Returns to the previous window.
Next>	Proceeds to the next window.
Exit	Exits the Configuration Tool. When you choose this button the Utility asks you if you are sure you want to exit (shut down) the Utility.

Directions for using the RouteAbout Access Configuration Tool are provided in the its online help.

NOTE

Be sure you are running the RouteAbout Access Configuration Tool version that supports the software load in your RouteAbout Access router. Select About in the Help menu to get this information.

Using Quick Config or the Command Line Interface

If you are running Windows on a PC not connected to the RouteAbout Access console port, your PC needs the TCP/IP networking software or "stack" (WINSOCK.DLL) that allows communication with the Internet or other TCP/IP networks. This software is included with Windows 95 and Windows NT 4.0.

If you want to configure your RouteAbout Access by using Quick Config or the Command Line Interface, connect your PC serial port to the RouteAbout Access Console port and run the HyperTerminal Application.

Windows 95 and Windows NT 4.0 HyperTerminal Application

If you are running Windows 95 or Windows NT 4.0, do the following to set up your HyperTerminal application:

1) Click the **Start** button and select **Programs**, **Accessories**, and **HyperTerminal**.
2) In the HyperTerminal window, double-click the **Hypertrm.exe** icon.
3) Enter **rtabt** in the Name field and select an icon to represent your RouteAbout Access router.
4) On the Phone Number screen, select the appropriate COM port to use in the Connect using field. For example: **Direct to Com 1**.
5) In the COM1 Properties screen, select the following settings:
   a) Baud Rate: **9600**
   b) Data Bits: **8**
   c) Parity: **None**
   d) Stop Bits: **1**
   e) Flow Control: **None**

Verifying the Configuration

After running the RouteAbout Access Configuration Tool and download (export) the configuration to your RouteAbout Access router, via the console port, you can check to see if your PC can reach the RouteAbout Access router and whether the RouteAbout Access router can forward data from your PC to a system on a remote LAN. If the **ping** and **telnet** commands are present on your PC or workstation, use these commands to check your connections. The location of the Ping and Telnet utilities varies from system to system, depending on your operating system and the vendor's TCP/IP stack.

From Your PC to the RouteAbout Access Router

To run Ping or Telnet from your PC to the RouteAbout Access router, do the following:

1) For Windows 95 and Windows NT 4.0, click the **Start** button and then select **Run** from the menu.

2) Enter **ping** or **telnet** and the IP address of the LAN connector (port) on your RouteAbout Access router in the text box. For example:

   c:\windows\ping 128.10.12.61

   c:\windows\telnet 128.10.12.61

If Ping succeeds, you receive either a message indicating that the RouteAbout Access router address is reachable or lines of output that show your PC receiving data from the RouteAbout Access router. If Telnet succeeds, you see a RouteAbout Access router welcome message.

From Your PC to a Remote Network

To run Ping or Telnet from your PC to a remote network, do the following:

1) Ask your Internet Service Provider for the IP address or name of a remote system that your PC can reach through the RouteAbout Access router.

2) For Windows 95 and Windows NT 4.0, click the **Start** button and then select **Run** from the menu.

3) Enter **ping** or **telnet** and the IP address of the remote system. For example:

   c:\windows\ping 128.10.12.61

   c:\windows\telnet 128.10.12.61

If Ping succeeds, you see either a message indicating that the address is reachable or a series of short messages that show your PC receiving data from the remote system. If Telnet succeeds, a welcome message appears prompting you to log in to the remote system.

Chapter 5

Troubleshooting

Overview

You can monitor the operational status of your RouteAbout Access ES and RouteAbout Access ISDN by checking the status lights on your router. You can also check the connection between your PC and the RouteAbout Access router by running either the Ping or Telnet program (refer to Verifying the Configuration on page 4-8).

This chapter provides information on the more common problems you may encounter using your RouteAbout Access router. It contains the following topics:

RouteAbout Access Routers Front Status Lights

There are four green status lights in slots on the front of the RouteAbout Access ES and RouteAbout Access ISDN routers. These lights indicate the current operating status of the RouteAbout Access router. The lights can glow steadily (ON) or they can blink. Table 5-1 indicates the meaning of each light.

Figure 5-1: Front Status Light Indications

Table 5-1: Lights on the Front of the RouteAbout Access Routers

Light	State	Indication
PWR	On (not blinking)	Power supply is operating within its specifications.
	Off (no light)	Not receiving power.
OK	On (blinking once every five seconds)	Running its operational software.
	On (blinking three times per second)	Performing diagnostics. This happens only at powerup.
	Blinking (once per second)	Running its startup (BOOT) software.
	Off	Hardware problem (refer to Hardware Problems and Solutions on page 5-6).
WAN	On	WAN connection is up, and at least one router B channel has a call.
	Blinking	Traffic on one or both ISDN B channels.
	Off	Has no B channels calls up.
LAN	On	LAN connection to your local network is up.
	Blinking	Sending and receiving user data on its LAN link.
	Off	LAN connection is down.

RouteAbout Access ISDN Rear Status Lights

There are three green status lights on the back panel of the RouteAbout Access ISDN. These lights indicate the BRI ISDN status of the two B and one D channels. The lights can glow steadily (ON) or they can blink. Both D and B channel lights go off when you restart the router.

Figure 5-2: RouteAbout Access ISDN U Rear Panel

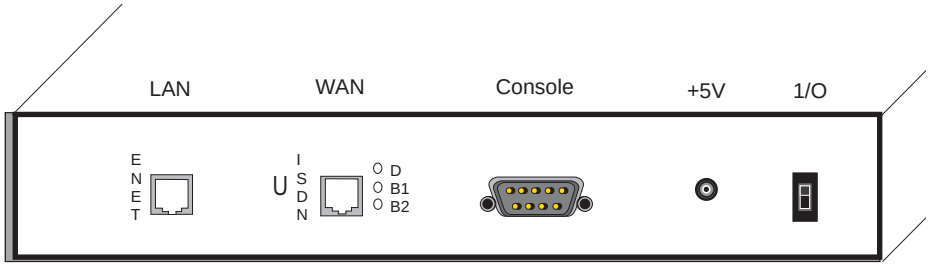


Figure 5-3: RouteAbout Access ISDN S/T Rear Panel

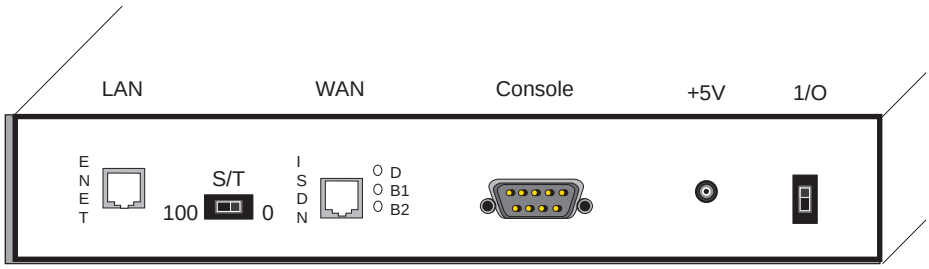


Table 5-2 indicates the meaning of each light on the rear of your RouteAbout Access ISDN.

Table 5-2: Rear Status Lights on RouteAbout Access ISDN

Light	State	Indication
D	On	RouteAbout Access ISDN is linked to the telephone company.
	Blinking	Traffic is on the D channel.
	Off	RouteAbout Access ISDN is not linked to the telephone company. This is an error in North America but okay in Europe.
B1	On	Call established on the B1 channel.
	Blinking	Traffic is on the B1 channel.
	Off	Channel is not in use or the channel is idle.
B2	On	Call established on the B2 channel.
	Blinking	Traffic is on the B2 channel.
	Off	Channel is not in use or the channel is idle.

Hardware Problems and Solutions

The following table lists the more common hardware problems you may encounter with your RouteAbout Access router. It identifies the problem, possible cause(s) of the problem, and the steps to take to solve the problem.

Table 5-3: Hardware Problems and Solutions

Problem	Possible Cause(s)	Solution
No PWR light, console, or other activity.	RouteAbout Access router is not plugged into a power source.	Plug your RouteAbout Access router into a grounded power outlet.
	Circuit power interrupted. Note: The RouteAbout Access router has no fuses.	Check outlet and circuit fuses or breakers.
No OK light.	RouteAbout Access router is not booting.	Contact DIGITAL customer service if you get the message `Power On Self Test detected a hardware failure. Error log longword = xxxxxxxx` where *xxxxxxxx* will be eight hex digits. Report this value to DIGITAL customer service.
No LAN light.	Ethernet is not up.	Check all Ethernet-specific connections.

Problem	Possible Cause(s)	Solution
No WAN light.	Loose connection.	Secure all connections.
	Bad cable.	Try another DIGITAL supplied cable and see if it works.
	Wrong cable.	Check the Part Number (PN) on the cable and use the appropriate cable (refer to Before You Begin on page 3-3).
	For RouteAbout Access ISDN only, see problems with D and B channels in this table.	

Problem	Possible Cause(s)	Solution
No D channel light. (RouteAbout Access ISDN only)	Line activation is not achieved due to the following:	
	Incorrect S/T switch setting.	Set switch correctly (refer to Setting the S/T Switch on page 3-7).
	European switch type.	The European switch type (NET3, VN3) activates the line only during a call. The line is de-activated when the interface has no active calls, and no light will be on.
	Loose connection.	Secure all connections.
	Bad cable.	Try another DIGITAL-supplied RJ-45 ISDN cable and see if it works.
	Wrong cable.	Check the Part Number (PN) on the cable and use the appropriate cable (refer to Before You Begin on page 3-3). If all else is okay, check with your telephone company.

Problem	Possible Cause(s)	Solution
No B channel light. (RouteAbout Access ISDN only)	The call is not successfully established.	Check to be sure you are dialing the correct telephone number. Check that your ISDN line is in service. (D channel light must be on.) Check to see if the remote site is busy. Check the *RouteAbout Access ES and RouteAbout ISDN LAN/ WAN Interface Guide* on the DIGITAL web site for other possible configuration problems and try again later.
Cannot access a remote network or the Internet even though the RouteAbout Access router looks okay.	ISP service is down.	Try again later. Contact your ISP for status.

ISDN-Specific Problems and Solutions

The following table lists ISDN-specific problems and solutions. These problems apply to the RouteAbout Access ISDN only

Table 5-4: ISDN-Specific Problems and Solutions

Problem	Possible Cause(s)	Solution
TEIs are not assigned.	The switch is unable to assign a TEI. See also No D channel light in Table 6-1.	Contact your telephone company.
SPIDs not initializing when needed for switch variant.	Using a SPID not given to you by your telephone company.	Call your telephone company to find out if you need a SPID and, if so, get a valid SPID from them. You can configure up to two SPIDs on the RouteAbout Access ISDN, one for each B channel.

Problem	Possible Cause(s)	Solution
Unable to place a successful outbound call.	Incorrect local telephone number (DN0 and DN1).	Call your telephone company to verify your local telephone numbers.
	Incorrect destination telephone number. Example: Using a seven-digit destination number instead of a four-digit extension number to dial out.	Call your telephone company to verify your remote telephone numbers.
	Incorrect switch type.	Call your telephone company to verify what switch type your ISDN lines are coming from.
	ISDN interface has been disabled.	At the `Config>` prompt, enter **enable interface**.
	Using point-to-point instead of multipoint for multipoint selection.	At the `ISDN Config>` prompt, enter **set multipoint-selection mp**. Call your telephone company to verify this provision on the switch.

Problem	Possible Cause(s)	Solution
Unable to receive an inbound telephone call.	Authorization fails because caller ID is absent.	Caller ID, a supplementary service is not supported for this line. You must do one of the following to work around this: • Configure PAP and CHAP on both the calling and the called routers. • At the `WAN Config>` prompt, enter **enable any-inbound**.
	Authentication fails.	Check PAP and CHAP configuration on both the calling and the called routers.
	Router dialing in is not part of Access Control List.	At the `WAN Config>` prompt, add the remote router name to the Access Control List using the **set access-list** command.
	Disable inbound is set at the `WAN Config>` prompt.	At the `WAN Config>` prompt, enter **enable inbound**.
	ISDN interface has been disabled.	At the `Config>` prompt, enter, **enable interface *interface number***.

Problem	Possible Cause(s)	Solution
Remote site is not responding.	Remote site is not configured.	Check the configuration of the remote site.
	Remote site is busy with all its channels in use.	Wait until the remote site frees up a channel and try again.

Event Logging System Messages

Events occur continuously while the router is operating. They can be caused by any of the following:

- System activity
- Status changes
- Service requests
- Data transmission and reception
- Data and internal errors

The Event Logging System (ELS) is a monitoring system that manages the messages logged as a result of the router activity. When an event occurs, ELS generates a message describing the event. This description indicates the possible problem.

Using ELS commands, you can set up a configuration that sorts out only those messages that are important to you. You can display the messages using the Command Line Interface. You can find the ELS commands under the GWCON commands at the + prompt. See Appendix A, Using the Command Line Interface.

For detailed information on ELS messages, refer to the *RouteAbout Access ES and RouteAbout Access ISDN Event Logging System Messages Guide.* This is part of the RouteAbout Access Software documentation set available on the DIGITAL web site (www.networks.digital.com).

Appendix A

Using the Command Line Interface

Overview

This appendix provides instructions for using the Command Line Interface to configure your RouteAbout Access router. It includes the following topics:

Accessing the Command Line Interface

You access the Command Line Interface through a local or remote terminal. You must use a local terminal for the initial software configuration. Refer to Using Quick Config or the Command Line Interface on page 4-7 for information on how to connect a local PC or terminal to the RouteAbout Access router.

Once you have enabled IP on the RouteAbout Access router, and it is active on the network, you can use Telnet to connect remote terminals to the RouteAbout Access router. Telnet is a protocol in the TCP/IP protocol suite. It enables remote access and control of one host from another host on the IP network.

If you are running Windows on a PC, TCP/IP software is included with Windows 95 and Windows NT 4.0. If you are running an earlier version of Windows (Windows 3.1, Windows for Workgroups 3.11, or Windows NT), be sure you have installed the TCP/IP protocol stack on your PC.

Remote connections provide the same functionality as local connections. You can connect two remote terminals to the RouteAbout Access router at the same time.

Procedures for Using the Command Line Interface

This section includes the following procedures for using the Command Line Interface to configure and monitor your RouteAbout Access router:

- Logging in
- Connecting to a process
- Identifying the process by the prompt
- Getting back to the * prompt
- Exiting the router

Logging In

Before you log in from a remote terminal, you need to connect to the router using Telnet. To do so:

1) Start Telnet on your remote terminal. Supply the router's name or Internet Protocol (IP) address. To use router names, your network must have a name server. For example:

%telnet brandenburg
or
%telnet 128.185.132.43

From this point on, there is no difference whether you have logged in remotely or locally.

2) If prompted, enter your login name and password. The password controls access to the router. The software prompts you for a login only if you have set one up. For example:

```
login: ifr
Password:
```

NOTE

If you do not type a login name and valid password within a minute of the initial prompt, or if you type an incorrect password three times in succession, the router drops the Telnet connection.

3) You may now enter commands.

Connecting to a Process

When you start the router, the screen first displays a boot message, then the * prompt. The * prompt is the top-level prompt. From this prompt, you can communicate with different processes. (Prompts are symbols for processes.)

To connect to a process, do the following:

1) To find out the process ID (PID) number of a process, type **status** at the * prompt**.** For example:

```
*status
Pid  Name      Status TTY  Comments
1    COpCon    IOW    TTY0
2    Monitr    DET     --
5    CGWCon    DET     --
6     Config     DET      --
```

The **status** command displays information about the router processes, such as the PIDs, the process names, and the status of the process.

2) To configure the router, type **talk** *pid*, where pid is the number of the process to which you want to connect. For example:

```
*talk 6
Config>
```

Table A-1 shows each process along with the equivalent ways to connect to it, as well as an abbreviation.

Table A-1: Equivalent Ways to Connect to a Process

Process	Talk Command With PID	Command	Abbreviation
MONITR	talk 2	monitor	m
GWCON (same as CGWCON)	talk 5	gw-console	g
CONFIG	talk 6	config	c

Identifying the Process by the Prompt

Each process uses a different prompt. You can tell which process you are connected to by looking at the prompt. If you type **talk** *pid*, you are no longer at the * prompt. If a prompt does not appear, press **Enter** again.

The following list shows the prompts for the main processes:

Process	Prompt
OPCON	*
GWCON	+
CONFIG	Config>

NOTE

The MONITR process does not have a prompt.

Getting Back to the * Prompt

To get back to the * prompt from any main process, such as CONFIG (Config> prompt) or GWCON (+ prompt), press **Ctrl p**, which is called the intercept character. You must always return to the * prompt before you can go to another main process. For example, if you are at the + prompt and you want to go to the Config> prompt, press **Ctrl p** to return to the * prompt first.

Example

```
*config
Config> Ctrl p
*gw-console
+ Ctrl p
*
```

Exiting the Router

Return to the * prompt and close the Telnet connection.

Example

```
Config> Ctrl p
* logout
%
```

You can also use local Telnet commands (such as **exit**) on your Telnet client to close the connection.

NOTE

There is a limit of only two concurrent Telnet sessions to a router at any one time.

Using the Command Line Interface

The Command Line Interface provides the following capabilities:

- Command line editing
- Command completion
- Command line recall

NOTE

The arrow keys are VT100/ANSI escape sequences. If your terminal or terminal emulator cannot produce these, use the control keys listed.

Command Line Editing

You can edit lines using the following keys:

Command	Description
Ctrl u	Go up one line (up arrow).
Ctrl n	Go down one line (down arrow).
Ctrl b	Go back one character (back arrow).
Ctrl f	Go forward one character (forward arrow).
Ctrl a	Go to the beginning of line.
Ctrl e	Go to the end of the line.
Ctrl d	Delete forward one character.
Ctrl k	Delete from cursor to end of line.
Ctrl t	Transpose character at cursor with previous character.
Backspace or **Delete**	Delete characters to the left of the cursor.

You can press **Enter** with the cursor at any point in the line.

You can find a list of available command line editing commands by entering **help** at any prompt.

Command Completion

Enter **?** or press **Space** from any prompt to display a list of available commands or command options. Entering **?** or pressing **Space** always lists the possible completions for the present input. The lists of completions will vary depending on the software running on your router.

Example

```
Config> PROTOCOL

The choices/prefixes are (a complete list):

IP
ARP
IPX
SNMP
AP2
BRIDGE
HST
```

Pressing **Space** on a blank input line displays a list of all commands the software allows at that prompt.

Pressing **Space** at the end of an input line terminates input and searches all commands that start with the present input. One of the following happens:

If the software finds . . .	Then . . .
A complete match of a command	The space becomes a real space.
A common unique (sub)string of commands greater than the existing input	The software displays all of the commands allowed at that prompt and redisplays the input line.

`Config>` **add**	`The choices/prefixes are (a complete list):`
	`INTERFACE`
	`USER`
	
	`Config>` **add**

No unique common (sub)string of commands	The software displays all commands and present input.

A **Tab** acts similarly to a space in most cases. The exception is when you enter a command and there is a default supplied for that command. In this case, **Tab** completes the default. The **Tab** is helpful when you enter values rather than commands because you can press **Tab** repeatedly to enter default values.

Command Line Recall

You can display up to the last 10 correctly entered command lines using the following keys:

Command	Description
Ctrl u	Go up the saved command list (up arrow).
Ctrl n	Go down the saved command list (down arrow).

Understanding the Command Line Interface

The processes you use most often are OPCON, GWCON, CONFIG, and MONITR. Figure A-1 shows the processes and how they fit within the structure of the router software.

Figure A-1: Router Software Processes

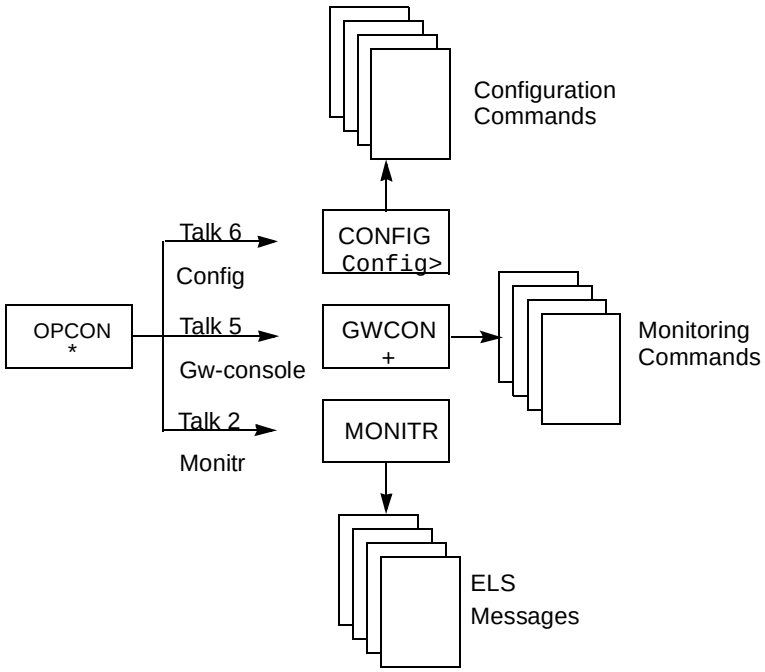


Table A-2 provides a list of processes on the router, with definitions and prompts.

Table A-2: Process Definitions

Process	Definition	Prompt
OPCON (First Level)	Operator console.	*
ROPCON	Remote operator console that supports two Telnet clients as remote operators. Functionally, OPCON and ROPCON are the same.	*
GWCON (Second Level)	Gateway configuration. Allows you to monitor the status and statistics of the router's hardware and software. Provides access to the third-level processes, which allow you to monitor configured protocols and features. Functionally, GWCON and CGWCON are the same.	+
CGWCON	Current gateway configuration. See GWCON.	

Process	Definition	Prompt
CONFIG (Second Level)	Allows you to configure router parameters for interfaces, protocols, users, and booting. Provides access to third-level processes, which allow you to configure various protocols and features.	`Config>`
MONITR (Second Level)	Receives Event Logging System (ELS) messages and messages from the operating system and displays them on the console, according to user-selected criteria.	None

Commands

The OPCON process provides access to second-level processes, which allow you to configure (`Config>`) and monitor (`+`) your router. The OPCON prompt (`*`) is the main user interface to these processes.

Some changes to the router's operating parameters made while in OPCON take effect immediately without requiring re-initializing the router. If the changes do not take effect, use the **restart** command at the `*` prompt.

NOTE

The following figure and tables are only samples. What you actually see on your router may vary based on the specific features available on your product.

Figure A-2 shows the OPCON command tree.

Table A-3 is a list of the OPCON commands. To use these commands, access the OPCON process and enter the command at the `*` prompt.

Table A-4 is a list of the CONFIG commands for configuring your router. To use these commands, access the OPCON process and enter the **config** command at the `*` prompt. At the `Config>` prompt, enter whatever CONFIG commands you need.

Table A-5 is a list of the GWCON commands for monitoring your router. To use these commands, access the OPCON process and enter the **gw-console** command at the `*` prompt. At the `+` prompt, enter whatever GWCON commands you need.

NOTE

For detailed information on using these commands to configure the router, refer to the *RouteAbout Access ES and RouteAbout Access ISDN System Software Guide*, available on the DIGITAL web site.

Figure A-2: OPCON Command Tree

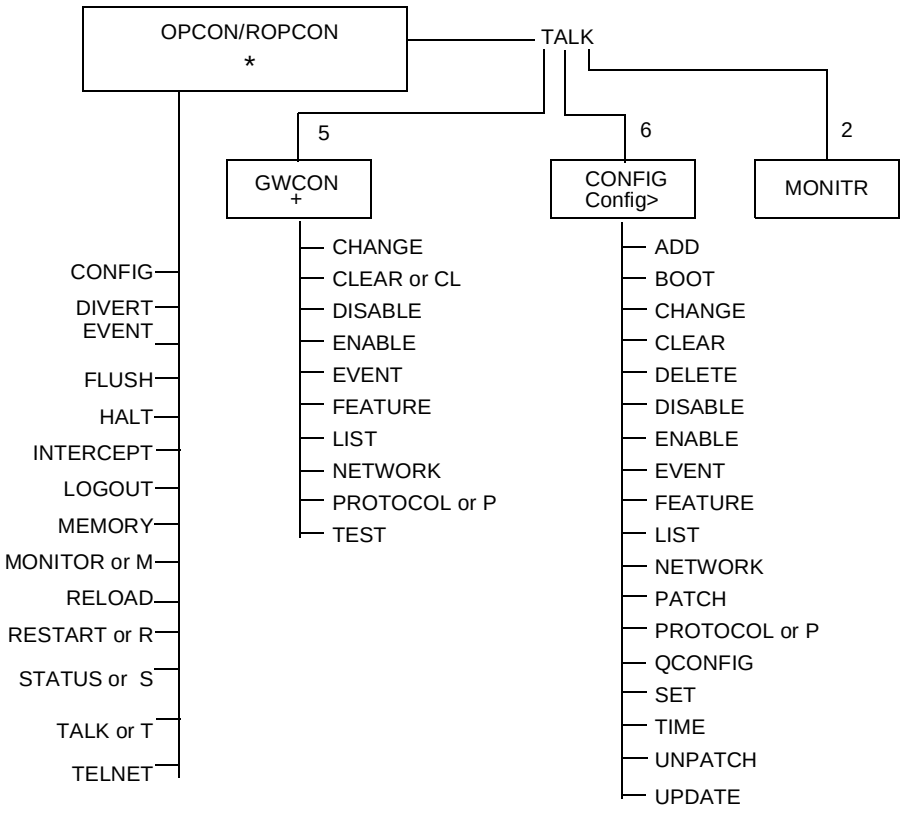


Table A-3: OPCON/ROPCON Commands

Command	Function
Config	Enters the configuration process.
Divert	Sends output to a console or other terminal.
Event	Enters Event Logging System (ELS).
Flush	Discards output.
Halt	Stops output.
Intercept	Sets the intercept character (normally, **Ctrl p**).
Logout	Logs out from a router.
Memory or M	Reports the router's memory usage.
Monitor	Enters event log monitor process.
Reload	Reloads the router with a new load and restarts.
Restart	Restarts the router with the same load.
Status	Shows information about all router processes.
Talk	Contacts another router process and enables the use of its commands.
Telnet	Connects to another router.

Table A-4: Config Commands

Command	Function
Add	Adds an interface to the router configuration or a user to the router.
Boot	Enters the Boot CONFIG command process.
Change	Changes the current interface's configuration or a user's password.
Clear	Clears configuration information.
Delete	Deletes a user or an interface from the router configuration.
Disable	Disables an interface or other system options.
Enable	Enables an interface or other system options.
Event	Enters the Event Logging System configuration process.
Feature	Provides access to configuration commands for independent router features outside the usual protocol and network interface configuration processes.
List	Displays the router's sytem parameters, devices, interfaces, services, stacks, users, or utilization information.
Network	Enters the configuration menus of the specified network. This command accesses the Dial Circuit protocol stack.
Patch	Modifies the router's global configuration.
Protocol	Enters the command environment of the specified protocol.
Qconfig	Initiates the Quick Config process.
Set	Sets system-wide parameters for buffers, hostname, inactivity timer, logging disposition and level, packet size, restart count, location, and contact-person.
Time	Sets up system time and displays it.
Unpatch	Restores variables of the patches to default values.
Update	Updates the configuration.

Table A-5: GWCON Commands

Command	Function
Change	Changes the log level.
Clear or CL	Clears interface statistics.
Disable	Disables device, interface, or system options, such as command completion.
Enable	Enables system options, such as command completion.
Event	Enters the Event Logging System environment.
Feature	Provides access to monitoring commands for independent router features outside the usual protocol and network interface monitoring processes.
List	Lists devices, interfaces, services, stacks, and other configuration parameters.
Network	Enters the console environment of the specified interface.
Protocol or P	Enters the command environment of the specified protocol.
Test	Enables a disabled device or interface or tests the specified device or interface.

Appendix B

Using Quick Configuration

Overview

This appendix describes how to configure the RouteAbout Access routers using the Quick Config process and includes the following sections:

Before You Begin

Quick Configuration (Quick Config) is part of the Command Line Interface, and is a question and answer script that allows you to configure basic device, bridging, routing, and booting information without having to enter and exit the different configuration processes. (Other parameters are set to normal default values.)

Quick Config is appropriate for installations where the RouteAbout Access router always calls the same remote router. You can also use Quick Config to configure the primary remote site that the RouteAbout Access router calls, and then use the RouteAbout Access Configuration Tool or Command Line Interface to add other sites.

Parameters that cannot be configured using Quick Config can be configured using the Command Line Interface.

You cannot delete Quick Config information from within Quick Config; but you can make corrections by exiting and returning to Quick Config or by typing **r** for **restart** as a response to a Quick Config question.

NOTES

- Quick Config prompts you only for information that pertains to the hardware version and the software loaded on your RouteAbout Access routers.
- Information within brackets [ ] is the default. Press **Enter** to use this value, or enter a value and press **Enter**.
- Information within parentheses ( ) is either a list of or a description of acceptable input.
- Enter **r** at any time to restart the current configuration section. For example, if you are in the device configuration section, enter **r** to redisplay the device configuration prompts.
- Press **Backspace** or **Delete** to delete the last character typed. Press **Ctrl u** to delete an entire entry so that you can re-enter it.

Procedures for Using Quick Configuration

Entering Quick Config

If you are configuring the RouteAbout Access router for the first time and you are using the Command Line Interface, the RouteAbout Access router enters Quick Config automatically the first time you boot it.

To run Quick Config after you have initially configured the RouteAbout Access router, follow these steps:

1) At the * prompt, enter **config** to display the `Config>` prompt.

```
* config
Config>
```

2) Enter **qc** at the `Config>` prompt to begin Quick Config.

Exiting Quick Config

To exit Quick Config, type **r** for restart at any prompt and follow the queries until you type **no** and then **q** for **quit**. The router returns to the `Config (only)>` prompt or the `Config>` prompt.

Restarting the Router

When Quick Config is finished, it prompts you to restart the router. You must restart the router for the configuration to take effect.

You may defer restarting the router to configure additional protocols and features. When you complete the configuration, restart the router for all settings to take effect.

Appendix C

Product Specifications

Overview

This appendix lists the product specifications for the RouteAbout Access ES and the RouteAbout Access ISDN routers.

RouteAbout Access ES Product Specification

Table C-1 contains the product specification for the RouteAbout Access ES.

Table C-1: RouteAbout Access ES Product Specifications

Parameter	Specification
Processor	MC 68360
Memory	
DRAM	2 MB
Flash	1 MB
Input/Output Interfaces	1 or 2 Ethernet (10BaseT/10Base2) 1 WAN
WAN Speeds	4,800 bps to 2.048 Mbps
Dimensions	7.25 x 6.38 x 1.25 in (18.4 x 16.2 x 3.2 cm)
Weight	1 lb (0.45 kg)
Power	100 to 240 V 50 to 60 Hz 18 V
Operating Temperature	10 to 40 degrees C (50 to 104 degrees F)
Relative Humidity	10% to 80%
Agency Approvals	FCC Class B UL, CSA, TUV CISPR-22, Class B CE Mark

RouteAbout Access ISDN Product Specification

Table C-2 contains the product specification for the RouteAbout Access ISDN.

Table C-2: RouteAbout Access ISDN Product Specifications

	RouteAbout Access ISDN/IP	RouteAbout Access ISDN/MP
Processor	MC 68360	MC 68360
Memory DRAM **Flash**	2 MB 1 MB	4 MB 2 MB
***Input/Output Interfaces**	1 Ethernet (10BaseT) 1 ISDN BRI	1 Ethernet (10BaseT) 1 ISDN BRI
Dimensions	7.25 x 6.38 x 1.25 in (18.4 x 16.2 x 3.2 cm)	7.25 x 6.38 x 1.25 in (18.4 x 16.2 x 3.2 cm)
Weight	1 lb (0.45 kg)	1 lb (0.45 kg)
Power	90 to 264 V 47 to 63 Hz 18 V	90 to 264 V 47 to 63 Hz 18 V
Operating Temperature	10 to 40 degrees C (50 to 104 degrees F)	10 to 40 degrees C (50 to 104 degrees F)
Relative Humidity	10% to 80%	10% to 80%
Agency Approvals	FCC Class B UL, CSA, TUV CISPR-22, Class B CE Mark, JATE	FCC Class B UL, CSA, TUV CISPR-22, Class B CE Mark, JATE

* For RouteAbout Access ISDN/IP and /MP, Model U, BRI U interface
For RouteAbout Access ISDN/IP and /MP, Model S/T, BRI S/T interface

Appendix D

Cable Specifications

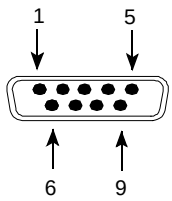
Overview

This appendix describes the signals associated with the pins on the console port, the 10BaseT Ethernet port, the WAN port (RouteAbout Access ES only), and the ISDN BRI S/T port (RouteAbout Access ISDN only). It also shows the voltages of the power connector. This information will assist you in obtaining custom cables from your supplier.

Console Port

Figure D-1 lists pin assignments for the RouteAbout Access ES and RouteAbout Access ISDN Console port.

Figure D-1: Console Port Cable - RS-232 DTE Male



Connector Pin #	Signal
1	Data Carrier Detect
2	Received Data
3	Transmitted Data
4	Data Terminal Ready
5	Signal Ground
6	DCE Ready
7	Request To Send
8	Clear To Send
9	Call Indicate

Console Adapter

Figure D-2 lists the pin assignments for the 9-pin to 25-pin console adapter used with the console cable.

Figure D-2: Console Adapter Pin Assignments

Connectors

J1 = DB9M J2 = DB25F

Wiring

J1	J2	SIGNAL
1	8	DCD
2	3	RXD
3	2	TXD
4	20	DTR
5	7	SGN G
6	6	DSR
7	4	RTS
8	5	CTS
9	22	RI
SHELL	SHELL	SHIELD

Ethernet 10BaseT Connector

Figure D-3 lists the pin assignments for the Ethernet 10BaseT RJ-45 connector.

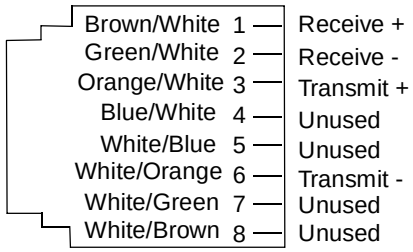
Figure D-3: Ethernet Cable 10BaseT Connector Pin Assignments

Connector Pin #	Description
1	Transmit Data +
2	Transmit Data -
3	Receive Data +
6	Receive Data -

Ethernet 10BaseT Crossover Cable Connector

Figure D-4 lists the pin assignments for the Ethernet 10BaseT crossover cable.

Figure D-4: Ethernet Crossover Cable Connector Pin Assignments



Connector Pin #	Description
1	Receive Data +
2	Receive Data -
3	Transmit Data +
6	Transmit Data -

WAN Port

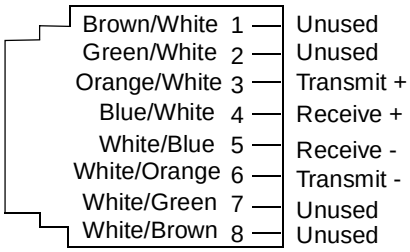
The following interchange circuits are available on the RouteAbout Access ES serial interfaces:

- RS-232 physical interface (V.24/V.28)
- V.35 physical interface
- V.11 physical interface

ISDN BRI Connectors

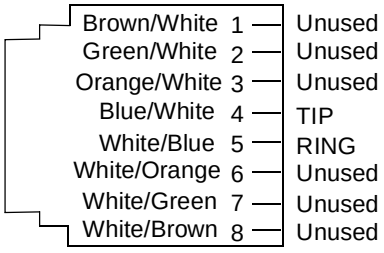
Figure D-5 lists the cable specifications for the ISDN BRI S/T. Figure D-6 lists the cable specifications for the ISDN BRI U physical interfaces

Figure D-5: ISDN Cable Pin Assignments for S/T Interface



Connector Pin #	Description
3	Transmit Data +
4	Receive Data +
5	Receive Data -
6	Transmit Data -

Figure D-6: ISDN Cable Pin Assignments for U Interface

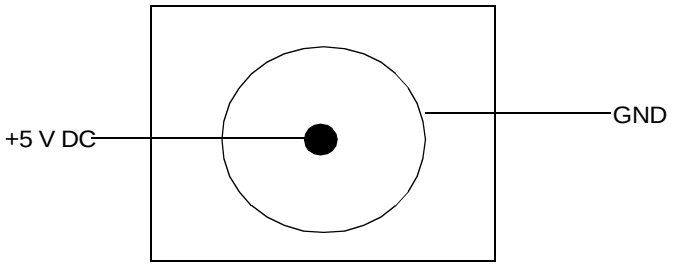


Connector Pin #	Description
4	TIP
5	RING

Power Connector

Figure D-7 shows the voltages of the power connector pins.

Figure D-7: Power Connector



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