Router 3000 Family Installation Guide

Router 3012 (3C13612)
Router 3013 (3C13613)
Router 3015 (3C13615)
Router 3016 (3C13616)
Router 3018 (3C13618)

http://www.3com.com/

Part No. 10014206
Published March 2004

3Com Corporation
350 Campus Drive
Marlborough, MA
01752-3064

CONTENTS

Optional Cable Specifications

Obtaining Support for your Router

ABOUT THIS GUIDE

This guide describes the 3Com® Router 3000 Family of routers and how to install hardware, configure and boot software, and maintain software and hardware. This guide also provides troubleshooting and support information for your router.

This guide is intended for the system or network administrator who is responsible for configuring, using, and managing the routers. It asumes a working knowledge of wide area network (WAN) operations and familiarity with communication protocols that are used to interconnect WANs.

Always download the Release Notes for your product from the 3Com World Wide Web site for the latest updates to product documentation:

http://www.3com.com

Conventions

Table 1 and Table 2 list conventions that are used throughout this guide.

Table 1 Notice Icons

Icon	Notice Type	Description
	Information note	Information that describes important features or instructions.
	Caution	Information that alerts you to potential loss of data or potential damage to an application, system, or device.
	Warning	Information that alerts you to potential personal injury.

Table 2 Text Conventions

Convention	Description
`Screen displays`	This typeface represents information as it appears on the screen.
Keyboard key names	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+), for example: Press Ctrl+Alt+Del
The words "enter" and type"	When you see the word "enter" in this guide, you must type something, and then press Return or Enter. Do not press Return or Enter when an instruction simply says "type."

Words in *italics*	Italics are used to: Emphasize a point. Denote a new term at the place where it is defined in the text. Identify menu names, menu commands, and software button names. Examples: From the *Help* menu, select *Contents*. Click *OK*.
Words in **bold**	Boldface type is used to highlight command names. For example, "Use the **display user-interface** command to..."

1 INTRODUCING THE ROUTER 3000 FAMILY

Routers in the 3Com® Router 3000 Family provides the following types of ports:

- Ethernet port
- Synchronous/asynchronous serial port
- Auxiliary (AUX) port
- ISDN BRI S/T and U port
- CT1/PRI port
- E1/CE1/PRI port

These features allow you to combine the various networking technologies, such as PSTN/ISDN, FR (Frame Relay), X.25, leased line, and T1 line. These multiple ports also allow Router 3000 series routers to interoperate with the products of other manufacturers.

Router 3000 routers use three types of memory:

- Synchronous Dynamic Random Access Memory (SDRAM) — Saves router operation system software
- Flash memory — Saves router program files, configuration files and so on
- Boot ROM — Saves the boot and initialization programs of the router

Router 3012

Figure 1 illustrates the Router 3012.

Figure 1 Router 3012

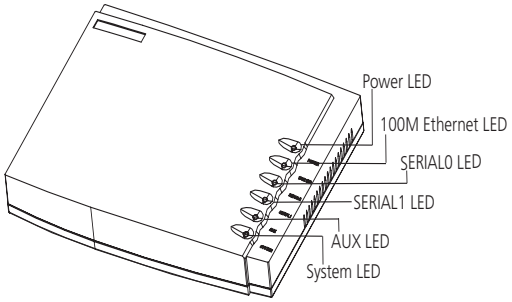
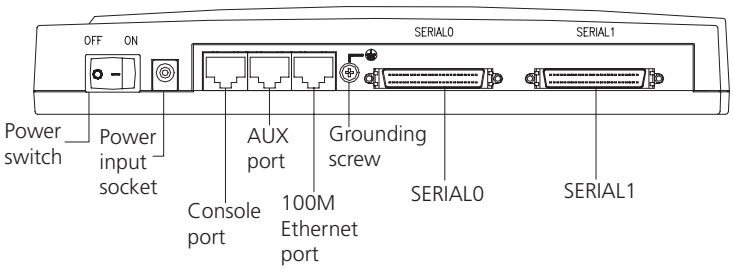


Figure 2 illustrates the back panel of the Router 3012.

Figure 2 Back Panel of the Router 3012



System Specifications

Table 3 lists system specifications for the Router 3012.

Table 3 System Specifications for the Router 3012

Item	Description
Fixed ports	1 10/100 Mbps Ethernet port 2 synchronous/asynchronous serial ports 1 AUX port 1 console port
Processor	MPC860T 50M Hz
SDRAM	64 MB
Flash memory	8 MB
Maximum power	20 W
Power supply (external)	Input voltage and frequency: 100 to 240V AC (the actual range can be 80 to 264 V) 50/60 Hz Input current: 0.5 A to 1 A
	Output voltage: 12 V Output current: 4 A
Dimensions (W X H X D, highest arc points of the plastic panel)	251 X 42.5 X 187 mm (9.9X 1.7 X 7.4 in)
Weight	0.75 kg (1.65 lb)
Operating temperature	0 to 40^0 C (32 to 104^0 F)
Relative humidity	5 to 85% (noncondensing)

LEDs

Table 4 lists and describes the LEDs on the front panel of the Router 3012.

Table 4 Router 3012 LEDs

LED	Description
POWER	Off —The power is off. Green — The power is on.
100M ETH	Off — The link is not connected. Flashing green — Data is being transmitted through the Ethernet port.
SERIAL0	Off — The link is not connected. Green — The link is connected. Flashing green — Data is being transmitted through serial port 0.

Table 4 Router 3012 LEDs (continued)

LED	Description
SERIAL1	Off — The link is not connected. Green — The link is connected. Flashing green — Data is being transmitted over serial port 1.
AUX	Off — The link is not connected. Green — The link is connected. Flashing green — Data is being transmitted over the AUX port.
SYSTEM	Flashing green — The system is operating normally. Always green or off — The system is not operating normally.

Port Attributes

The Router 3012 provides a console port, an AUX port, a 10/100M Ethernet port and a synchronous/asynchronous serial port. The attributes of these ports are described in the following sections.

Console Port

Table 5 lists attributes of the console port.

Table 5 Attributes of the Console Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232
Baud rate	9.6 to 115.2 kbps (the default is 9.6 kbps)
Services	Connects with character terminal Connects with the serial ports of the local PCs and runs the terminal emulation program on the PCs Command line interface

AUX Port

Table 6 lists attributes of the AUX port.

Table 6 Attributes of the AUX Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232
Baud rate	300 bps to 115.2 kbps
Services	Modem dial-up Backup
Protocols	PPP (Point to Point Protocol) SLIP (Serial Line Internet Protocol) MP (Multilink PPP)

Ethernet Port

Table 7 lists attributes of the Ethernet port.

Table 7 Attributes of the Fast Ethernet Port

Attribute	Description
Connector	RJ-45
Frame format	Ethernet_II Ethernet_SNAP IEEE 802.2 IEEE 802.3
Operating mode	10/100 Mbps autosensing Full duplex/half duplex
Network protocol	IP (Internet Protocol) Novell IPX (Internet Packet Exchange)

Synchronous/Asynchronous Serial Port

Table 8 lists attributes of the serial port.

Table 8 Attributes of the Serial Port

Attribute	Description				
	Synchronous				Asynchronous
Connector	DB50				
Port standard and operating mode	V.24 (EIA/TIA-232)	V.35	EIA/TIA-449, X.21 and EIA-530		V.24 (EIA/TIA-232)
	DTE, DCE	DTE, DCE	DTE	DCE	
Minimum baud rate (bps)	1200	1200	1200	1200	300
Maximum baud rate (bps)	64 k	2.048 M	2.048 M	2.048 M	115.2 K
Services	DDN leased line Terminal access Backup				Modem dial-up Backup
Protocols	PPP MP LAPB (Link Access Protocol-Balanced) HDLC (High-level Data Link Control) SDLC (Synchronous Data Link Control) X.25 Frame Relay				PPP SLIP MP

Router 3013 and Router 3015

The Router 3013 and Router 3015 offer ISDN BRI support. The Router 3013 has an ISDN BRI S/T port and the Router 3015 has an ISDN BRI U port.

Figure 3 illustrates the Router 3013 and Router 3015 routers.

Figure 3 Router 3013 and Router 3015

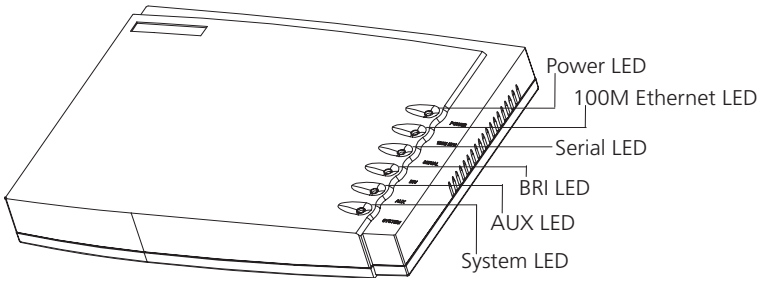
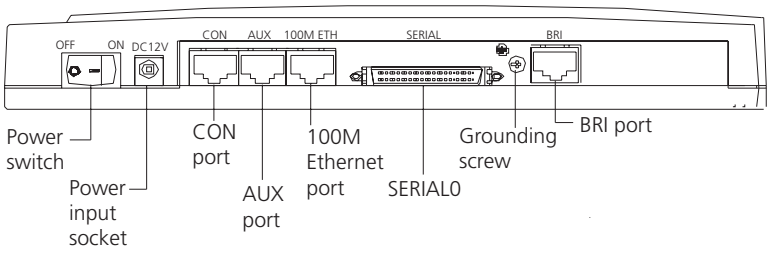


Figure 4 illustrates the back panel of the Router 3013 and 3015.

Figure 4 Back Panel of the Router 3013 and Router 3015



System Specifications

Table 9 lists system specifications for the Router 3013 and Router 3015.

Table 9 System Specifications for the Router 3013 and Router 3015

Item	Router 3013 Description	Router 3015 Description
Fixed ports	1 console port 1 10/100M Ethernet port 1 AUX port 1 synchronous/asynchronous serial port 1 ISDN BRI S/T port	1 console port 1 10/100M Ethernet port 1 AUX port 1 synchronous/asynchronous serial port 1 ISDN BRI U port
Processor	MPC860T 50 MHz	
SDRAM	64 MB	
Flash memory	8 MB	
Maximum power	20 W	
Power supply (external)	Input voltage and frequency: 100 to 240V AC (the actual range can be 80 to 264 V) 50/60 Hz Input current: 0.5 A to 1A	
	Output voltage: 12 V Output current: 4 A	
Dimensions (W X H X D, the highest arc points of the plastic panel)	251 X 42.5 X 187mm (9.9 X 1.7 X 7.4 in)	
Weight	0.75 kg (1.65 lb)	
Operating temperature	0 to 40 C (32 to 104^0 F)	

Table 9 System Specifications for the Router 3013 and Router 3015 (continued)

Item	Router 3013 Description	Router 3015 Description
Operating humidity	5 to 85% (noncondensing)	

LEDs

Table 10 lists and describes the LEDs on the front panel of the Router 3013 and Router 3015.

Table 10 Router 3013 and Router 3015 LEDs

LED	Description
POWER	Off — The power is not on. Green — The power is on.
100M ETH	Off — The link is not connected. Flashing green — Data is being transmitted over the Ethernet port.
SERIAL	Off — The link is not connected. Green — The link is connected. Flashing green — Data is being transmitted over the serial port.
BRI	Off — No data is being transmitted over the ISDN BRI port and two B channels are free. Flashing green — Data is being transmitted over the ISDN BRI port.
AUX	Off — The link is not connected. Green means — The link is connected. Flashing green — Data is being transmitted over the AUX port.
SYSTEM	Flashing green — The system is operating normally. Always green or off — The system is not operating normally.

Port Attributes

The Router 3013 provides a console port, an AUX port, a 10/100M Ethernet port, a synchronous/asynchronous serial port, and an ISDN S/T port.

The Router 3015 provides a console port, an AUX port, a 10/100M Ethernet port, a synchronous/asynchronous serial port, and an ISDN U port.

Console Port

Table 11 lists attributes of the console port.

Table 11 Attributes of the Console Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232
Baud rate	9.6 to 115.2 kbps (9.6 kbps is the default)
Services	Connects with terminal Connects with serial ports of the local PCs and runs the terminal emulation program on the PCs Command line interface

AUX Port

Table 12 lists attributes of the AUX port.

Table 12 Attributes of the AUX Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232
Baud rate	300 bps to 115.2 kbps
Services	Modem dial-up Backup
Protocols	PPP (Point to Point Protocol) SLIP (Serial Line Internet Protocol) MP (Multilink PPP)

Ethernet Port

Table 13 lists attributes of the Ethernet port.

Table 13 Attributes of the Fast Ethernet Port

Attribute	Description
Connector	RJ-45
Frame format	Ethernet_II Ethernet_SNAP IEEE 802.2 IEEE 802.3
Operating mode	10/100 Mbps autosensing Full duplex/half duplex
Network protocol	IP (Internet Protocol) Novell IPX (Internet Packet Exchange)

Synchronous/Asynchronous Serial Port

Table 14 lists attributes of the serial port.

Table 14 Attributes of the Serial Port

Attribute	Description				
	Synchronous				Asynchronous
Connector	DB50				
Port standard and operating mode	V.24 (EIA/TIA-232)	V.35	EIA/TIA-449, X.21 and EIA-530		V.24 (EIA/TIA-232)
	DTE, DCE	DTE, DCE	DTE	DCE	
Minimum baud rate (bps)	1200	1200	1200	1200	300
Maximum baud rate (bps)	64 K	2.048 M	2.048 M	2.048 M	115.2 K
Services	DDN leased line Terminal access Backup				Modem dial-up Backup

Table 14 Attributes of the Serial Port (continued)

Attribute	Description	
	Synchronous	**Asynchronous**
Protocols	PPP	PPP
	MP	SLIP
	LAPB (Link Access Protocol-Balanced)	MP
	HDLC (High-level Data Link Control)	
	SDLC (Synchronous Data Link Control)	
	X.25	
	Frame Relay	

ISDN S/T and ISDN U Ports

Table 15 lists attributes of the ISDN S/T and ISDN U ports.

Table 15 Attributes of ISDN S/T and U Ports

Attribute	Description
Connector	RJ-45
Protocol standards	Complies with ITU-T I.430, Q.921 and Q.931 recommendations
Operating mode	ISDN dial-up
	ISDN leased line
Services	ISDN
	ISDN additional services
	Multi-subscriber number
	Subaddress
	Backup

Router 3016 and Router 3018

Figure 5 illustrates the Router 3016.

Figure 5 Router 3016

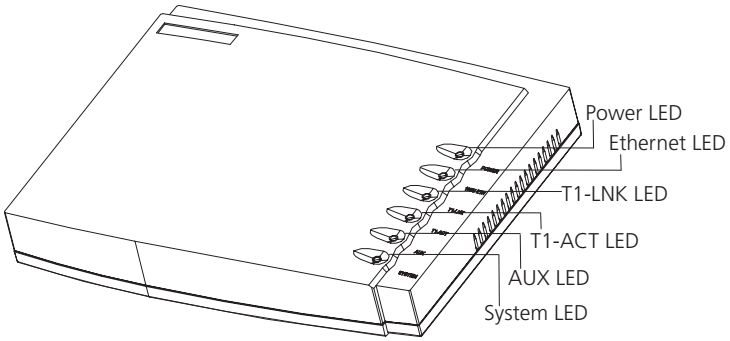


Figure 6 illustrates the back panel of the Router 3016.

Figure 6 Back Panel of the Router 3016

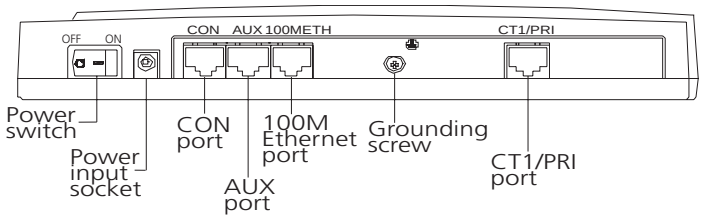


Figure 7 illustrates the Router 3018.

Figure 7 Router 3018

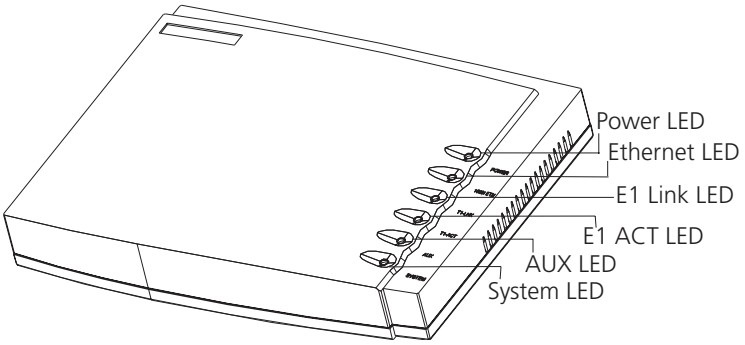
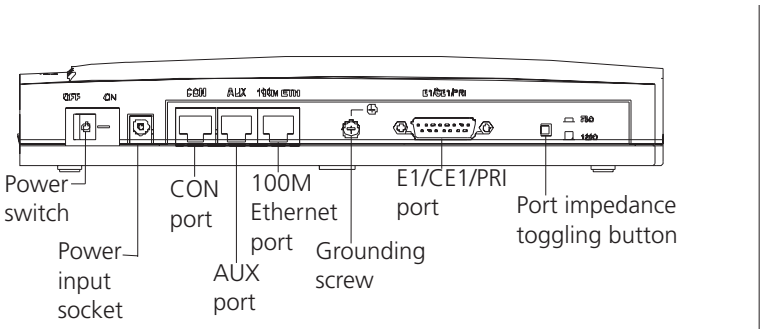


Figure 8 illustrates the back panel of the Router 3018.

Figure 8 Back Panel of the Router 3018



System Specifications

Table 16 lists system specifications for the Router 3016 and Router 3018.

Table 16 System Specifications for the Router 3016 and Router 3018

Item	Router 3016 Description	Router 3018 Description
Fixed ports	1 console port 1 10/100 Mbps Ethernet port 1 AUX port 1 CT1/PRI port	1 console port 1 10/100 Mbps Ethernet port 1 AUX port 1 E1/CE1/PRI port
Button		1 E1/CE1/PRI port impedance toggling button
Processor	MPC860T 50 MHz	
SDRAM	64 MB	
Flash memory	8 MB	

Table 16 System Specifications for the Router 3016 and Router 3018 (continued)

Item	Router 3016 Description	Router 3018 Description
Maximum power	20 W	
Power supply (external)	Input voltage and frequency: 100 to 240V AC (the actual range can be 80 to 264 V) 50/60 Hz Input current: 0.5A to 1A Output voltage: 12 V Output current: 4 A	
Dimensions (W X H X D, the highest arc points of the plastic panel)	251 X 42.5 X 187 mm (9.9 X 1.7 X 7.4 in)	
Weight	0.75 kg (1.65 lb)	
Operating temperature	0 to 40^0 C (32 to 104^0 F)	
Operating humidity	5 to 85% (noncondensing)	

LEDs

Table 17 lists and describes the LEDs on the Router 3016 and Router 3018.

Table 17 Router 3016 LEDs

LED	Description
POWER	Off — The power is not on. Green — The power is on.
100M ETH	Off — The link is not connected. Flashing green — Data is being being transmitted over the Ethernet port.
T1-LNK/E1-LNK	Off — The link is not set up. Green means — The link has been set up.
T1-ACT/E1-ACT	Off — No data is being transmitted through the port. Green — Data is being transmitted through the port.
AUX	Off — No data is being transmitted through the AUX port. Green — The link is connected. Flashing green — Data is being transmitted through the AUX port.
SYSTEM	Flashing green — The system is operating normally. On or off — The system is not operating normally.

Port Attributes

The Router 3016 provides a console port, an AUX port, a 10/100 Mbps Ethernet port, and a CT1/PRI port.

The Router 3018 provides a console port, an AUX port, a 10/100 Mbps Ethernet port, and a E1/CE1/PRI port.

Console Port

Table 18 lists attributes of the console port.

Table 18 Attributes of the Console Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232

Table 18 Attributes of the Console Port (continued)

Attribute	Description
Baud rate	9.6 to 115.2 kbps (the default is 9.6 kbps)
Services	Connects with character terminal Connects with serial ports of the local PCs and runs the terminal emulation program on the PCs Command line interface

AUX Port

Table 19 lists attributes of the AUX port.

Table 19 Attributes of the AUX Port

Attribute	Description
Connector	RJ-45
Port standard	Asynchronous EIA/TIA-232
Baud rate	300 bps to 115.2 kbps
Services	Modem dial-up Backup
Protocols	PPP (Point to Point Protocol) SLIP (Serial Line Internet Protocol) MP (Multilink PPP)

Ethernet Port

Table 20 lists attributes of the Ethernet port.

Table 20 Attributes of the Ethernet Port

Attribute	Description
Connector	RJ-45
Frame format	Ethernet_II Ethernet_SNAP IEEE 802.2 IEEE 802.3
Operating mode	10/100 Mbps autosensing Full duplex/half duplex
Network protocol	IP (Internet Protocol) Novell IPX (Internet Packet Exchange)

CT1/PRI and E1/CE1/PRI Ports

Table 21 lists attributes of the CT1/PRI and and E1/CE1/PRI ports.

Table 21 Attributes of the CT1/PRI Port

Attribute	CT1/PRI Description	E1/CE1/PRI Description
Connector	RJ-45	DB15
Port standard	G.703/T1 102 and G.704	
Port rate	1.544 Mbps	2.048 Mbps

Table 21 Attributes of the CT1/PRI Port (continued)

Attribute	CT1/PRI Description	E1/CE1/PRI Description
Operating mode	Channelized T1 Fractional T1 ISDN PRI	E1 Channelized E1 Fractional E1 ISDN PRI
Services	Backup Terminal access ISDN	
Protocols	PPP MP HDLC LAPB X.25 (ITU-T X series Recommendations) Frame Relay Q.921 Q.931 Q.SIG	

2 INSTALLING THE ROUTER

There are two ways you can install your router:

- On a vertical surface
- On a workbench

The following sections describe how to prepare and install your router:

- Preparing to Install the Router
- Mounting the Router on a Vertical Surface
- Installing the Router on a Workbench
- Connecting the Protection Ground Wire
- Connecting the Power Cable
- Connecting the Router to the Console Terminal
- Connecting the Router to the Ethernet
- Connecting the Router to the WAN
- Verifying the Installation

Preparing to Install the Router

This section provides guidelines for preparing your site and router for installation.

Safety Warnings

Before installing your router, consider the following safety guidelines:

- Switch off the power supply before connecting the cables.
- Keep the router far away from any heat source.
- To ensure normal heat dissipation, do not stack routers.
- Do not keep a router in a damp place, and prevent liquid from getting into the router.
- Ensure that the neutral point of the power is grounded properly, to avoid personal injury.
- Ensure that the power is off before plugging or unplugging the interface cards, modules and cables of the router.
- Before removing the chassis, disconnect all the power cords and external cables.
- To avoid damage to the router, connect all the cables correctly. Never connect telephone cables (including the ISDN lines) to the console or AUX port.

- During the installation, wear an ESD (Electro-Static Discharge) preventive wrist strap and ESD-preventive gloves. See "Static Electricity" on page 20 for additional information on ESD prevention.

3Com recommends that you use an uninterrupted power supply (UPS) with your router.

General Site Requirements

The environment of the installation site influences the performance and lifetime of the router. The installation site for your router should meet the following requirements for temperature and humidity, dust, gases, static electricity, and electromagnetic discharge.

Temperature and Humidity

To ensure normal operation and to prolong the operational lifetime of the router, the temperature and humidity of the equipment room must be within controlled limits. The requirements for the temperature and humidity of the router installation site are listed in Table 22.

Table 22 Temperature and Humidity Requirements

Temperature	Relative humidity
0^0 to 40^0C (32^0 to 104^0F)	5% to 85%

Dust

Dust is harmful to the safe operation of the router. The specifications for the dust content and diameter of the granule within the equipment room are listed in Table 23.

Table 23 Specification for Dust Content

Maximum diameter (μ m)	0.5	1	3	5
Maximum density (the number of granules per cubic meter)	1.4×10^7	7×10^5	2.4×10^5	1.3×10^5

Gases

The equipment room of the router must meet strict requirements for the content of salt, acid and sulfide. The specific limitation values of these harmful gases are given in Table 24.

Table 24 Harmful Gas Limitation Values in Equipment Room

Gas	Average (mg/m^3)	Maximum (mg/m^3)
SO_2	0.2	1.5
H_2S	0.0	0.03
NO_2	0.04	0.15
NH_3	0.05	0.15
Cl_2	0.01	0.3

Static Electricity

To prevent damage caused by the static electricity, insure that:

- The equipment is grounded

- The equipment room is dust-proof
- Adequate temperature and humidity conditions prevail
- The operator wears the ESD-preventive wrist strap, ESD-preventive gloves and ESD-preventive clothes while handling the circuit board.
- The dismantled circuit board is placed upward on the ESD preventive workbench, or put into an ESD preventive bag.
- You avoid direct contact with the elements of the circuit board.

Electromagnetic Discharge

To prevent damage by electromagnetic discharge, do the following:

- Take effective measures against electrical net interference for the power supply system.
- Separate the working ground of the router from the grounding device of the power equipment, or thunder proof grounding.
- Keep the router away from wireless launchers, radar launchers and other high frequency and high current equipment.

Lightning Damage

To minimize the risk of lightning damage do the following:

- Install a lightning arrester on the input end of a telephone cable, ISDN line or T1/E1 line.
- Ensure that the PGND wire of the chassis is well grounded
- Ensure that the neutral point of the socket of AC power supply is well grounded
- Install a lightning arrester at the input end of the power supply

Workbench Requirements

Whether you install the router in a rack or place it directly on the workbench, it is necessary to ensure that:

- Airflow is not restricted around the router.
- The cabinet and workbench are strong enough to support the weight of the router and other installation accessories.
- The cabinet and workbench are well grounded.

Installation Checklist

After you verify that the installation conditions comply with these requirements, open the packing case of the router and check the contents against the your order contract. Contact your Service representative if you find any discrepancies.

To install your router, you will need:

- Tools
  - Phillips screwdriver
  - Flat-head screwdriver
  - ESD-preventive wrist strap and ESD-preventive gloves
  - Flat-blade screws (used in wall mounting)
- Cables

- Ethernet cable
- Console cable
- AUX cable
- Power supply, power cord, and chassis ground wire

- Equipment

  A router

  Ethernet 10/100BASE-T Hub or LAN switch

  Channel service unit/data service unit (CSU/DSU) or other data communications equipment (DCE) equipment (such as a modem)

  Configuration terminal, such as a PC

Mounting the Router on a Vertical Surface

The Router 3000 can be mounted onto a vertical surface using two pan-head screws aligned to the brackets on the base of the router. To mount the router on a vertical surface, do the following:

1. Mark the bracket positions on the wall.
2. Screw two pan-head screws into the marked positions on the wall or other vertical surface, so that the screws match the position of the two brackets on the base of the router. Each screw should project 0.6 cm (.25 in) from the wall or the surface.
3. Make sure that the front panel LEDs are easily visible to the operator.
4. Hang the router on the screws by the two brackets.
5. Secure the external power supply of the router to prevent the power cords from detaching.

See Figure 9 and Figure 10 for illustrations of this procedure.

Figure 9 The Bottom of the Router

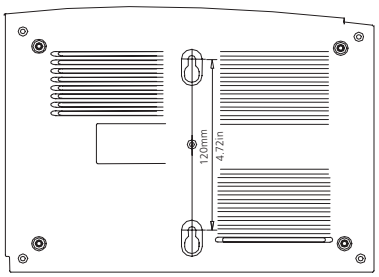
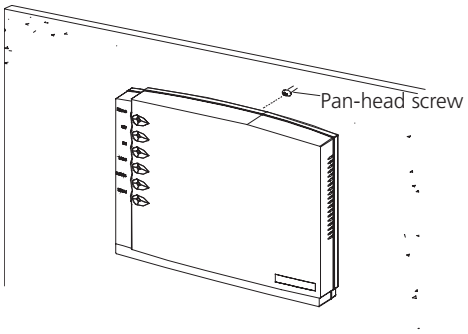


Figure 10 Mounting the Router on a Vertical Surface



Installing the Router on a Workbench

You can install any Router 3000 on a workbench.

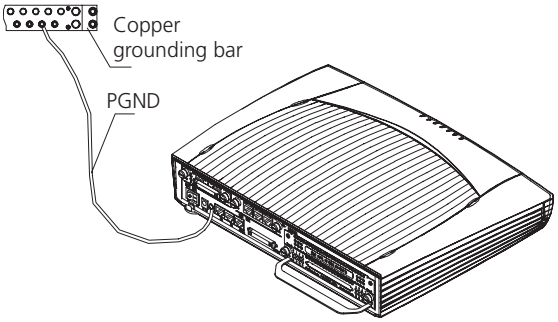
To install the router on a workbench, take the following precautions:

- Ensure that the workbench is smooth and stable.
- Leave a heat-dissipation clearance of 10 m (4 in) around the router.
- Do not put heavy objects on the router.

Connecting the Protection Ground Wire

The protection ground (PGND) point of the chassis is located on the left side of the rear panel, near the power switch and is labeled with a grounding label, as shown in Figure 11. The grounding resistance should not be greater than 5 ohm.

Figure 11 Connecting the PGND



Connect the PGND wire before connecting other cables. Shorten the ground wire as much as possible to avoid the router and the peer device being damaged during lightning.

Connecting the Power Cable

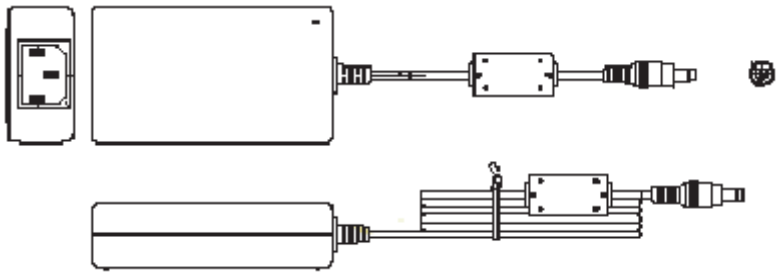
To connect the router to the power outlet and confirm that the PGND wire is properly grounded, do the following:

1. Connect the output end of the power supply to the power socket on the rear panel of the router.
2. Connect the input end of the power supply to the AC power outlet.
3. Turn on the power switch on the router.
4. Confirm that the router has power by checking whether the POWER LED is on.

If you repeat this procedure several times and the POWER LED remains off, see "The Power LED is Off." on page 49.

Figure 12 illustrates the power supply.

Figure 12 Router 3000 Power Supply



Connecting the Router to the Console Terminal

The Router 3000 provides a console port, through which you can configure the router.

The console cable is an 8-core shielded cable. The end that is used to connect to the console port of the router has an RJ-45 connector. The other end of the console cable has both a DB-9 (female) adapter and a DB-25 (female) adapter. Use the appropriate connector for the port on the console terminal.

See Appendix A for the illustration and pinout details of the console cable.

To configure the router through the console terminal:

1. Turn off power to the router.
2. Select a console terminal — This can be either a standard ASCII terminal with an RS-232 serial port, or a PC.
3. Connect the cable — Turn the power switch off, and then connect the serial interface of the console cable to the console port of the router.

   After connection, power on the router. The startup information of the router is displayed on the console terminal.

Connecting the Router to the Ethernet

The Router 3000 routers provide a fixed 10/100BASE-TX fast Ethernet port that uses category-5 twisted pair cable.

See Chapter A for the illustration and pinout details of the Ethernet cables.

Note the following before you connect:

- The fixed Ethernet cables are supplied with the router.
- Use shielded cables to ensure electromagnetic compatibility.
- Identify the mark on the module port so you can plug the cable in correctly.
- When connecting the Ethernet cable to a LAN Switch, plug the cable into the 10/100BASE-T port marked with MDIX.

To connect the Ethernet cable:

1. Turn off power to the router.
2. Select the Ethernet cable.

   When connecting the router with a PC or a router, use the crossover network cable.

   When connecting the router to a hub or a LAN switch, use the straight-through network cable.
3. Connect one end of the Ethernet cable to the appropriate Ethernet module on the router.
4. Connect the other end of the Ethernet cable to the Ethernet port of the network device.
5. Verify the connection by checking that the 100M ETH LED on the top of the router is on.

Connecting the Router to the WAN

The Router 3000 series routers provide the following WAN ports:

- AUX port (all models)
- Mutiprotocol synchronous/asynchronous serial port (Router 3012, Router 3013, Router 3015)
- ISDN S/T port (Router 3013)
- ISDN U port (Router 3015)
- CT1/PRI port (Router 3016)
- E1/CE1/PRI port (Router 3018)

See Chapter A for illustrations and pinout details of all WAN port cables.

Connecting the AUX Port to the Modem

The auxiliary (AUX) port is an EIA/TIA-232-compliant synchronous/asynchronous serial port that is used for remote configuration or dial-up backup. To connect the router to a remote device, a local modem must be connected to a remote modem through PSTN. For the connection method, see Chapter 3. For the AUX port specifications of each router, see Chapter 1.

If the console port fails, the AUX port can also serve as a console port.

To connect the AUX cable:

1. Turn off power to the router.
2. Plug the RJ-45 connector of the AUX cable into the AUX port of the router.
3. Connect the DB-25 or DB-9 adapter of the AUX cable to the serial port of the analog modem.

   For pinout details of the AUX cable, see Appendix A.

Connecting the Serial Port to a CSU/DSU

The serial port is usually used to connect the router to DSU/CSU. For the serial port specifications of each router, see Chapter 1.

CAUTION: *Plugging and unplugging the connectors of the serial port online can damage the router or the remote device.*

Nine types of serial port cables are available. However, these cables are optional and you must select the proper one based on your requirements when you purchase the router. All these types of cables have a DB-50 adapter at the router end.

For pinout details of the serial port cables, see Appendix A.

At the network end, the connector is different for each type of cable, as described in the following list:

- V.24 (EIA/TIA-232) DTE cable — DB-25 (male) adapter
- V.24 (EIA/TIA-232) DCE cable — DB-25 (female) adapter
- V.35 DTE cable — 34-pin (male) adapter
- V.35 DCE cable — 34-pin (female) adapter
- X.21 DTE cable — DB15 (male) adapter
- X.21 DCE cable — DB15 (female) adapter
- EIA/TIA-449 DTE cable — DB37 (male) adapter
- EIA/TIA-449 DCE cable — DB37 (female) adapter
- EIA-530 DTE cable — DB25 (male) adapter

Use the following procedure to connect the serial cable to the SERIAL0 port and the DSU/CSU device:

1. Turn off power to the router.
2. Choose the appropriate serial cable.
3. Plug the DB-50 adapter of the cable into the SERIAL0 port of the router.
4. Connect the other end of the cable to the CSU/DSU device. (If the WAN uses a dial-up line, connect the cable to the serial port of the analog modem. See "Connecting the AUX Port to the Modem" on page 25.

Connecting to the CT1/PRI Port

The Router 3016 hass a CT1/PRI port that provides CT1 (channelized T1) access and implements the ISDN function. See Table 21 on page 17.

The CT1/PRI cable is a 100-ohm shielded straight-through cable with RJ-45 connectors at both ends.

For pinout details of the T1 cable, see Appendix A.

To connect the T1 cable:

1. Turn off power to the router.

CAUTION: *Identify the mark on the CT1/PRI port. Plugging the connector in incorrectly can cause damage to the router.*

2. Insert the connector at one end of the T1 cable into the CT1/PRI port of the router.
3. Insert the connector at the other end of the T1 cable into the corresponding port in a WAN device.
4. Power on the router and verify that the T1-LNK LED on the front panel of the router chassis is lit. If it is off, check the connection cable.

Connecting to the ISDN BRI Port

The Router 3013 router has an ISDN S/T port and the Router 3015 router has an ISDN U port. These routers perform data transfer in 2B+D mode and support both ISDN dial-up and leased line. See Table 15 on page 14 for the ISDN port attributes.

The ISDN S/T cable is a 4-core twisted pair cable. Both ends of the cable have RJ-45 connectors. The 3-pin and 6-pin connectors are at the sending end, and the 4-pin and 5-pin connectors are at the receiving end.

The ISDN U cable is a 2-core twisted pair cable. One end has an RJ11 connector and the other end has an output terminal (OT) connector.

For illustrations and pinout details of the ISDN BRI cables, see Appendix A.

To connect the ISDN BRI port:

1. Turn off power to the router.

CAUTION: *Identify the router model and the ISDN BRI mark on the port when making the connection. Plugging the connector in incorrectly can cause damage to the router*

2. Confirm the type of ISDN line provided by the telecommunications service provider.
3. Connect the cable.

   For the Router 3013:

   a If the line is ISDN U, use an NT1 adapter. Insert one end of the S/T cable into the S/T port of the NT1, and the other end into the ISDN BRI port of the router.

   b If the line is ISDN S/T, insert the cable directly into the ISDN BRI port of the router

   For the Router 3015, the line must be ISDN U.

   Connect the RJ-45 connector to the ISDN BRI port of the router, and connect the output terminal (OT) end to the ISDN line through a telephone adapter.

Verifying the Installation

Verify whether the router has been correctly installed by checking the following items:

- There is airflow around the router
- Power is connected correctly
- The ground wire of the router is correctly connected
- The router is connected to other devices, such as the console terminal

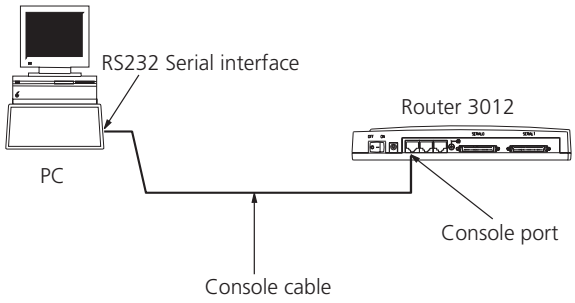
3 Booting and Configuring the Router

During the initial configuration of the router, you can use only the console or AUX port. This chapter describes how to connect the router to a local or remote console terminal and how to set parameters at the console terminal.

Connecting the Router to a Local Console Terminal

To set up the local configuration environment, connect the RJ-45 connector of the console cable to the console port on the router, and the DB-25 connector or DB-9 connector to the serial port of a PC, as shown in Figure 13.

Figure 13 Local Configuration Through the Console Port



Setting the Parameters of the Console Terminal

To set terminal parameters:

1 Start the PC and select *Start* > *Programs* > *Accessories* > *Communications* > *HyperTerminal*.

The HyperTerminal window displays the Connection Description dialog box, as shown in Figure 14.

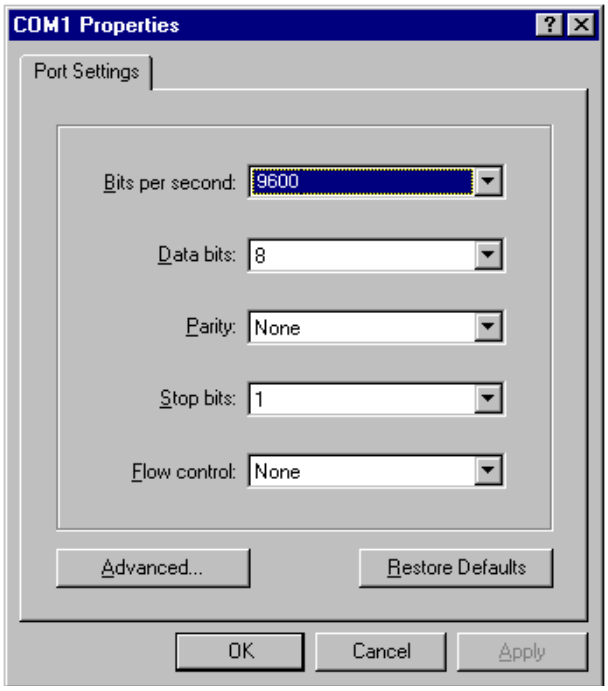
Figure 14 Connection Description Dialog Box

2 Enter the name of the new connection in the *Name* field and click *OK*. The *Connect To* dialog box, shown in Figure 15 displays.

Figure 15 Connect To Dialog Box

3 Select the serial port for the connection from the *Connect using* dropdown menu and click OK. The Connection Properties dialog box, shown in Figure 16 displays.

Figure 16 Connection Properties Dialog Box



4 Set the following parameters:

Bits per second — 9600

Data bits — 8

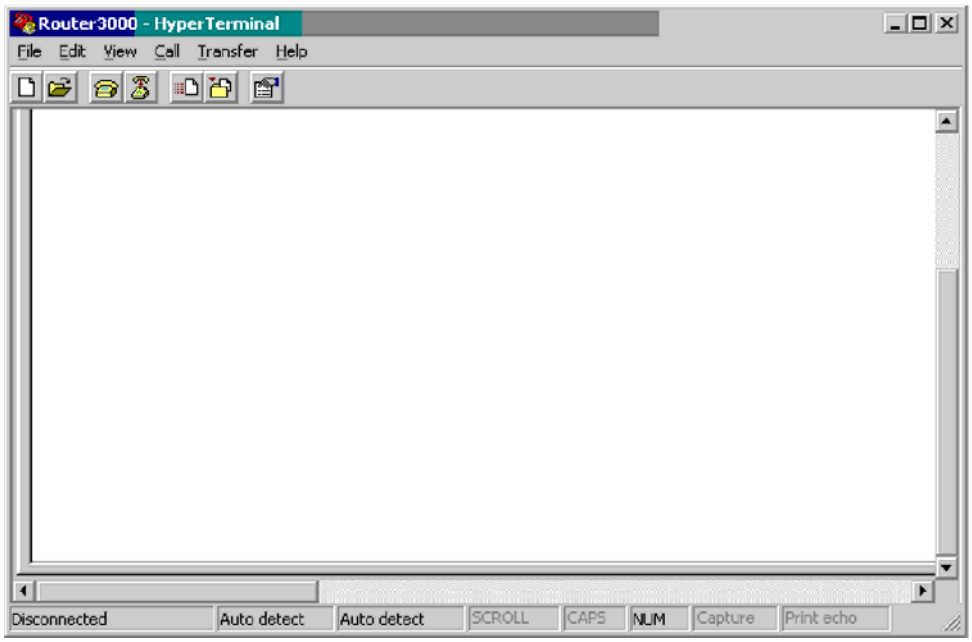
Parity — None

Stop bits — 1

Flow control — None.

5 Click *OK*. The HyperTerminal dialog box displays, as shown in Figure 17.

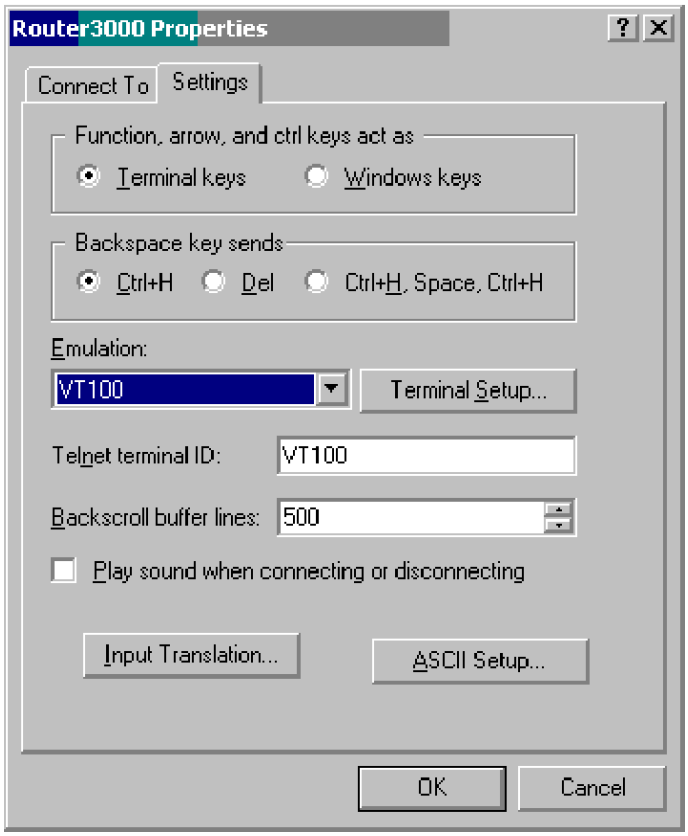
Figure 17 HyperTerminal Window



6 Select *Properties*. The *Properties* dialog box for your connection displays.

7 Click the *Settings* tab, shown in Figure 18.

Figure 18 Settings Tab



8 In the *Emulation* dropdown menu, select *VT100* or *Auto detect*. Click *OK*.

Powering on the Router

Before you power on the router, verify that:

- The connection between the power cord and ground wire is secure
- The voltage of the power supply complies with the requirement of the router
- The console cable is correctly connected to either the PC or the terminal, and that the parameters are correct, as described in "Setting the Parameters of the Console Terminal" on page 29.

WARNING: *Before switching on the power, locate the power-off switch in the workroom so that, in case of an electrical accident, power can be turned off quickly.*

Turn on the power switch of the router.

Checking and Operating after Power-on

After the router is powered on, verify that:

- The LEDs on the front panel are normal.

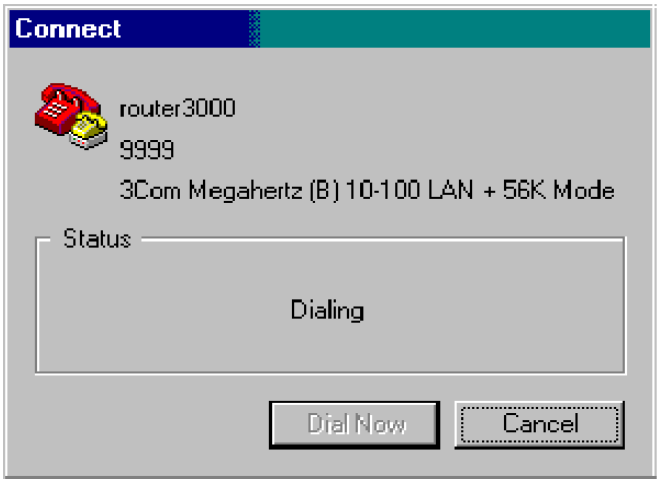
  For the status of the LEDs during normal operation after power-on, see the LED tables in Chapter 1.

- The console terminal display is normal

  For the local configuration, the startup interface on the console terminal displays after the router is powered on. See "Startup Process" on page 33.

  For the remote configuration, you must dial up, using HyperTerminal, after the router is powered on, as shown in Figure 19. After the dial-up, the startup interface is displayed on the terminal. See "Startup Process" on page 33.

Figure 19 Connect Dialog Box



After the POST, press *Enter*. When the `[3Com]` prompt displays, you can configure the router.

Startup Process

After the router starts up, the Boot ROM program runs and the following information displays on the terminal screen:

```
Booting
****************************************
```

```
*        3Com Router Boot Rom, V4.60

****************************************
Copyright(C) 2002-2005 by 3Com Corporation, Inc.
  Compiled at 20:46:59 , Jul 25 2003.

   Now testing memory...OK
   64M    bytes  SDRAM
   8192k  bytes  flash memory
   Hardware Version is MTR 0.1
   CPLD Version is CPLD 1.0
   Bootrom Version is V1.00

  Press Ctrl-B to Enter Boot Menu
```

The contents displayed on the terminal can vary with different versions of Boot ROM.

If you press Ctrl+B immediately, the system displays the Boot Menu. If you do not press Ctrl+B, the system initiates the program decompression process.

After "3Com Router Boot Rom, V4.60" appears, "Booting" disappears.

When the system begins the decompression and initialization process, the screen displays:

```
Now system is self-decompressing...
  System now is starting...

  Press ENTER to get started
```

Press *Enter*. The system displays the `[3Com]` prompt, which indicates that the router has entered the system view and you can configure the router.

Configuration Fundamentals of the Router

The configuration process includes the following steps:

1. Clarify your networking requirements. These requirements include:
   - The connectivity requirements of the remote sites
   - The types of LAN and WAN ports required for the network
   - The configuration of IP and IP subnet settings and any other protocols
   - The network reliability, management, and security policies
2. Based on your network requirements, draw a clear and integrated networking diagram.

3 Configure the WAN port of the router:

- Configure the physical operating parameters (the operating mode of the serial port, baud rate, and synchronous clock) of the port according to the transmission medium of the WAN. For the dial-up port, you need to configure DDR parameters.
- Configure the link layer protocol encapsulated on the port and the related operating parameters according to the type of the WAN.

4 Configure the IP addresses or IPX network number for all the ports of the router according to the division of the subnets.

5 Configure the routes. If you have to start up the dynamic routing protocol, configure the related operating parameters of the protocol.

6 Create the security configuration for the router, as necessary.

7 Create the reliability configuration for the router, as necessary.

SNMP Management

For help managing routers on your network, you can use 3Com Network Supervisor software to discover, map, and display network links and IP devices.

To allow Network Supervisor to monitor your routers, you must first configure SNMP V1 and SNMP Trap support with the following commands:

```
[3Com]snmp-agent sys-info version v1
[3Com]snmp-agent community read <read-community-string>
[3Com]snmp-agent community write <write-community-string>

[3Com]snmp-agent trap enable
[3Com]snmp-agent target-host trap address <addr> parameter
v1 securityname <security-name-string>
```

In this example, `<addr>` is the address of the PC on which you have installed Network Supervisor.

To learn more about Network Supervisor, on the 3Com Corporation World Wide Web site, enter this URL into your Internet browser:

http://www.3com.com/3ns

Command Line Interface

The command line interface of the Router 3000 series routers provides commands to configure and manage the router. The command line interface has the following characteristics:

- Performs the local configuration through the console port.
- Performs local or remote configuration through the **telnet** command, which can be used to log on directly and manage other routers.
- Implements the configuration on the router through the terminals (the asynchronous port, including those connected to the AUX port and AS port) in the dumb terminal mode.
- Configures the hierarchical user protection (guest, operator, administrator). Only administrator users are authorized to configure and manage the routers.
- Online help, available by typing **?** at any time.

- Provides network diagnostic tools, such as Tracert and Ping, to quickly diagnose the availability of the network.
- Provides detailed debugging information to diagnose network faults.
- The command line interpreter adopts fuzzy search for the keywords of the command. A conflict-free keyword if entered, will be interpreted accordingly. For example, for a **display** command, you can enter **dis**.

To facilitate the management of the router in the system view, all the commands are grouped. Each group corresponds to a view. Users can use these commands to switch between different views. Many commands are limited to use in a single view. Other commands (such as **ping**, **display current-configuration**, **interface**) can be executed in all views.

Help for the Configuration

Router 5000 routers provide online Help for the command line interface:

- In any view, enter **?** for all the commands in the view and a brief description of each command.
- Enter a command, followed by a space and **?**, in the keyword position for a list of all keywords and a brief description of each one.
- Enter a command, followed by a space and **?**, in the argument position for a description of related arguments.
- Enter a character string, followed by a space and **?**, for a list of all commands that begin with the character string.
- Enter a command, followed by a character string and **?**, for a list of all keywords that begin with the string.

4 MAINTAINING THE ROUTER

Software Maintenance

The Router 3000 supports three types of software file:

- BootROM program files
- Application files
- Configuration files

This chapter describes the configuration methods you can use to upgrade, upload and download configuration files and application files, and manage the BootROM password.

Accessing the Boot Menu

The Boot menu is used during software maintenance of the router. Create a configuration environment (see "Configuration Fundamentals of the Router" on page 34) and boot the router. The terminal screen displays the following information:

```
Booting
****************************************

*          R3000 Boot Rom, V4.60

****************************************
Copyright(C) 2002-2005 by 3Com Corporation, Inc.
  Compiled at 20:46:59 , Jul 25 2003.

  Now testing memory...OK!
  64M    bytes  SDRAM
  8192k  bytes  flash memory

  Press Ctrl-B to Enter Boot Menu
```

Press Ctrl + B within 5 seconds. The system prompts you for the BootROM password:

```
Please  input bootrom password :
```

If you do not press Ctrl + B within 5 seconds, the system begins decompression, and you must restart the router.

Enter the Boot ROM password, if there is one, and press *Enter.* The Boot menu displays:

```
Boot Menu:
1: Download application program with XMODEM
2: Download application program with TFTP
3: Clear application password
4: Clear configuration
5: Start up and ignore console configuration
6: Download Boot ROM ALL with XMODEM
7: Restore Boot ROM from FLASH
8: Backup Boot ROM from FLASH
9: Exit and reboot

Enter your choice(1-9):
```

The Boot menu provides two methods for upgrading the applications. See "Downloading Applications with the Xmodem Protocol" on page 38 and "Downloading Applications with the TFTP Protocol" on page 40.

CAUTION: *When you upgrade application programs, verify and match the version of the Boot ROM software to the version of the main software.*

Downloading Applications with the Xmodem Protocol

If you download software applications using the Xmodem protocol, you can use the console port.

Use the following process to download applications with the Xmodem protocol:

1. Enter the Boot menu.
2. Press 1 to select the *Download application program with Xmodem*. The router provides the following download speed options:

   ```
   Downloading application program from serial ...
   Please choose your download speed:
   1: 9600 bps
   2: 19200 bps
   3: 38400 bps
   4: 57600 bps
   5: 115200 bps
   6: Exit and reboot
   Enter your choice(1-6):
   ```

3. Select the appropriate download speed. The router displays information based on your selection, for example:

   ```
   Download speed is 115200 bps. Change the terminal's speed to 115200
   bps, and select Xmodem protocol. Press ENTER key when ready.
   ```

4. Change the baud rate at the console terminal to make it consistent with your selection in Step 3.

   To allow the new baud rate to take effect, you must disconnect the terminal and reconnect it.

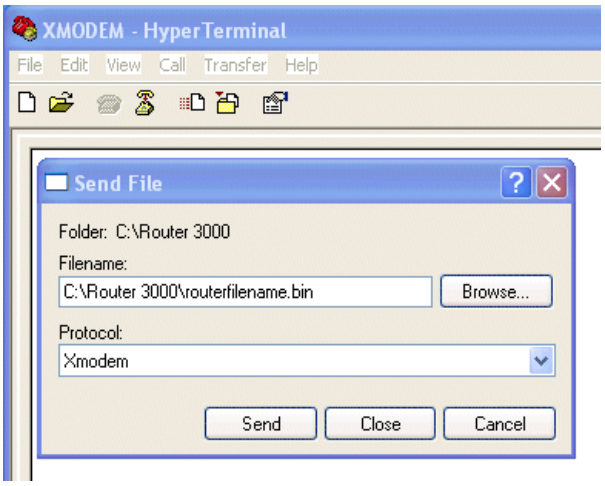
5. Press *Enter* to begin the download. The system displays the following prompt:

   ```
   Downloading ... CCCCC
   ```

6. Select *Transmit/Send* file in the terminal window.

7 Select *Browse* in the Send File dialog box, shown in Figure 20, and select the application you want to download.

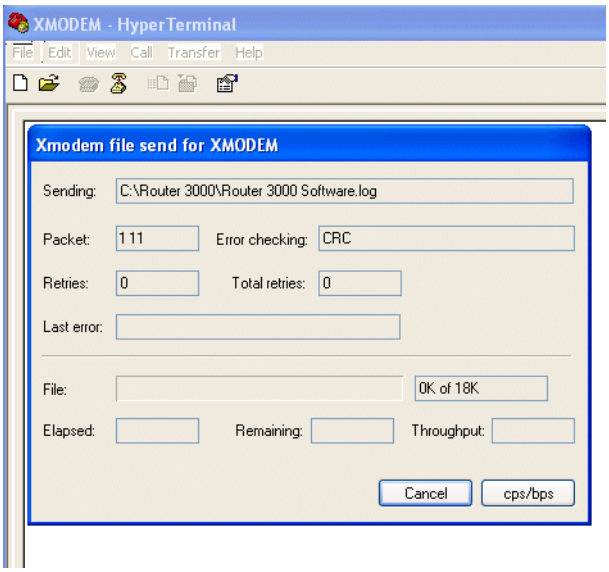
Figure 20 Send File Dialog Box



8 In the *Protocol* dropdown menu, select *Xmodem*.

9 Click *Send*. The system displays the Xmodem file send dialog box, shown in Figure 21.

Figure 21 Xmodem File Send Dialog Box



After the download is complete, the system begins the operation of writing to Flash memory, after which, the following information will be displayed in the terminal interface, indicating that the download is completed:

```
Download completed.
Writing to flash memory...
Please wait,it needs a long time (about 5 min).
############################
Write Flash Success.
Please return to  9600 bps. Press ENTER key to reboot the system.
```

10 Restore the baud rate of the console terminal to 9600bps and repeat the disconnection and reconnection of the terminal.

Downloading BootROM with the Xmodem Protocol

To upgrade the Boot ROM by using Xmodem:

1 Power on the router start the POST, and press Ctrl+B within 5 seconds of the prompt that tells you to do so.

2 Enter the Boot ROM password at the prompt:

```
Please input bootrom password:
```

The terminal displays the following menu:

```
Boot Menu:
 1:  Download BootRom program
 2:  Modify BootRom password
 3:  Reboot
Enter your choice(1-3):
```

3 Enter 1 and continue with Step 3 in "Downloading Applications with the Xmodem Protocol" on page 38.

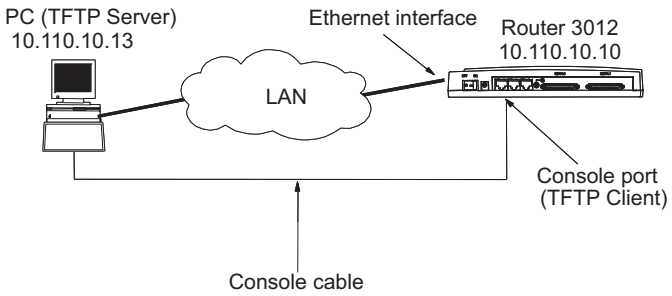
Downloading Applications with the TFTP Protocol

TFTP Server software is not provided with your router but you can download a free copy from:

ftp://ftp.3com.com/pub/utilbin/win32/3ts01_04.exe

To download application upgrades with the TFTP protocol, you must create the configuration shown in Figure 22.

Figure 22 TFTP Upgrade Environment



Creating the TFTP Upgrade Configuration:

1 Connect the ETHERNET port to a PC through a crossover network cable.

2 Connect the console port of the router to an external console terminal and configure HyperTerminal. See "Setting the Parameters of the Console Terminal " on page 29.

3 Install the TFTP Server on the PC.

4 Copy the new application files to a suitable path. The default is C:\R3000.

5 Configure the IP address for the Ethernet port on the PC, and assume that the address is 10.110.10.13.

6 Start the TFTP Server on the PC. The TFTP dialog box displays.

7 Depending on your TFTP server interface, click on the appropriate icon or button, to set the path for the application on your system.

Configuring the Router

1 Enter the TFTP configuration status.

2 Boot the router and press N immediately when *Booting* displays on the screen. The following information displays on the terminal interface:

```
(M)odify any of router configuration or (C)ontinue? [M]
```

3 Press *Enter*. The following information displays:

```
For each of the following questions, you can press <Return> to select
the value shown in braces, or you can Enter a new value.
NETWORK INTERFACE PARAMETERS:
Do you want a LAN interface?  [N] y
This board's LAN IP address? [169.254.10.10]10.110.10.10
Subnet mask for LAN (0 for none)? [255.255.0.0]
TFTP SERVER PARAMETERS:
Configure the TFTP Server parameters, including IP address of the
Ethernet interface on the PC, file name of the application program,
CPU delay time and so on.
IP address of the TFTP server? [169.254.75.166]10.110.10.13
What is the name of the file to be loaded and started? [m8241ram.arj]
How long (in seconds) should CPU delay before starting up? [5]
```

4 Configure the network interface parameters for the router, including the interface to be used, its IP address, and subnet mask.

As you configure these parameters, set the values so that:

- The IP address of the TFTP server is the IP address of the PC connected to the Ethernet port on the router.
- The IP address and subnet mask are the same as the IP address and subnet mask of the LAN0 port.
- The IP addresses of the PC network interface and the LAN0 port of the router reside on the same segment.

After you enter the last parameter, the following information displays and you can verify that the parameters are set correctly.

```
-----------------------------------------------------------------
NETWORK INTERFACE PARAMETERS:
  IP address on LAN is 10.110.10.10
  LAN interface's subnet mask is 0xffff0000
HARDWARE PARAMETERS:
  Processor type is MPC8241
  Internal Clock Rate 200 Mhz
  External Clock Rate 100 Mhz
  Serial channels will use a baud rate of 9600
TFTP SERVER PARAMETERS:
  IP address of the TFTP host is 10.110.10.13
  The file to download and start is m8241ram.arj
  After board is reset, start-up code will wait 5 seconds
-----------------------------------------------------------------
(M)odify any of this or (C)ontinue? [M]C
```

5 Enter C to confirm this configuration or M to modify any of the parameter settings.

Upgrading the Application

To upgrade the application:

1. Boot the system normally.
2. Press Ctrl+B within 5 seconds of the prompt that tells you to do so.
3. Enter the BootROM password, if necessary.
4. Enter 2 at the Boot menu, to select *Download the Application Program Through TFTP*. The following information displays:

```
Please start TFTP server then press ENTER key to get started
```

5. If the PC running TFTP Server is ready, press *Enter* to begin loading the program.

```
Starting the TFTP download...
 ..............................................................
TFTP download completed...
read len=[03713478]
Writing program code to FLASH...
Please waiting,it needs a long time (about 5 min)
##############################
Write Flash Success.
Press ENTER key to reboot the system.
```

6. After the loading, press *Enter* to reboot the router.

Uploading and Downloading Applications and Configuration Files Using FTP

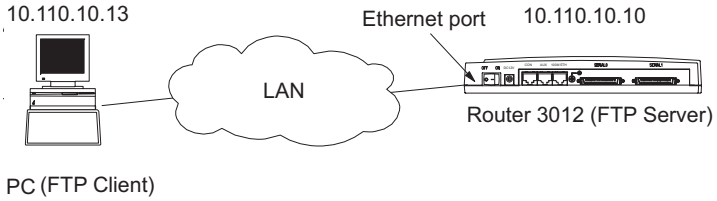
Uploading files involves transferring them from a PC running the FTP client to a router running the FTP server, through the router's Ethernet port. This is called a **put** operation.

Downloading files involves transferring them from the FTP server on the router, through its Ethernet port, to the PC running the FTP client. This is called a **get** operation. All FTP clients, including local and remote users, who are connected to a router can upload and download if they pass user authentication.

Creating a Local FTP Upload/Download Configuration

To transfer files using FTP, you must create the appropriate configuration, as shown in Figure 23 and Figure 24, and described in the following procedures.

Figure 23 Creating a Local FTP Upload/Download Configuration



To create a local FTP upload/download configuration:

1. Connect the PC to any of the Ethernet ports on the router.
2. Configure the IP address for the Ethernet port on the router. The default IP address is 10.110.10.10.
3. Configure the IP address of the Ethernet port on the PC. The default IP address is 10.110.10.13.

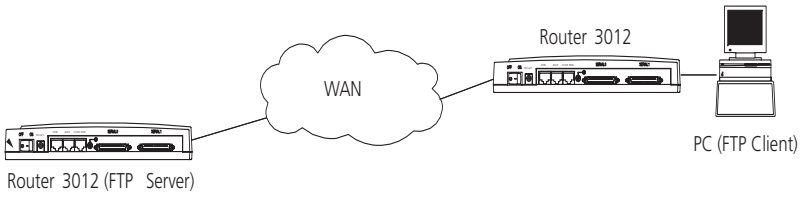
The IP addresses of the PC network port and of the router's Ethernet port must be on the same segment.

4 Copy the application program files to a path, the default is C:\version.

Creating a Remote FTP Upload/Download Configuration

Figure 24 illustrates a remote FTP upload/download configuration

Figure 24 Creating a Remote FTP Upload/Download Configuration



To create a remote FTP upload/download configuration:

1 Connect the PC to any port on the router through a WAN. This procedure does not require that the IP address of the PC and that of the router be on the same segment.

2 Copy the application program files or configuration files to a suitable path. The default is C:\version.

To start the FTP server on the router and to set the user name and password, you should work with the maintenance personnel at the router site. All FTP client programs can use the username and password to log on to the FTP server.

To start the FTP server and set the user name and password:

1 Set the authentication mode:

[3Com] **aaa-enable**

[3Com] **aaa authentication-scheme login default local**

[3Com] **aaa accounting-scheme optional**

2 Add the user name and password:

```
[3Com] local-user user password simple 123 service-type ftp
```

where **user** is the user name and *123* is the password.

3 Start the FTP server:

```
[3Com] ftp-server enable
```

Uploading or Downloading an Application or Configuration File

To upload or download an application program file or configuration file:

1 In DOS mode, enter the path where the application or configuration files are located.

2 Execute the **FTP** command and set up the FTP connection with the router. For example:

```
C:\version\ftp 10.110.10.10
```

If the connection is set up, the following information displays:

```
Connected to 10.110.10.10
```

```
220 FTP server ready on R3000 at
User(10.110.10.10:(none)):
```

3 Use the username and password that have already been set on the router to log on to the FTP server.

```
User(10.110.10.10:(none)): user
331 Password required for ftp
Password:
230 User ftp logged in
ftp>
```

The appearance of the `ftp>` prompt indicates that you can begin the upload or download operation.

During the upload and download operation, the default name of the router's application program is SYSTEM. Configurations file are named CONFIG by default.

4 To upload the application or configuration files, enter the appropriate path and file name at the following prompts:

```
ftp>put
local file
remote file
```

After the uploading is completed, the `ftp>` DOS prompt displays again.

5 Enter **dir** to display the name and size of the file on the router. If the upload is successful, the sizes of the file on the router and on the PC will be the same.

6 To download the application or configuration files, enter the appropriate path and file name at the following prompts:

```
ftp>get
local file
remote file
After the upload or download is complete, exit the FTP client
program:
ftp>quit
```

Creating a New Router Password

If the router's Boot ROM password or user password is lost, use the following procedure:

1 Boot the router.

2 Press Ctrl+B within 5 seconds of the prompt that tells you to do so.

3 Enter 3 at the Boot Menu:

```
Boot Menu:
1:  Download application program with Xmodem
2:  Download application program with TFTP
3:  Clear application password
4:  Clear configuration
5:  Start up and ignore Console configuration
6:  Exit and reboot
Enter your choice(1-6):3
```

4 When the Boot menu is shown again, enter 6 to exit the Boot menu and run the router's main software.

5 Press *Enter* in the system view to enter the user password directly.

```
[3Com] local-user user password simple service-type
exec-administrator 123
```

In this example, `user` indicates the user name, `123` indicates the new user password.

```
[R3000] quit
[R3000] save
```

6 Execute the **save** command after modifying the user password to save the change.

```
[R3000] quit
[R3000] save
```

If the Boot ROM password for the router is lost, contact your Service representative.

Maintaining Router Hardware

In preparation for the maintenance of your router hardware, have the following tools:

- Phillips screwdriver
- ESD-preventive wrist strap and ESD-preventive glove
- Static shielding bag
- Chip extractor

CAUTION: *Observe the following precautions when maintaining your router hardware:*

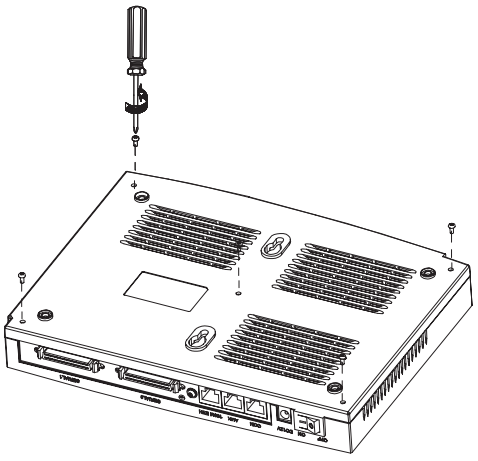
- On the Router 3000, there is a seal on one of the screws on the chassis. Contact your Service representative before you open the chassis.
- Always maintain the router under the guidance of technical support personnel.
- Confirm that all power supplies have been disconnected from the router when performing hardware maintenance.
- Wear an ESD-preventive wrist strap and ESD-preventive gloves during hardware maintenance and ensure that the strap makes skin contact.
- Use only the SDRAM provided by 3Com Corporation.

Opening the Cover of Router Chassis

Use the following procedure to open the router chassis cover:

1. Turn off the power to router and remove the power cord.
2. Remove all port cables on the back panel of the router. **Do not** remove the PGND cable.
3. Place the router upside down on a work surface. Remove the screws on the bottom of the chassis with the Phillips screwdriver and set them aside.
4. Turn the router right side up, with the rear panel toward you.
5. Remove the captive screws on the rear panel with the Phillips screwdriver and set them aside.
6. Raise the chassis cover until it is free of the bottom of the router, and put it to one side.

Figure 25 Removing the Screws from the Bottom of the Router Chassis

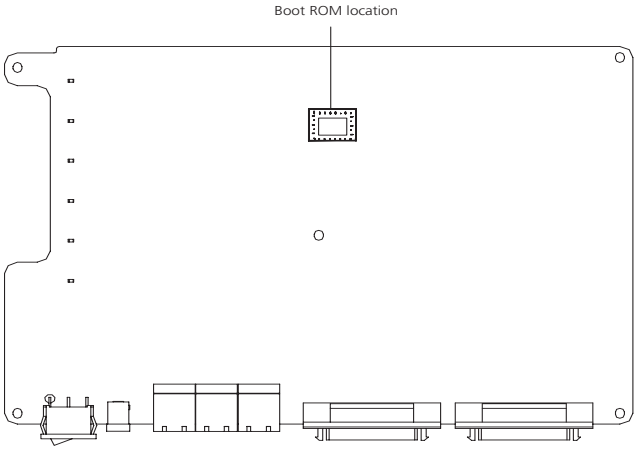


Replacing the Boot ROM

When a Boot ROM is damaged or when data becomes corrupted because of a software failure and cannot be corrected, the Boot ROM should be replaced.

Router 3000 Boot ROMs are located at the same position on the mainboard, as shown in Figure 26.

Figure 26 Boot ROM Location



CAUTION: *Use a chip extractor to replace the Boot ROM.*

To replace the Boot ROM:

1. Insert the top end of the chip extractor into the Boot ROM socket, turn inward slightly, withdraw the extractor upward and lift the Boot ROM out.
2. Put the Boot ROM into the static shielding bag.
3. Insert the end of the chip extractor into the socket of the new Boot ROM.
4. Position the Boot ROM so that the beveled edge of the socket matches the beveled edge on the Boot ROM and plug it into the Boot ROM socket.

CAUTION: *Be careful not to damage or bend the pins at the bottom of the Boot ROM. If the pins are bent, straighten them with needle-nose pliers.*

Closing the Router Chassis Cover

To prevent cables from being pressed or cut off when you close the cover of the router chassis, roll up all the cables and put them into the chassis before closing the cover.

5 TROUBLESHOOTING

The Power LED is Off.

If the power LED is off, verify that:

- The power switch of the router is turned on.
- The power supply switch is turned on.
- The power cord of the router is connected properly.
- The power supply suits the requirement of the router.

CAUTION: *Do not plug in or unplug the power cord when the power is on. After having checked the conditions in the previous list, if the power LED is still off, contact your Service representative.*

Nothing is Displayed on the Terminal after Power-On

After the system runs the power-on self-test (POST), if the system operates normally, the start-up information is displayed on the console terminal. If the configuration system has a fault, the terminal may display nothing.

If the terminal does not display any information after the POST, verify that:

- The power system is operating normally.
- The console cable is connected correctly.

If the power system is normal and the console cable is connected properly, there may be something wrong with the console cable or the HyperTerminal parameters. Check the cable or the parameters.

HyperTerminal parameters should have the following values:

- Baud — 9600
- Data bits — 8
- Stop bit — 1
- Parity — None
- Flow control — None
- Terminal emulation — VT100

If the parameter settings do not match these values, reconfigure them.

If the previous checks do not solve the problem, contact your Service representative and follow the representative's instructions.

Illegible Characters Display on the Terminal after Power-On

If the system operates normally after the system runs the POST, the start-up information is displayed on the console terminal. If the configuration system has a fault, the terminal may display only illegible characters.

If the console terminal displays illegible characters after the POST, verify that the HyperTerminal parameters are set properly, as follows:

- Baud: 9600
- Data bits: 8
- Stop bit: 1
- Parity: None
- Flow control: None
- Terminal emulation: VT100

If the parameter settings do not match these values, reconfigure them.

A

Optional Cable Specifications

The tables in this appendix describe the pinouts for the cables that you can use with Router 3000 series routers. Pins that are not described in the following tables are not connected.

Console Cable

Figure 27 illustrates the console cable.

Figure 27 Console Cable Assembly

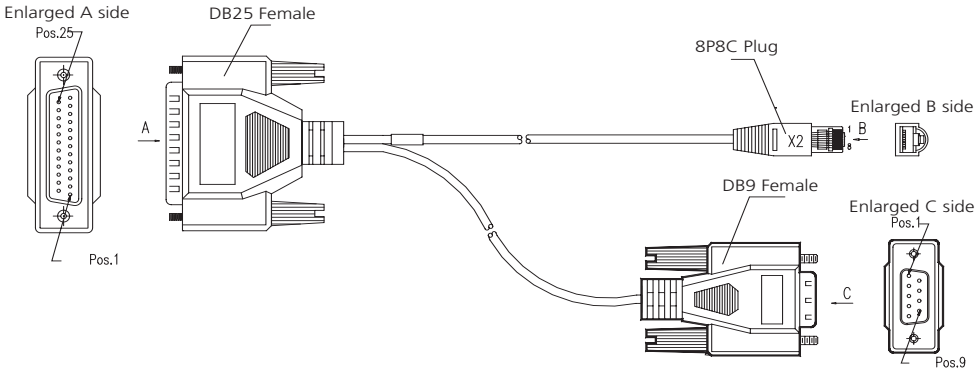


Table 25 describes the console cable pinouts.

Table 25 Console Cable Pinouts

RJ-45	Signal Direction	DB-25	DB-9	Signal
1	—>	5	8	CTS
2	—>	6	6	DSR
3	—>	3	2	RXD
4	<—	8	1	DCD
5	-	7	5	GND
6	<—	2	3	TXD
7	<—	20	4	DTR
8	<—	4	7	RTS

AUX Cable

The AUX cable is an 8-core shielded cable. One end of the cable has an RJ-45 connector and connects to the AUX port of the router. The other end has both a DB-25 (male) adapter and a DB-9 (male) adapter. Use the appropriate connector for the port on the modem.

Figure 28 illustrates the AUX cable.

Figure 28 AUX Cable Assembly

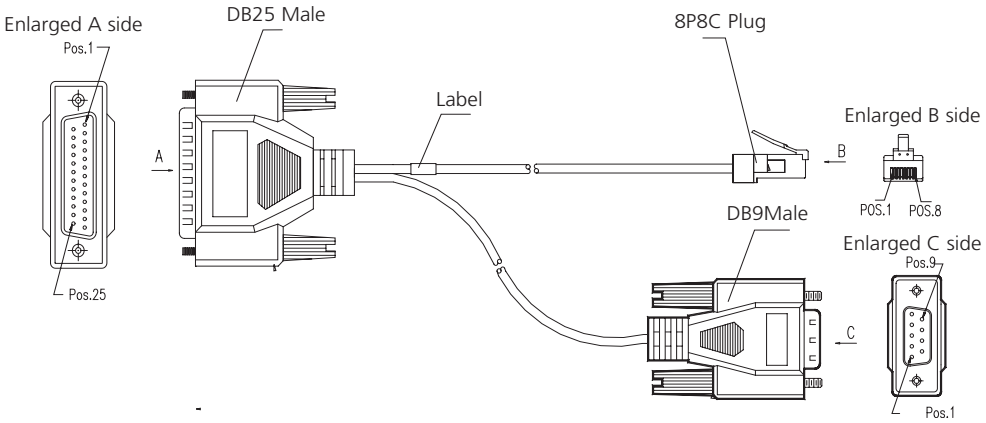


Table 26 describes the AUX cable pinouts.

Table 26 AUX Cable Pinouts

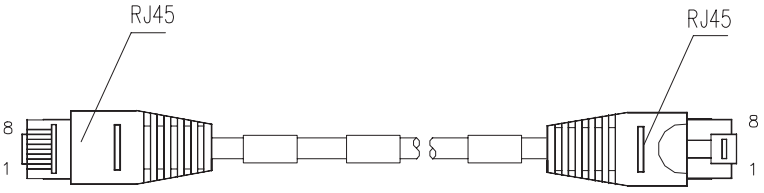
RJ-45	Signal Direction	DB-25	DB-9	Signal
1	—>	4	7	RTS
2	—>	20	4	DTR
3	—>	2	3	TXD
4	<—	8	1	DCD
5	-	7	5	GND
6	<—	3	2	RXD
7	<—	6	6	DSR
8	<—	5	8	CTS

Ethernet Cable

The Ethernet cable uses an RJ-45 connector and category 5 twisted pair cable.

The Router 3000 series routers provide a fixed 10/100BASE-TX fast Ethernet port that uses category-5 twisted pair cable, as shown in Figure 29

Figure 29 Ethernet Cable Assembly



The Ethernet cables are classified as straight-through network cable and crossover network cable. They have the following features:

- Straight-through network cable — The sequences of the wires crimped at the RJ-45 connectors of the two ends are the same. The cable is used in the connection between a terminal device, such as a PC or a router, and the Hub or

LAN Switch. Straight-through network cables are delivered along with the router.

- Crossover network cable — The sequences of the wires crimped at the RJ-45 connectors of the two ends are different. The cable is used in the connection between the terminal device, such as a PC or a router, and another terminal device. You can create this cable yourself, if necessary.

Table 27 describes straight-through network cable pinouts.

Table 27 Straight-through Network Cable Pinouts

RJ-45	Signal	Category 5 twisted pair	Signal Direction	RJ-45
1	TX+	White (Orange)	—>	1
2	TX-	Orange	—>	2
3	RX+	White (Green)	<—	3
4	-	Blue	-	4
5	-	White (Blue)	-	5
6	RX-	Green	<—	6
7	-	White (Brown)	-	7
8	-	Brown	-	8

Table 28 describes crossover network cable pinouts.

Table 28 Crossover Network Cable Pinouts

RJ-45	Signal	Category 5 Twisted Pair	Signal Direction	RJ-45
1	TX+	White (Orange)	—>	3
2	TX-	Orange	—>	6
3	RX+	White (Green)	<—	1
4	-	Blue	-	4
5	-	White (Blue)	-	5
6	RX-	Green	<—	2
7	-	White (Brown)	-	7
8	-	Brown	-	8

You can use Table 28 as a reference while distinguishing or preparing the two kinds of Ethernet cables. While preparing the Ethernet cables, follow the chromatogram given in this table to arrange the wires. Otherwise, communication quality will be affected even though the equipment at two ends is connected.

Serial Port Cable

The synchronous/asynchronous serial port cable is connected to a DB-50 receptacle. You must select the appropriate cable for the protocol.

Synchronous and Asynchronous mode

V.35 and V.24 (EIA/TIA-232) standards support synchronous operating mode, while only V.24 (EIA/TIA-232) standard supports the asynchronous operating mode. The maximum transmission distance and baud rate of the signal vary with the operating mode. See Table 29 for details.

Table 29 Transmission Rate and Transmission Distance of V.24 (EIA/TIA-232)/V.35 Cable

V.24 (EIA/TIA-232)		**V.35**	
Baud Rate (bps)	**Maximum Transmission Distance (m)**	**Baud Rate (bps)**	**Maximum Transmission Distance (m)**
2400	60	2400	1250
4800	60	4800	625
9600	30	9600	312
19200	30	19200	156
38400	20	38400	78
64000	20	56000	60
115200	10	64000	50
-	-	2048000	30

CAUTION: *The baud rate should not exceed 64 Kbps when the V.24 cable operates in synchronous mode.*

DTE and DCE mode

The synchronous serial port can operate in both DTE mode and DCE mode. For two devices connected directly, one device should operate in DTE mode, and the other device should operate in DCE mode. The DCE mode device provides a synchronous clock and specifies the transmission rate, the DTE mode device accepts the synchronous clock and communicates at the specified transmission rate. Usually, the router serves as the DTE device. To determine whether the device is a DTE or a DCE, refer to the user manual for the device. Table 30 helps identify DTE and DCE devices.

Table 30 Typical DTE and DCE

Type of Equipment	**Type of Interface**	**Typical Equipment**
DTE	male	PC or router
DCE	female	Modem, multiplexer or CSU/DSU

In general, the asynchronous serial interface is connected to a modem or a terminal adapter (TA) to act as the dial-up interface. In this case, it is unnecessary to determine whether the device is DTE or DCE, you must only select the appropriate baud rate.

V.24 (EIA/TIA-232) DTE Cable Pinouts

Figure 30 illustrates the V.24 DTE cable

Figure 30 V.24 DTE Cable Assembly

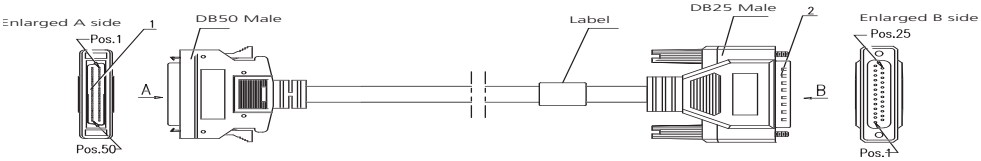


Table 31 describes V.24 (EIA/TIA-232) DTE cable pinouts.

Table 31 V.24 (EIA/TIA-232) DTE Cable Pinout

DB-50	Signal	Signal Direction	DB-25	Signal
5	TxD/RxD	—>	2	TxD
27	RxD/TxD	<—	3	RxD
2	RTS/CTS	—>	4	RTS
31	CTS/RTS	<—	5	CTS
6	DSR/DTR	<—	6	DSR
30	DCD/LL	<—	8	DCD
3	TxC/NIL	<—	15	TxC
28	RxC/TxCE	<—	17	RxC
1	LL/DCD	—>	18	LTST
26	DTR/DSR	—>	20	DTR
4	TxCE/TxC	—>	24	TxCE
50	GND	-	1	Shield_GND
7	GND	-	7	Circuit_GND

V.24 EIA/TIA-232 DCE Cable Pinouts

Figure 31 illustrates the V.24 DCE cable.

Figure 31 V.24 DCE Cable Assembly

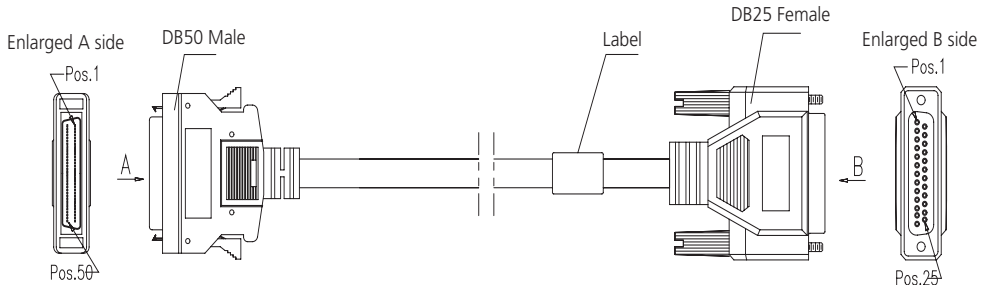


Table 32 describes V.24 (EIA/TIA-232) DCE cable pinouts.

Table 32 V.24 (EIA/TIA-232) DCE Cable Pinouts

DB-50	Signal	Signal Direction	DB-25	Signal
5	TxD/RxD	—>	3	RxD

Table 32 V.24 (EIA/TIA-232) DCE Cable Pinouts (continued)

DB-50	Signal	Signal Direction	DB-25	Signal
27	RxD/TxD	<—	2	TxD
2	RTS/CTS	—>	5	CTS
31	CTS/RTS	<—	4	RTS
26	DTR/DSR	—>	6	DSR
1	LL/DCD	—>	8	DCD
4	TxCE/TxC	—>	15	TxC
29	NIL/RxC	—>	17	RxC
30	DCD/LL	<—	18	LTST
6	DSR/DTR	<—	20	DTR
28	RxC/TxCE	<—	24	TxCE
50	GND	-	1	Shield_GND
7	GND	-	7	Circuit_GND

V.35 DTE Cable Pinouts Figure 32 illustrates the V.35 DTE cable.

Figure 32 V.35 DTE Cable Assembly

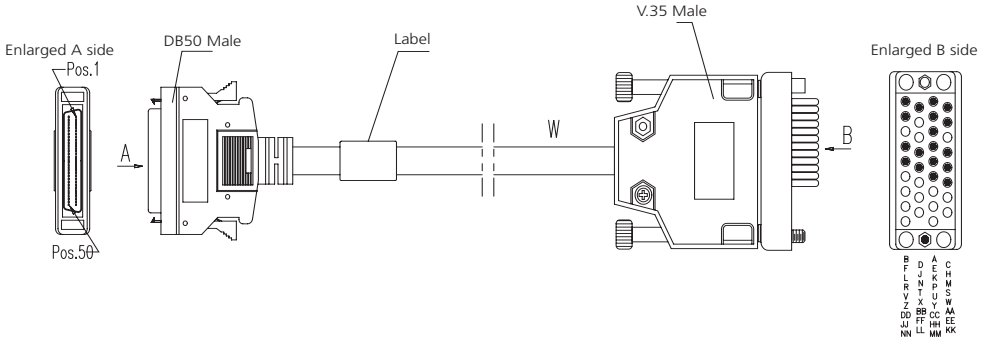


Table 33 describes V.35 DTE cable pinouts.

Table 33 V.35 DTE Cable Pinouts

DB-50	Signal	Signal Direction	34PIN	Signal
2	RTS/CTS	—>	C	RTS
31	CTS/RTS	<—	D	CTS
6	DSR/DTR	<—	E	DSR
30	DCD/LL	<—	F	RLSD
26	DTR/DSR	—>	H	DTR
1	LL/DCD	—>	K	LT
15	TxD/RxD+	—>	P	SD+
39	TxD/RxD-	—>	S	SD-
20	RxD/TxD+	<—	R	RD+
44	RxD/TxD-	<—	T	RD-
16	TxCE/TxC+	—>	U	SCTE+
40	TxCE/TxC-	—>	W	SCTE-
19	RxC/TxCE+	<—	V	SCR+
43	RxC/TxCE-	<—	X	SCR-
18	TxC/RxC+	<—	Y	SCT+
42	TxC/RxC-	<—	AA	SCT-
50	GND	-	A	Shield_GND
7	GND	-	B	Circuit_GND
24	RxD-REST	GND	-	-
49	RxC-REST	GND	-	-
25	TxC-REST	GND	-	-

V.35 DCE Cable Pinouts Figure 33 illustrates the V.35 DCE cable.

Figure 33 V.35 DCE Cable Assembly

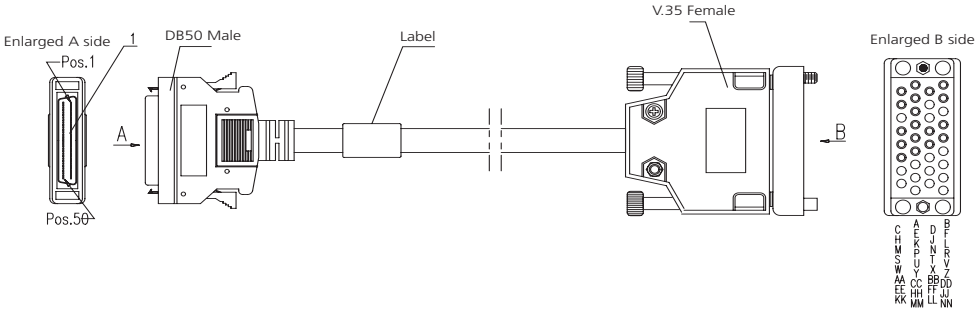


Table 34 describes V.35 DCE cable pinouts.

Table 34 V.35 DCE cable Pinouts

DB-50	Signal	Signal Direction	34PIN	Signal
31	CTS/RTS	<—	C	RTS
2	RTS/CTS	—>	D	CTS
26	DTR/DSR	—>	E	DSR
1	LL/DCD	—>	F	RLSD
6	DSR/DTR	<—	H	DTR
30	DCD/LL	<—	K	LT
20	RxD/TxD+	<—	P	SD+
44	RxD/TxD-	<—	S	SD-
15	TxD/RxD+	—>	R	RD+
39	TxD/RxD-	—>	T	RD-
19	RxC/TxCE+	<—	U	SCTE+
43	RxC/TxCE-	<—	W	SCTE-
17	NIL/RxC+	—>	V	SCR+
41	NIL/RxC-	—>	X	SCR-
16	TxCE/TxC+	—>	Y	SCT+
40	TxCE/TxC-	—>	AA	SCT-
50	GND	-	A	Shield_GND
7	GND	-	B	Circuit_GND
24	RxD-REST	GND	-	-
49	RxC-REST	GND	-	-
25	TxC-REST	GND	-	-

X.21 DTE Cable Pinouts Figure 34 illustrates the X.21 DTE cable.

Figure 34 X.21 DTE Cable Assembly

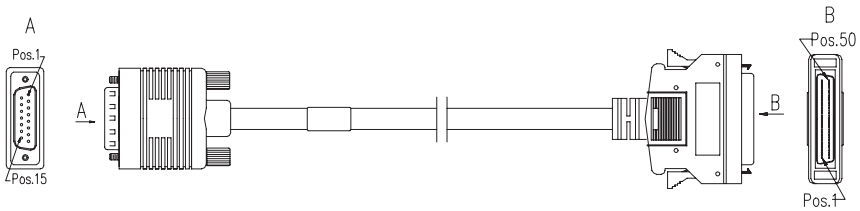


Table 35 describes X.21 DTE cable pinouts.

Table 35 X.21 DTE Cable Pinouts

DB50	Signal	Signal Direction	Signal	DB15
7	GND	<-->	Circuit GND	8
23	DTE/DCE	-	Circuit GND	8
50	GND	<-->	Shield GND	1
10	RTS/CTS+	->	Control+	3
34	RTS/CTS-	->	Control-	10
38	CTS/RTS+	<-	Indication+	5
14	CTS/RTS-	<-	Indication-	12
20	RXD/TXD+	<-	Receiver+	4
44	RXD/TXD-	<-	Receiver-	11
15	TXD/RXD+	->	Transmit+	2
39	TXD/RXD-	->	Transmit-	9
19	RXC/TXCE+	<-	Timing+	6
43	RXC/TXCE-	<-	Timing-	13
-	Shielding sheath	<-->	Shielding sheath	-

X.21 DCE Cable Pinouts

Figure 35 illustrates the X.21 DCE cable.

Figure 35 X.21 DCE Cable Assembly

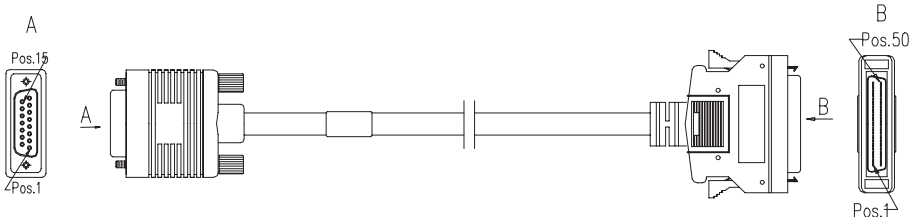


Table 36 describes X.21 DCE cable pinouts.

Table 36 X.21 DCE Cable Pinouts

DB50	Signal	Signal Direction	Signal	DB15
7	GND	<-->	Circuit GND	8
50	GND	<-->	Shield GND	1
10	RTS/CTS+	->	Indication+	5
34	RTS/CTS-	->	Indication-	12
38	CTS/RTS+	<-	Control+	3

Table 36 X.21 DCE Cable Pinouts (continued)

DB50	Signal	Signal Direction	Signal	DB15
14	CTS/RTS-	<-	Control-	10
20	RXD/TXD+	<-	Transmit+	2
44	RXD/TXD-	<-	Transmit-	9
15	TXD/RXD+	->	Receiver+	4
39	TXD/RXD-	->	Receiver-	11
16	RXC/TXCE+	->	Timing+	6
40	RXC/TXCE-	->	Timing-	13
-	Shielding sheath	<-->	Shielding sheath	-

EIA/TIA-449 DTE Cable Pinouts

Figure 36 illustrates the EIA/TIA-449 DTE cable.

Figure 36 EIA/TIA-449 DTE Cable Assembly

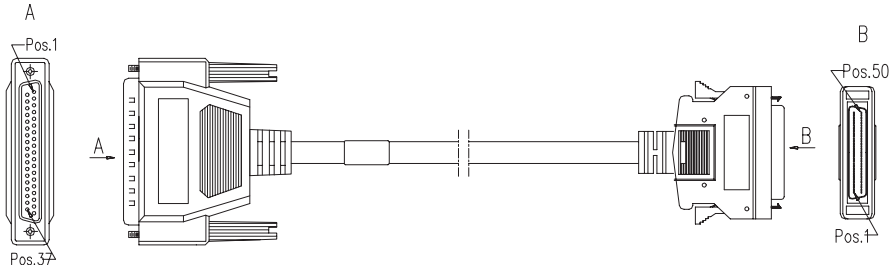


Table 37 describes EIA/TIA-449 DTE cable pinouts.

Table 37 EIA/TIA-449 DTE Cable Pinouts

DB50	Signal	Signal Direction	Signal	DB37
7	GND	<-->	Circuit GND	19
23	DTE/DCE	-	Circuit GND	19
50	GND	<-->	Sield GND	1
8	DTR/DSR+	->	TR+	12
32	DTR/DSR-	->	TR-	30
13	DSR/DTR+	<-	DM+	11
37	DSR/DTR-	<-	DM-	29
10	RTS/CTS+	->	RS+	7
34	RTS/CTS-	->	RS-	25
38	CTS/RTS+	<-	CS+	9
14	CTS/RTS-	<-	CS-	27
36	DCD/DCD+	<-	RR+	13
12	DCD/DCD-	<-	RR-	31
1	LL/LL	->	LL	10
20	RXD/TXD+	<-	RD+	6
44	RXD/TXD-	<-	RD-	24
15	TXD/RXD+	->	SD+	4
39	TXD/RXD-	->	SD-	22
16	TXCE/RXC+	->	TT+	17

Table 37 EIA/TIA-449 DTE Cable Pinouts (continued)

DB50	Signal	Signal Direction	Signal	DB37
40	TXCE/RXC-	->	TT-	35
19	RXC/TXCE+	<-	RT+	8
43	RXC/TXCE-	<-	RT-	26
18	TXC/NIL+	<-	ST+	5
42	TXC/NIL-	<-	ST-	23
-	Shielding sheath	<-->	Shielding sheath	-

EIA/TIA-449 DCE Cable Pinouts

Figure 37 illustrates the EIA/TIA-449 DCE cable.

Figure 37 EIA/TIA-449 DCE Cable Assembly

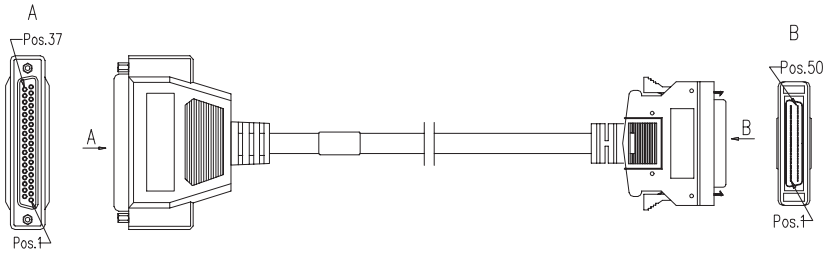


Table 38 describes EIA/TIA-449 DCE cable pinouts.

Table 38 EIA/TIA-449 DCE Cable Pinouts

DB50	Signal	Signal Direction	Signal	DB37
7	GND	<-->	Circuit GND	19
50	GND	<-->	Shield GND	1
8	DTR/DSR+	->	DM+	11
32	DTR/DSR-	->	DM-	29
13	DSR/DTR+	<-	TR+	12
37	DSR/DTR-	<-	TR-	30
10	RTS/CTS+	->	CS+	9
34	RTS/CTS-	->	CS-	27
38	CTS/RTS+	<-	RS+	7
14	CTS/RTS-	<-	RS-	25
36	DCD/DCD+	<-	RR+	13
12	DCD/DCD-	<-	RR-	31
20	RXD/TXD+	<-	SD+	4
44	RXD/TXD-	<-	SD-	22
15	TXD/RXD+	->	RD+	6
39	TXD/RXD-	->	RD-	24
16	TXCE/RXC+	<-	RT+	8
40	TXCE/RXC-	<-	RT-	26
19	RXC/TXCE+	<-	TT+	17
43	RXC/TXCE-	<-	TT-	35
17	NIL/TXC+	<-	ST+	5

Table 38 EIA/TIA-449 DCE Cable Pinouts (continued)

DB50	Signal	Signal Direction	Signal	DB37
41	NIL/TXC-	<-	ST-	23
-	Shielding sheath	<-->	Shielding sheath	-

EIA-530 DTE Cable Pinouts

Figure 38 illustrates the EIA-530 DTE cable.

Figure 38 EIA-530 DTE Cable Assembly

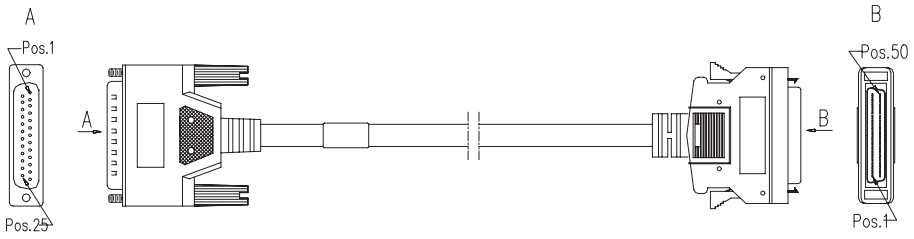


Table 39 describes EIA-530 DTE cable pinouts.

Table 39 EIA-530 DTE Cable Pinouts

DB50	Signal	Signal Direction	Signal	DB25
7	GND	<-->	Circuit GND	7
23	DCE/DTE	-	Circuit GND	7
50	GND	<-->	Shield GND	1
8	DTR/DSR+	->	DTR+	20
32	DTR/DSR-	->	DTR-	23
13	DSR/DTR+	<-	DSR+	6
37	DSR/DTR-	<-	DSR-	22
10	RTS/CTS+	->	RTS+	4
34	RTS/CTS-	->	RTS-	19
38	CTS/RTS+	<-	CTS+	5
14	CTS/RTS-	<-	CTS-	13
36	DCD/DCD+	<-	DCD+	8
12	DCD/DCD-	<-	DCD-	10
1	LL/LL	->	LL	18
20	RXD/TXD+	<-	RXD+	3
44	RXD/TXD-	<-	RXD-	16
15	TXD/RXD+	->	TXD+	2
39	TXD/RXD-	->	TXD-	14
16	TXCE/RXC+	->	TXCE+	24
40	TXCE/RXC-	->	TXCE-	11
19	RXC/TXCE+	<-	RXC+	17
43	RXC/TXCE-	<-	RXC-	9
18	TXC/NIL+	<-	ST+	15
42	TXC/NIL-	<-	ST-	12
-	Shielding sheath	<-->	Shielding sheath	-

T1 Cable

Figure 39 illustrates the T1 cable.

Figure 39 T1 Cable

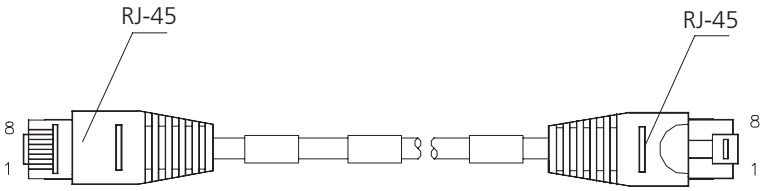


Table 40 describes T1 cable pinouts.

Table 40 T1 Cable Pinouts

RJ-45	Straight-through Shielded Network Cable	Signal	Description	RJ-45
1	White (Orange)	Rx	Ring	1
2	Orange	Rx	Tip	2
3	White (Green)	-	-	3
4	Blue	Tx	Ring	4
5	White (Blue)	Tx	Tip	5
6	Green	-	-	6
7	White (Brown)	-	-	7
8	Brown	-	-	8

ISDN BRI Cables

Figure 40 illustrates the the ISDN S/T Port cable.

Figure 40 ISDN S/T Port Cable

Table 41 describes ISDN S/T port cable pinouts.

Table 41 ISDN S/TPort Cable Pinouts

RJ-45	Signal	RJ-45
1	-	1
2	-	2
3	Tx+	3
4	Rx+	4
5	Rx-	5
6	Tx-	6
7	-	7
8	-	8

Figure 41 illustrates the ISDN U port cable.

Figure 41 ISDN U Port Cable

Table 42 describes ISDN U port cable pinouts.

Table 42 ISDN U Port Cable Pinouts

RJ-45	Signal
1	-
2	-
3	-
4	Ring
5	Tip
6	-
7	-
8	-

B OBTAINING SUPPORT FOR YOUR ROUTER

Register Your Product to Gain Service Benefits

To take advantage of warranty and other service benefits, you must first register your product at **http://eSupport.3com.com/**. 3Com eSupport services are based on accounts that you create or have authorization to access. First time users must apply for a user name and password that provides access to a number of eSupport features including Product Registration, Repair Services, and Service Request.

Purchase Value-Added Services

To enhance response times or extend warranty benefits, contact 3Com or your authorized 3Com reseller. Value-added services can include 24x7 telephone technical support, software upgrades, onsite assistance or advance hardware replacement. Experienced engineers are available to manage your installation with minimal disruption to your network. Expert assessment and implementation services are offered to fill resource gaps and ensure the success of your networking projects. More information on 3Com Extended Warranty and Professional Services is available at **http://www.3com.com/**

Contact your authorized 3Com reseller or 3Com for additional product and support information.

Troubleshoot Online

You will find support tools posted on the 3Com web site at **http://www.3com.com/**

- **3Com Knowledgebase** helps you troubleshoot 3Com products. This query-based interactive tool is located at **http://knowledgebase.3com.com** and contains thousands of technical solutions written by 3Com support engineers.
- **Connection Assistant** helps you install, configure and troubleshoot 3Com desktop and server NICs, wireless cards and Bluetooth devices. This diagnostic software is located at: **http://www.3com.com/prodforms/software/connection_assistant/ca_thankyou.html**

Access Software Downloads

Software Updates are the bug fix / maintenance releases for the version of software initially purchased with the product. In order to access these Software Updates you must first register your product on the 3Com web site at **http://eSupport.3com.com/**.

First time users will need to apply for a user name and password. A link to software downloads can be found at **http://eSupport.3com.com/**, or under the Product Support heading at **http://www.3com.com/**

Software Upgrades are the software releases that follow the software version included with your original product. In order to access upgrades and related documentation you must first purchase a service contract from 3Com or your reseller.

Contact Us

3Com offers telephone, e-mail and internet access to technical support and repair services. To access these services for your region, use the appropriate telephone number, URL or e-mail address from the list below. You will find a current directory of support telephone numbers posted on the 3Com web site at **http://csoweb4.3com.com/contactus/**

Telephone Technical Support and Repair

To obtain telephone support as part of your warranty and other service benefits, you must first register your product at **http://eSupport.3com.com/**

When you contact 3Com for assistance, please have the following information ready:

- Product model name, part number, and serial number
- A list of system hardware and software, including revision level
- Diagnostic error messages
- Details about recent configuration changes, if applicable

To send a product directly to 3Com for repair, you must first obtain a return authorization number (RMA). Products sent to 3Com, without authorization numbers clearly marked on the outside of the package, will be returned to the sender unopened, at the sender's expense. If your product is registered and under warranty, you can obtain an RMA number online at **http://eSupport.3com.com/**. First time users will need to apply for a user name and password.

Telephone numbers are correct at the time of publication. Find a current directory of support telephone numbers posted on the 3Com web site at **http://csoweb4.3com.com/contactus/**

Country	Telephone Number	Country	Telephone Number
Asia, Pacific Rim Telephone Technical Support and Repair			
Australia	1 800 678 515	Philippines	1235 61 266 2602 or
Hong Kong	800 933 486		1800 1 888 9469
India	+61 2 9424 5179 or	P.R. of China	10800 61 00137 or
	000800 650 1111		021 6350 1590 or
Indonesia	001 803 61009		00800 0638 3266
Japan	00531 616 439 or	Singapore	800 6161 463
	03 5977 7991	S. Korea	080 333 3308
Malaysia	1800 801 777	Taiwan	00801 611 261
New Zealand	0800 446 398	Thailand	001 800 611 2000
Pakistan	+61 2 9937 5083		
You can also obtain support in this region using the following e-mail: **apr_technical_support@3com.com**			
Or request a repair authorization number (RMA) by fax using this number:			+ 65 543 6348
Europe, Middle East, and Africa Telephone Technical Support and Repair			

Country	Telephone Number	Country	Telephone Number
From anywhere in these regions, call:	+44 (0)1442 435529		
From the following countries, you may use the numbers shown:			
Austria	01 7956 7124	Luxembourg	342 0808128
Belgium	070 700 770	Netherlands	0900 777 7737
Denmark	7010 7289	Norway	815 33 047
Finland	01080 2783	Poland	00800 441 1357
France	0825 809 622	Portugal	707 200 123
Germany	01805 404 747	South Africa	0800 995 014
Hungary	06800 12813	Spain	9 021 60455
Ireland	01407 3387	Sweden	07711 14453
Israel	1800 945 3794	Switzerland	08488 50112
Italy	199 161346	U.K.	0870 241 3901

You can also obtain support in this region using the following URL: **http://emea.3com.com/support/email.html**

Latin America Telephone Technical Support and Repair

Antigua	1 800 988 2112	Guatemala	AT&T +800 998 2112
Argentina	0 810 444 3COM	Haiti	57 1 657 0888
Aruba	1 800 998 2112	Honduras	AT&T +800 998 2112
Bahamas	1 800 998 2112	Jamaica	1 800 998 2112
Barbados	1 800 998 2112	Martinique	571 657 0888
Belize	52 5 201 0010	Mexico	01 800 849CARE
Bermuda	1 800 998 2112	Nicaragua	AT&T +800 998 2112
Bonaire	1 800 998 2112	Panama	AT&T +800 998 2112
Brazil	0800 13 3COM	Paraguay	54 11 4894 1888
Cayman	1 800 998 2112	Peru	AT&T +800 998 2112
Chile	AT&T +800 998 2112	Puerto Rico	1 800 998 2112
Colombia	AT&T +800 998 2112	Salvador	AT&T +800 998 2112
Costa Rica	AT&T +800 998 2112	Trinidad and Tobago	1 800 998 2112
Curacao	1 800 998 2112	Uruguay	AT&T +800 998 2112
Ecuador	AT&T +800 998 2112	Venezuela	AT&T +800 998 2112
Dominican Republic	AT&T +800 998 2112	Virgin Islands	57 1 657 0888

You can also obtain support in this region using the following:

Spanish speakers, enter the URL:
http://lat.3com.com/lat/support/form.html

Portuguese speakers, enter the URL:
http://lat.3com.com/br/support/form.html

English speakers in Latin America should send e-mail to:
lat_support_anc@3com.com

US and Canada Telephone Technical Support and Repair

1 800 876 3266