CISCO SYSTEMS

Cisco 800 Series Routers Hardware Installation Guide

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• Move the equipment farther away from the television or radio.

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Cisco 800 Series Routers Hardware Installation Guide

CONTENTS

About This Guide

This preface discusses the audience, organization, and conventions used in this guide.

Audience

This guide is intended for service technicians with all levels of experience in installing routers. The goal of all technicians is to connect the router to the network as quickly as possible. Where relevant, this guide explains how the router is implemented and why. Conceptual information is usually in a separate section or appendix so that technicians who are not interested can skip this information.

Organization

This guide contains the following information:

- About This Guide—Describes audience, organization, conventions used in this guide, and how to access related documentation.
- Overview—Contains router features and a description of router LEDs, ports, and other components.
- Installation—Provides information on safety, preventing damage, unpacking, and preparing for installation as well as installing, mounting, and verifying the connections to your router.
- Troubleshooting—Describes how to identify and solve problems with your router.
- ISDN and IDSL Concepts—Describes how ISDN is implemented on the router.
- Specifications and Cables—Provides router, port, and cable specifications.
- Glossary—Defines technical terms frequently used in this guide.

Conventions

This section describes the conventions used in this guide.

Note Means *reader take note*. Notes contain helpful suggestions or references to additional information and material.

Cisco 800 Series Routers Hardware Installation Guide

⚠

Caution   This symbol means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

⚠

Warning   **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with the standard practices for preventing accidents.**

Waarschuwing   **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen.**

Varoitus   **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista.**

Attention   **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents.**

Warnung   **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt.**

Avvertenza   **Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti.**

Advarsel   **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker.**

Aviso   **Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes.**

¡Atención!	**Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes.**
Varning!	**Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador.**

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation DVD

Cisco documentation and additional literature are available in a Documentation DVD package, which may have shipped with your product. The Documentation DVD is updated regularly and may be more current than printed documentation. The Documentation DVD package is available as a single unit.

Registered Cisco.com users (Cisco direct customers) can order a Cisco Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/

Cisco Marketplace:

http://www.cisco.com/go/marketplace/

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

Cisco 800 Series Routers Hardware Installation Guide

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

  http://www.cisco.com/en/US/partner/ordering/

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com
- Nonemergencies—psirt@cisco.com

Tip   We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.*x* through 8.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one that has the most recent creation date in this public key server list:

http://pgp.mit.edu:11371/pks/lookup?search=psirt%40cisco.com&op=index&exact=on

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note   Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is "down," or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

Overview

The Cisco 800 series routers connect small professional offices or telecommuters over Integrated Services Digital Network (ISDN) Basic Rate Interface (BRI) lines to the Corporate LANs and the Internet. The routers offer bridging and multiprotocol routing capability between LAN and WAN ports.

This chapter contains the following topics:

- Feature Summary
- Router Ports Summary
- Front Panels
- Back Panels
- LEDs

Feature Summary

Table 1-1 summarizes the features of the Cisco 800 series routers.

Table 1-1   Cisco 800 Series Feature Summary

Feature	Routers	Description
10BASE-T Ethernet port(s)	All	Provides connection to 10BASE-T (10 Mbps) Ethernet networks. Compatible with 10/100-Mbps devices.
ISDN BRI S/T port	Cisco 801 and 803	Provides connection to ISDN S/T network.
ISDN BRI U port	Cisco 802 and 804	Provides connection to ISDN U network.
IDSL port	Cisco 802 IDSL and 804 IDSL	Provides connection to IDSL network.
Telephone ports	Cisco 803 and 804	Provide connection to telephone, fax machine, or modem, which are connected to telephone services through ISDN line.
Internal Network Termination 1 (NT1)	Cisco 802 and 804	Eliminates need for an external NT1 in North America.[1]
Flash memory	All	8 MB of Flash memory.[2]
Dynamic RAM (DRAM)	All	4 MB of DRAM.[2]
Easily distinguishable ISDN B-channel LEDs	All	ISDN B-channel LEDs in a different color from other LEDs.
Ease of installation	All	Color-coded ports and cables to reduce the chance of error.
Cisco IOS software	All	Supports Cisco IOS software.
Cisco 800 Fast Step application	All	Provides a Windows 95–, Windows 98–, and Windows NT–based software tool for basic configurations.
Console port	All	Provides connection to terminal or PC for software configuration using command-line interface and for troubleshooting. **Note** The console port is a service port.
Cable lock	All	Provides a way to physically secure the router.
Locking power connector	All	Locks power connector in place.
Wall-mount feature	All	Brackets on router bottom provide a way to mount router on wall or vertical surface.

1. Although the ISDN U interfaces on the Cisco 802 and Cisco 804 routers provide internal NT1s, the routers themselves do not function as NT1s. You cannot connect S/T devices to Cisco 802 and Cisco 804 routers.

2. An additional 8 MB of Flash memory and 4 or 8 MB of DRAM can be added at the factory or later. You can order upgrade kits and have trained and qualified personnel add the memory. The Cisco product number for the 8-MB Flash memory upgrade kit is MEM800-8F and the numbers for the DRAM upgrade kits are MEM800-4D and MEM800-8D.

Router Ports Summary

Table 1-2 lists the Cisco 800 series routers and ports.

Table 1-2   Router Ports

Router	Ethernet Ports	ISDN Ports	Telephone Ports
Cisco 801	One	ISDN BRI S/T	None
Cisco 802	One	ISDN BRI U	None
Cisco 802 IDSL	One	IDSL	None
Cisco 803	Four	ISDN BRI S/T	Two
Cisco 804	Four	ISDN BRI U	Two
Cisco 804 IDSL	Four	IDSL	None

Front Panels

The figures in this section show the front panel of the Cisco 800 series routers.

Figure 1-1   Cisco 801, Cisco 802, and Cisco 802 IDSL Front Panel

NT1 LED on
Cisco 802 and
802 IDSL routers only
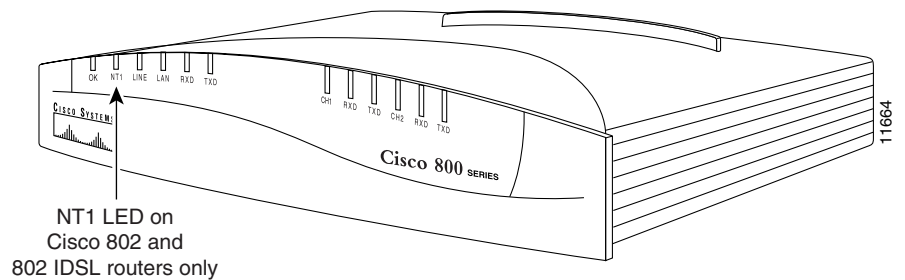
Figure 1-2   Cisco 803 and Cisco 804 Front Panel

NT1 LED on
Cisco 804 router only

Cisco 800 Series Routers Hardware Installation Guide
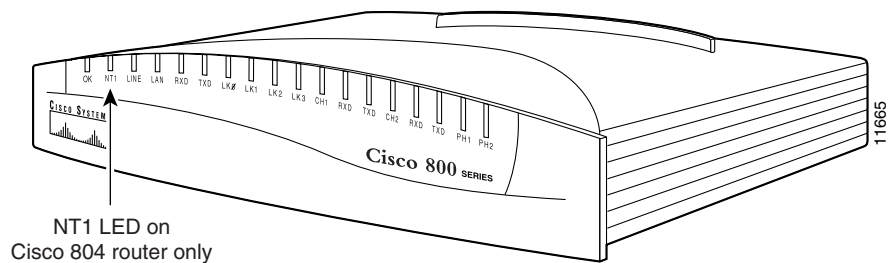
Figure 1-3   Cisco 804 IDSL Front Panel
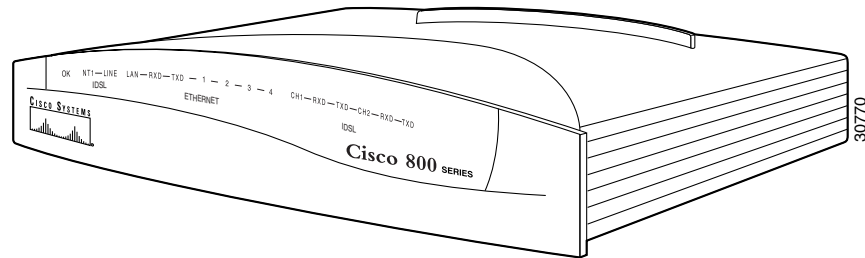
Back Panels

The figures in this section show the back panel of each of the Cisco 800 series routers.

If the symbol of suitability (⊠) appears above a port, you can connect the port directly to a public network that follows the European Union standards.

Warning   **If the symbol of suitability with an overlaid cross (⊘) appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe injury or damage your router.**

Figure 1-4   Cisco 801 Router Back Panel

Figure 1-5   Cisco 802 Router Back Panel

Link LED
Indicates state
of Ethernet port.

Ethernet port
Connect Ethernet
network device.

ISDN BRI U port
Connect to
ISDN wall jack.

Power switch
I = On.
⏻ = Standby or no power output.

Cable lock
Use cable
lock to
physically
secure
router.

HUB/NO HUB button
(for Ethernet port)
Determines cable
type for Ethernet
device connection.

Console port
Connect PC
or terminal.

**Locking power
connector**
Connect power
supply.

LINK   HUB NO HUB   ETHERNET   10 BASE T   CONSOLE   Cisco 802   ISDN U   +5, -24, -71 VDC   11667

Figure 1-6   Cisco 803 Router Back Panel

Ethernet ports
Connect Ethernet
network devices.

ISDN BRI S/T port
Connect to external
NT1 or ISDN wall jack.

Telephone ports
Connect to telephone,
fax machine, or modem.

Power switch
I = On.
⏻ = Standby or
no power output.

Cable lock
Use cable
lock to
physically
secure
router.

HUB/NO HUB button
(for Ethernet port Ø)
Determines cable
type for Ethernet
device connection.

Console port
Connect PC or
terminal.

**Locking power
connector**
Connect power
supply.

HUB NO HUB   ETHERNET 10 BASE T   Cisco 803   Ø 1 2 3   CONSOLE   ISDN S/T   PHONE 1 2   +5, -24, -71 VDC   11668

Figure 1-7   Cisco 804 Router Back Panel

Ethernet ports
Connect Ethernet
network devices.

ISDN BRI U port
Connect to ISDN
wall jack.

Telephone ports
Connect to telephone,
fax machine, or
modem.

Power switch
I = On.
⏻ = Standby or no
    power output.

Cable lock
Use cable
lock to
physically
secure
router.

HUB/NO HUB button
(for Ethernet port Ø)
Determines cable
type for Ethernet
device connection.

Console port
Connect PC or
terminal.

**Locking power
connector**
Connect power
supply.

Figure 1-8   Cisco 802 IDSL Router Back Panel

Link LED
Indicates state
of Ethernet port.

Ethernet port
Connect Ethernet
network device.

IDSL port
Connect to
IDSL wall jack.

Power switch
I = On.
⏻ = Standby or no power output.

Cable lock
Use cable
lock to
physically
secure
router.

TO HUB/TO PC
(for Ethernet port)
Determines cable
type for Ethernet
device connection.

Console port
Connect PC
or terminal.

**Locking power
connector**
Connect power
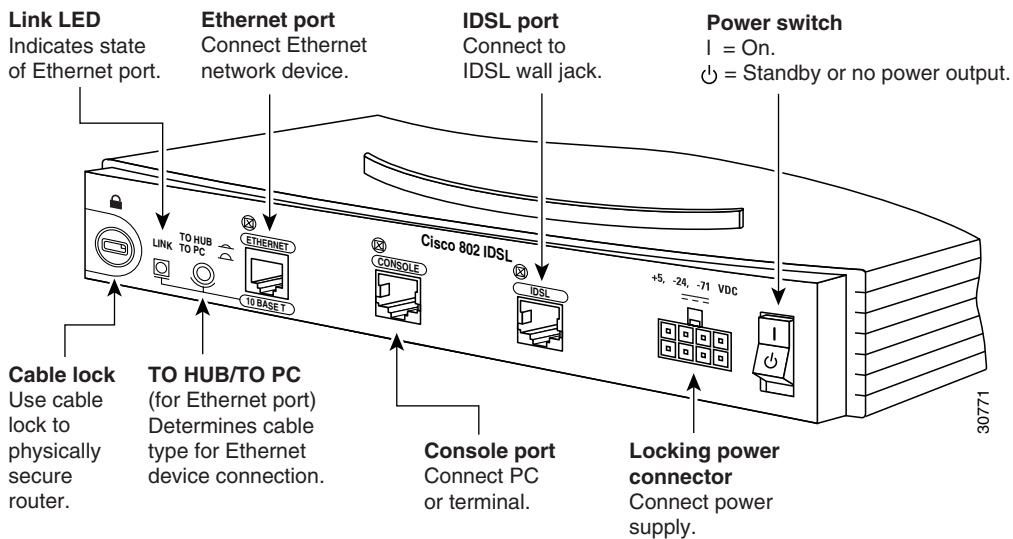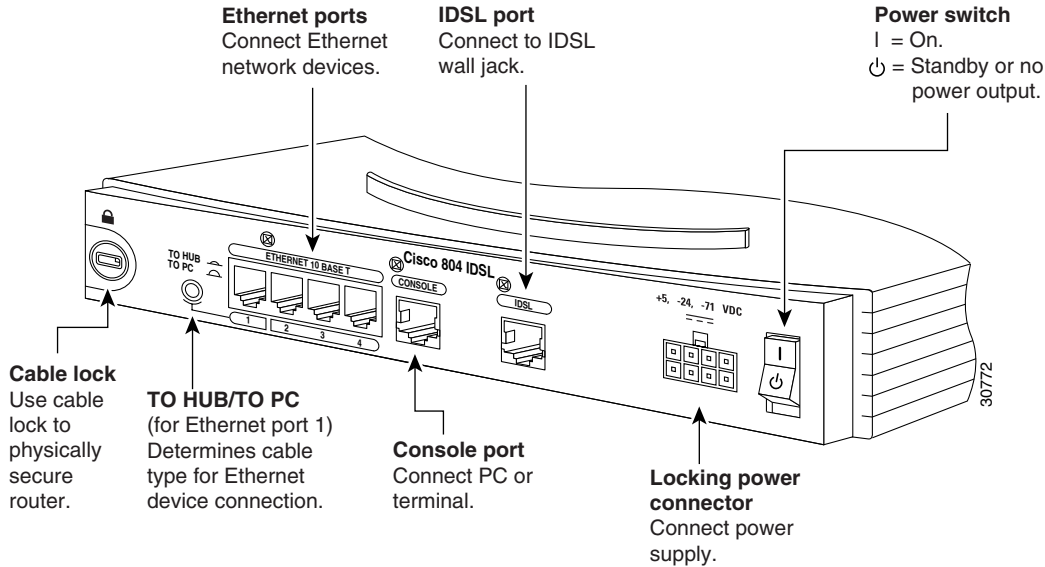supply.

Figure 1-9   Cisco 804 IDSL Router Back Panel

LEDs

Table 1-3 summarizes the function of each LED.

Table 1-3   LED Functions

LED	Color	Function
OK	Green	On when power is supplied to the router and when the router completes the self-test procedure and begins operating.
NT1	Green	Not applicable for Cisco 801 and 803 routers. On when the internal NT1 and the ISDN switch are synchronized. Blinks when the internal NT1 and the ISDN switch are attempting to synchronize.
LINE	Green	On when the ISDN interface and the ISDN terminal device are synchronized.
LAN	Green	On when packets are sent to or received from an Ethernet port.
LAN RXD	Green	Blinks when an Ethernet port receives a packet.
LAN TXD	Green	Blinks when an Ethernet port sends a packet.
LKØ, LK1, LK2, LK3	Green	Cisco 803 and 804 routers only. On when the Ethernet device is connected. Off when the Ethernet device is not connected. Blinks when the connection has a problem. See the "Troubleshooting" chapter.
ETHERNET 1, 2, 3, 4	Green	Cisco 804 IDSL routers only. On when the Ethernet device is connected. Off when the Ethernet device is not connected. Blinks when the connection has a problem. See the "Troubleshooting" chapter.

Cisco 800 Series Routers Hardware Installation Guide

Table 1-3   LED Functions (continued)

LED	Color	Function
CH1	Orange	Blinks when placing or receiving a call on the first ISDN B channel. On when a call is connected on the first ISDN B channel. For IDSL routers, see the Note following this table.
CH1 RXD	Orange	Blinks when packets are received from the first ISDN B channel.
CH1 TXD	Orange	Blinks when packets are sent from the first ISDN B channel.
CH2	Orange	Blinks when placing or receiving a call on the second ISDN B channel. On when a call is connected on the second ISDN B channel. For IDSL routers, see the Note following this table.
CH2 RXD	Orange	Blinks when packets are received from the second ISDN B channel.
CH2 TXD	Orange	Blinks when packets are sent from the second ISDN B channel.
PH1,PH2	Green	Cisco 803 and 804 routers only. On when basic telephone service is in use.
LINK	Green	On back panel of Cisco 801, 802, and 802 IDSL routers only. On when Ethernet device is connected. Blinks when the connection has a problem. Refer to the "Troubleshooting" chapter.

Note   On Cisco 802 IDSL and Cisco 804 IDSL routers, either CH1 or CH2 is on if the router has an active data connection and the line speed is 64 kbps. CH1 and CH2 are both on if the router has an active data connection and the line speed is 128 or 144 kbps.

Installation

This chapter provides information on the following topics:

- Safety
- European Union Statements
- Preventing Electrostatic Discharge Damage
- Preventing Router Damage
- Unpacking Your Router
- Preinstallation Activities
- Installing Your Router
- Mounting Your Router
- Verifying Installation
- Where to Go from Here

Safety

Before installing the router, read the following warnings:

Warning   **Only trained and qualified personnel should be allowed to install or replace this equipment.**

Warning   **Read the installation instructions before you connect the system to its power source.**

Warning   **Before working on a system that has a standby/off switch, turn the power to standby and unplug the power cord.**

Warning   **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.**

Warning   **The ISDN connection is regarded as a source of voltage that should be inaccessible to user contact. Do not attempt to tamper with or open any public telephone operator (PTO)-provided equipment or connection hardware. Any hardwired connection (other than by a nonremovable, connect-one-time-only plug) must be made only by PTO staff or suitably trained engineers.**

Warning   **To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.**

Warning   **Ultimate disposal of this product should be handled according to all national laws and regulations.**

Warning   **If the symbol of suitability with an overlaid cross (⊘) appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe injury or damage your router**

European Union Statements

The following statements apply to Cisco 801 routers and Cisco 803 routers sold in the European Union (EU).

Network Termination Point Statement

This product does not contain a "Network Termination Point" (NTP) as defined by ETSI 300 386-2. This product is classified by the manufacturer as "Terminal Equipment." If you have any additional questions, please contact your local network operator.

ISDN S/T Ports Statement

These ports have not been classified as "directly connected ports" to outside cables as defined by CISPR 24, 1997 by the manufacturer. If you have any additional questions, please contact your local network operator.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) is a transfer of electrostatic charge between bodies of different electrostatic potentials, such as a person and a piece of electrical equipment. It occurs when electronic components are improperly handled, and it can damage equipment and impair electrical circuitry. Electrostatic discharge is more likely to occur with the combination of synthetic fibers and dry atmosphere.

Always use the following ESD-prevention procedures when removing and replacing components:

1. Connect the chassis to earth ground with a wire that you provide.

2. Wear an ESD-preventive wrist strap that you provide, ensuring that it makes good skin contact.

   Connect the clip to an unpainted surface of the chassis frame to safely channel unwanted ESD voltages to ground. To properly guard against ESD damage and shocks, the wrist strap and cord must operate effectively. If no wrist strap is available, ground yourself by touching the metal part of the chassis. Always follow the guidelines in the preceding section, "Safety."

3. Do not touch any exposed contact pins or connector shells of interface ports that do not have a cable attached.

   If cables are connected at one end only, do not touch the exposed pins at the unconnected end of the cable.

Note This device is intended for use in residential and commercial environments only.

Caution Periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohms).

Preventing Router Damage

Use the following guidelines when connecting devices to your router:

- Connect the color-coded cables supplied by Cisco Systems to the color-coded ports on the back panel.

- If you must supply your own cable, see the "Cabling Specifications" section in Appendix B, "Specifications and Cables." If this appendix does not provide specifications for a particular cable, we strongly recommend ordering the cable from Cisco Systems.

- If the symbol of suitability (⊠) appears above a port, you can connect the port directly to a public network that follows the European Union standards.

⚠

Warning   **If the symbol of suitability with an overlaid cross (⊘) appears above a port, you must not connect the port to a public network that follows the European Union standards. Connecting the port to this type of public network can cause severe injury or damage your router.**

Unpacking Your Router

Table 2-1 lists the items that come with your router. All these items are in the accessory kit that is inside the box that your router came in. If any of the items is missing or damaged, contact your customer service representative.

Table 2-1   Router Box Contents

• Power cord (black)
• Desktop power supply
• Console cable (light blue)
• DB-9-to-RJ-45 adapter for use with light blue console cable
• ISDN ST cable (orange) (Cisco 801 and 803 routers)
• Ethernet cable (yellow)
• ISDN U or IDSL cable (red) (Cisco 802, 802 IDSL, 804, and 804 IDSL routers)
• RJ-45-to-RJ-11 adapter cable for use with red ISDN U cable
• Product documentation

Preinstallation Activities

Before you begin installing your Cisco 800 series router, perform the following steps:

Step 1   Order an ISDN BRI line from your telephone service provider. For more information, refer to the *Cisco 800 Series Routers Software Configuration Guide*.

Step 2   If you have a Cisco 801 or Cisco 803 router, do the following:

- If you are outside of North America, ask your telephone service provider if you must provide an external Network Termination 1 (NT1) and the ISDN U cable that connects the NT1 to the ISDN wall jack. Ask for NT1 vendors if necessary.

- If you are in North America, ask your telephone service provider for external NT1 vendors. Provide the ISDN U cable that connects the NT1 to the ISDN wall jack.

Step 3   Be aware of Ethernet, ISDN, and IDSL cable distance limitations. For more information, see the "Maximum Cable Distances" section in Appendix B, "Specifications and Cables."

Step 4   Gather the Ethernet devices to be connected to the router: hub, server, workstation, or PC with 10- or 10/100-Mbps network interface card (NIC).

Step 5   If you have a Cisco 801 or Cisco 803 router and plan to connect a digital telephone, you must provide an NT1 with two S/T interfaces and one U interface, a telephone cable to connect the telephone (usually this cable is provided with the device), and an ISDN U cable that connects the NT1 to the ISDN wall jack.

Step 6   If you have a Cisco 803 or Cisco 804 router, gather the devices (such as an analog telephone, fax machine, or modem) that you plan on connecting to the router. You must also provide the telephone cable to connect each device (usually this cable is provided with the device).

Step 7   If you plan to configure the software using a terminal or PC connected to the router, provide the terminal or PC.

Step 8   If you plan to mount your router on a wall or vertical surface, you need to provide two number-six, 3/4-in. (M3.5 x 20 mm) screws. If the wall on which you mount your router is drywall, you instead need to provide two hollow wall-anchors (1/8-in. with 5/16-in. drill bit or M3 with 8-mm drill bit) to secure the screws.

Step 9   If you plan to use the cable lock feature, you need to provide a Kensington or equivalent locking cable.

Installing Your Router

To install the Cisco 800 series routers, you need to perform the following tasks in the following order:

1. Connect the Ethernet devices to the router.

2. Connect the ISDN or IDSL line to the router.

3. If you have a Cisco 801 or Cisco 803 router, connect an optional digital telephone.

4. If you have a Cisco 803 or Cisco 804 router, connect an optional analog telephone, fax, or modem.

5. Connect a terminal or PC to the router (for software configuration using the command-line interface [CLI] or for troubleshooting).

6. Connect the router to the power source.

7. Mount your router.

8. Verify the router installation.

Connecting Ethernet Devices

Table 2-2 lists the Ethernet devices you can connect to the router, connections for each device, and the settings of the router HUB/NO HUB or TO HUB/TO PC button (the default setting is IN).

Table 2-2   Connecting Ethernet Devices

Network Device Connected to Router	Router Port	Ethernet Cable Type[1]	Router HUB/NO HUB, TO HUB/TO PC Button Setting	Network Device Button Setting[2]
Hub with equivalent to router HUB/NO HUB button	Cisco 801 and 802 routers: Ethernet port Cisco 803 and 804 routers: Ethernet port Ø	Straight-through	IN	MDI (IN)
Hub with equivalent to router HUB/NO HUB button	Cisco 801 and 802 routers: Ethernet port Cisco 803 and 804 routers: Ethernet port Ø	Straight-through	OUT	MDI-X (OUT)
Hub with equivalent to router TO HUB/TO PC button	Cisco 802 IDSL router: Ethernet port Cisco 804 IDSL router: Ethernet port 1	Straight-through	IN	MDI (IN)
Hub with equivalent to router TO HUB/TO PC button	Cisco 802 IDSL router: Ethernet port Cisco 804 IDSL router: Ethernet port 1	Straight-through	OUT	MDI (OUT)
Hub with equivalent to router HUB/NO HUB button	Cisco 803 and 804 routers: Ethernet ports 1, 2, 3	Straight-through	N/A[3]	MDI (IN)
Hub with equivalent to router TO HUB/TO PC button	Cisco 804 IDSL router: Ethernet ports 2, 3, 4	Straight-through	N/A[4]	MDI (IN)
Hub without equivalent to router HUB/NO HUB button	Cisco 801 and 802 routers: Ethernet port Cisco 803 and 804 routers: Ethernet port Ø	Straight-through	OUT	MDI-X (OUT)
Hub without equivalent to router TO HUB/TO PC button	Cisco 802 IDSL router: Ethernet port Cisco 804 IDSL router: Ethernet port 1	Straight-through	OUT	MDI-X (OUT)
Hub without equivalent to router HUB/NO HUB button	Cisco 803 and 804 routers: Ethernet ports 1, 2, 3	Crossover	N/A[3]	MDI-X (OUT)
Hub without equivalent to router TO HUB/TO PC button	Cisco 804 IDSL router: Ethernet ports 2, 3, 4	Crossover	N/A[4]	MDI-X (OUT)

Table 2-2   Connecting Ethernet Devices (continued)

Network Device Connected to Router	Router Port	Ethernet Cable Type[1]	Router HUB/NO HUB, TO HUB/TO PC Button Setting	Network Device Button Setting[2]
Server, PC, or workstation	Cisco 801 and 802 routers: Ethernet port Cisco 803 and 804 routers: Ethernet port Ø	Straight-through	OUT	N/A
Server, PC, or workstation	Cisco 802 IDSL router: Ethernet port Cisco 804 IDSL router: Ethernet port 1	Straight-through	OUT	N/A
Server, PC, or workstation	Cisco 803 and 804 routers: Ethernet ports 1, 2, 3	Straight-through	N/A[3]	N/A
Server, PC, or workstation	Cisco 804 IDSL router: Ethernet ports 2, 3, 4	Straight-through	N/A[4]	N/A

1. Cisco provides a yellow straight-through cable. You provide crossover or additional straight-through cables. For details on cables, refer to Appendix B, "Specifications and Cables."

2. Hub vendors choose different names for the button controlling cable selections. This table uses the Cisco 1528 Micro Hub 10/100 with an MDI/MDI-X button as an example. Determine the button name and setting for your particular hub. Refer to your hub documentation for details.

3. On Cisco 803 and Cisco 804 routers, the HUB/NO HUB button affects only Ethernet port Ø.

4. On Cisco 804 IDSL routers, the TO HUB/TO PC button affects only Ethernet port 1.

Connecting Hubs

If you have a Cisco 803, 804, or 804 IDSL router, you can connect as many as four hubs.

Before connecting a hub, see Table 2-2, and do the following:

- Choose Ethernet cables.
- On the router, set the HUB/NO HUB or TO HUB/TO PC button.
- On the hub, set the HUB/NO HUB button or its equivalent.

Follow the steps in Figure 2-1 to connect a hub to a Cisco 800 series ISDN or IDSL router. This figure shows a Cisco 803 router with four Ethernet ports.

> ⚠
> **Caution**   Always connect the yellow cable or an Ethernet cable to the yellow ports on the router. Do not connect the cable to an ISDN S/T or U port, to an IDSL port, or to an NT1. Connecting the cable to the wrong port or NT1 can damage your router.

Figure 2-1   Connecting a Hub
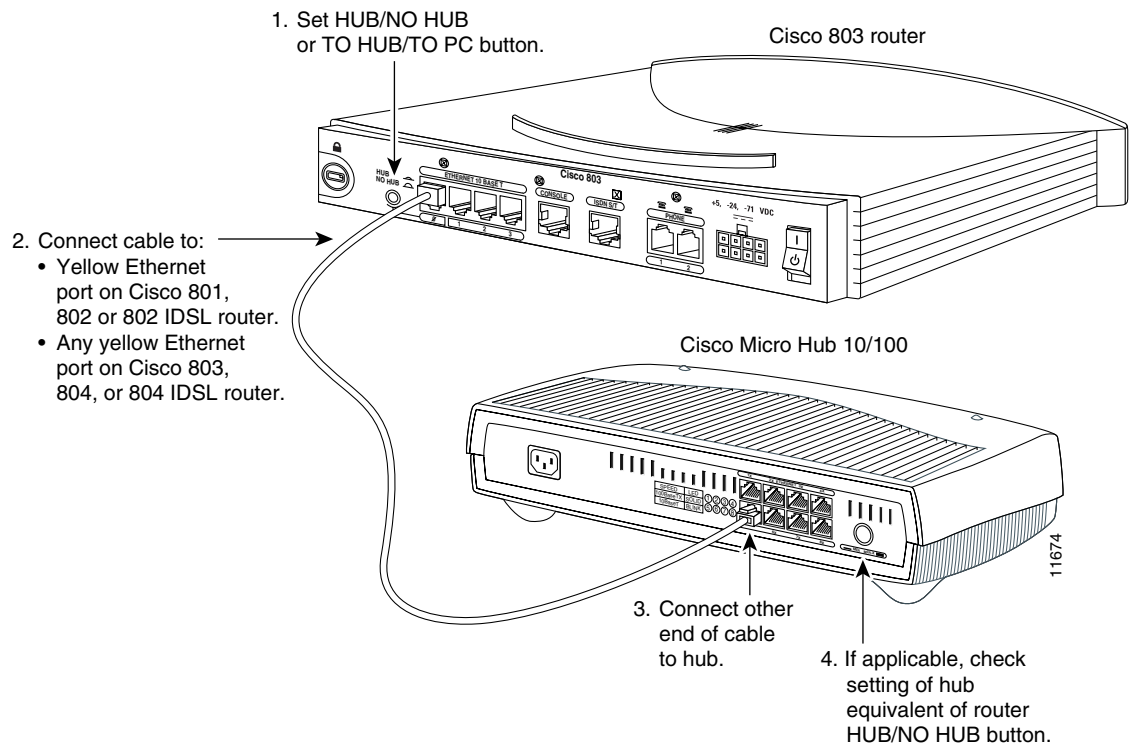
To verify your hub connection, verify that one of the following LEDs is on after you have completed the router installation:

- LINK LED on the Cisco 801, 802, or 802 IDSL back panel.
- LKØ, LK1, LK2, or LK3 LED on the Cisco 803 or Cisco 804 front panel.
- ETHERNET 1, 2, 3, or 4 LED on the Cisco 804 IDSL front panel.

If the LED is not on, see Table 3-2 in Chapter 3, "Troubleshooting."

Connecting a Server, PC, or Workstation

Before connecting the server, PC, or workstation, refer to Table 2-2 to determine how to set the router HUB/NO HUB or TO HUB/TO PC button. Ensure that your device has a 10- or 10/100-Mbps NIC.

To connect one of these devices to a Cisco 800 series ISDN or IDSL router, follow the steps in Figure 2-2.

⚠️

Caution   Always connect the yellow cable or an Ethernet cable to the yellow ports on the router. Do not connect the cable to an ISDN S/T or U port, to an IDSL port, or to an NT1. Connecting the cable to the wrong port or NT1 can damage your router.

Figure 2-2   Connecting a Server, PC, or Workstation
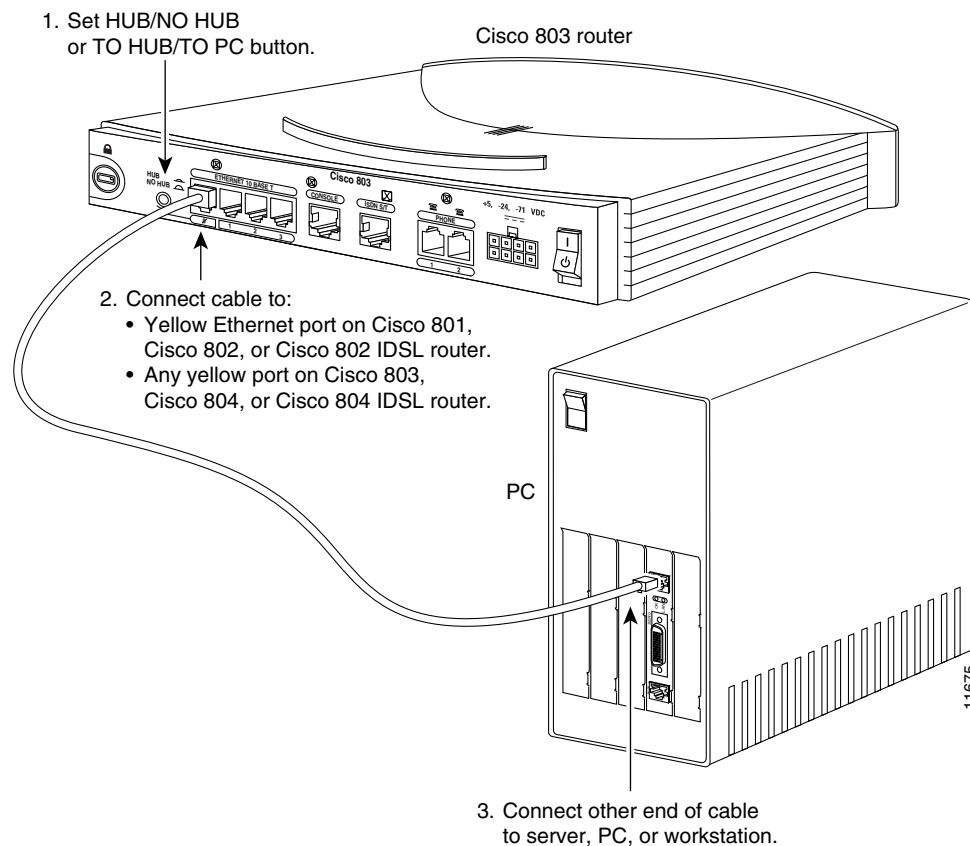
To verify your connection, verify that one of the following LEDs is on after you have completed router installation:

- LINK LED on the Cisco 801, 802, or 802 IDSL back panel.
- LKØ, LK1, LK2, or LK3 LED on the Cisco 803 or Cisco 804 front panel.
- ETHERNET 1, 2, 3, or 4 LED on the Cisco 804 IDSL front panel.

If the LED is not on, see Table 3-2 in Chapter 3, "Troubleshooting."

Connecting an ISDN Line

The procedure to connect an ISDN line depends on the router and in some cases your location. The following sections describe the following procedures:

- Connecting an ISDN Line to Cisco 801 and Cisco 803 Routers
- Connecting an ISDN Line to Cisco 802 and Cisco 804 Routers

Connecting an ISDN Line to Cisco 801 and Cisco 803 Routers

Outside of North America, you might need to provide an external NT1 device and the ISDN U cable that connects the NT1 to the ISDN wall jack. Contact your telephone service provider to supply the following information:

- Whether you must supply an external NT1 and the ISDN U cable.
- If necessary, the names of NT1 vendors.

In North America, you must provide an external NT1 and the ISDN U cable that connects the NT1 to the ISDN wall jack. Contact your telephone service provider for a list of NT1 vendors.

To connect an ISDN line to a Cisco 801 or Cisco 803 router without an external NT1, follow the steps in Figure 2-3 on page 2-11.

To connect an ISDN line to a Cisco 801 or Cisco 803 router with an external NT1, follow the steps in Figure 2-4 on page 2-11.

> **Warning** **Network hazardous voltages are present in the ISDN cable. If you detach the ISDN cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the ISDN port (RJ-45 connector), regardless of when power is turned to standby.**

> **Warning** **Do not work on the system or connect or disconnect cables during periods of lightning activity.**

> **Warning** **To reduce the risk of fire, use only No. 26 AWG or larger telecommunications line cord.**

> **Caution** Always connect the orange cable to the orange ISDN S/T port on the router. Do not connect the cable to a yellow Ethernet port. This will damage your router.

> **Caution** The Cisco 800 series routers do not support the Australian IUT requirement, which specifies that the routers must communicate for 1/2 hour after a power failure. If a power failure occurs, a Cisco 800 series router stops communicating with other devices.

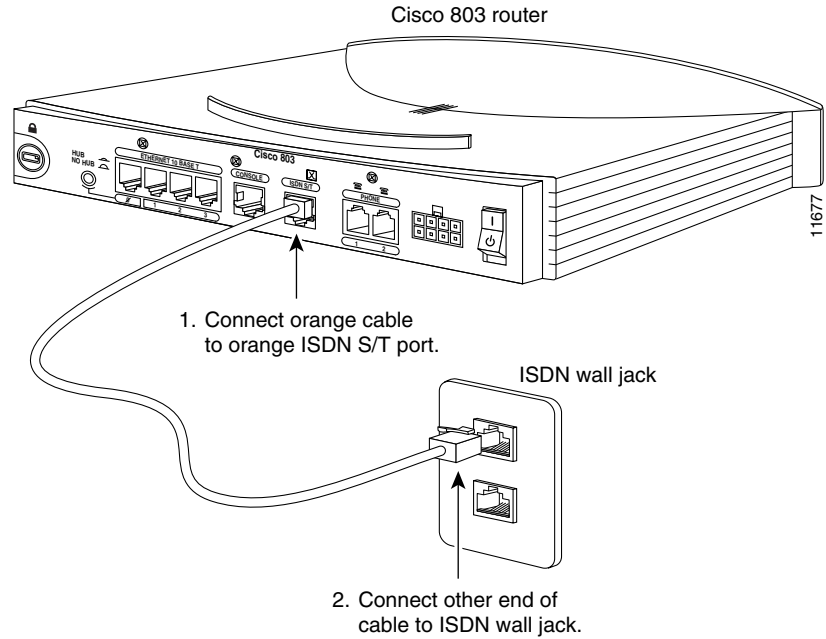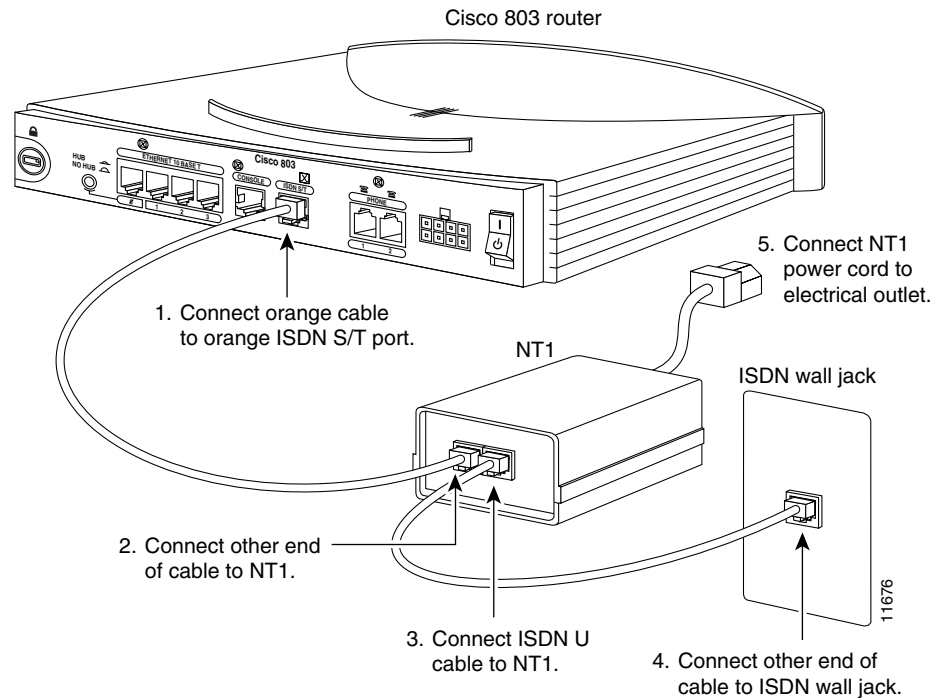*Figure 2-3   Connecting an ISDN Line to Cisco 801 and Cisco 803 Routers (without External NT1)*

Cisco 803 router

1. Connect orange cable
   to orange ISDN S/T port.

ISDN wall jack

2. Connect other end of
   cable to ISDN wall jack.

Figure 2-4   Connecting ISDN to Cisco 801 and Cisco 803 Routers (with External NT1)

Cisco 803 router

1. Connect orange cable
   to orange ISDN S/T port.

NT1

5. Connect NT1
   power cord to
   electrical outlet.

ISDN wall jack

2. Connect other end
   of cable to NT1.

3. Connect ISDN U
   cable to NT1.

4. Connect other end of
   cable to ISDN wall jack.

Connecting an ISDN Line to Cisco 802 and Cisco 804 Routers

To connect an ISDN line to Cisco 802 and Cisco 804 routers, follow the steps in Figure 2-5.

Warning   **Network hazardous voltages are present in the ISDN cable. If you detach the ISDN cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the ISDN port (RJ-45 connector), regardless of when power is turned to standby.**

Warning   **Do not work on the system or connect or disconnect cables during periods of lightning activity.**

Warning   **To reduce the risk of fire, use only No. 26 AWG or larger telecommunications line cord.**

Caution   Always connect the red cable to the red ISDN U port on the router. Do not connect the cable to a yellow Ethernet port. This will damage your router.

Caution   The Cisco 800 series routers do not support the Australian IUT requirement, which specifies that the routers must communicate for 1/2 hour after a power failure. If a power failure occurs, a Cisco 800 series router stops communicating with other devices.

Figure 2-5   Connecting ISDN to Cisco 802 or Cisco 804 Routers
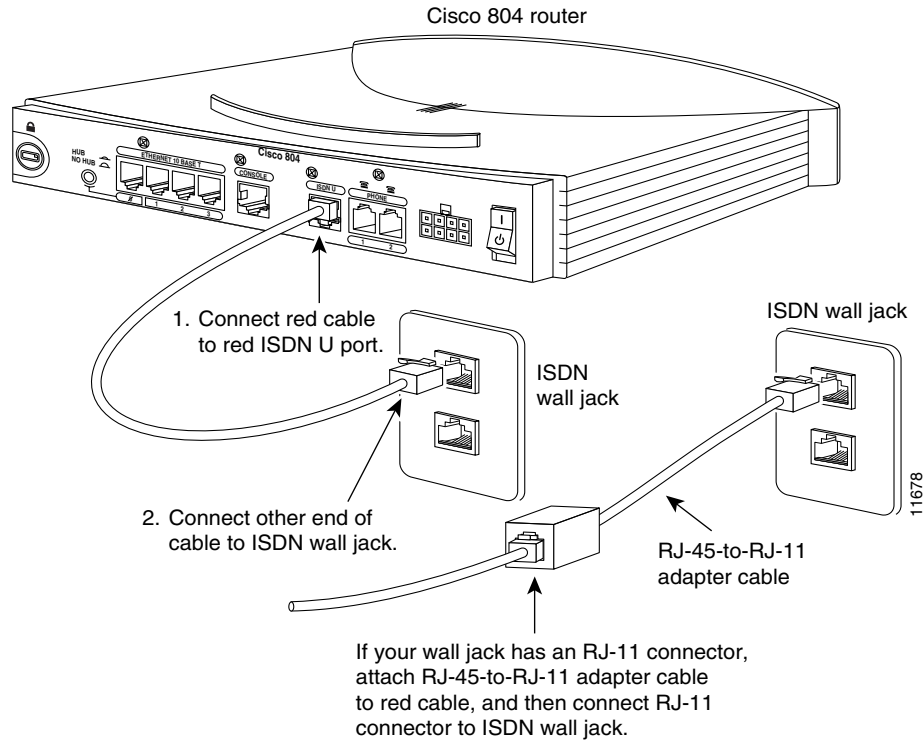
Connecting an IDSL Line

⚠ **Warning**   **Network hazardous voltages are present in the IDSL cable. If you detach the IDSL cable, detach the end away from the router first to avoid possible electric shock. Network hazardous voltages also are present on the system card in the area of the IDSL port (RJ-45 connector), regardless of when power is turned to standby.**

⚠ **Warning**   **Do not work on the system or connect or disconnect cables during periods of lightning activity.**

⚠ **Warning**   **To reduce the risk of fire, use only No. 26 AWG or larger telecommunications line cord.**

⚠ **Caution**   Always connect the red cable to the red IDSL port on the router. Do not connect the cable to a yellow Ethernet port. This will damage your router.

⚠ **Caution**   Cisco 802 IDSL and Cisco 804 IDSL routers do not support the Australian IUT requirement, which specifies that the routers must communicate for 1/2 hour after a power failure. If a power failure occurs, a Cisco 802 IDSL or 804 IDSL router stops communicating with other devices.

To connect an IDSL line to Cisco 802 IDSL and Cisco 804 IDSL routers, follow the steps in Figure 2-6.

*Figure 2-6   Connecting the IDSL Cable to Cisco IDSL Routers*
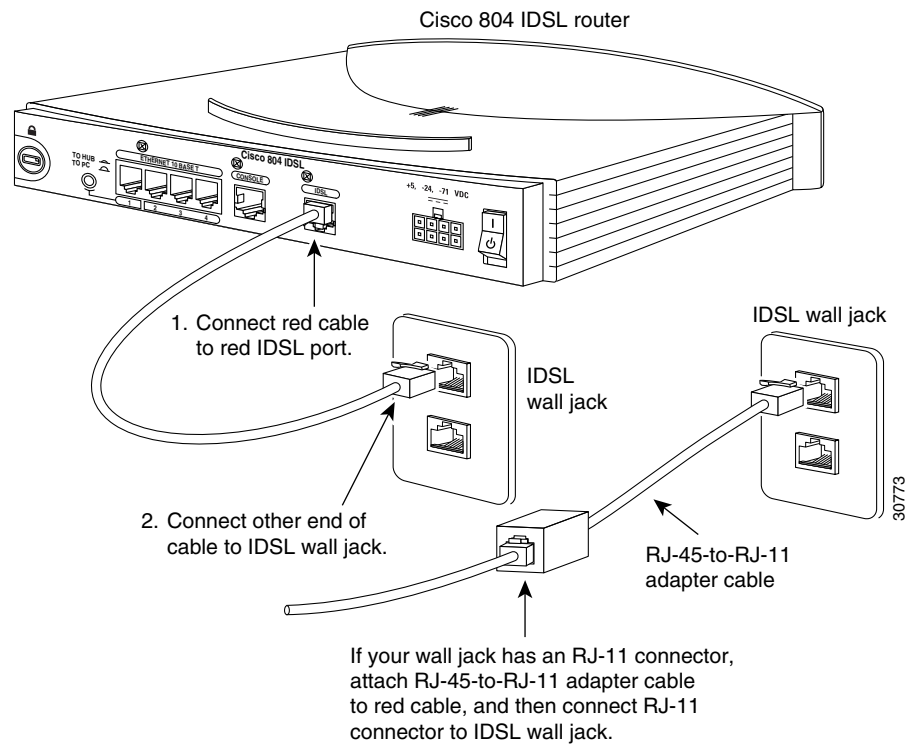
Connecting a Digital Telephone

You can connect a digital telephone, also known as an ISDN telephone, to the ISDN S/T port on Cisco 801 and Cisco 803 routers. This device connects to basic telephone services through the ISDN line.

To connect a digital telephone, follow the steps in Figure 2-7. You must provide the following equipment:

- NT1 with two S/T interfaces and one U interface.
- Telephone cable to connect digital telephone. (This cable is usually provided with the telephone.)
- ISDN U cable that connects the NT1 to the ISDN wall jack.

Figure 2-7   Connecting Digital Telephone to Cisco 801 and Cisco 803 Routers
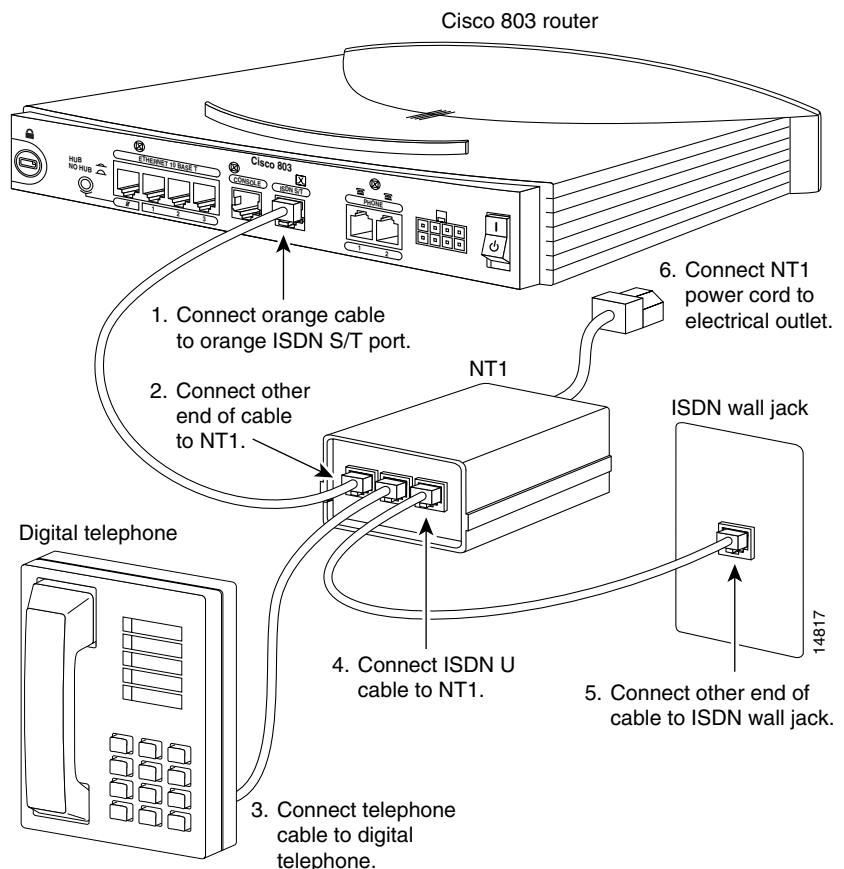
Connecting an Analog Telephone, Fax, or Modem

If you have Cisco 803 or Cisco 804 routers, you can connect two devices, such as an analog touch-tone telephone, fax machine, or modem. Each device is connected to basic telephone services through the ISDN line.

To connect an analog telephone, fax machine, or modem, follow the steps in Figure 2-8. You must provide the telephone cable to connect each device. The telephone cable is usually provided with the device.

The gray PHONE 1 and PHONE 2 ports are RJ-11 connectors. If you are outside of North America, you must buy and attach adapters that allow your telephones, faxes, or modems to be connected to these RJ-11 connectors. In some countries, these adapters need additional electronics to convert the

telephones, faxes, or modems to work properly with the router phone ports. For example, in the United Kingdom, you must buy an adapter that also provides a *master socket,* which causes incoming calls to ring the connected devices. For information on recommended master sockets, see Table 2-3.

Warning   **This equipment contains a ring signal generator (ringer), which is a source of hazardous voltage. Do not touch the RJ-11 (phone) port wires (conductors), the conductors of a cable connected to the RJ-11 port, or the associated circuit-board when the ringer is active. The ringer is activated (indicated by a clicking sound) by an incoming call.**

Caution   Do not connect the router telephone ports to the telephone wall jack. These ports are not meant for direct connection to a public network. This connection can damage your router.

Figure 2-8   Connecting an Analog Telephone, Fax, or Modem to Cisco 803 and Cisco 804 Routers
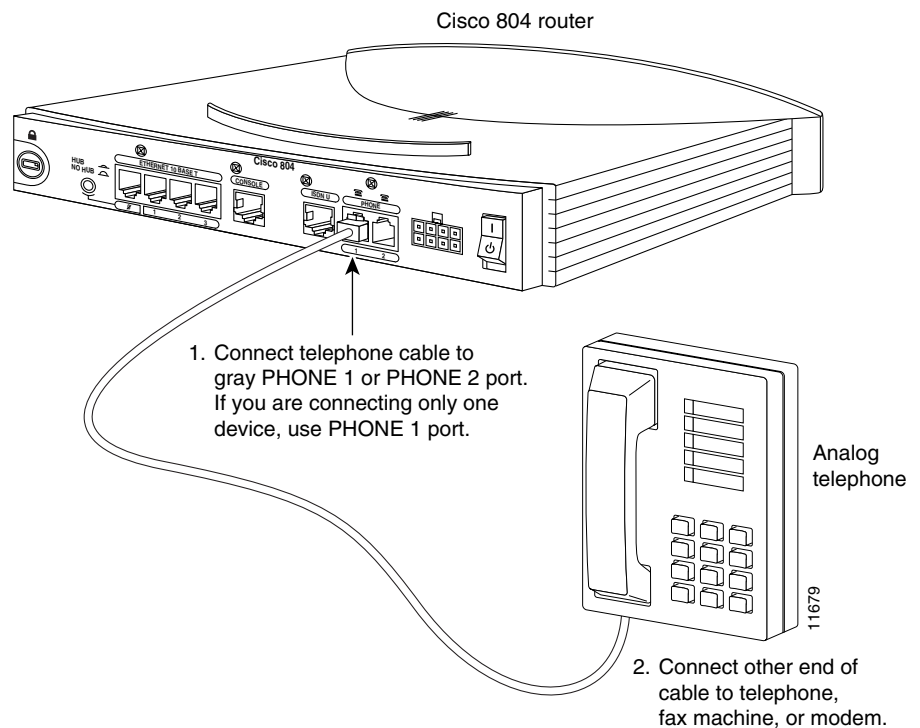
Table 2-3   Recommended Vendors for United Kingdom Master Sockets

Vendor Name	Product Name	For More Information
RS Components	Avro Pacific Telephone Ring Adapter (part number 303-2000)	http://www.rswww.com/
Tandy	Export Adapter (part number 2797057)	http://www.tandy.co.uk/

Connecting a Terminal or PC

You can connect either a terminal or a PC from which you can configure the software via the CLI or troubleshoot. To connect a terminal or PC, follow the steps in Figure 2-9.

Figure 2-9   Connecting Terminal or PC

Cisco 804 router

1. Connect light blue cable to light blue CONSOLE port.

3. Connect DB-9 connector to terminal or PC.

DB-X-to-RJ-45 adapter

2. If necessary, connect other end of cable to either DB-9-to-RJ-45 adapter or DB-25-to-RJ-45 adapter.
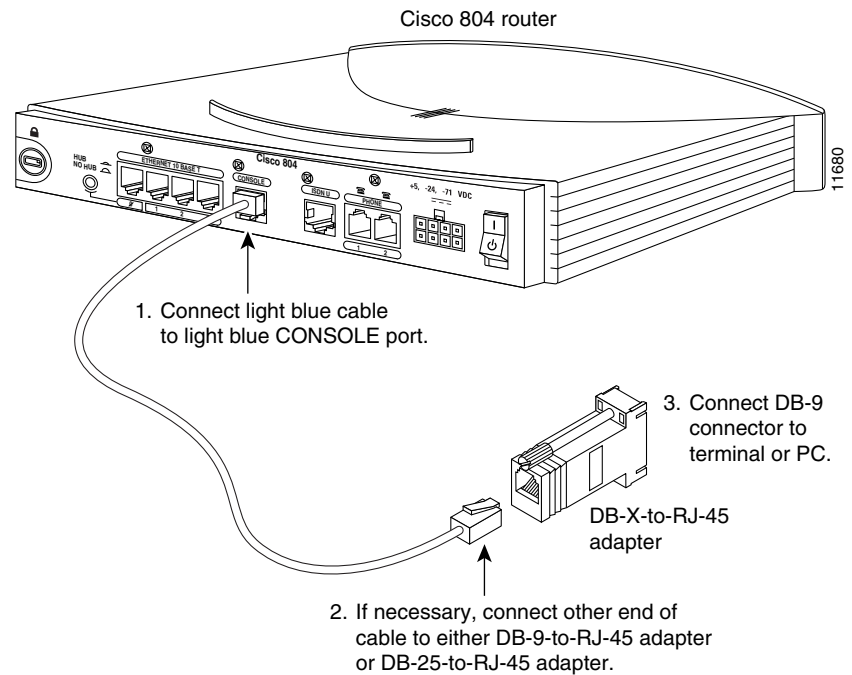
Connecting the Power Supply

To connect the power supply, follow the steps in Figure 2-10.

Warning   **The device is designed to work with TN power systems.**

Warning   **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that a fuse or circuit breaker no larger than 120 VAC, 15A U.S. (240 VAC, 16A international) is used on the phase conductors (all current-carrying conductors).**

Warning   **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.**

Figure 2-10   Connecting the Power Supply
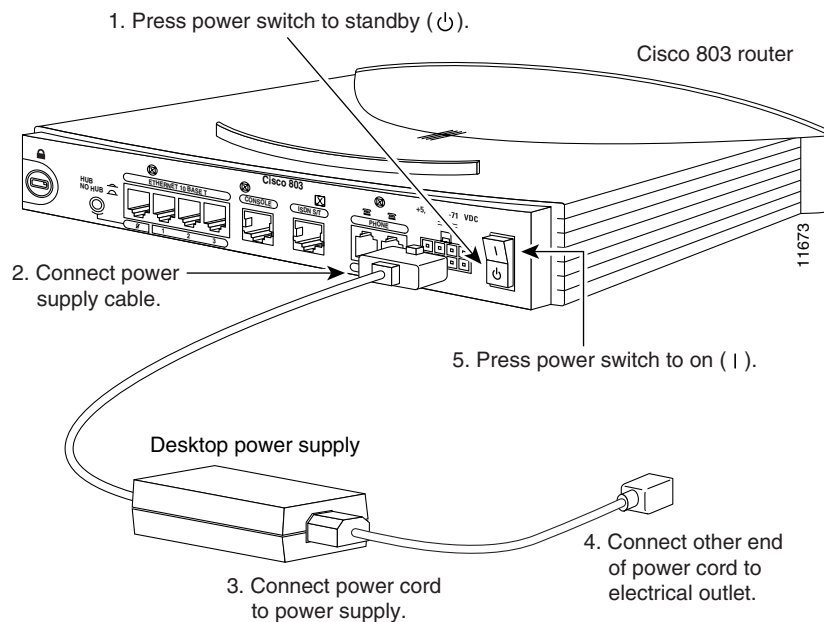
Mounting Your Router

You can mount your router on one of the following surfaces:

- Table or other horizontal surface
- Wall or other vertical surface

Mounting on a Table

You can mount your router on a table or other horizontal surface. Use the following guidelines:

   • Do not cover or obstruct router vents, which are located on the router sides.

   • You can stack a maximum of five routers atop one another.

Mounting on a Wall

You can mount your router on a wall or other vertical surface by using the molded mounting brackets on the bottom of the router and two number-six, 3/4-in. (M3.5 x 20 mm) screws. You must provide the screws. Figure 2-11 shows the mounting brackets.

⚠

Caution   If the wall to which you mount your router is drywall, use two hollow wall-anchors (1/8-in. with 5/16-in. drill bit or M3 with 8-mm drill bit) to secure the screws. If the screws are not properly anchored, the strain of the network cable connections could pull the router from the wall.

Figure 2-11   Wall-Mounting Brackets (Bottom of Router)
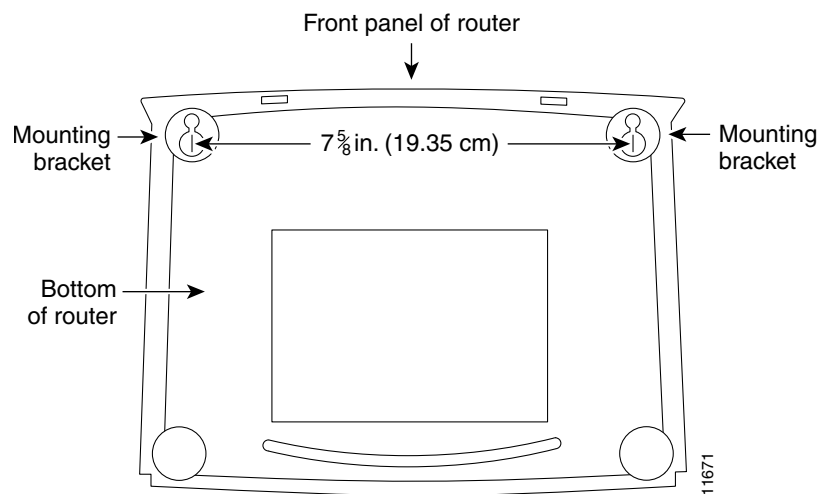
When mounting the router, the following conditions must be met:

   • Because you will use the LEDs as status and problem indicators, the LEDs on the front panel must face upward and be easily visible.

   • The back panel must face downward to reduce strain on the cable connections.

   • The power supply must rest on a horizontal surface such as the floor or a table. If the power supply is not supported, it might place strain on the power supply cable and cause it to disconnect from the connector on the router back panel.

To mount the router, follow the steps in Figure 2-12. The last page of this manual provides a template for measuring the distance between the screws.

Figure 2-12   Mounting Router on Wall

1. Secure two screws $7\frac{5}{8}$ inches (19.35 cm) apart in a wall and $\frac{1}{8}$ in. (0.32 cm) from the wall.

$7\frac{5}{8}$ in. (19.35 cm)

Wall

Wall-mount screw

Wall-mount screw

Front panel

Mounting brackets

2. Hang router on screws.

$\frac{1}{8}$ in. (0.32 cm)

Wall

Screw

11672

Maximum distance 6 ft (18 m)

3. Place power supply on horizontal surface.
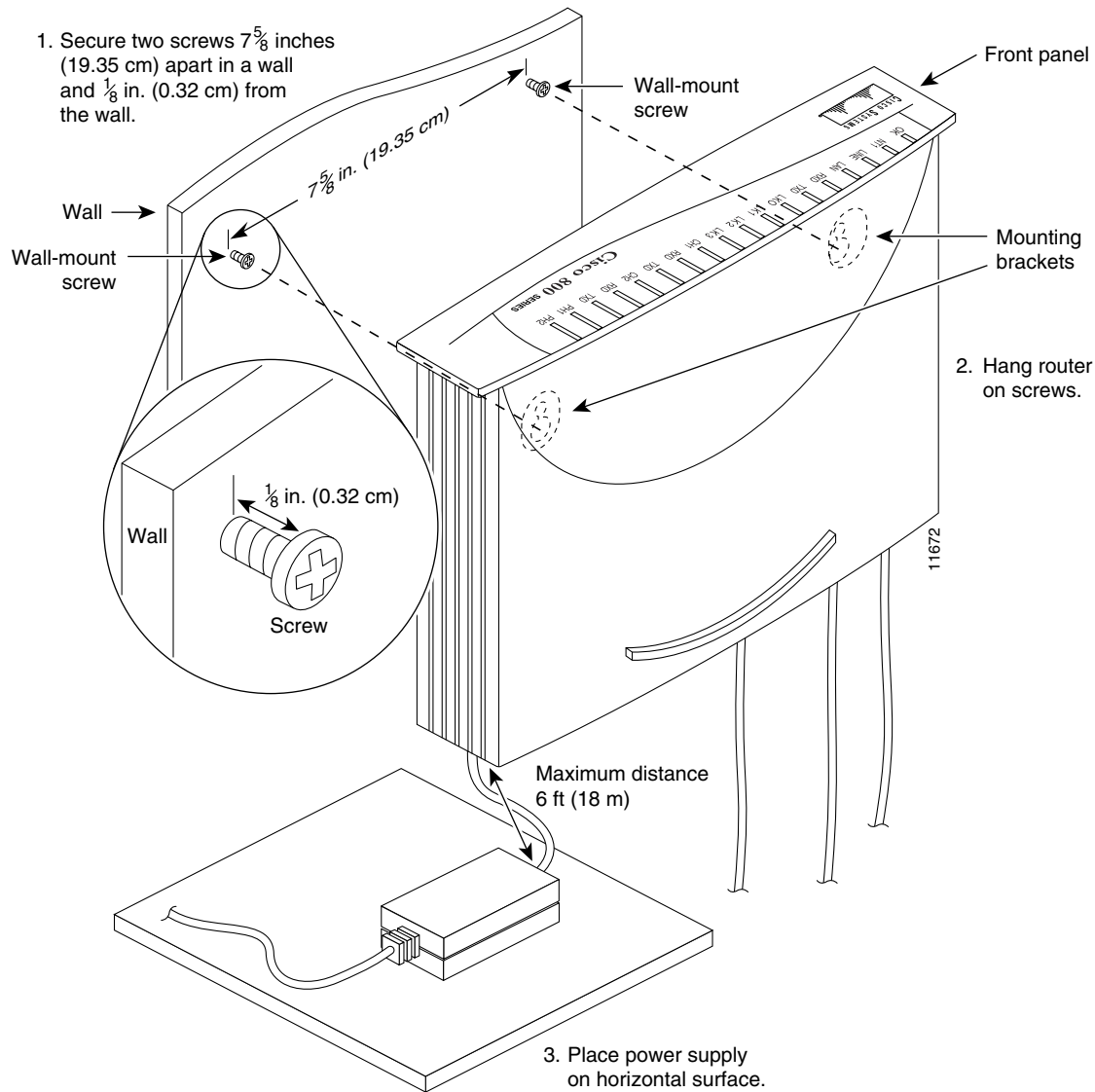
Verifying Installation

Verify the cable connections (links) by checking the LEDs listed in Table 2-4. If the LEDs are not on, see Chapter 3, "Troubleshooting."

The LINK LED is on the back panel of Cisco 801 and Cisco 802 routers.

Table 2-4   Verifying Installation

Power/Link	LEDs To Check	Normal Patterns
Power	OK	On
To hub, server, PC, or workstation	• Cisco 801, 802, and 802 IDSL routers: LINK, LAN, LAN RXD, and LAN TXD • Cisco 803 and Cisco 804 routers: LKØ, LK1, LK2, LK3, LAN, LAN RXD, and LAN TXD • Cisco 804 IDSL router: ETHERNET LAN, RXD, TXD, 1, 2, 3, and 4	• LINK, LKØ, LK1, LK2, LK3, ETHERNET 1, 2, 3, 4, LAN: On. LAN is on when indicated Ethernet port sends or receives a packet. • LAN RXD: blinking when an Ethernet port receives a packet. • LAN TXD: blinking when an Ethernet port sends a packet.
To ISDN network using ISDN S/T port	LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, and CH2 TXD	• LINE, CH1, and CH2: On. CH1 or CH2 is on when the router has an active voice or data connection. • CH1 RXD, CH2 RXD: Blinking when indicated ISDN B channel receives a packet. • CH1 TXD, CH2 TXD: Blinking when indicated ISDN B channel sends a packet.
To ISDN network using ISDN U port	NT1, LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, and CH2 TXD	• NT1, LINE, CH1, and CH2: On. CH1 or CH2 is on when the router has an active voice or data connection. • CH1 RXD, CH2 RXD: Blinking when indicated ISDN B channel receives a packet. • CH1 TXD, CH2 TXD: Blinking when indicated ISDN B channel sends a packet.
To IDSL network using IDSL port	NT1, LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, and CH2 TXD	• NT1, LINE, CH1, and CH2: On. CH1 or CH2 is on when the router has an active data connection and the line speed is 64 kbps. CH1 and CH2 are both on when the router has an active data connection and the line speed is 128 or 144 kbps. • CH1 RXD, CH2 RXD: Blinking when indicated ISDN B channel receives a packet. • CH1 TXD, CH2 TXD: Blinking when indicated ISDN B channel sends a packet.

Table 2-4   Verifying Installation (continued)

Power/Link	LEDs To Check	Normal Patterns
To digital telephone	LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, and CH2 TXD	• LINE, CH1, and CH2: On. CH1 or CH2 is on when the router has an active voice connection. • CH1 RXD, CH2 RXD: Blinking when indicated ISDN B channel receives a packet. • CH1 TXD, CH2 TXD: Blinking when indicated ISDN B channel sends a packet.
To analog telephone, fax, or modem	PH1 and PH2[1]	On when telephone, fax, or modem is in use.

1.   You can also pick up the handset and listen for a dial tone.

Where to Go from Here

You have completed the hardware installation and are ready to configure the software. Cisco strongly recommends that inexperienced network administrators use the Cisco 800 Fast Step application. Use the Cisco 800 Fast Step CD-ROM and online help. If you are an experienced network administrator and want to use the CLI to configure the software, refer to the *Cisco 800 Series Routers Software Configuration Guide*.

Troubleshooting

This chapter describes problems that could occur with the Cisco 800 series router hardware, reasons for the problems, and steps to solve the problems. The problems are grouped as follows:

- Problems during first startup
- Problems after first startup
- Problems after router is running

For information on problems that could occur with the software, refer to the *Cisco 800 Series Routers Software Configuration Guide*.

Problems During First Startup

Table 3-1 lists problems that could occur after you turn on the power switch for the first time.

Table 3-1   Problems During First Startup

Symptom	Problem	Solutions
All LEDs, including OK LED, are off.	No power to router.	Perform the following steps in the following order: • Make sure that the power switch is ON. • Make sure that all connections to and from the power supply are securely connected. • Make sure that the power outlet has power. • If the problem continues, the router might have a faulty power supply. Contact your Cisco reseller.

Problems After First Startup

Table 3-2 lists problems that could occur after the router has power for the first time.

Table 3-2   Problems After First Startup

Symptom	Problem	Solutions
No link to an Ethernet device. (On Cisco 801, Cisco 802, and 802 IDSL routers, the LINK LED on the back panel is off. On Cisco 803 and 804 routers, the LKØ, LK1, LK2, or LK3 LED on the front panel is off. On the Cisco 804 IDSL router, the ETHERNET 1, 2, 3, or 4 LED on the front panel is off.)	• A cable-related problem: – Wrong cable. – Improperly connected cable. – Damaged cable.	Perform the following tasks in the following order: • If you supply your own cable, make sure you are using the right type of cable (either straight-through or crossover). Check the cable information in Table 2-2 in Chapter 2, "Installation." • Check specifications in Table B-13 and Table B-14 in Appendix B, "Specifications and Cables," to make sure the cable complies. If it does not, replace it. • To make sure you have cabled the devices correctly, see Table 2-2 in Chapter 2, "Installation." • Make sure the connectors at both ends of the cable are securely seated. • Make sure the cable is not physically damaged. If it is, replace it.
	• Improperly set router HUB/NO HUB or TO HUB/TO PC button or hub equivalent of HUB/NO HUB button	• To make sure you have set buttons correctly, see Table 2-2 in Chapter 2, "Installation."
	• Improperly functioning network interface card (NIC) on server, PC, or workstation.	• Run the NIC diagnostic supplied by the vendor to make sure it is functioning properly. If it is not, replace it.
		• If the problem continues, call your Cisco reseller.
No link to ISDN or IDSL network. (NT1, LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, or CH2 TXD LED is off.)	• If you have a Cisco 801 or 803 router in North America or in parts of Europe, you might need to connect the router to an external NT1 and connect the NT1 to an ISDN wall jack.	• If outside of North America, contact your telephone service provider and ask if you must provide an NT1 and the ISDN U cable that connects the NT1 to the ISDN wall jack. In North America, you must provide an NT1 and the ISDN U cable. Connect NT1 as described in the "Connecting an ISDN Line to Cisco 801 and Cisco 803 Routers" section in Chapter 2, "Installation."

Table 3-2   Problems After First Startup (continued)

Symptom	Problem	Solutions

	• One of the following cable-related problems:
	  – Improperly connected cable.
	  – Damaged cable.
		Perform the following tasks in the following order:
		• To make sure you have cabled the ISDN or IDSL port correctly, see the "Connecting an ISDN Line" or "Connecting an IDSL Line" sections in Chapter 2, "Installation."
		• Make sure the connectors at both ends of each cable are securely connected.
		• Make sure each cable is not physically damaged. If it is, replace it with a similar cable.

	• Problem with ISDN or IDSL line.	• Contact your telephone or Internet service provider to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.

No link to digital telephone.	• One of the following cable-related problems:
	  – Improperly connected cable.
	  – Damaged cable.
		Perform the following tasks in the following order:
		• To make sure you have cabled the port correctly, see the "Connecting a Digital Telephone" section in Chapter 2, "Installation."
		• Make sure the connectors at both ends of each cable are securely connected.
		• Make sure each cable is not physically damaged. If it is, replace it.

	• Problem with ISDN line.	• Contact your telephone service provider to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.

No link to analog telephone, fax machine, or modem. (PH1 or PH2 LED on Cisco 803 and 804 routers is off.)	• One of the following cable-related problems:
	  – Improperly connected cable.
	  – Damaged cable.
		Perform the following tasks in the following order:
		• To make sure you have cabled the telephone port correctly, see the "Connecting an Analog Telephone, Fax, or Modem" section in Chapter 2, "Installation."
		• Make sure the connectors at both ends of the cable are securely connected.
		• Make sure the cable is not physically damaged. If it is, replace it.

Table 3-2   Problems After First Startup (continued)

Symptom	Problem	Solutions
	• Problem with ISDN line.	• Contact your telephone service provider to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.

Problems After Router Is Running

Table 3-3 lists problems that could occur after the router has been up and running for a while.

Table 3-3   Problems After Router Is Running

Symptom	Problem	Solutions
Problems with Ethernet link. (On Cisco 801, Cisco 802, and Cisco 802 IDSL routers, the LINK LED on the back panel blinks. On Cisco 803 and 804 routers, the LKØ, LK1, LK2, or LK3 LED on the front panel blinks. On the Cisco 804 IDSL router, the ETHERNET 1, 2, 3, or 4 LED on the front panel blinks.)	• One of the following cable-related problems: – Disconnected cable. – Damaged cable.	Perform the following tasks in the following order: • Make sure the connectors at both ends of the cable are securely connected. • Make sure the cable is not physically damaged. If it is, replace it.
	• Improperly functioning NIC on server, PC, or workstation.	• Run the NIC diagnostic supplied by the vendor to make sure it is functioning properly. If it is not, replace it.
		• If the problem continues, call your Cisco reseller.
Connection to an Ethernet device is intermittent or lost. (On Cisco 801, 802, and 802 IDSL routers, the LINK LED on the back panel is off. On Cisco 803 and 804 routers, the LKØ, LK1, LK2, or LK3 LED on the front panel is off. On the Cisco 804 IDSL router, the ETHERNET 1, 2, 3, or 4 LED on the front panel is off.)	• A cable-related problem: – Disconnected cable. – Damaged cable.	• Make sure the connectors at both ends of the cable are securely connected. • Make sure the cable is not physically damaged. If it is damaged, replace it.
	• Improperly functioning NIC on server, PC, or workstation.	• Run the NIC diagnostic supplied by the vendor to determine if it is functioning properly. If it is not, replace it.

Table 3-3   Problems After Router Is Running (continued)

Symptom	Problem	Solutions
		• If the problem continues, call your Cisco reseller.
Problems with ISDN or IDSL link. (CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, or CH2 TXD are off.)	• A cable-related problem: – Disconnected cable. – Damaged cable.	• Make sure the connectors at both ends of each cable are securely connected. • Make sure each cable is not physically damaged. If one is damaged, replace it.
	• Problem with ISDN or IDSL line.	• Contact your telephone or Internet service provider to determine if there is a problem with your line.
Connection to an ISDN or IDSL network is lost. (LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, or CH2 TXD LED is off.)	• A cable-related problem: – Disconnected cable. – Damaged cable.	• Make sure the connectors at both ends of each cable are securely connected. • Make sure each cable is not physically damaged. If one is damaged, replace it.
	• Problem with ISDN or IDSL line.	• Contact your telephone or Internet service provider to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.
Problems with link to digital or analog telephone. Symptoms include no dial tone, a call that is abruptly disconnected, and an incoming call that does not cause the device to ring.	• A cable-related problem: – Disconnected cable. – Damaged cable.	• Make sure the connectors at both ends of each cable are securely connected. • Make sure each cable is not physically damaged. If one is damaged, replace it.
	• Problem with ISDN line.	• Contact your telephone company to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.
Connection to digital telephone is lost. (LINE, CH1, CH1 RXD, CH1 TXD, CH2, CH2 RXD, and CH2 TXD LEDs on Cisco 801 and 803 routers are off.)	• A cable-related problem: – Disconnected cable. – Damaged cable.	• Make sure the connectors at both ends of each cable are securely connected. • Make sure each cable is not physically damaged. If one is damaged, replace it.
	• Problem with ISDN line.	• Contact your telephone company to determine if there is a problem with your line.

Table 3-3   Problems After Router Is Running (continued)

Symptom	Problem	Solutions
		• If the problem continues, call your Cisco reseller.

Connection to analog telephone, fax machine, or modem is lost. (PH1 or PH2 LED on Cisco 803 and 804 routers is off.)	• A cable-related problem:
	  – Disconnected cable.
	  – Damaged cable.
		• Make sure the connectors at both ends of the cable are securely connected.
		• Make sure the cable is not physically damaged. If it is damaged, replace it.

	• Problem with ISDN line.	• Contact your telephone company to determine if there is a problem with your line.
		• If the problem continues, call your Cisco reseller.

When Contacting Your Cisco Reseller

Some of the solutions instruct you to contact your Cisco reseller. Before contacting your reseller, have the following information ready:

- Router model and serial number (see the back panel of the router)
- Maintenance agreement or warranty information
- Date you received your router
- Brief description of the problem
- Brief description of the steps you have taken to solve the problem

ISDN and IDSL Concepts

This appendix provides further explanation of ISDN and IDSL concepts.

The Cisco 800 series routers provide one basic rate interface (BRI). The ISDN BRI service provided by your telephone service provider offers two bearer channels (B channels) and one data channel (D channel). The B channel operates at 64 kbps and carries user data. The D channel operates at 16 kbps and carries control and signaling information although it can support user data transmission under certain circumstances.

Cisco 801 and Cisco 803 routers have an ISDN S/T port. Cisco 802 and Cisco 804 routers have an ISDN U port, and Cisco 802 IDSL and Cisco 804 IDSL routers have an IDSL port.

Outside North America, telephone service providers typically provide an S/T interface. The S/T interfaces are four-wire (two pairs of wires) interfaces from the phone switch that supports full-duplex data transfer over two pairs of wires.

In North America, telephone service providers typically provide a U interface. The U interface is a two-wire (single pair) interface from the phone switch that supports full-duplex data transfer over a single pair of wires.

Cisco 803 and Cisco 804 routers support data and voice applications. The data applications on these routers are implemented through the ISDN port on these routers. The voice applications on these routers are implemented with ISDN BRI and through the telephone ports.

B

Specifications and Cables

This appendix provides system, port, and cabling specifications for the Cisco 800 series routers.

System Specifications

Table B-1 outlines the system specifications for the routers.

Table B-1   System Specifications

Description	Design Specification
Physical Dimensions	
Dimensions (H x W x D)	2.0 x 9.7 x 8.3 in. (5.1 x 24.6 x 21.1 cm)
Weight (does not include desktop power supply)	Cisco 801 router: 1.39 lb (0.63 kg) Cisco 802 router: 1.42 lb (0.64 kg) Cisco 802 IDSL router: 1.42 lb (0.64 kg) Cisco 803 router: 1.44 lb (0.65 kg) Cisco 804 router: 1.45 lb (0.66 kg) Cisco 804 IDSL router: 1.45 lb (0.66 kg)
Environmental Operating Ranges	
Nonoperating temperature	–4 to 149°F (–20 to 65°C)
Nonoperating humidity	5 to 95%, relative humidity
Nonoperating altitude	0 to 15,000 ft (4570 m)
Operating temperature	32 to 104°F (0 to 40°C)
Operating humidity	10 to 85%, relative humidity
Operating altitude	0 to 10,000 ft (3000 m)
Router Power	
AC input voltage	100 to 250 VAC
Frequency	50 to 60 Hz
Power consumption	20W
Telephone Port Power	
Voltage	-24V

For information on regulatory compliance, refer to the *Regulatory Compliance and Safety Information for Cisco 800 Series Routers* document that shipped with your router.

⚠

Warning   **Ultimate disposal of this product should be handled according to all national laws and regulations.**

Port Connector Pinouts

This section provides pinouts for the following connectors:

- Ethernet–Table B-2, Table B-3, Table B-4, Table B-5, and Table B-6
- Console (for connecting a terminal or PC)–Table B-7
- ISDN S/T–Table B-8
- ISDN U–Table B-9
- IDSL–Table B-10
- Telephone–Table B-11
- Power–Table B-12

Table B-2   Cisco 801, Cisco 802, and Cisco 802 IDSL Ethernet Connector Pinouts (RJ-45)

Pin	Function (HUB/NO HUB or TO HUB/TO PC Button – IN Position)	Function (HUB/NO HUB or TO HUB/TO PC Button – OUT Position)
1	TX+	RX+
2	TX–	RX–
3	RX+	TX+
4	Unused	Unused
5	Unused	Unused
6	RX–	TX–
7	Unused	Unused
8	Unused	Unused

Table B-3   Cisco 803 and Cisco 804 Ethernet Connector Pinouts for Port Ø Only (RJ-45)

Pin	Function (HUB/NO HUB Button – OUT Position)	Function (HUB/NO HUB Button – IN Position)	Pin	Function (HUB/NO HUB Button – OUT Position)	Function (HUB/NO HUB Button – IN Position)
A1	RX+	TX+	A2	RX–	TX–
A3	TX+	RX+	A4	Unused	Unused
A5	Unused	Unused	A6	TX–	RX–
A7	Unused	Unused	A8	Unused	Unused

Table B-4   Cisco 804 IDSL Ethernet Connector Pinouts for Port 1 Only (RJ-45)

Pin	Function (TO HUB/TO PC Button – OUT Position)	Function (TO HUB/TO PC Button – IN Position)	Pin	Function (TO HUB/TO PC Button – OUT Position)	Function (TO HUB/TO PC Button – IN Position)
A1	RX+	TX+	A2	RX–	TX–
A3	TX+	RX+	A4	Unused	Unused
A5	Unused	Unused	A6	TX–	RX–
A7	Unused	Unused	A8	Unused	Unused

Table B-5   Cisco 803 and Cisco 804 Ethernet Connector Pinouts for Ports 1, 2, and 3 (RJ-45)

Pin	Function	Pin	Function
B1	RX3+	B2	RX3–
B3	TX3+	B4	Unused
B5	Unused	B6	TX3–
B7	Unused	B8	Unused
C1	RX2+	C2	RX2–
C3	TX2+	C4	Unused
C5	Unused	C6	TX2–
C7	Unused	C8	Unused
D1	RX1+	D2	RX1–
D3	TX1+	D4	Unused
D5	Unused	D6	TX1–
D7	Unused	D8	Unused

Table B-6   Cisco 804 IDSL Ethernet Connector Pinouts for Ports 2, 3, and 4 (RJ-45)

Pin	Function	Pin	Function
B1	RX4+	B2	RX4–
B3	TX4+	B4	Unused
B5	Unused	B6	TX4–
B7	Unused	B8	Unused
C1	RX3+	C2	RX3–
C3	TX3+	C4	Unused
C5	Unused	C6	TX3–
C7	Unused	C8	Unused
D1	RX2+	D2	RX2–

Table B-6   Cisco 804 IDSL Ethernet Connector Pinouts for Ports 2, 3, and 4 (RJ-45) (continued)

Pin	Function	Pin	Function
D3	TX2+	D4	Unused
D5	Unused	D6	TX2–
D7	Unused	D8	Unused

Table B-7   Console Connector Pinouts (RJ-45)

Pin	Function
1	RTS
2	DTR
3	TXD
4	GND
5	GND
6	RXD
7	DSR
8	CTS

The console port is configured as a data communications equipment (DCE) device. The default parameters for the console port are as follows:

- 9600 baud
- 8 data bits
- No parity
- One stop bit

Table B-8   ISDN S/T Connector Pinouts (RJ-45)

Pin	Function
1	Unused
2	Unused
3	TXD+
4	RXD+
5	RXD–
6	TXD–
7	Unused
8	Unused

Table B-9   ISDN BRI U Connector Pinouts (RJ-45)

Pin	Function
1	Unused
2	Unused
3	Unused
4	U interface network connection (Tip)
5	U interface network connection (Ring)
6	Unused
7	Unused
8	Unused

Table B-10   IDSL Connector Pinouts (RJ-45)

Pin	Function
1	Unused
2	Unused
3	Unused
4	IDSL interface network connection (Tip)

Cisco 800 Series Routers Hardware Installation Guide

Table B-10   IDSL Connector Pinouts (RJ-45)

Pin	Function
5	IDSL interface network connection (Ring)
6	Unused
7	Unused
8	Unused

Table B-11   Telephone Connector Pinouts (RJ-11)

Pin	Function
1	Unused
2	Unused
3	Ring
4	Tip
5	Unused
6	Unused

Table B-12   Power Connector Pinouts

Pin	Function
1	ROF
2	RTN
3	Unused
4	Unused
5	+5
6	RTN
7	–71
8	–24

Cabling Specifications

This section provides the following cabling specifications:

- Straight-through and crossover Ethernet cables.
- Ethernet, ISDN, IDSL and telephone cable distance limitations. (A *telephone cable* connects a device to a telephone port.)

Ethernet Cable Specifications

Table B-13 lists the specifications for straight-through and crossover Ethernet cables. Refer to the Glossary for definitions of straight-through Ethernet cable and crossover Ethernet cable.

Table B-13   Ethernet Cable Specifications

Type	Category	Shielding
10BASE-T	Category 3 or 5	Shielded twisted-pair (STP)
10BASE-T	N/A	Unshielded twisted-pair (UTP)

Maximum Cable Distances

Table B-14 provides the maximum distances of Ethernet, ISDN, IDSL, and telephone cables that you can use.

Table B-14   Maximum Cable Distances

Cable	Maximum Distance
Ethernet cable	328 ft (100 m)
ISDN S/T and U and IDSL cables	32.8 ft (10 m)
Telephone cable	500 ft (152 m)

Numerics

10BASE-T   The 10-Mbps baseband Ethernet specification that uses two pairs of twisted-pair cabling (Category 3 or 5): one pair for transmitting data and the other for receiving data.

B

BRI   Basic Rate Interface. An ISDN interface composed of two bearer channels (B channels) and one data channel (D channel) for circuit-switched communication of voice, video, and data.

C

Cisco 800 Fast Step Application   A Windows 95–, Windows 98–, and Windows NT–based software tool that ships with the Cisco 800 series routers for basic configurations and verification of the router software configuration. It also monitors the status of the ISDN interface, error detail, and usage statistics.

crossover Ethernet cable   A cable that wires a pin to its opposite pin; for example, RX+ is wired to TX+. This cable connects two similar devices, for example, two data terminal equipment (DTE) devices or two data communications equipment (DCE) devices.

D

DRAM   Dynamic RAM that stores information in capacitors that must be refreshed periodically.

E

Cisco 800 Series Routers Hardware Installation Guide

EMI   Electromagnetic interference. The interference by electromagnetic signals that can cause reduced data integrity and increased error rates on transmission channels.

ESD   Electrostatic discharge. A transfer of electrostatic charge between bodies of different electrostatic potentials, such as an operator and a piece of electrical equipment. ESD occurs when electronic components are improperly handled and can damage equipment and impair electrical circuitry. ESD is more likely to occur with the combination of synthetic fibers and dry atmosphere.

F

Flash memory   The nonvolatile storage that can be electrically erased and reprogrammed so that data can be stored, booted, and rewritten as necessary.

H

HUB/NO HUB button   The Cisco 800 series routers provide a HUB/NO HUB button. This button is associated with the Ethernet port on Cisco 801 and Cisco 802 routers and with Ethernet port Ø on Cisco 803 and Cisco 804 routers. The setting of this button determines the cable type (straight-through or crossover) that you use to connect an Ethernet device. This button is the equivalent of the TO HUB/TO PC button on the Cisco 802 IDSL and Cisco 804 IDSL routers.

I

IDSL   ISDN Digital Subscriber Line. A digital communication protocol that uses an ISDN line and supports line rates up to 144 kilobits per second (kbps).

ISDN   Integrated Services Digital Network. A communication protocol that permits telephone networks to carry data, voice, and other source traffic.

N

NIC   Network interface card. A board that provides network communication capabilities to and from a computer system. Also called an *adapter*.

NT1   Network Termination 1. A device that provides the interface between equipment on the customer and ISP premises.

S

straight-through Ethernet cable   A cable that wires a pin to its equivalent pin. This cable connects two dissimilar devices, for example, a data terminal equipment (DTE) and a data communications equipment (DCE) device. A straight-through Ethernet cable is the most common cable used.

T

TO HUB/TO PC button   The Cisco 802 IDSL and Cisco 804 IDSL routers provide a TO HUB/TO PC button that is equivalent to the HUB/NO HUB button on the other Cisco 800 series routers. This button is associated with the Ethernet port on the Cisco 802 IDSL router and with Ethernet port 1 on the Cisco 804 IDSL router. The setting of this button determines the cable type (straight-through or crossover) that you will use to connect an Ethernet device.

telephone cable   The cable used to connect a device to a telephone port.

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