



Preparing for Installation

This chapter describes the tasks you must perform before you begin to install a Cisco uBR7100 series router and includes the following sections:

- [Tools and Parts Required, page 2-1](#)
- [Shipping Container Contents, page 2-2](#)
- [Safety Guidelines, page 2-3](#)
- [Site Requirement Guidelines, page 2-6](#)



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030



Warning

Read the installation instructions before connecting the system to the power source. Statement 1004

Tools and Parts Required

Cisco uBR7100 series routers are fully assembled at the factory; no additional assembly is required prior to installing the router. The following tools and parts are shipped with Cisco uBR7100 series routers (unless noted otherwise) and are required for installation:

- Electrostatic discharge (ESD)-preventive wrist strap (not included with the router)
- Number 2 Phillips screwdriver (not included with the router)
- Flat-head screwdriver (not included with the router)
- Rack-mount and cable-management kit for 19-inch, four-post or telco-type rack installation (mounting brackets for a 23- or 24-inch rack are available separately)
- Rubber feet for desktop installation
- One double ground lug and two 3.5 x 8-mm screws for grounding the chassis. This optional procedure also requires a 6-AWG grounding wire, a crimping tool suitable for the wire, and a knife or wire stripper.

Shipping Container Contents

Ensure that the correct Cisco uBR7100 series router is in the shipping container. The shipping container includes the following items:

- Cisco uBR7100 series router with appropriate port adapter card installed. If the port adapter is not installed, it should be installed, using the instructions that accompany the card, before the router is installed.
- A rack-mount and cable-management kit that includes the following items:
 - Two rack-mount brackets for 19-inch rack installations
 - One cable-management bracket
 - Sixteen 3.5 x 8-mm Phillips flathead screws for securing the rack-mount brackets to the chassis
 - Two 3.5 x 7-mm slotted hexhead screws for securing the cable-management bracket to the chassis



Note Four 10-32 x 3/8-inch slotted binderhead screws are required to secure the chassis to the rack rails; the binderhead screws are not included in the rack-mount and cable-management kit.

- Four Rubber feet for mounting the router on a tabletop
- Nylon cable tie
- Cable tie holder
- Ground lug kit that includes two M3.5 x 7-mm screws
- Rollover RJ-45 to RJ-45 cable for connecting the console or auxiliary port
- Female RJ-45-to-DB-9 adapter for connecting a PC running terminal emulation software to the console port
- Male RJ-45-to-DB-25 adapter for connecting a modem to the auxiliary port for remote access
- Documentation roadmap
- *Regulatory Compliance and Safety Information for the Cisco uBR7100 and Cisco uBR7100E Series Universal Broadband Router*



Note

Depending on the exact model and bundle ordered, other materials, such as an evaluation copy of Cisco Network Registrar (CNR), might also be included with the Cisco uBR7100 series router.

Keep the shipping container in case you must return the router to the factory.

Safety Guidelines

Any device that uses electricity must be handled carefully; follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.
- If removing the chassis cover, put the removed chassis cover in a safe place.
- Keep tools away from walk areas where you and others could fall over them.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.
- Wear safety glasses if you are working under any conditions that might be hazardous to your eyes.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- The installation of the router should be in compliance with national and local electrical codes. In the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code. In Canada, Canadian Electrical Code, part I, CC22.1. In other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.
- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always turn all power supplies off (O) and unplug all power cables before opening the chassis.
- Always unplug the power cable before installing or removing a chassis.
- The AC-powered routers ship with a three-wire electrical grounding-type plug, which only fits into a grounding-type power outlet. This is a safety feature. The equipment grounding should be in accordance with local and national electrical codes.



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Warning

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

Electrical Equipment Guidelines



Warning

Do not touch the power supply when the power cord is connected. For systems with a power switch, line voltages are present within the power supply even when the power switch is off and the power cord is connected. For systems without a power switch, line voltages are present within the power supply when the power cord is connected. Statement 4



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. Statement 43

Follow these guidelines when you work on equipment powered by electricity.

- Locate the emergency power-off switch for the room in which you are working. Then, if an electrical accident occurs, you can act quickly to turn off the power.
- Before working on the system, unplug the power cord.
- Disconnect all power before doing the following:
 - Installing or removing a chassis
 - Working near power supplies



Warning

Before working on a system that has an on/off switch, turn OFF the power and unplug the power cord. Statement 1



Warning

Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12



Warning

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.
- If an electrical accident occurs, proceed as follows:
 - Use caution; do not become a victim yourself.
 - Turn off power to the system.
 - If possible, send another person to get medical aid. Otherwise, assess the condition of the victim and then call for help.
 - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or other network cabling.

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.

Electrostatic Discharge Prevention

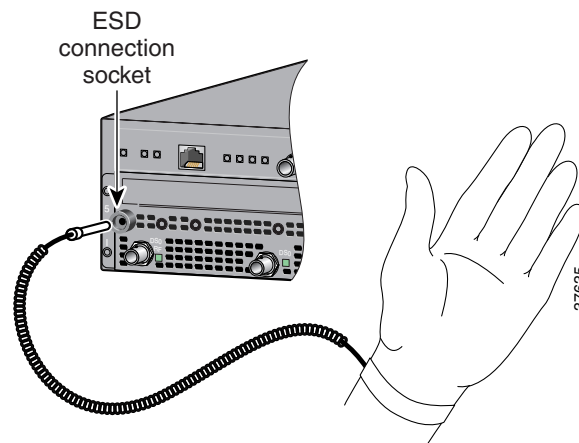
Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD damage occurs when electronic components are improperly handled and can result in complete or intermittent failures. [Figure 2-1](#) illustrates how to attach an electrostatic discharge wrist strap.

Always follow ESD-prevention procedures when you remove and replace components. Ensure that the chassis is electrically connected to earth ground. Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the grounding clip to an unpainted surface of the chassis frame to safely ground unwanted ESD voltages. To guard against ESD damage and shocks, the wrist strap and cord must operate properly. If no wrist strap is available, ground yourself by touching the metal part of the chassis.

**Caution**

For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms (Mohm).

Figure 2-1 Attaching an Electrostatic Discharge Wrist Strap



Chassis Lifting Guidelines

A fully configured Cisco uBR7100 series router weighs approximately 32 pounds (14.5 kg). The chassis is not intended to be moved frequently. Before you install the router, ensure that your site is properly prepared so you can avoid having to move the chassis later to accommodate power sources and network connections.

Whenever you lift the chassis or any heavy object, follow these guidelines:

- Always disconnect all external cables before lifting or moving the chassis.
- Ensure that your footing is solid, and balance the weight of the object between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your lower back muscles.
- Lift the chassis from the bottom; grasp the underside of the chassis exterior with both hands.

Site Requirement Guidelines



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Statement 1017

The environmental monitoring functionality in the router protects the system and components from potential damage from overvoltage and overtemperature conditions. To ensure that normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site *before* installation. After installation, make sure the site maintains an ambient temperature of 32°F through 104°F (0°C through 40°C), and keep the area around the chassis as free from dust as is practical.

Planning a proper location for the router and the layout of your equipment rack or wiring closet is essential for successful system operation. Equipment placed too close together or inadequately ventilated can cause system overtemperature conditions. In addition, chassis panels made inaccessible by poor equipment placement can make system maintenance difficult. Following are precautions that can help avoid problems during installation and ongoing operation.

Follow these general precautions when planning your equipment locations and connections:

- Plan for access to both front and rear panels of the chassis.
- Ensure that the room where the chassis operates has adequate ventilation. Remember that electrical equipment generates heat. Ambient air temperature may not cool equipment to acceptable operating temperatures without adequate ventilation.
- Use the **show environment** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings for high temperature and maximum and minimum voltages and creates reports on any occurrences. If warning messages are displayed, take immediate action to identify the cause and correct the problem.
- We recommend keeping the router off the floor and out of any area that tends to collect dust.
- Follow ESD prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- Ensure that the port adapter (or the blank port adapter) is in place and secure for proper cooling. The fans direct cooling air throughout the chassis interior; a loose component or empty slot can redirect the air flow away from active components.

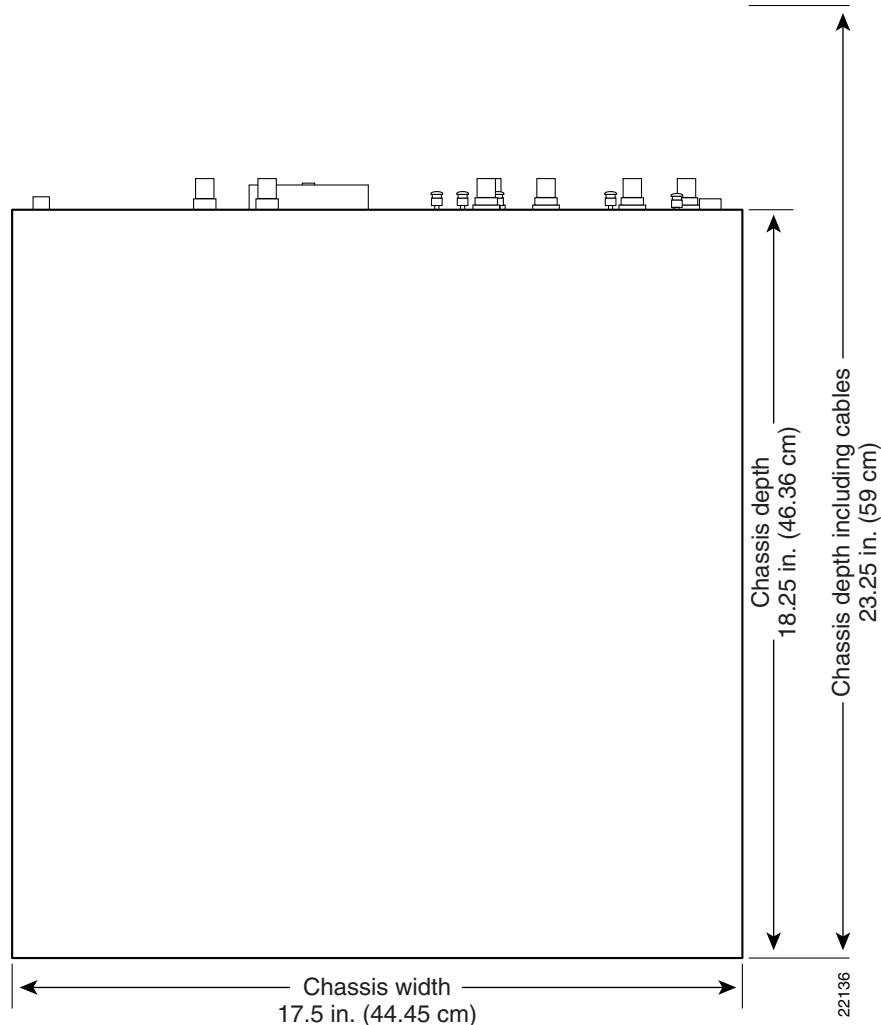
Rack-Mounting Guidelines

The rack-mounting hardware included with router is suitable for standard 19-inch equipment racks and telco-type racks; brackets for 23- and 24-inch racks are available separately. To easily access the interface cables while the router is installed in a rack make certain that you have access to the rear of the router.

Before using a particular rack, check for obstructions (such as a power strip) that could impair rack-mount installation. If a power strip does impair a rear rack-mount installation, remove the power strip before installing the router in the rack, and then replace it after the chassis is installed. As an alternative, you can mount the router on an equipment shelf, provided that the rack dimensions allow you to secure the router to the shelf and the overall configuration permits safe installation and access. However, we recommend rack-mounting the router.

Figure 2-2 shows the chassis outer dimensions and required footprint for the Cisco uBR7114 universal broadband router. The dimensions for the other models of Cisco uBR7100 series routers are identical.

Figure 2-2 Cisco uBR7114 Router Footprint and Outer Dimensions



To use the rack-mounting hardware provided with the router, consider the following guidelines:

- To mount the router between two posts or rails using the brackets, the inner clearance (the width between the *inner* sides of the two posts or rails) must be at least 17 inches (43.18 cm).
- The height of the chassis is 3.5 inches (8.89 cm).
- When mounting the router in four-post or telco-type racks, be sure to use all the screws and the brackets provided to secure the chassis to the rack posts.
- If you plan to use an equipment shelf, ensure that the shelf is constructed to support the weight and dimensions of the chassis. Figure 2-2 shows the chassis footprint, which you need if you are designing a customized shelf. We recommend that you use the rack-mount kit designed for Cisco uBR7100 series routers.

When planning your rack installation, consider the following guidelines:

- Install the router in an open rack whenever possible. If installation in an enclosed rack is unavoidable, ensure that the rack has adequate ventilation.

An enclosed rack should have louvered sides and a fan to provide cooling air, because heat generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.



Caution

To prevent chassis overheating, never install the router in an enclosed rack or room that is not properly ventilated or air conditioned.

- Ensure that the rack is not congested, because each unit generates heat. Maintain a minimum clearance of 3 inches (7.62 cm) on the back and front of the chassis for the cooling air inlet and exhaust ports, respectively.
- Baffles can isolate exhaust air from intake air, which also helps to draw cooling air through the chassis. The best placement of the baffles depends on the airflow patterns in the rack, which can be found by experimenting with different configurations.
- When equipment installed in a rack (particularly in an enclosed rack) fails, try operating the equipment by itself, if possible. Power off other equipment in the rack to allow the unit under test a maximum of cooling air and clean power.
- Allow sufficient clearance around the rack for maintenance. If the rack is mobile, you can push it back near a wall or cabinet for normal operation and pull it out for maintenance (installing or removing a port adapter or connecting cables). Otherwise, allow 19 inches (48.3 cm) of clearance to remove the port adapter.
- Install the chassis and external devices to which it will connect in a contiguous stack.
- Always install heavier equipment in the lower half of a rack to maintain a low center of gravity and prevent the rack from falling over.
- If you use telco-type racks, be sure that the rack is bolted to the floor and secured, because in these types of installations only one end of the chassis mounts to the two rack posts with the brackets. Ensure that the weight of the chassis does not make the rack unstable.
- Provide an adequate chassis ground (earth) connection for your router chassis.



Note

We strongly recommend that you provide a chassis ground connection. (See [“Attaching the System Ground Connection”](#) section on page 3-5 for instructions.)

In addition to the preceding guidelines, review the precautions for avoiding overtemperature conditions in the following section, [“Temperature and Humidity Requirements.”](#) To properly install a Cisco uBR7100 series chassis in a rack, see the instructions given in [“Rack-Mounting the Chassis”](#) section on page 3-3.

Temperature and Humidity Requirements

[Table 2-1](#) lists the operating and nonoperating environmental site requirements. The ranges listed are those within which Cisco uBR7100 series routers continue to operate; however, a measurement that is approaching the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental anomalies before they approach a maximum operating range.

Table 2-1 Specifications for Operating and Nonoperating Environments

Specification	Minimum	Maximum
Temperature, ambient operating	32°F (0°C)	104°F (40°C)
Temperature, ambient nonoperating and storage	-4°F (-20°C)	149°F (65°C)
Humidity, ambient (noncondensing) operating	10%	90%
Humidity, ambient (noncondensing) nonoperating and storage	5%	95%
Altitude, operating and nonoperating	Sea level	10,000 ft. (3050 m)
Vibration, operating	5–200 Hz, 0.5 g (1 octave/min.)	–
Vibration, nonoperating	5–200 Hz, 1 g (1 octave/min.) 200–500 Hz, 2 g (1 octave/min.)	–

Power Connection Guidelines

Follow these precautions and recommendations when planning power connections to a Cisco uBR7100 series router:

- Check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.
- The AC power supply includes the following features:
 - Autoselects either 110V or 220V operation.
 - All units include a 6-foot (1.8-meter) electrical power cord that is appropriate for the country of operation.



Warning

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 15A minimum, 60VDC. Statement 1005



Warning

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

- Use a grounded AC power outlet and install proper grounding to avoid damage from lightning and power surges.
- The AC-input power supply operates on input voltage and frequency within the ranges of 100 to 240 VRMS and 50/60 Hz without the need for operator adjustments. This power supply also incorporates an active power factor corrector that minimizes the unwanted generation of line current harmonics that can cause overload of site electrical distribution systems.



Note

We recommend an uninterruptible power source to protect against power failures at your site. We recommend powering a Cisco uBR7100 series router from a 15A receptacle at the power source.

**Note**

The Cisco uBR7100 series router installation must comply with all applicable codes and is approved for use with copper conductors only. If installing the router in a central office environment that requires Telcordia grounding, the ground bond fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system should be made with a minimum 6-AWG, copper ground conductor.

To satisfy Telcordia grounding requirements, the chassis provides two threaded chassis grounding receptacles, located on the sides near the rear of the chassis, which are intended to be bonded directly to the central offices or other interior ground system. The chassis ground requires 3.5 mm screws, which are included. See [“Attaching the System Ground Connection” section on page 3-5](#) for instructions on attaching the system ground.

Plant Wiring Guidelines

Following are guidelines for setting up the plant wiring and cabling at your site. When planning the location of the new system, consider the distance limitations for signaling, EMC, and connector compatibility, as described in the following sections.

Interference Considerations

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires. This fact has two implications for the construction of plant wiring:

- Bad wiring practice can result in radio interference emanating from the plant wiring.
- Strong electromagnetic interference (EMI), especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the router, and can even create an electrical hazard by conducting power surges through lines and into equipment. (Review the safety warnings in the [“Electrical Equipment Guidelines” section on page 2-3](#).)

**Note**

To predict and remedy strong EMI, you may also need to consult experts in radio frequency interference (RFI).

If you use twisted-pair cable in your plant wiring with a good distribution of grounding conductors, the plant wiring is unlikely to emit radio interference. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.

If wires exceed recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic devices. If you have had problems of this sort in the past, you may want to consult experts in electrical surge suppression and shielding.

Distance Limitations and Interface Specifications

The size of your networks and the distances between connections depend on the type of signal, the signal speed, and the transmission media (the type of cabling used to transmit the signals). For example, standard coaxial cable has a greater channel capacity than twisted-pair cabling. The distance and rate limits in the following descriptions are the IEEE recommended maximum speeds and distances for signaling; however, you can usually get good results at speeds and distances far greater than these. For example, the recommended maximum rate for V.35 is 2 Mbps, but it is commonly used at 4 Mbps without any problems. If you understand the electrical problems that might arise and can compensate for them, you should get good results with rates and distances greater than those shown here; however, do so at your own risk.

**Note**

We recommend that you do not exceed specified transmission rate and distance limits.

When preparing your site for network connections to a Cisco uBR7100 series router, you must consider a number of factors related to each type of interface:

- The type of cabling required for each type (fiber, thick or thin coaxial, foil-twisted pair [FTP], or unshielded twisted-pair [UTP] cabling)
- Distance limitations for each signal type
- The specific cables you need to connect each interface
- Any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSUs), or data service units (DSUs)
- Cable pinouts if you plan to build your cables

**Note**

The specific interface information you need is contained in the documentation that is shipped with each port adapter.

Also see [Appendix C, “Cable Specifications,”](#) for cabling information.

Before installing a Cisco uBR7100 series router, have all additional external equipment and cables on hand. For ordering information, contact a customer service representative.

Ethernet Connections

There are two 10BASE-T/100BASE-TX Fast Ethernet ports on the rear panel of the router. Both ports use unshielded twisted-pair (UTP) cable. We recommend Category 5 UTP cable. The maximum segment distance is 328 feet (100 meters). UTP cables look like the cables used for ordinary telephones; however, UTP cables meet certain electrical standards that telephone cables do not. Cables are not included.

Port Adapter WAN Connections

Cisco uBR7100 series routers support a number of port adapters that provide different WAN connection ports on the rear panel of the router. For more information on the cables used with the WAN ports, see the documentation that accompanies the port adapter, as well as [Appendix C, “Cable Specifications,”](#)

**Warning**

This equipment must be installed and maintained by service personnel as defined by AS/NZS 3260. Incorrectly connecting this equipment to a general-purpose outlet could be hazardous. The telecommunications lines must be disconnected 1) before unplugging the main power connector or 2) while the housing is open, or both. Statement 1043

**Warning**

Hazardous network voltages are present in WAN ports regardless of whether power to the unit is OFF or ON. To avoid electric shock, use caution when working near WAN ports. When detaching cables, detach the end away from the unit first. Statement 1026

Console and Auxiliary Port Considerations

Cisco uBR7100 series routers include an asynchronous serial console port and an auxiliary port. The console and auxiliary ports provide access to the access server either locally (with a console terminal) or remotely (with a modem). This section discusses important cabling information to consider before connecting a console terminal (such as PC running terminal emulation software) to the console port or connecting a modem to the auxiliary port.

The main difference between the console and auxiliary ports is that the auxiliary port supports hardware flow control using RTS/CTS (Request To Send/Clear To Send) signaling, and the console port does not. Flow control paces the transmission of data between a sending device and a receiving device, ensuring that the receiving device can absorb the data sent to it before the sending device sends more.

When the buffers on the receiving device are full, a message is sent to the sending device to suspend transmission until the data in the buffers has been processed. Because the auxiliary port supports flow control, it is ideally suited for use with the high-speed transmissions of a modem. Console terminals transmit at slower speeds than modems; therefore, the console port is ideally suited for use with console terminals.

For detailed information about installing a console terminal and connecting devices to the auxiliary port, see the [“Connecting the Console Port and Auxiliary Port”](#) section on page 3-10. For cable and port pinouts, see [Appendix C, “Cable Specifications,”](#)

Console Port Connections

Cisco uBR7100 series routers include an EIA/TIA-232 asynchronous serial console port (RJ-45). Depending on the cable and the adapter used, this port will appear as a data terminal equipment (DTE) or data communications equipment (DCE) device at the end of the cable. Your router arrives with cables and adapters to connect a console terminal (an ASCII terminal or PC running terminal emulation software) to the console port.

To connect a PC running terminal emulation software to the console port, use the RJ-45 rollover cable with the female RJ-45-to-DB-9 adapter (labeled TERMINAL). The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 2 stop bits. The console port does not support hardware flow control.

Auxiliary Port Connections

Cisco uBR7100 series routers include an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports RTS/CTS flow control. Depending on the cable and the adapter used, this port will appear as a DTE or DCE device at the end of the cable. Your router arrives with a cable and an adapter to connect a modem to the auxiliary port. To connect a modem to the auxiliary port, use the RJ-45 rollover cable with the male RJ-45-to-DB-25 adapter (labeled MODEM).

