Preparing for Router Installation

This section provides preinstallation information such as recommendations and requirements to review prior to installing your router.

The following sections prepare you for installation.

Note: To see translated warnings that appear in this publication, see the *Connected Grid Router 2000 Series Regulatory Compliance and Safety Information* document.

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

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

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: This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Warning: This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: Maximum 15 A, 120 Vac or Maximum 10 A, 230 Vac Statement 1005

Warning: Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018

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

Warning: Installation of the equipment must comply with local and national electrical codes. Statement 1074

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

Warning: Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.
Statement 1029

Safety Recommendations

Follow these guidelines to ensure general safety:

- Keep the chassis area clear and dust-free during and after installation.

- Keep tools and chassis components away from walk areas.

- Do not wear loose clothing that could get caught in the chassis. Fasten your tie or scarf and roll up your sleeves.

- Wear safety glasses when working under conditions that might be hazardous to your eyes.

- Do not perform any action that creates a hazard to people or makes the equipment unsafe.

Safety with Electricity

Follow these guidelines when working on equipment powered by electricity:

- Locate the emergency power-off switch in the room in which you are working. If an electrical accident occurs, you can quickly turn off the power.

- Disconnect all power before doing the following:

  - Installing or removing a chassis

  - Working near power supplies

- Look carefully for possible hazards in your work area, such as moist floors, ungrounded power extension cables, frayed power cords, and missing safety grounds.

- Do not work alone if hazardous conditions exist.

- Never assume that power is disconnected from a circuit. Always check.

- Never open the enclosure of the router's internal power supply.

- If an electrical accident occurs, proceed as follows:

  - Use caution; do not become a victim yourself.

  - Turn off power to the device.

  - If possible, send another person to get medical aid. Otherwise, assess the victim's condition and then call for help.

  - Determine if the person needs rescue breathing or external cardiac compressions; then take appropriate action.

Warning: This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

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

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It can occur if electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. Always follow ESD prevention procedures when removing and replacing modules:

■ Ensure that the router chassis is electrically connected to earth ground.

■ Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. Connect the clip to an unpainted surface of the chassis frame to channel unwanted ESD voltages safely to ground. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.

■ If no wrist strap is available, ground yourself by touching a metal part of the chassis.

Caution: **For the safety of your equipment, periodically check the resistance value of the antistatic strap. It should be between 1 and 10 megohms (Mohm).**

General Site Requirements

This section describes the requirements your site must meet for safe installation and operation of your router. Ensure that the site is properly prepared before beginning installation. If you are experiencing shutdowns or unusually high errors with your existing equipment, this section can also help you isolate the cause of failures and prevent future problems.

Rack Requirements

The following information will help you plan your equipment rack configuration:

■ Allow clearance around the rack for maintenance.

■ Allow at least one rack unit of vertical space between routers.

■ Enclosed racks must have adequate ventilation. Ensure that the rack is not congested, because each router generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat generated by equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.

Router Environmental Requirements

Mount the Cisco CGR 2010 routers in a rack. The location of your router and the layout of your equipment rack or wiring room are extremely important considerations for proper operation. Equipment placed too close together, inadequate ventilation, and inaccessible panels can cause malfunctions and shutdowns, and can make maintenance difficult. Plan for access to both power supply side and cable side panels of the router.

Note: Allow at least one rack unit of vertical space above the router.

When planning your site layout and equipment locations, refer to General Site Requirements, page 19. If you are currently experiencing shutdowns or an unusually high number of errors with your existing equipment, these precautions and recommendations may help you isolate the cause of failure and prevent future problems.

■ Ensure that the room where your router operates has adequate air circulation. Electrical equipment generates heat. Without adequate air circulation, ambient air temperature may not cool equipment to acceptable operating temperatures.

■ Always follow ESD-prevention procedures described in Preventing Electrostatic Discharge Damage, page 19 to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

- Ensure that the chassis cover and module cable side panels are secure. All empty interface card slots and power supply bays must have filler panels installed.

- 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 (and in adjacent racks) to allow the router under test a maximum of cooling air and clean power.

Power Guidelines and Requirements

Check the power at your site to ensure that you are receiving "clean" power (free of spikes and noise). Install a power conditioner if necessary.

The AC power supply includes the autoselect feature for either 110 V or 220 V operation.

Caution: **Two types of power supplies are supported on the Cisco CGR 2010: a low-voltage DC power supply and a high-voltage DC/AC power supply. Take caution when selecting the correct input voltage for the power supply installed or damage will result.**

Network Cabling Specifications

The following sections describe the cables needed to install your Cisco CGR 2010 router:

- Console and Auxiliary Port Considerations, page 20

- Preparing for Network Connections, page 21

Console and Auxiliary Port Considerations

The Cisco CGR 2010 router includes an asynchronous serial console port and an auxiliary port. The console and auxiliary ports provide access to the router either locally using a console terminal connected to the console port, or remotely using a modem connected to the auxiliary port. This section discusses important cabling information to consider before connecting the router to a console terminal or modem.

The main difference between the console and auxiliary ports is that the auxiliary port supports hardware flow control and the console port does not. Flow control paces the transmission of data between a sending device and a receiving device. Flow control ensures 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 send data at slower speeds than modems; therefore, the console port is ideally suited for use with console terminals.

Console Port Connections

The router has both EIA/TIA-232 asynchronous (RJ-45) and USB 5-pin mini Type B, 2.0 compliant serial console ports. The console ports do not have any hardware flow control. Shielded USB cables with properly terminated shields are recommended.

EIA/TIA-232 Port

Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable. Only one port can be used at the same time.

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support hardware flow control. For detailed information about installing a console terminal, see Connecting to a Console Terminal or Modem, page 43.

For cable and port pinouts, see *Cisco Modular Access Router Cable Specifications*.

USB Serial Console Port

The USB serial console port connects directly to the USB connector of a PC using a USB Type A to 5-pin mini USB Type-B cable. The USB Console supports full speed (12Mb/s) operation. The console port does not support hardware flow control.

Note: Always use shielded USB cables with a properly terminated shield.

The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 1 stop bit. The console port does not support mode control. For detailed information about installing a console terminal, see Connecting to a Console Terminal or Modem, page 43.

For operation with Microsoft Windows, the Cisco Windows USB Console Driver must be installed on every PC connected to the console port. If the driver is not installed, prompts guide you through a simple installation process. For detailed information about installing the Cisco Windows USB Console Driver see Installing the Cisco Microsoft Windows USB Device Driver, page 45.

The Cisco Windows USB Console Driver allows plugging and unplugging the USB cable from the console port without affecting Windows HyperTerminal operations. No special drivers are needed for Mac OS X or Linux.

Only one console port can be active at a time. When a cable is plugged into the USB console port the RJ-45 port becomes inactive. Conversely, when the USB cable is removed from the USB port, the RJ-45 port becomes active.

Baud rates for the USB console port are 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bps.

> **Note:** 4-pin mini USB Type-B connectors are easily confused with 5-pin mini USB Type-B connectors. They are not compatible. Only the 5-pin mini USB Type-B can be used.

Auxiliary Port Connections

The router has an EIA/TIA-232 asynchronous serial auxiliary port (RJ-45) that supports flow control. Depending on the cable and the adapter used, this port appears as a DTE or DCE device at the end of the cable.

Preparing for Network Connections

When setting up your router, consider distance limitations and potential electromagnetic interference (EMI) as defined by the applicable local and international regulations.

Network connection considerations are provided for several types of network interfaces and are described in the following sections:

- Ethernet Connections, page 21

- Serial Connections, page 22

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. Statement 1021

Ethernet Connections

The IEEE has established Ethernet as standard IEEE 802.3. The Cisco CGR 2010 router supports the following Ethernet implementations:

- 1000BASE-X—1000 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3z). Supports the Ethernet maximum length of 328 feet (100 meters).

- 1000BASE-T—1000 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3ab). Supports the Ethernet maximum length of 328 feet (100 meters).

- 100BASE-TX—100 Mb/s full-duplex transmission over a Category 5 or better unshielded twisted-pair (UTP) cable (IEEE 802.3u). Supports the Ethernet maximum length of 328 feet (100 meters).

See *Cisco Modular Access Router Cable Specifications* at www.cisco.com for information about Ethernet cables, connectors, and pinouts.

Serial Connections

Serial connections are provided by the grid router WAN interface card (GRWIC). Before you connect a device to a serial port, you need to know the following:

- Type of device, data terminal equipment (DTE) or data communications equipment (DCE), you are connecting to the synchronous serial interface

- Type of connector, male or female, required to connect to the device

- Signaling standard required by the device

Configuring Serial Connections

The serial ports on the asynchronous/synchronous serial network modules and the serial grid router WAN interface card use a GRWIC-8A/S cable with a DB-25 connector. Serial ports can be configured as DTE or DCE, depending on the serial cable used.

Serial DTE or DCE Devices

A device that communicates over a synchronous serial interface is either a DCE or DTE device. A DCE device provides a clock signal that paces the communications between the device and the router. A DTE device does not provide a clock signal. DTE devices usually connect to DCE devices. The documentation that accompanied the device should indicate whether it is a DTE or DCE device. (Some devices have a jumper to select either DTE or DCE mode.) The following table lists typical DTE and DCE devices.

Device Type	Gender	Typical Devices
DTE	Male[1]	Terminal
		PC
DCE	Female[2]	Modem
		CSU/DSU
		Multiplexer

[1] If pins protrude from the base of the connector, the connector is male.

[2] If the connector has holes to accept pins, the connector is female.

Signaling Standards Supported

The synchronous serial ports available for the router support the following signaling standards: EIA/TIA-232 (EIA-323). You can order a Cisco DB-25 shielded serial transition cable that has the appropriate connector for the standard you specify. The documentation for the device should indicate the standard used for that device. The router end of the shielded serial transition cable has a DB-25 connector, which connects to the DB-25 port on a serial grid router WAN interface card. The other end of the serial transition cable is available with a connector appropriate for the standard you specify. For a list of the serial cables supported for GRWICs as well as the pinouts, see Connectors and Cabling for the 8-Port Asynchronous/ Synchronous RS-232 GRWIC, page 55.

The synchronous serial port can be configured as DTE or DCE, depending on the attached cable.

All serial ports configured as DTE require external clocking from a CSU/DSU or other DCE device.

Distance Limitations

Serial signals can travel a limited distance at any given bit rate; generally, the slower the data rate, the greater the distance. All serial signals are subject to distance limits, beyond which a signal significantly degrades or is completely lost.

Table 1 on page 23 lists the recommended maximum speeds and distances for each serial interface type; however, you might get good results at speeds and distances greater than those listed, if you understand the electrical problems that might arise and can compensate for them. For instance, the recommended maximum rate for V.35 is 2 Mb/s, but 4 Mb/s is commonly used.

Table 1   Serial Signal Transmission Speeds and Distances

Rate (bps)	Distance for EIA/TIA-232		Distance for X.21 and V.35		Distance for USB	
	Feet	Meters	Feet	Meters	Feet	Meters
2400	200	60	4100	1250	16.4	5
4800	100	30	2050	625	16.4	5
9600	50	15	1025	312	16.4	5
19200	25	7.6	513	156	16.4	5
38400	12	3.7	256	78	16.4	5
56000	8.6	2.6	102	31	16.4	5
1544000 (T1)	–	–	50	15	16.4	5

Asynchronous/Synchronous Serial Module Baud Rates

The following baud-rate limitations apply to the slow-speed serial interfaces found in the asynchronous/synchronous serial modules:

- Asynchronous interface—Maximum baud rate is 115.2 kbps.

- Synchronous interface—Maximum baud rate is 128 kbps full duplex.

Required Tools and Equipment for Installation and Maintenance

You need the following tools and equipment to install and upgrade the router and its components:

- ESD-preventive cord and wrist strap
- Number 2 Phillips screwdriver
- Phillips screwdrivers: small, 3/16-in. (4 to 5 mm) and medium, 1/4-in. (6 to 7 mm)
- Screws that fit your rack

In addition, depending on the type of modules you plan to use, you might need the following equipment to connect a port to an external network:

- Cables for connection to the WAN and LAN ports (dependent on configuration).
- Ethernet hub or PC with a network interface card for connection to an Ethernet (LAN) port.
- Console terminal (an ASCII terminal or a PC running HyperTerminal or similar terminal emulation software) configured for 9600 baud, 8 data bits, 1 stop bit, no flow control, and no parity.
- Modem for connection to the auxiliary port for remote administrative access (optional).
- Data service unit (DSU) or channel service unit/data service unit (CSU/DSU) as appropriate for serial interfaces.
- External CSU for any CT1/PRI modules without a built-in CSU.

Installation Checklist

The sample installation checklist on page 25 lists items and procedures for installing a new router. Make a copy of this checklist and mark the entries when completed. Include a copy of the checklist for each router in your site log (described in Creating a Site Log, page 26).

Installation checklist for site_____

Router name_____

Task	Verified by	Date
Installation checklist copied		
Background information placed in Site Log		
Site power voltages verified		
Installation site power check completed		
Required tools available		
Additional equipment available		
Router received		
Product registration card received		
www.cisco.com contact information label received		
Chassis components verified		
Initial electrical connections established		
ASCII terminal (for local configuration) or modem (for remote configuration) available		
Signal distance limits verified		
Startup sequence steps completed		
Initial operation verified		
Software image verified		

Creating a Site Log

The Site Log provides a record of all actions related to the router. Keep it in an accessible place near the chassis where anyone who performs tasks has access to it. Use the installation checklist to verify steps in the installation and maintenance of the router. Site Log entries might include the following information:

- Installation progress—Make a copy of the installation checklist and insert it into the site log. Make entries as each procedure is completed.

- Upgrade and maintenance procedures—Use the site log as a record of ongoing router maintenance and expansion history. A site log might include the following events:

  - Installation of GRWICs

  - Removal or replacement of GRWICs and other upgrades

  - Configuration changes

  - Maintenance schedules and requirements

  - Maintenance procedures performed

  - Intermittent problems

  - Comments and notes

Inspect all items for shipping damage. If anything appears to be damaged or you encounter problems installing or configuring your router, contact Cisco customer service. Warranty, service, and support information is in the quick start guide that shipped with your router.