Cisco uBR10012 Series Universal Broadband Router–Quick Start Guide

Part Number: OL-24972-01
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Contents

This document includes procedures for installing and removing the Cisco uBR10012 components that are shipped with the Cisco uBR10012 universal broadband router. This document also includes technical specifications and troubleshooting information.

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Objective

The purpose of this document is to provide installation, removal, and troubleshooting information for the fan assembly module installed in the Cisco uBR10012 universal broadband router.

Audience

This document is intended for field service engineers who are familiar with Cisco products and headend cable installation procedures.

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

Cisco One-Year Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranties and license agreements applicable to Cisco software, is available on Cisco.com. To access and download the *Cisco Information Packet* and your warranty and license agreements from Cisco.com:

1. Launch your browser, and go to this URL:

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

   The Warranties and License Agreements page appears.

2. To read the *Cisco Information Packet*, follow these steps:

   a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-03A0 is highlighted.

   b. Select the language in which you would like to read the document.

   c. Click **Go**.

      The Cisco Limited Warranty and Software License page from the Information Packet appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

Note You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from the Adobe website: http://www.adobe.com

3. To read translated and localized warranty information about your product:

   a. Enter this part number in the Warranty Document Number field:

      78-10747-01C0

   b. Select the language in which you would like to view the document.

   c. Click **Go**. The Cisco warranty page appears.

   d. Read the document online, or click the **PDF** icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:
http://www.cisco.com/en/US/support/

Duration of Hardware Warranty

One (1) year

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

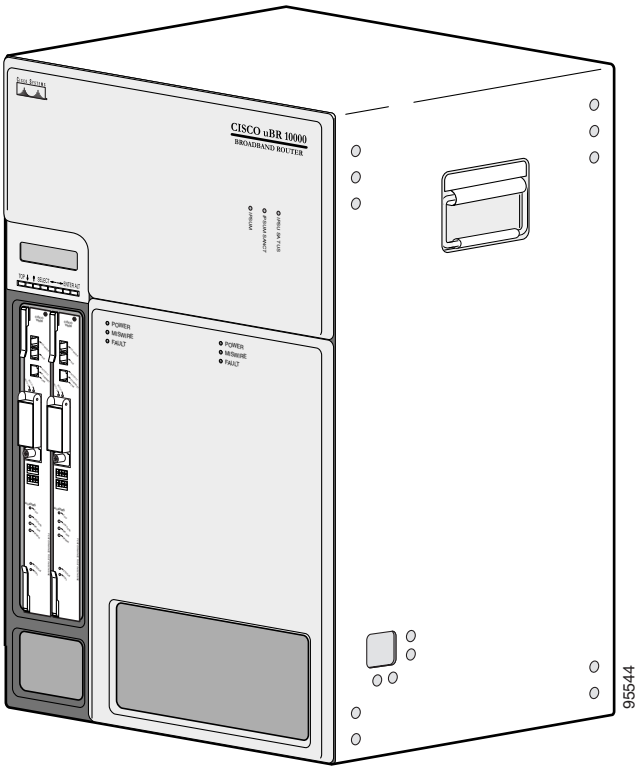
Complete the information below, and keep it for reference.

Company product purchased from	
Company telephone number	
Product model number	
Product serial number	
Maintenance contract number	

Overview

The Cisco uBR10012 universal broadband router is an aggregation platform that provides a high-end, high-performance, high-capacity Cable Modem Termination System (CMTS) solution. The system provides high-speed data, broadband entertainment, and IP telephony services over a coaxial cable connection to residential and commercial subscribers using cable modems or digital set-top boxes (STBs). The router enables high-speed data services to be packaged like they are in basic cable television services or video programming. (See Figure 1.)

Figure 1 Cisco uBR10012 Universal Broadband Router



The Cisco uBR10012 universal broadband router:

- Operates with cable modems or STBs that support the DOCSIS 1.0, DOCSIS 1.1, DOCSIS 2.0, and DOCSIS 3.0 versions of the DOCSIS specification. The router supports the 6 MHz North American channel plans using the ITU J.83 Annex B RF standard.
- Supports downstream and upstream digitally modulated signals.
- Supports multiple standards and multiple interfaces and allows operators to choose the appropriate services and devices for their CMTS platform.
- Supports data and digitized voice connectivity over a bidirectional cable television and IP backbone network.
- Uses the same Parallel Express Forwarding (PXF) technology used by the Cisco ESR10000 edge services router.

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

For translations of the warnings used in this document, see the Cisco Regulatory Compliance and Safety Information document that comes with this chassis. Reference the translations by statement number (ex: Statement 1030).

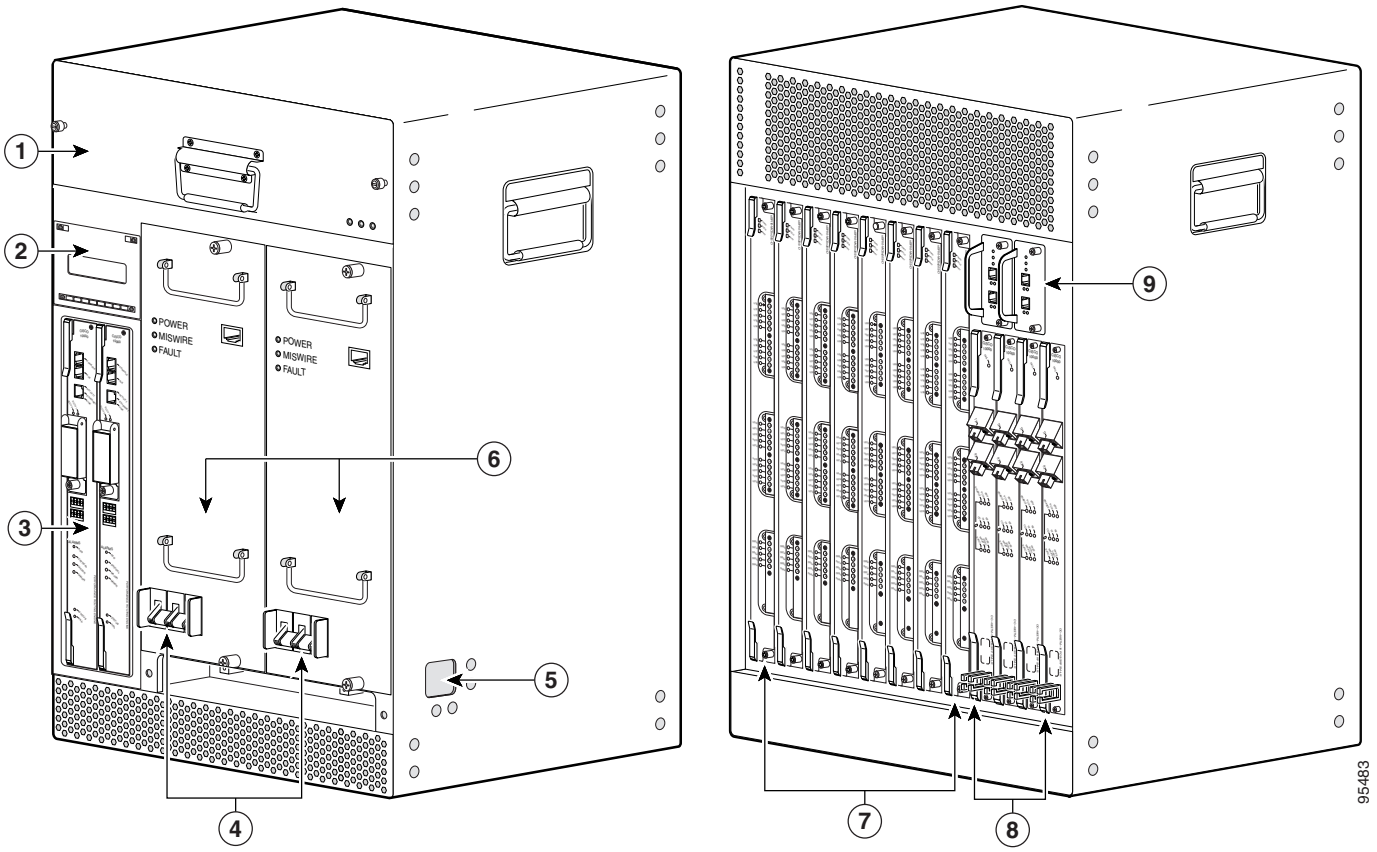
Cisco uBR10012 Universal Broadband Router Components

The Cisco uBR10012 router chassis is designed for front and rear access. The two AC or DC power entry modules (PEMs), two Performance Routing Engine (PRE) modules, an LCD panel, and the fan assembly module are accessed from the front of the chassis. The eight slots for cable interface line cards, four full slots for network uplink line cards, and two slots for the Timing, Communication, and Control Plus (TCC+) and the DOCSIS Timing, Communication, and Control (DTCC) cards are accessed from the rear of the chassis. (See Figure 2.)

Note Figure 2 is a sample representation of the Cisco uBR10012 chassis with the DC PEM (UBR10-PWR-DC=) modules.

Note If the only available power supply source is 100-120 VAC, you can use the auxiliary AC-input power shelf. The AC-input power shelf converts AC to DC power for the Cisco uBR10012 router. If you are using the optional 2400 W AC-input power shelf, refer to *2400W AC-Input Power Shelf Installation Guide*.

Figure 2 Front and Rear Chassis Views



1	Fan assembly	**6**	PEM modules
2	LCD module	**7**	Cable interface line cards
3	PRE processor modules	**8**	High-speed, high-performance network uplink line cards
4	DC PEM power switches	**9**	TCC+ and DTCC timing cards
5	DC power cable and ground cable exit		—

Fan Assembly Modules

The Cisco uBR10012 chassis uses a fan assembly module containing fans to supply cooling air to the chassis. The fan assembly connects to the chassis through a blind mate connector that plugs into the cable assembly and then into the chassis backplane. The fan assembly modules are identified by their product part numbers. The fan assembly modules supported on the Cisco uBR10012 chassis are:

- Fan Assembly Module (UBR10-FAN-ASSY=)
- Fan Assembly Module (UBR10012-FAN-PLUS=)

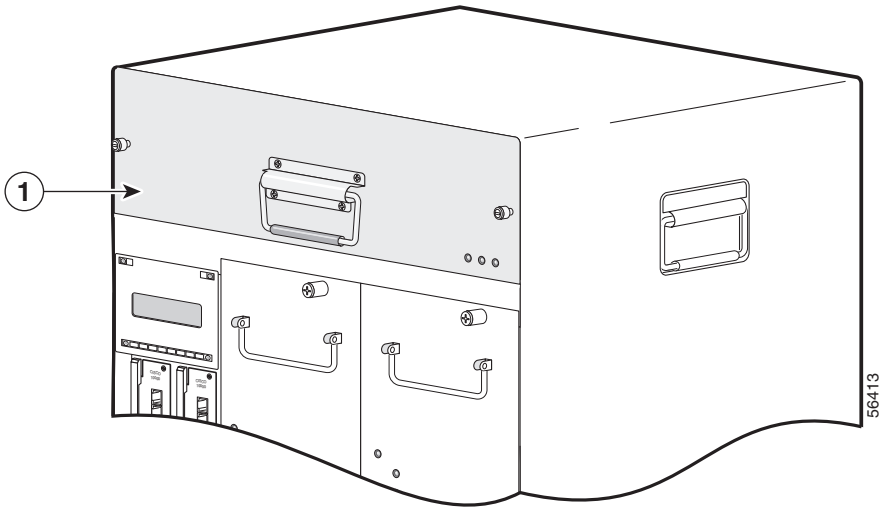
Fan Assembly Module (UBR10-FAN-ASSY=)

This fan assembly module has four internal fans that draw cooling air into the front of the chassis and direct it across the internal components. The air is exhausted through the openings in the rear of the chassis (see Figure 3). The fan assembly module works at two speeds:

- Low speed (with a clean air filter)
- High speed (with a clean air filter)

The temperature of the fan module at the module air outlet determines the operating speed. Three LEDs (FAN OK, SINGLE FAN FAIL, and MULTI FAN FAIL) indicate the status of the fan assembly.

Figure 3 Fan Assembly Module (UBR10-FAN-ASSY=)



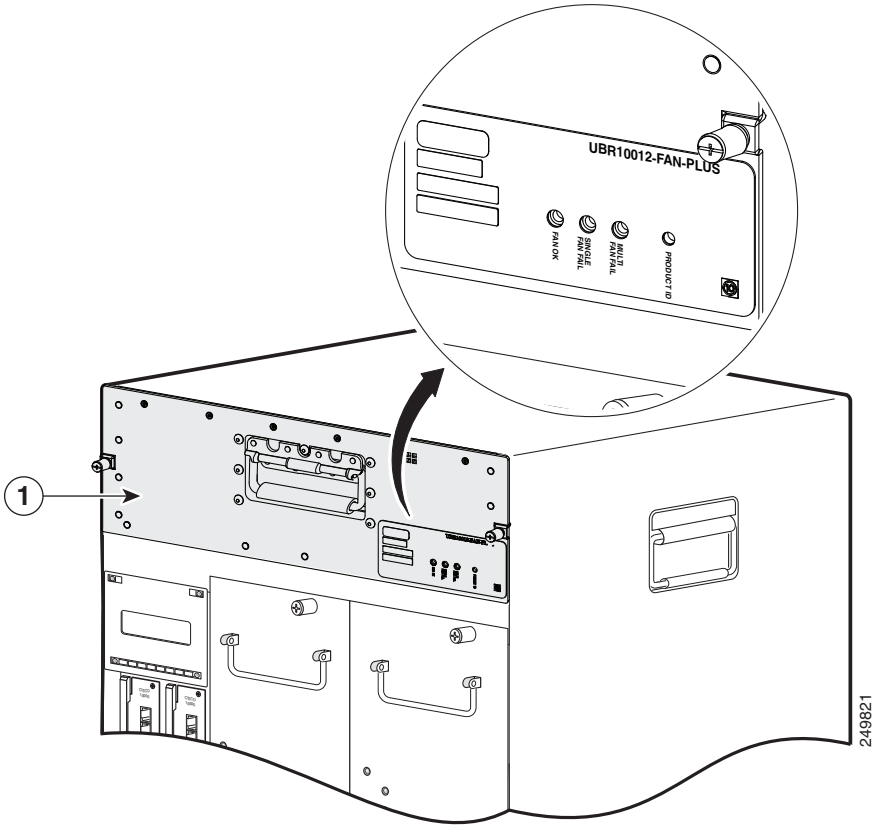
1	Fan assembly module		—

Fan Assembly Module (UBR10012-FAN-PLUS=)

This fan assembly has nine internal fans that draw cooling air into the front of the chassis and directs it across the internal components (see Figure 4). This fan assembly module provides:

- Increased cooling capability
- Higher redundancy in case of a failure
- Repositioned thermal sensor that detects the ambient temperature of the cable plant or facility and adjusts the variable fan speeds to maintain the temperature

Figure 4 Fan Assembly Module (UBR10012-FAN-PLUS=)



1	Fan assembly module		—

This fan assembly module works at four variable speed levels (0, 1, 2, and 3). The operating speed of the fan is determined by the temperature of the facility. A thermistor, mounted on the fan assembly module, is placed in front of the vent holes on the front panel. It measures the ambient air temperature on the outside of the fan module. The threshold temperatures and speed levels are set internally and the fan assembly controller monitors the thermistor and controls the speed of the fan. When powered on, the fans operate at a speed according to the ambient average air temperature of the facility at the appropriate speed level.

Note On startup, it may take up to 30 seconds for the fans to stabilize at the appropriate speed.

Three LEDs (FAN OK, SINGLE FAN FAIL, and MULTI FAN FAIL) indicate the status of the fan assembly. In addition, there is a PRODUCT ID LED/switch on the front panel of the fan assembly module.

Table 1 lists the default activation status of the PRODUCT ID LED/switch when it is shipped.

Table 1 PRODUCT ID LED/Switch Default Activation Status

Ordered Equipment	PRODUCT ID LED/Switch Status
Fan module (Spare)	Activated
Fan module and Cisco uBR10012 chassis running unsupported Cisco IOS Release	Not activated
Fan module and Cisco uBR10012 chassis running supported Cisco IOS Release[1]	Activated

1. For information on Cisco IOS Releases that support the PRODUCT ID LED/switch feature, see the Cisco uBR10012 Router Release Notes for Cisco IOS Release 12.2(33)SCE.

When you press the PRODUCT ID LED/switch it illuminates (green) and the Cisco IOS software identifies the fan assembly module as UBR10012-FAN-PLUS only if you are running a supported Cisco IOS release on the chassis. Otherwise, the software reports the default UBR10-FAN-ASSY product part number and a FAN-MISSING alarm may be randomly raised. To clear the alarm, see "Troubleshooting" section on page 63.

Tip Use a small object, such as a paper clip, to press the PRODUCT ID LED/switch inside the cavity on the front panel of the fan assembly module.

Note If you are installing the fan module (spare) in an existing Cisco uBR10012 router chassis, ensure that the Cisco IOS Release running on the chassis supports the PRODUCT ID LED/switch feature before installing the module.

Note Even if you are using a supported Cisco IOS release, the software may not identify the fan assembly as UBR10012-FAN-PLUS. If this occurs, ensure that the PRODUCT ID LED/switch is illuminated and then either reload the software, or physically remove the fan assembly module for at least 1 minute and then reinsert it.

Table 2 summarizes the specifications of both the fan assembly modules.

Table 2 Specifications of the Fan Assembly Modules

Component	UBR10012-FAN-PLUS=	UBR10-FAN-ASSY=
Power Consumption (Max)	224 W	185 W
Fans	9	4
Operating Speed Levels	4	2
LEDs	3	3
PRODUCT ID LED/switch	Yes	No
Weight	22 lbs (10 kg)	30 lbs (3.16 kg)
Label on Front Panel	Blue	White

AC Power Entry Modules

The Cisco uBR10012 router is shipped with two AC power entry modules (AC PEMs) that provide power supply to the system. One AC PEM module is sufficient to provide power for a fully configured chassis. However, if one AC PEM module fails, the other AC PEM module automatically begins providing power to the entire chassis, without impacting the system operation.

The AC PEM modules use a standard 200–240 VAC (50 or 60 Hz) input power obtained through power receptacles on the front panel of each PEM. The two AC PEMs convert the AC power to provide filtered, redundant, and load shared DC power to the Cisco uBR10012 chassis. The AC PEM modules can be identified by their product part numbers.

The AC PEM modules supported on the Cisco uBR10012 chassis are:

- AC PEM Module (UBR10-PWR-AC=)
- AC PEM Module (UBR10-PWR-AC-PLUS=)

AC PEM Module (UBR10-PWR-AC=)

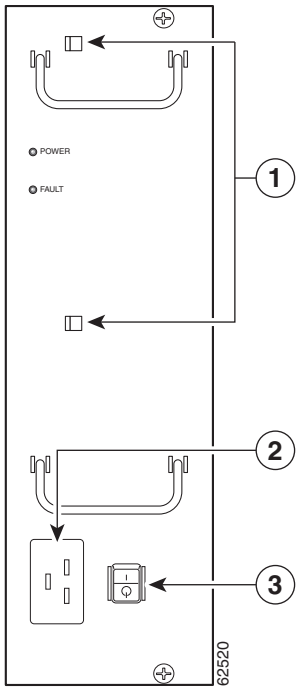
This AC PEM module provides a power output of 2400 W with a single AC-input power connection.

Figure 5 shows the faceplate of this AC PEM module, which has:

- AC power receptacle—This connects to the facility power source.
- AC power switch—This powers on the AC PEM module.
- Two handles—These help during installation and removal of the AC PEM.

Two LEDs (POWER and FAULT) indicate the status of the AC PEM module.

Figure 5 AC PEM Module (UBR10-PWR-AC=)



1	Power cord clips	**3**	AC power switch
2	AC power receptacle		—

AC PEM Module (UBR10-PWR-AC-PLUS=)

This AC PEM module provides a power output of 3300 W with dual AC-input power connections. This AC PEM module provides:

- Increased power to the chassis
- Load shared power to the chassis (under normal conditions)

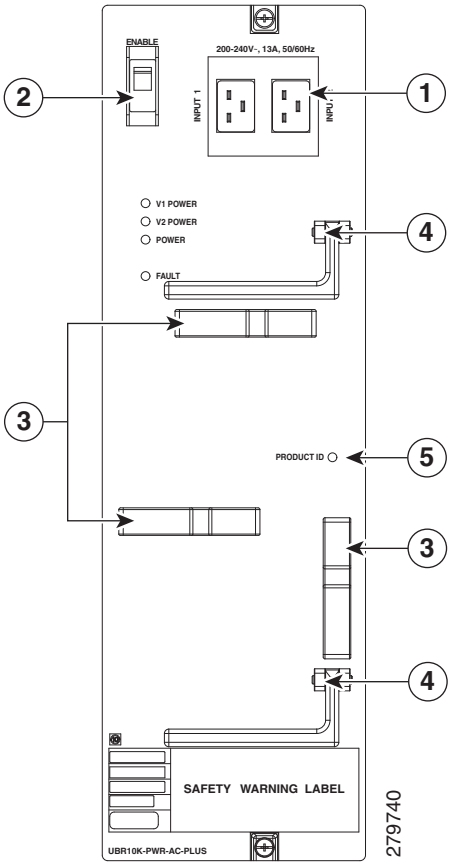
Note The two AC power cables must be connected and powered on for each AC PEM to function properly. Ensure that you exercise caution while connecting the AC power cables because the facility power may be energized. The AC PEM internal fans start working and are audible as soon as the AC power cables are installed and AC power is supplied to the AC PEMs, although the AC power enable switch is in the Standby (0) position.

Note The U-CHAS-COVER-PLUS= front cover must be used with the Cisco uBR10012 chassis for proper routing of the AC cables from the 3300 W AC PEMs through the chassis to the facility power source.

Figure 6 shows the faceplate of the AC PEM module, which has:

- Two AC power receptacles—These connect to the facility power source.
- AC PEM enable power switch—This powers on the AC PEM module.
- AC power cord clips—These help to secure the AC power cables.
- Two handles—These help during the removal and installation of the AC PEM module in the Cisco uBR10012 chassis.

Figure 6 AC PEM Module (UBR10-PWR-AC-PLUS=)



1	AC power receptacles	**4**	Handles on the AC PEM
2	AC PEM enable power switch	**5**	PRODUCT ID LED/switch
3	AC power cord clips		—

Four LEDs (V1 POWER, V2 POWER, POWER, and FAULT) indicate the status of the AC PEM module. In addition, there is a PRODUCT ID LED/switch on the front panel of the AC PEM module.

Table 3 lists the default activation status of the PRODUCT ID LED/switch when it is shipped.

Table 3 PRODUCT ID LED/Switch Default Activation Status

Ordered Equipment	PRODUCT ID LED/Switch Status
AC PEM module (Spare)	Activated
AC PEM module and Cisco uBR10012 chassis running unsupported Cisco IOS Release	Not activated
AC PEM module and Cisco uBR10012 chassis running supported Cisco IOS Release[1]	Activated

1. For information on Cisco IOS Releases that support the PRODUCT ID LED/switch feature, see the Cisco uBR10012 Router Release Notes for Cisco IOS Release 12.2(33)SCE.

When you press the PRODUCT ID LED/switch it illuminates (green) and the Cisco IOS software identifies the PEM module as UBR10-PWR-AC-PLUS only if you are running a supported Cisco IOS release on the chassis. Otherwise, the software reports the default UBR10-PWR-AC product part number and the **show environment** command randomly displays the PEM type as DC instead of AC.

Tip Use a small object, such as a paper clip, to press the PRODUCT ID LED/switch inside the cavity on the front panel of the AC PEM module.

Note If you are installing the AC PEM module (spare) in an existing Cisco uBR10012 router chassis, ensure that the Cisco IOS Release running on the chassis supports the PRODUCT ID LED/switch feature before installing the module.

Note Even if you are using a supported Cisco IOS release, the software may not identify the PEM module as UBR10-PWR-AC-PLUS. If this occurs, ensure that the PRODUCT ID LED/switch is illuminated and then either reload the software, or physically remove the AC PEM module for at least 1 minute and then reinsert it.

Table 4 summarizes the specifications of the AC PEM modules.

Table 4 Specifications of the AC PEM Modules

Component	UBR10-PWR-AC-PLUS=	UBR10-PWR-AC=
Cisco AC PEM (Part Number)[1]	341-0387-01	34-1966-02
Power Output	3300 W	2400 W
DC-output Voltage	57.5 VDC	54 VDC
AC-input Power Connections	16 A + 16 A	13 A
AC-input Voltage	200-240 VAC (50 or 60 Hz)	200-240 VAC (50 or 60 Hz)
Physical Differences		
Weight	19 lbs (8.64 kg)	14.7 lbs (6.65 kg)

Table 4 Specifications of the AC PEM Modules (continued)

Component	UBR10-PWR-AC-PLUS=	UBR10-PWR-AC=
LEDs	4	2
PRODUCT ID LED/switch	Yes	No

1. The 34- part number is listed on compliance label of the AC PEM.

DC Power Entry Modules

The Cisco uBR10012 router is shipped with two DC power entry modules (DC PEMs) that provide power to the system. One DC PEM can provide sufficient power for a fully configured chassis. However, if one DC PEM fails, the other automatically begins providing power to the entire chassis, without impacting the system operation.

The two DC PEMs provide filtered, redundant, and load shared DC power to the Cisco uBR10012 chassis. The DC PEM modules can be identified by their product part numbers.

The DC PEM modules supported on the Cisco uBR10012 chassis are:

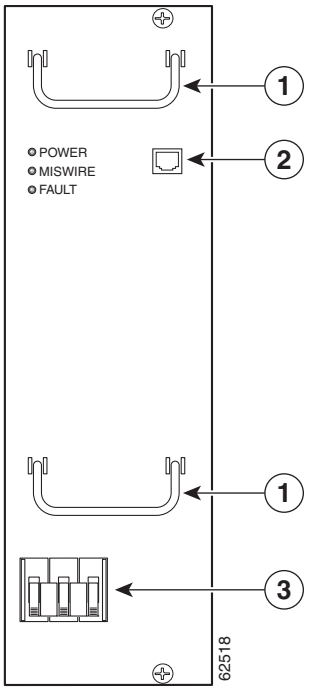
- DC PEM Module (UBR10-PWR-DC=)
- DC PEM Module (UBR10-PWR-DC-PLUS=)

DC Power Entry Module (UBR10-PWR-DC=)

Figure 7 shows the faceplate of the DC PEM module, which has:

- DC power switch—This powers on the DC PEM module.
- External alarm connector—This is an input connector to monitor the external alarms from the external AC-input power shelf.
- Two handles—These help during installation and removal of the DC PEM.

Figure 7 DC Power Entry Module (UBR10-PWR-DC=)



1	Handles on the DC PEM	**3**	DC power switch
2	External alarm connector		—

Three LEDs (POWER, MISWIRE, and FAULT) indicate the status of the DC PEM module.

Note The DC PEMs receive –48 /–60 VDC power through two separate DC terminal blocks located beneath each PEM in the midplane of the Cisco uBR10012 chassis. For details on how to connect the DC cables, see "Connecting the DC Power Cables for the UBR10-PWR-DC= Module" section on page 34.

DC Power Entry Module (UBR10-PWR-DC-PLUS=)

This DC PEM module provides a power output of 3300 W with dual DC-input power connections. This DC PEM module provides:

- Increased power to the chassis
- Load shared DC power to the chassis (under normal conditions)

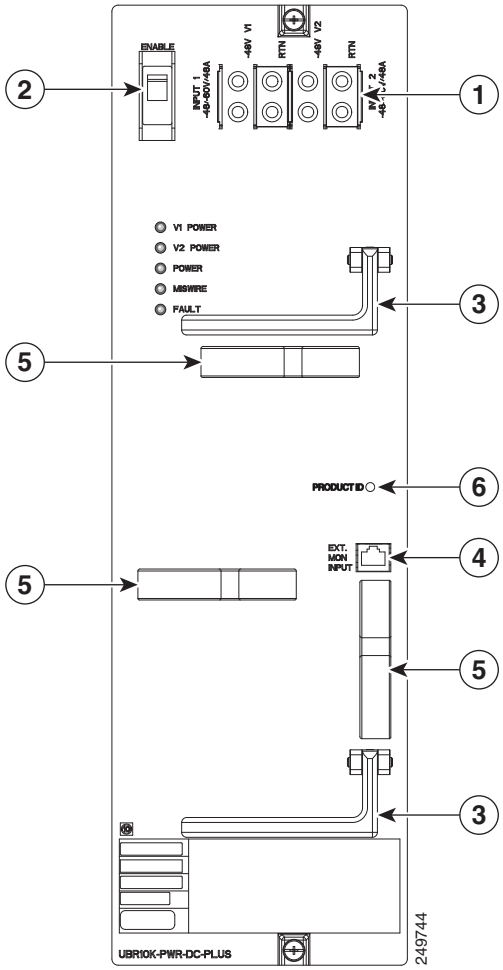
Note Four DC power cables must be connected and powered on for the DC PEM to function properly. The four cables must be attached to the input studs on the DC power terminal blocks on the front panel of each DC PEM. As soon as the DC cables are connected to the facility power source and the facility power is turned on, the DC PEM internal fans start working and are audible, although the DC power enable switch is in Standby (0) position. For details on how to connect the DC cables, see "Connecting the DC Power Cables for the UBR10-PWR-DC-PLUS= Module" section on page 35.

Note The U-CHAS-COVER-PLUS= front cover must be used with the 3300 W DC PEM modules for proper routing of the DC cables through the chassis to the facility power source.

Figure 8 shows the faceplate of this DC PEM module, which has:

- Two DC power terminal blocks—These connect to the facility power source.
- DC power enable switch—This powers on the DC PEM module.
- Two Handles—These help during the removal and installation of the DC PEM module.
- External alarm connector—This is an input connector to monitor the alarms from the external AC-input power shelf.
- DC power cord clips—These help to secure the DC power cables.

Figure 8 DC Power Entry Modules (UBR10-PWR-DC-PLUS=)



1	DC power terminal blocks	**4**	External alarm connector
2	DC power enable switch	**5**	DC power cord clips
3	Handles on the DC PEM	**6**	PRODUCT ID LED/switch

Five LEDs (V1 POWER, V2 POWER, POWER, MISWIRE, and FAULT) indicate the status of the DC PEM module. In addition, there is a PRODUCT ID LED/switch on the front panel of the DC PEM module.

Table 5 lists the default activation status of the PRODUCT ID LED/switch when it is shipped.

Table 5 PRODUCT ID LED/Switch Default Activation Status

Ordered Equipment	PRODUCT ID LED/Switch Status
DC PEM module (Spare)	Activated
DC PEM module and Cisco uBR10012 chassis running unsupported Cisco IOS Release	Not activated
DC PEM module and Cisco uBR10012 chassis running supported Cisco IOS Release[1]	Activated

1. For information on Cisco IOS Releases that support the PRODUCT ID LED/switch feature, see the Cisco uBR10012 Router Release Notes for Cisco IOS Release 12.2(33)SCE.

When you press the PRODUCT ID LED/switch it illuminates (green) and the Cisco IOS software identifies the PEM module as UBR10-PWR-DC-PLUS only if you are running a supported Cisco IOS release on the chassis. Otherwise, the software reports the default UBR10-PWR-DC product part number and the **show environment** command randomly displays the PEM type as AC instead of DC.

Tip Use a small object, such as a paper clip, to press the PRODUCT ID LED/switch inside the cavity on the front panel of the DC PEM module.

Note If you are installing the DC PEM module (spare) in an existing Cisco uBR10012 router chassis, ensure that the Cisco IOS Release running on the chassis supports the PRODUCT ID LED/switch feature before installing the module.

Note Even if you are using a supported Cisco IOS release, the software may not identify the PEM module as UBR10-PWR-DC-PLUS. If this occurs, ensure that the PRODUCT ID LED/switch is illuminated and then either reload the software, or physically remove the PEM module for at least 1 minute and then reinsert it.

Table 6 summarizes the specifications of the DC PEM modules.

Table 6 Specifications of the DC PEM modules

Component	UBR10-PWR-DC-PLUS=	UBR10-PWR-DC=	
Cisco DC PEM (Part Number)[1]	341-0388-01	34-1651-04 and 34-1651-05	34-1651-05
Power output	3300 W	2400 W	3000 W
DC-input Voltage	–48 to –60 VDC nominal	–48 to –60 VDC nominal	–55 to –60 VDC nominal
DC-output Voltage (nominal)	–57.5 V	See footnote[2]	
DC-input Current Connections	50 A + 50 A	50 A	56 A
Physical Differences			
LEDs	5	3	3
Weight	16 lbs (7.25 kg)	10 lbs (4.54 kg)	10 lbs (4.54 kg)
PRODUCT ID LED/switch	Yes	No	No

1. The 34- part number is listed on compliance label of the DC PEM.
2. For the 34-1651-04 and 34-1651-05 DC PEM modules, the DC-output voltage varies according to the DC-input voltage with a drop in voltage between 1 V and 1.85 V. The allowable DC-input range is -40.5 V to -72 V. The DC-output voltage is not constant for these DC PEM modules. For the 341-0388-01 DC PEM module, the DC-output voltage is regulated and is constant.

Preparing the Site

Do not unpack the chassis until you are ready to install it. Keep the chassis in the shipping container to prevent accidental damage until you determine an installation site.

Before you install the Cisco uBR10012 universal broadband router, review the following:

- The environmental conditions in your installation site must be met to maintain normal operation.
- The power outlet meets the requirements at your installation sites.
- The cabling requirements for your installation sites.
- Rack-mounting requirements.
- The equipment required to install the router.

Site Environment 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

Warning **This product requires short-circuit (overturned) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.** Statement 1045

Follow these site environment guidelines:

- The site must be capable of maintaining an ambient temperature of 41° through 104° Fahrenheit (5° to 40° Celsius).
- The chassis must not be placed where heated exhaust air from other systems can enter the air intake vent at the bottom front, because this can cause overheating of the system.
- A minimum clearance of 4 in. (10.2 cm) from the vents on the front and back of the chassis must be maintained to allow for adequate airflow.
- Approximately 3 to 4 ft (91.44 to 121.92 cm) clearance at the front and rear of the chassis must be maintained for cabling and normal system maintenance.

Temperature and Humidity Requirements

Table 7 lists the nominal operating and nonoperating environments requirements. Any measurement that approaches the minimum or maximum of a range indicates a potential problem.

Table 7 Specifications for Operating and Nonoperating Environments

Specification	Minimum	Maximum
Temperature, ambient operating	41°F (5°C)	104°F (40°C)
Temperature, ambient nonoperating and storage	–40°F (–40°C)	158°F (70°C)
Humidity, ambient (noncondensing) operating	5%	85%
Humidity, ambient (noncondensing) nonoperating and storage	5%	95%
Altitude, operating (over allowable temperature)	32°F –200 ft (–60.9 m)	104°F (40°C) 10,000 ft (3048 m)
Altitude, nonoperating (over allowable temperature)	–200 ft (–60.9 m)	30,000 ft (9144 m)

Power Guidelines

Caution The Cisco uBR10012 router installation must comply with all applicable codes and is approved for use only with copper conductors. 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 of a 6 AWG, copper ground conductor.

Follow these precautions and recommendations when planning power connections to the Cisco uBR10012 router:

- Ensure that you are using proper cables and have circuit breakers installed.
- Check the power at your site before installation and periodically after installation to ensure that you are receiving uninterrupted power. Install a power conditioner if necessary.
- Provide proper grounding.
- Ensure that the frame ground is tied to a single building ground.
- Use a 6 AWG, copper ground conductor (minimum requirement) when attaching the chassis ground to a central office or other interior ground system. An insulation rating of 167° Fahrenheit (75° Celsius) is required for the 6 AWG wire for 3000 W of power.

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

Power Connection Guidelines for DC-powered Systems

Although the allowed DC-input voltage is between –40.5 to –72 VDC and the router can operate in this range with no harm, the recommended nominal ranges are defined in Table 7. These DC-input voltage nominal ranges are safety extra-low voltage (SELV) compliant and deliver the rated power at the allowed current levels.

Table 8 summarizes the power output, DC-input voltage, and DC-input current values for the DC PEM modules.

Table 8 Power Output, DC-input Voltage, and DC-input Current Values for the DC PEM

Cisco Product Part Number	Cisco DC PEM (Part Number)[1]	Power Output	DC-input Voltage	DC-input Current
UBR10-PWR-DC=	34-1651-04	2400 W maximum	–48 to –60 VDC nominal	50 A
	34-1651-05	2400 W maximum	–48 to –60 VDC nominal	50 A
		3000 W maximum	–55 to –60 VDC nominal	56 A
UBR10-PWR-DC-PLUS=	341-0388-01	3300 W maximum	–48 to –60 VDC nominal	50 A + 50 A

1. The 34- part number is listed on the compliance label of the DC PEM.

Warning **Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards.** Statement 1033

Note The Cisco uBR10012 router (using DC power supplies) is not shipped with wiring to connect to a DC power source. You must provide input, return, and earthing (grounding) wiring at the site, and install and protect the wiring in accordance with local and national wiring regulations. The Cisco uBR10012 router DC-input terminal block accepts a minimum of 6 AWG wire. An insulation rating of 167° Fahrenheit (75° Celsius) is required for the 6 AWG wire for 3000 W of power.

Cabling Guidelines

When planning the location of a new system, consider the signal type, signal speed, and transmission medium. Also, consider the distance limitations for signaling, EMI, and connector compatibility. The distance and rate limits shown in Table 9 are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline while planning your network connections *prior to* installing the Cisco uBR10012 router.

Ethernet and Fast Ethernet Connections

The maximum distances for Ethernet and Fast Ethernet network segments and connections depend on the type of transmission cable being used. Table 9 shows the maximum transmission distances between stations for Ethernet and Fast Ethernet connections.

Table 9 Ethernet and Fast Ethernet Maximum Transmission Distances

Transceiver Speed	Cable Type	Transmission Mode	Maximum Distance Between Stations
10 Mbps	Category 3	Full duplex and half duplex	328 ft (100 m)
100 Mbps	Category 5	Full duplex and half duplex	328 ft (100 m)

Fiber-Optic Connections

The specifications for single-mode, fiber-optic transmissions are outlined in Table 10.

Table 10 Fiber-Optic Transmission Characteristics

Characteristic	Permissible Value	Characteristic	Permissible Value
Transmitter output power	–15 to –8 dBm	Wavelength	1261 to 1360 nm
Receiver sensitivity	–28 to –8 dBm	Maximum span	9 miles (14.5 km)

Note Do not exceed the specified distance limits.

Installing the Chassis

Tip For easier installation, rest the chassis on an installation shelf while installing the chassis in a rack.

Rack-Mounting Guidelines

- Allow sufficient clearance around the rack for maintenance.You need 36 in. (91.44 cm) of clearance to remove and replace system components.
- If the Cisco uBR10012 chassis is the only unit in a rack, mount the chassis at the bottom of the rack. Use the rack-mount kit that comes with the Cisco uBR10012 chassis.
- Always place the heavier equipment in the lower half of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting the chassis.
- Ensure that Telco racks are bolted to the floor.
- When mounting the chassis in a 4-post or Telco racks, use all the screws and brackets that are provided.
- For 23-inch racks, order optional equipment rack mounting brackets from third-party vendors.

Installation Tools and Equipment

The tools and equipment listed below are recommended as the minimum necessary to install the Cisco uBR10012 router. Other equipment may include test equipment to check electronic and optical signal levels, power levels, and communications links.

- Rack-mounting kit (includes brackets and screws)
- Screwdrivers
  - Number 2 Phillips screwdriver
  - 3/16-inch flat-blade screwdriver
  - 1/4-inch flat-blade screwdriver
- Antistatic mat or antistatic foam and electrostatic discharge (ESD) grounding strap or the disposable ESD strap
- Wire stripper and crimping tool for preparing the ground connection (the accessory kit comes with ground lugs and M5 screws with captive, locking washers)
- Wire—6 AWG (16 mm.), customer provided
- Tape measure and level (optional)
- Cable mounting brackets and ties (optional), used with the RF Switch

Verifying Contents After Unpacking

Power cables, manuals, and other additional items are packaged in separate boxes. After you have unpacked the system, verify that you have received all the required components and documentation.

Step 1 Using the packing list as a guide, verify that you have received everything that is listed, including the following:

a. System hardware documentation and software documentation (if ordered)

b. Optional equipment that you ordered, such as transceivers (GBICs), flash cards, cables, or special connectors

Step 2 Check that all line cards you ordered are installed in the chassis (including PCMCIA flash cards installed in the PRE).

Step 3 Ensure that the system configuration matches the packing list.

Removing Chassis Components Before Installation

The Cisco uBR10012 router is shipped with all ordered components already installed in the chassis. When fully configured, the Cisco uBR10012 chassis weighs approximately 230 lbs (104.3 kg).

Caution You must use a hydraulic lift or forklift to move a fully populated chassis.

In a fully loaded chassis, the components (modules and cards) weigh approximately 170 lbs (77.11 kg), so removing them allows the chassis to be safely moved and installed by two people. After the chassis has been installed in a rack, the components can be reinstalled in the chassis.

The following components should be removed from the chassis before installing the chassis in a rack.

- Fan assembly module
- AC or DC power entry modules (PEMs)
- Performance routing engine (PRE) modules
- Cable interface cards
- Network uplink cards

Tip You do not need to remove the TCC+ or DTCC cards or the LCD monitor because these do not present a significant increase in weight.

Before You Begin

- Make sure that you have an antistatic surface available for the components that you are removing from the chassis.
- Make sure that you are wearing antistatic protection such as a wrist strap or heel strap and are properly grounded.

Removing the Modules from the Chassis

To remove the modules from the chassis:

Step 1 Remove the front cover by pulling the cover towards you and carefully set it aside.

Step 2 Loosen the captive screws on each of the modules to remove them from the chassis.

- Fan assembly module—Pull the fan assembly halfway out of the module using the handle, then use both hands to pull the module out of the router. You do not need to remove the fan assembly cable. The fan assembly pulls away from the cable as the module is removed from the router.

Caution As the fan assembly module is heavy, ensure that it is properly supported so that it does not suddenly swing down as the module clears the router.

- AC or DC power entry modules—Using the two handles on the faceplate, pull the PEM modules straight out from the chassis.
- PRE modules—Pivot both the ejector levers away from each other to disengage the PRE modules from the backplane and slide the PRE module out of the slot and place it on an antistatic surface.
- Interface line cards and uplink cards—Pivot both the ejector levers away from each other to disengage the line cards from the backplane. Grasp the faceplate with one hand and use your other hand to support the card as you pull it out of the chassis. Place the card on an antistatic surface with the component side up.

Caution As some of the cards weigh as much as 16 lbs (7.3 kg), ensure that they are properly supported while removing them from the chassis.

- HHGE line cards—Pivot both the ejector levers away from each other to disengage the line card from the backplane and slide the line card out of the slot splitter and place it on an antistatic surface or in an antistatic bag.

Attaching the Mounting Brackets

The Cisco uBR10012 router is shipped with four mounting brackets that can be attached to either the front or rear of the chassis. The brackets can be mounted either flush with the edge of the chassis or set back to allow the chassis to be offset mounted in the rack.

Note For 23-inch racks, order optional mounting brackets from third-party vendors.

To attach the mounting brackets:

Step 1 Determine whether you are mounting the chassis with the front or the rear facing forwards.

Step 2 Determine whether you are flush-mounting or offset-mounting the chassis. Typically, flush-mounting is used for most equipment racks except for Telco racks that require offset-mounting.

Step 3 Attach the large mounting bracket to the top of the chassis, and the smaller bracket to the bottom of the chassis, with the screws that are supplied with the brackets.

Figure 9 shows how to attach the brackets to flush-mount the chassis with the rear forward.

Figure 10 shows how to attach the brackets to flush-mount the chassis with the front forward, and how to attach the brackets to offset-mount the chassis with the front forward.

Note You must use three screws to install each large bracket and two screws to install each small bracket.

Figure 9 Installing the Mounting Brackets—Flush-Mount Rear

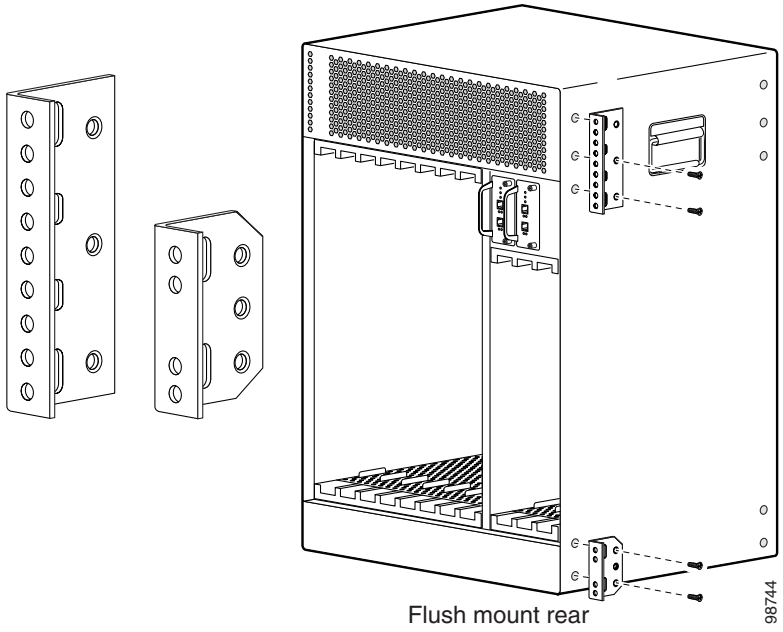
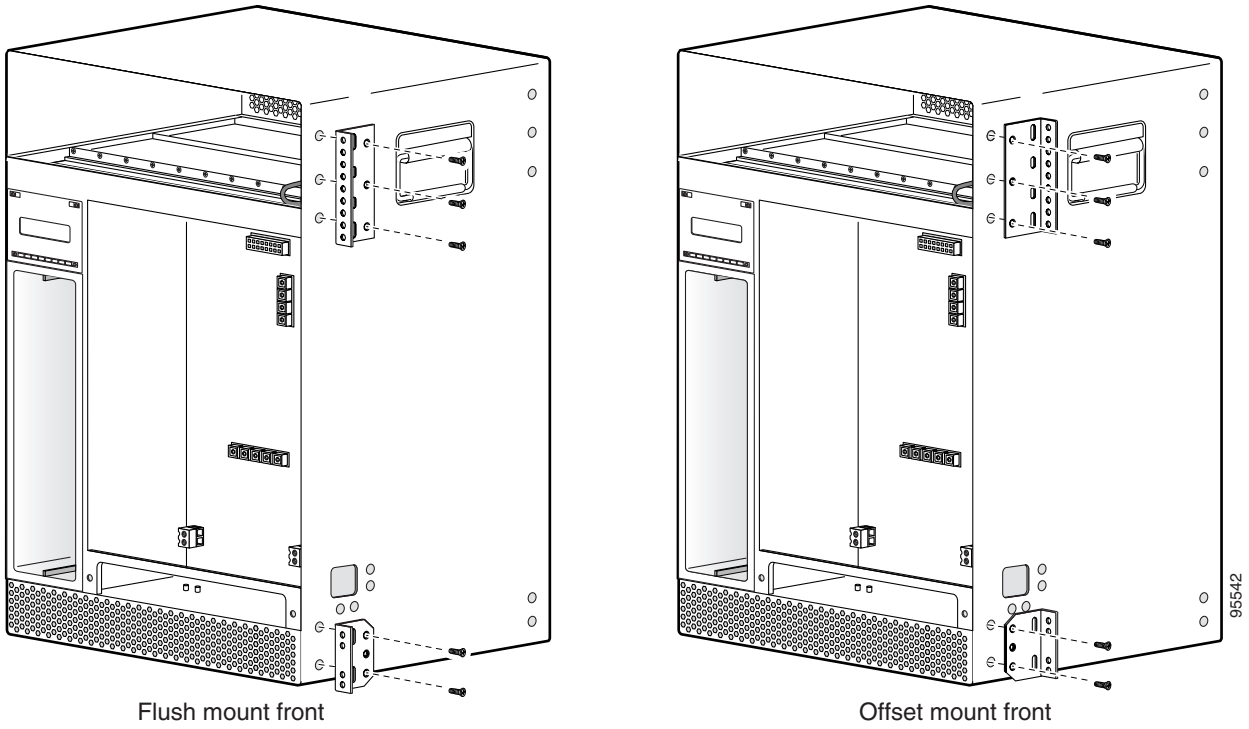


Figure 10 Installing the Mounting Brackets—Flush Mount Front and Offset Mount Front



Installing the Chassis in the Rack

With the fan assembly, PEMs, PREs, line cards, and uplink cards removed from the chassis, and the mounting brackets installed, the Cisco uBR10012 chassis is ready for installation in a 19-inch equipment rack or Telco rack.

Caution The Cisco uBR10012 chassis with all the components removed still weighs 60 lbs (27.22 kg). Take all necessary precautions when rack-mounting this chassis. A minimum of two people and a maximum of three people are required for installing this chassis in a rack.

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety.** Statement 1006

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack has stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Optional AC Power Shelf

If you are installing the AC power shelf, read the installation instructions that are provided with the shelf or see *2400W AC-Input Power Shelf for the Cisco uBR10012 Universal Broadband Router* at the following URL:

http://www.cisco.com/en/US/docs/cable/cuts/ubr10012/installation/field_replaceable_units/ub10acsh.html

Caution If you are using the optional AC-input power shelf, do not install the shelf until after you have installed the Cisco uBR10012 chassis to avoid the possibility of crushing the shelf during the router installation.

Install the Chassis

Tip (Optional) Install an equipment shelf in the rack to support the Cisco uBR10012 router chassis. This simplifies installation and provides additional support for the chassis. If you are installing an equipment shelf, it must be able to support the weight of a fully loaded chassis, which is approximately 230 lbs (104.3 kg).

Caution Two people are required to lift the Cisco uBR10012 router chassis. Three people might be needed to position the chassis into a rack, depending on whether you are using an equipment shelf and on how high you are mounting it.

If you have to lift the chassis to a higher location, have a third person present who can lift the middle of the chassis as the other two people lift it straight up.

To install the chassis in the rack:

Step 1 With a person standing on either side of the chassis, grab one of the handles on the side of the chassis and use the other to steady the chassis.

Step 2 Carefully lift the chassis straight up and carry it to the rack.

Step 3 When you reach your destination, lower the chassis to the ground.

Tip To prevent injury, keep your back straight and lift with your legs, not your back.

Step 4 Taking hold of the chassis, lift the chassis up to the height that it will be positioned in the rack.

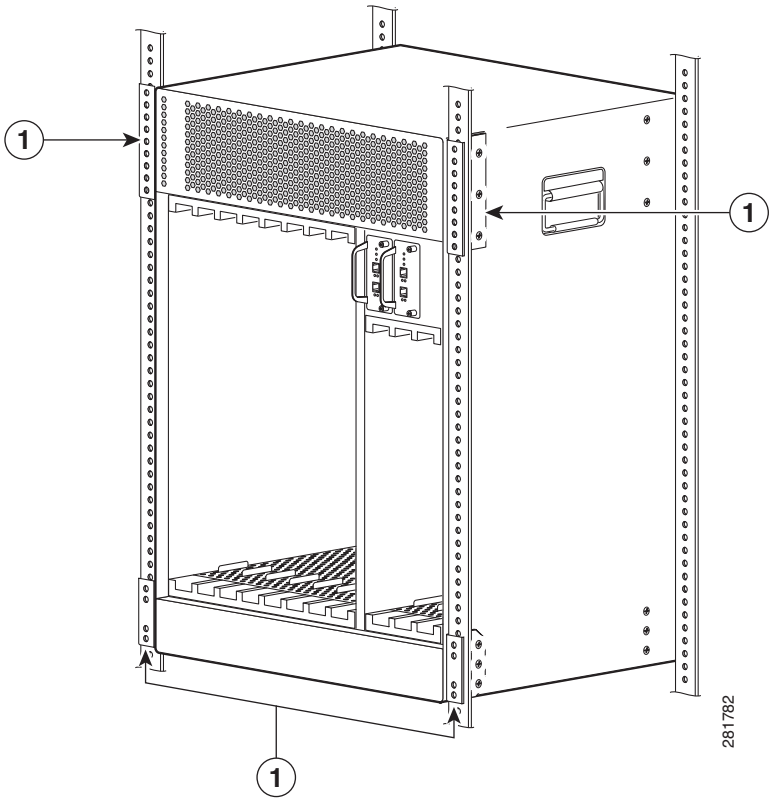
Note The chassis is usually installed in the bottom of the rack.

Step 5 Maneuver the chassis into position in the rack.

Step 6 Align the mounting bracket holes with the rack post holes and attach the chassis to the rack with the appropriate-sized screws (performed by the third person, unless the chassis is resting on the bottom of the rack or a shelf).

Note Figure 11 shows the chassis flush-mounted at the rear. The procedure is identical for the front mounting method.

Figure 11 Installing the Chassis in a Rack using the Rear Mounting Brackets



1	Rear mounting brackets		—

Connecting the Chassis to Ground

Connecting the Cisco uBR10012 router chassis to earth ground is required for all AC or DC-powered installations. Ensure that you have the recommended tools and supplies available before you begin this procedure.

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**.**

Caution The importance of proper grounding cannot be overemphasized. It will minimize the potential for damage to your system and maximize safety at the system site. We recommend that you consult a licensed electrician or your local electric utility company if you have any questions.

Recommended Tools and Supplies

Qty	Description	Comments
1	Number 2 Phillips screwdriver	—
1	Wire stripping tool	—
1	Crimping tool	Must fit diameter of grounding lugs.
1	2-hole grounding lug	Included in accessory kit shipped with the Cisco uBR10012 router.
1	Grounding wire	6 AWG (16 mm^2), customer provided.
2	M5 PEM screws with captive, locking washers	Included in accessory kit shipped with the Cisco uBR10012 router.
1	Antistatic mat and ESD-wrist strap	—

Attach the Grounding Cable

Warning **When installing the unit, always make the ground connection first and disconnect it last.** Statement 42

Warning **Use copper conductors only.** Statement 1025

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.** Statement 7

To attach the grounding cable to the Cisco uBR10012 router:

Step 1 Verify that no power source is connected to the Cisco uBR10012 chassis (the PEMs are not installed yet).

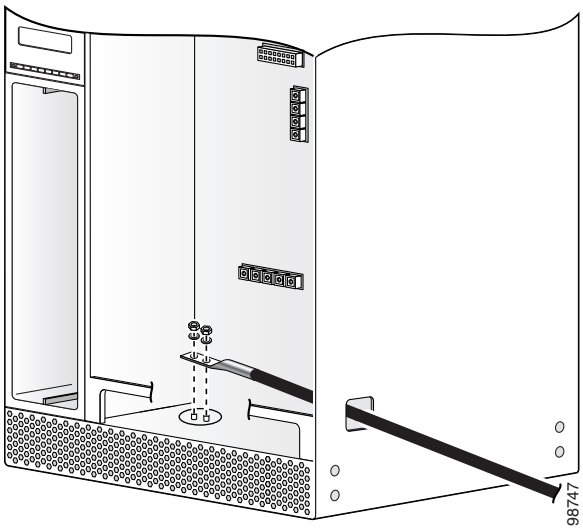
Step 2 Strip about 3/4 inches (2 cm) of the wire covering from the end of the grounding wire.

Step 3 Insert the stripped end of the grounding wire into the open end of the grounding lug, and crimp the grounding lug securely to the wire. (See Figure 12.).

Step 4 Using the two M5 screws provided in the accessory kit, fasten the grounding lug firmly to the bottom of the chassis.

Step 5 Attach the other end of the ground cable to a suitable grounding location in accordance with local practice at your site.

Figure 12 Ground Location



Connecting the Alarm Indicators

The Cisco uBR10012 router provides relay contacts for optional (customer-supplied) audible or visual alarm indicators. Relay contacts are provided for three levels of severity.

Caution The alarm contacts on the Cisco uBR10012 router are only relays and do not provide any power from the unit. These relays are rated for 60 VDC, 1 A maximum—ensure that the connected alarm equipment does not exceed these voltage and current ratings.

Warning **Use copper conductors only.** Statement 1025

Equipment

- Two wires for each set of relays, or six separate wires to connect all three relay contacts
- Wire stripper

Tip Use the gauge of wire required by the audible or visual alarm indicator equipment you are using (14 AWG, maximum).

To connect an alarm indicator to the chassis:

Step 1 Obtain sufficient wire for the desired connections.

Step 2 Strip approximately 0.31 inches (8 mm) of insulation off the ends of the alarm indicator wire.

Step 3 Connect one set of alarm indicator wires to the alarm terminal block as follows:

a. Connect one lead to the common (COM) terminal.

b. If you are wiring the router in series with other equipment for the alarm indicators, connect the other lead to the normally closed (NC) terminal.

c. If you are wiring the router in parallel with other equipment for the alarm indicators, connect the other lead to the normally open (NO) terminal.

Note Figure 13 shows the wiring configuration for NO alarm relays. For NC alarm relays, use the NC contacts.

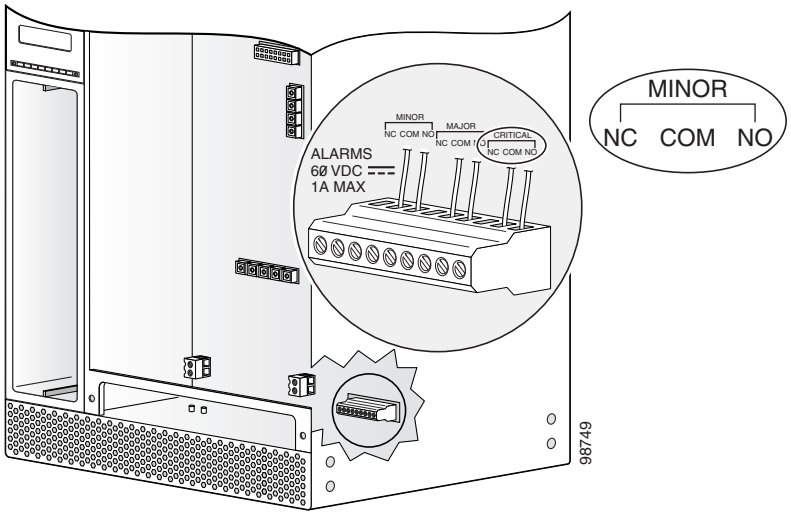
Step 4 Repeat Step 3 for the remaining alarm indicators

Step 5 Secure the alarm and power cabling to the chassis:

a. Feed a tie wrap through the square slot on the front, to the left side of the chassis (next to the alarm indicator terminal block).

b. Bind the wires to the chassis using the tie wrap.

Figure 13 Alarm Terminal Block Connections



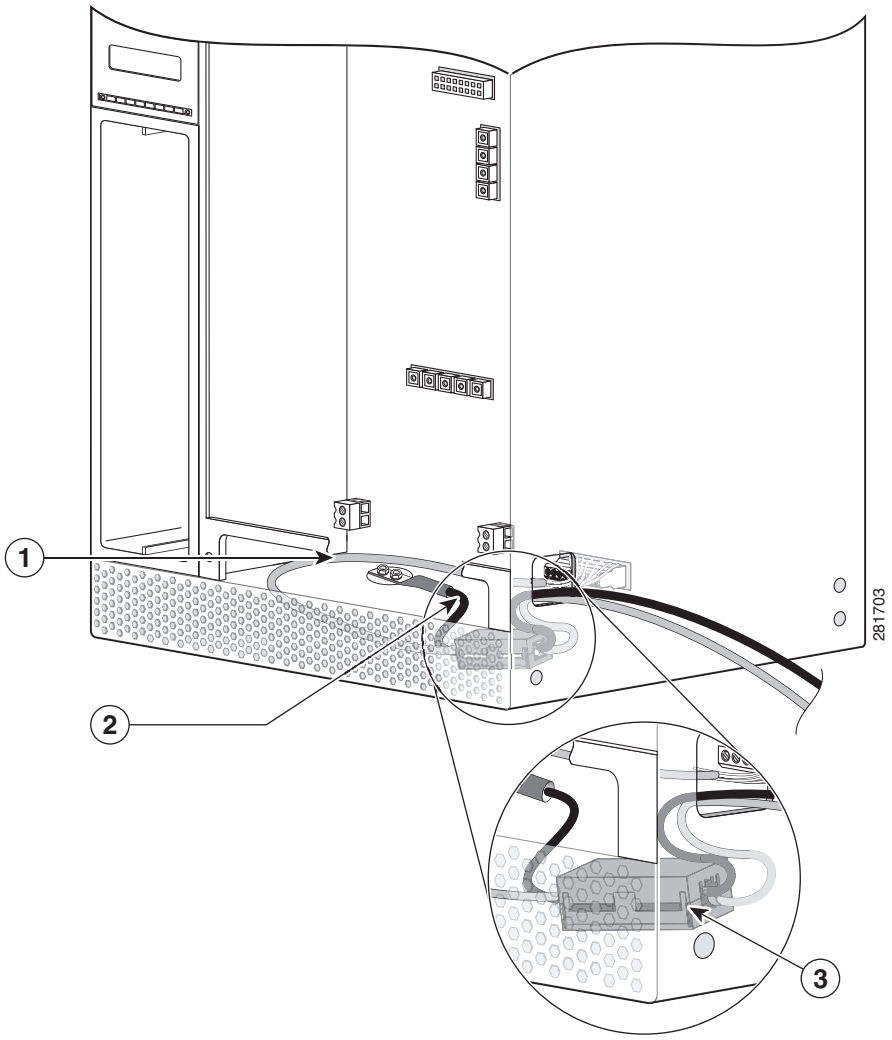
Attaching Ferrite Beads on the Cables

Ferrite beads can be clamped on where the beads are attached without wrapping the wires. Two ferrite beads (part number 36-0219-01) are included in the Cisco uBR10012 router accessory kit, and one ferrite bead is shipped with the spare of AC and DC power entry modules.

Attaching Ferrite Beads on Grounding and Alarm Cables

For Class B emission compliance requirements, one ferrite bead must be installed on the alarm port and chassis ground wire exiting the chassis. This is applicable for UBR10-PWR-AC, UBR10-PWR-AC-PLUS=, and UBR10-PWR-DC-PLUS= PEM modules. The ferrite bead should be installed (within 3 inches) close to the notch where the cables exit the chassis.

Figure 14 Ferrite Beads on Ground Cable and Alarm Cable



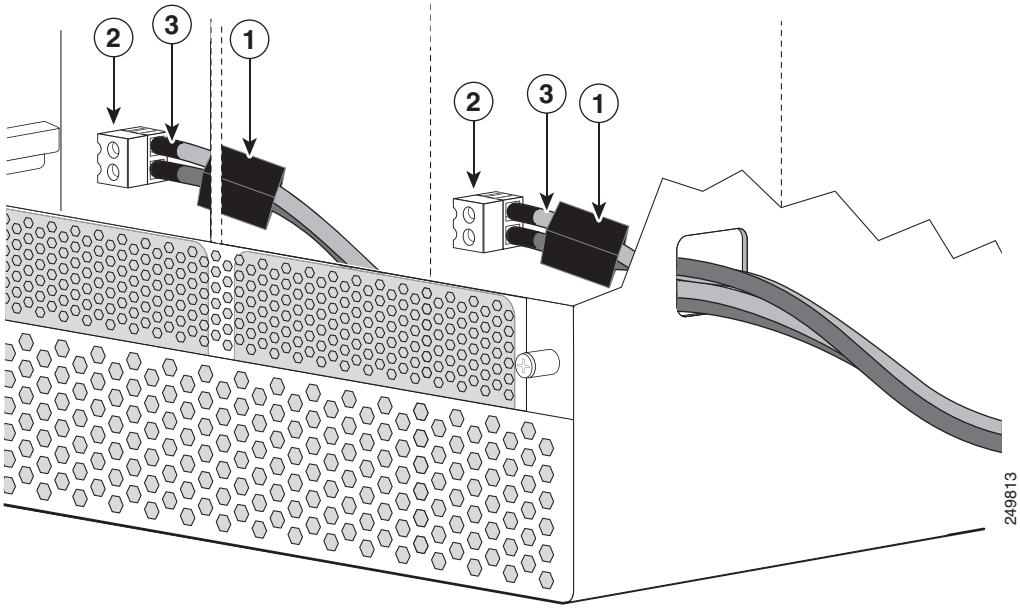
1	Alarm cable	**3**	Ferrite bead attached to both the ground and alarm cable
2	Ground cable		—

Attaching Ferrite Beads on DC Power Cables

For Class B emission compliance requirements, two ferrite beads must be installed on the DC-input power cables. This is applicable for UBR10-PWR-DC= PEMs. These ferrite beads should be installed (within 6 inches) close to the DC-input power connector (DC-input terminal connector).

Figure 15 shows the ferrite beads attached to the DC-input power cables connected to the DC-input terminal connector located beneath the UBR10-PWR-DC= module on the midplane of the chassis.

Figure 15 Ferrite Beads Attached on DC-input Power Cables



1	Ferrite beads attached to DC-input power cables	**3**	DC power cables
2	DC-input terminal connector on midplane of the chassis		—

Connecting the DC Power Cables to the Cisco uBR10012 Router

The DC power sources can be present at the site, or they can be provided by an external AC-input power shelf. If you are using the 2400 W AC-input power shelf, ensure that you have already installed it, as described in the *2400 W AC-Input Power Shelf Installation Guide*.

The following sections explain how to connect the DC power cables to the Cisco uBR10012 chassis:

- Connecting the DC Power Cables for the UBR10-PWR-DC= Module, page 34
- Connecting the DC Power Cables for the UBR10-PWR-DC-PLUS= Module, page 35

Note For full power redundancy, each terminal block must be connected to a separate power source. If you are using the external AC-input power shelf, full power redundancy requires that each of the AC power supplies in the shelf must be connected to the AC power sources that are on separate circuit breakers.

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.** Statement 7

Connecting the DC Power Cables for the UBR10-PWR-DC= Module

Equipment

- Wire stripper
- DC power cables, customer provided

Note The Cisco uBR10012 router (using DC power supplies) is not shipped with wiring to connect to a DC power source. The DC-input terminal block on the midplane of the chassis accepts a maximum of 6 AWG wire.

To connect the DC power cables to the Cisco uBR10012 router:

Step 1 Verify that the DC power source to the chassis is turned off (tape it in the OFF position, if possible).

Caution Do not connect power to the DC power sources or apply power to the chassis. This is done as part of the system startup after all connections are made. If you are using the external AC-input power shelf as the DC power source, verify that the AC-input power cords are not plugged into AC power outlets.

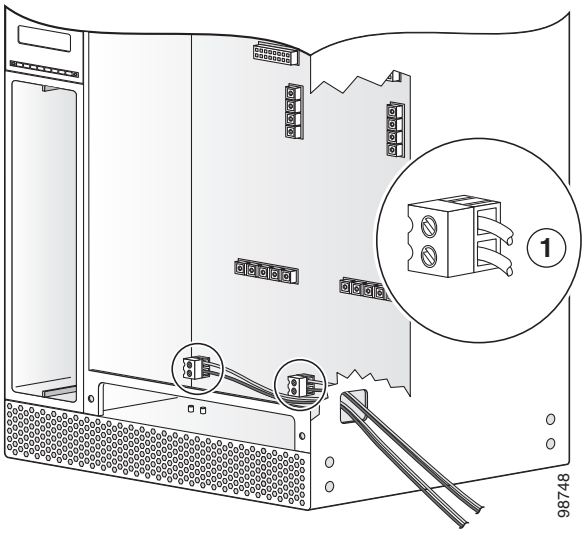
Step 2 Strip no more than 5/16 inches (8 mm) of insulation off the ends of the DC power cables.

Step 3 Route the two sets of DC power cables through the square hole at the right front of the chassis. (See Figure 16.)

Step 4 Attach ferrite beads on the DC power cables, see "Attaching Ferrite Beads on DC Power Cables" section on page 32.

Step 5 Connect the DC power cable from the first external power source to the –48 V PEM 0 terminal (left terminal) in the DC terminal block, and the return wire (RTN) to the top terminal in the terminal block.

Figure 16 Connecting the DC Power Cables for the UBR10-PWR-DC= Module



1	DC power terminal connectors, RTN (+) –48/–60 V		—

Step 6 Connect the second DC power source to the PEM 1 terminal (right terminal) as in Step 5.

Step 7 If you are connecting visual or audio alarm indicators to your system, go to the "Connecting the Alarm Indicators" section on page 30.

Step 8 If you are not connecting any alarm indicators, go to the "Installing the Modules" section on page 38.

Connecting the DC Power Cables for the UBR10-PWR-DC-PLUS= Module

Caution Do not use the DC power terminal connectors on the midplane of the chassis (see Figure 16) when you are using the UBR10-PWR-DC-PLUS= modules. Verify that the DC power terminal connectors are not connected to any wires before proceeding with the installation.

Note Before connecting the cables for the UBR10-PWR-DC-PLUS= module, you must install the DC PEM modules in the chassis. To install the DC PEM modules, see the "Installing the DC Power Entry Modules" section on page 39.

Equipment

- Number 2 Phillips Screwdriver
- 10 mm hex socket driver
- DC power cables, customer provided
- 0.625-inch dual-hole lugs, customer provided

Note The UBR10-PWR-DC-PLUS= module accepts a maximum of 6 AWG wire or 4 AWG high-flex wire for the DC-input cables. If you are using the 4 AWG wire, use a high-flex high strand count power cable for optimal routing of the cables under the front cover. The 2 AWG wire is not supported on the UBR10-PWR-DC-PLUS= module.

To connect the DC power cables to the Cisco uBR10012 router:

Step 1 If you are connecting visual or audio alarm indicators to your system, go to the "Connecting the Alarm Indicators" section on page 30.

Step 2 Verify that the DC power source to the chassis is turned off (tape it in the OFF position, if possible).

Caution Do not connect power to the DC power sources or apply power to the chassis. This is done as part of the system startup after all connections are made. If you are using the external AC-input power shelf as the DC power source, verify that the AC-input power cords are not plugged into the AC power outlets.

Step 3 Remove the safety cover from above the DC terminal blocks by loosening the captive screws and rotating the safety cover up and off of the PEM faceplate, to connect the first facility DC power source.

Step 4 Remove the install nuts from the input studs on the DC terminal blocks of the PEM modules.

Step 5 Prepare the DC-input cables by attaching 0.625-inch center to center dual-hole lugs. Attach the DC-input cables to the DC terminal blocks.

Step 6 Secure the dual-hole lugs to the input studs on the DC terminal blocks by reinstalling the nuts.

Note Secure the nuts using a 10 mm hex socket driver with an installation torque of 50-in lbs.

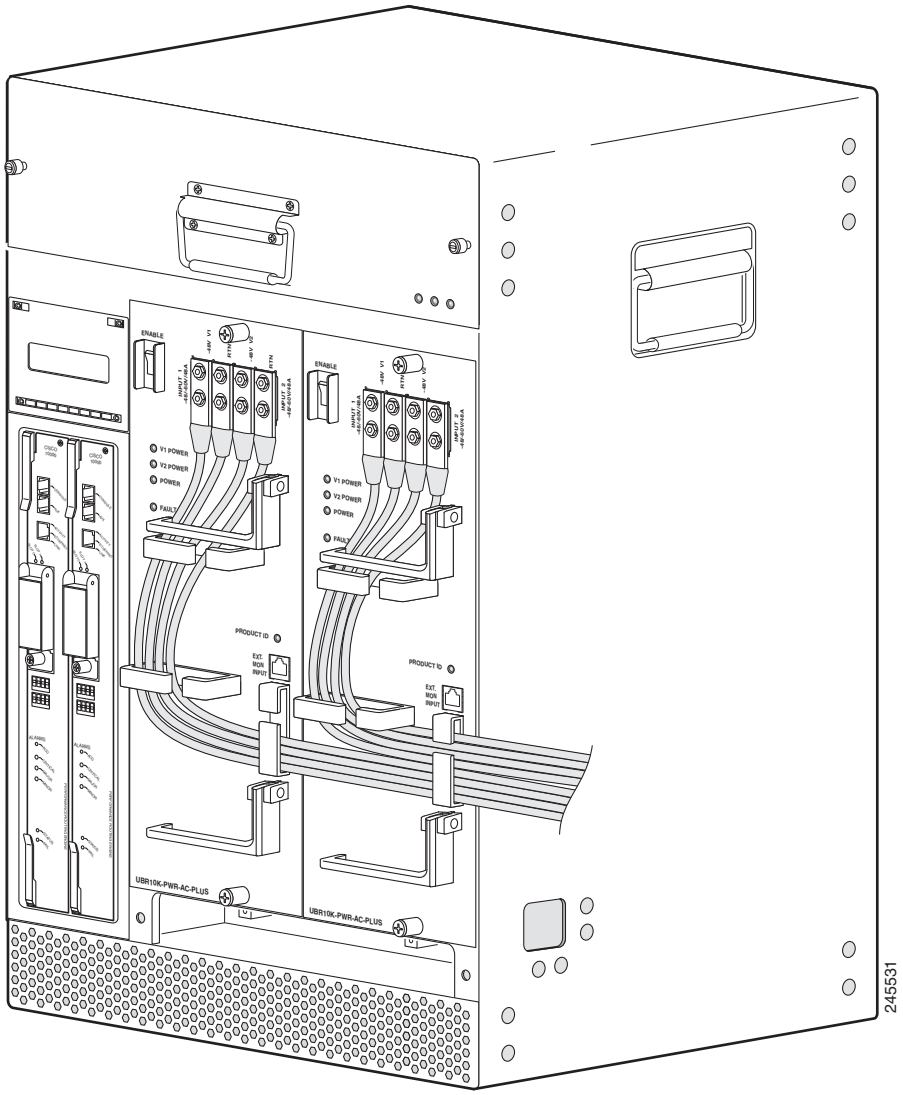
Caution You must attach both pairs of DC-input cables to the DC terminal blocks on each PEM for proper functioning of the PEMs.

Step 7 Repeat Step 3 to Step 6 to connect the second facility DC power source to the second PEM module.

Step 8 Route the four pairs of DC-input cables from the DC power terminal blocks on both the PEMs down through the front of the chassis through the three retaining power cord clips. (See Figure 17.)

Note Ensure that you lift the handles and route the cables underneath the handles and through the power cord clips of the PEM modules as shown in Figure 17 so that the front cover fits on the Cisco uBR10012 chassis.

Figure 17 Routing the DC-input Cables on the UBR10-PWR-DC-PLUS= Module

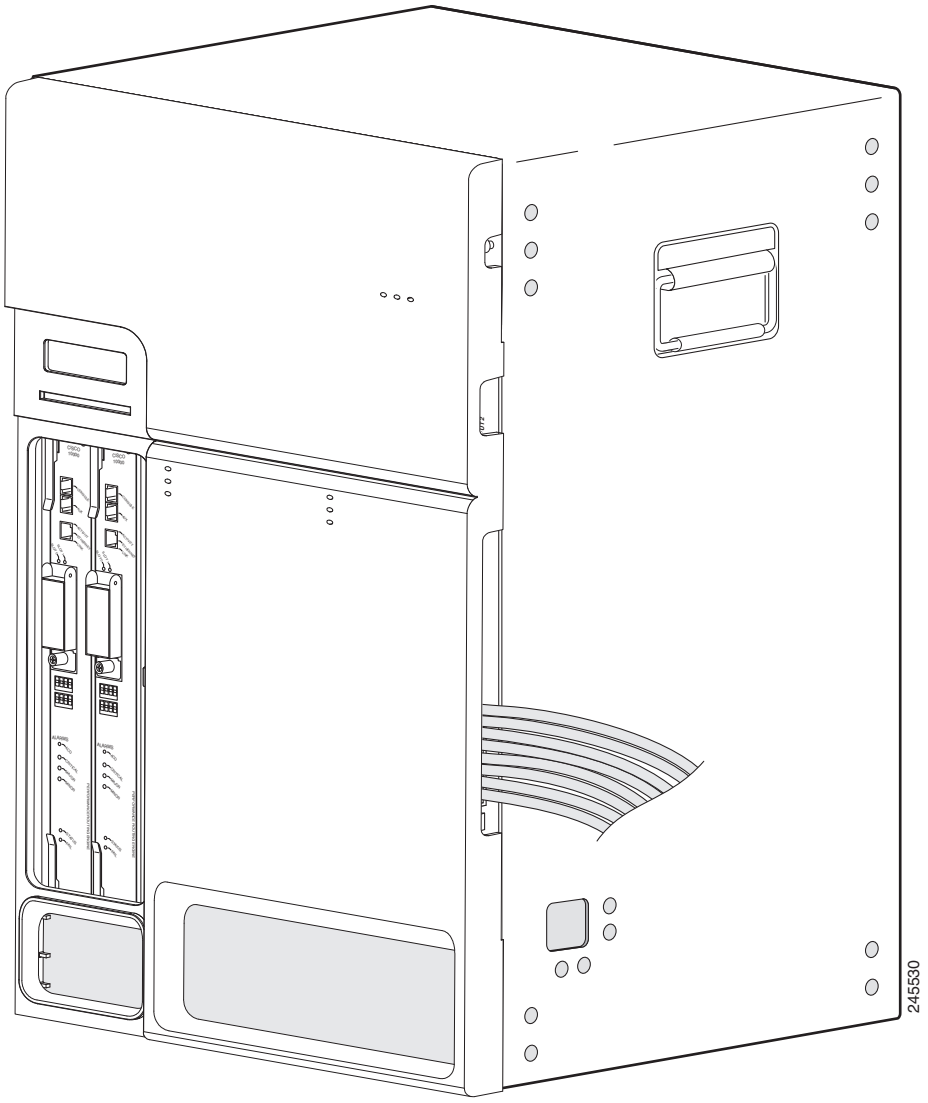


Step 9 Reinstall the safety cover on the DC power terminal blocks on both the PEM modules.

Step 10 Install the U-CHAS-COVER-PLUS= front cover on the DC PEM modules for proper routing of the DC-input cables.

Step 11 Route the eight cables through the notch provided on the right of the front cover. (See Figure 18.)

Figure 18 Routing the DC-input Cables From the Front Cover



Installing the Modules

Installing the PRE Modules

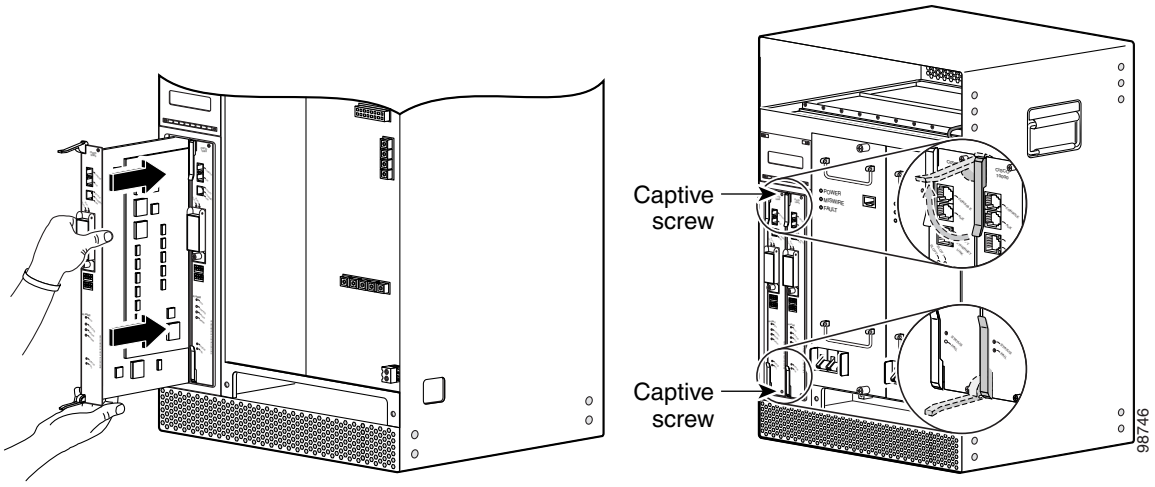
To replace the PRE modules in the Cisco uBR10012 router:

Step 1 Align the PRE module with the card guides in the slot. (See Figure 19.)

Step 2 Slide the card into the slot until you can feel it seat in the backplane connectors.

Step 3 Close the ejector levers to secure the card in the backplane, and tighten the captive screws to secure the card in the chassis.

Figure 19 Installing the PRE Module



Note To tighten the captive screws on the PRE modules, line cards, TCC cards, and fan assembly, the installation torque used should be 8 in-lbs.

Installing the DC Power Entry Modules

The installation procedure is the same for both the DC PEM modules (UBR10-PWR-DC= and UBR10-PWR-DC-PLUS=). Figure 20 is a sample representation of the DC PEM module (UBR10-PWR-DC=) installation procedure.

Note Ensure that you attach ferrite beads on the alarm cables or the grounding cables before you proceed to install the DC PEM modules in the chassis. You cannot access the alarm cables or grounding cables after the PEMs are installed in the chassis. For information on attaching the ferrite beads, see "Attaching Ferrite Beads on Grounding and Alarm Cables" section on page 31.

To install the DC PEM modules on the Cisco uBR10012 router:

Step 1 Verify that the DC power enable switch is in the Standby (0) position.

Step 2 Position the first DC PEM in the power bay and slide it all the way in, and ensure that it makes a secure connection with the chassis backplane.

Caution Ensure that the alarm cables and the DC cables are out of the way before you slide the PEMs into the power bay.

Step 3 Tighten the captive screws to secure the DC PEM using a screwdriver.

Note To tighten the captive screws on the DC PEM modules, the installation torque used should be 8 in-lbs.

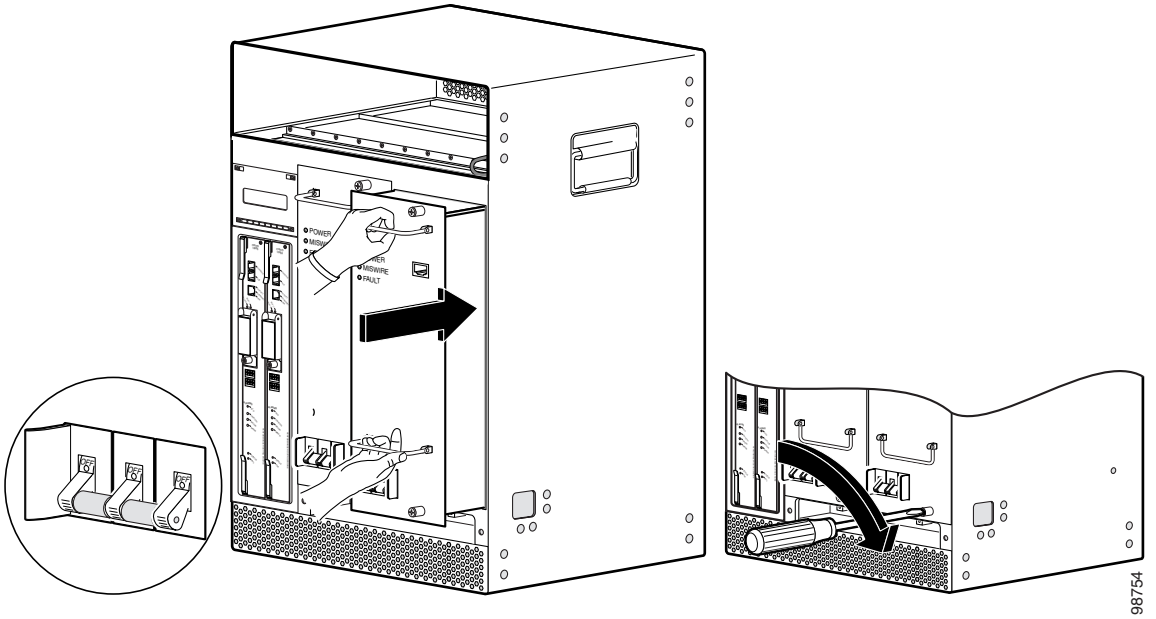
Step 4 Repeat Step 1 to Step 3 to install the second DC PEM.

Step 5 If you are using the UBR10-PWR-DC= module, then the DC power cables must be connected to the DC terminal connectors in the midplane of the chassis before the DC PEM modules are installed. See "Connecting the DC Power Cables for the UBR10-PWR-DC= Module" section on page 34.

If you are using the UBR10-PWR-DC-PLUS= module, then attach the DC power cables onto the DC terminal blocks on the PEM module, see "Connecting the DC Power Cables for the UBR10-PWR-DC-PLUS= Module" section on page 35.

Caution If you are using the UBR10-PWR-DC-PLUS= module, then two pairs of DC-input cables must be installed per PEM for the unit to operate.

Figure 20 Installing a DC PEM (UBR10-PWR-DC=)



Installing the AC Power Entry Modules

Note Do not use the DC terminal blocks when you are using the AC PEMs. Verify that the DC terminal blocks are not connected to any wires before proceeding with the installation.

The installation procedure is similar for both the AC PEM modules (UBR10-PWR-AC= and UBR10-PWR-AC-PLUS=) except for the routing of the cables.

Note Ensure that you attach ferrite beads on the alarm cables or the grounding cables before you proceed to install the AC PEM modules in the chassis. You cannot access the alarm cables or grounding cables after the PEMs are installed in the chassis. For information on attaching the ferrite beads, see "Attaching Ferrite Beads on Grounding and Alarm Cables" section on page 31.

To install the AC PEM module on the Cisco uBR10012 router:

Step 1 Verify that the power switch on the AC PEM is in the Standby (0) position.

Caution Do not connect power to the AC power sources or apply power to the chassis. This is done as part of the system startup after all connections are made.

Step 2 Position the AC PEM in the power bay and slide it all the way in, and ensure that it makes a secure connection with the chassis backplane.

Step 3 Tighten the captive screws to secure the AC PEM using a screwdriver.

Note To tighten the captive screws on the AC PEM modules, the installation torque used should be 8 in-lbs.

Step 4 Plug the AC-input power cables into the power receptacles on the front of the AC PEM.

Note If you are using the UBR10-PWR-AC-PLUS= module, then the two AC power cables must be installed on each PEM module for the PEM to operate.

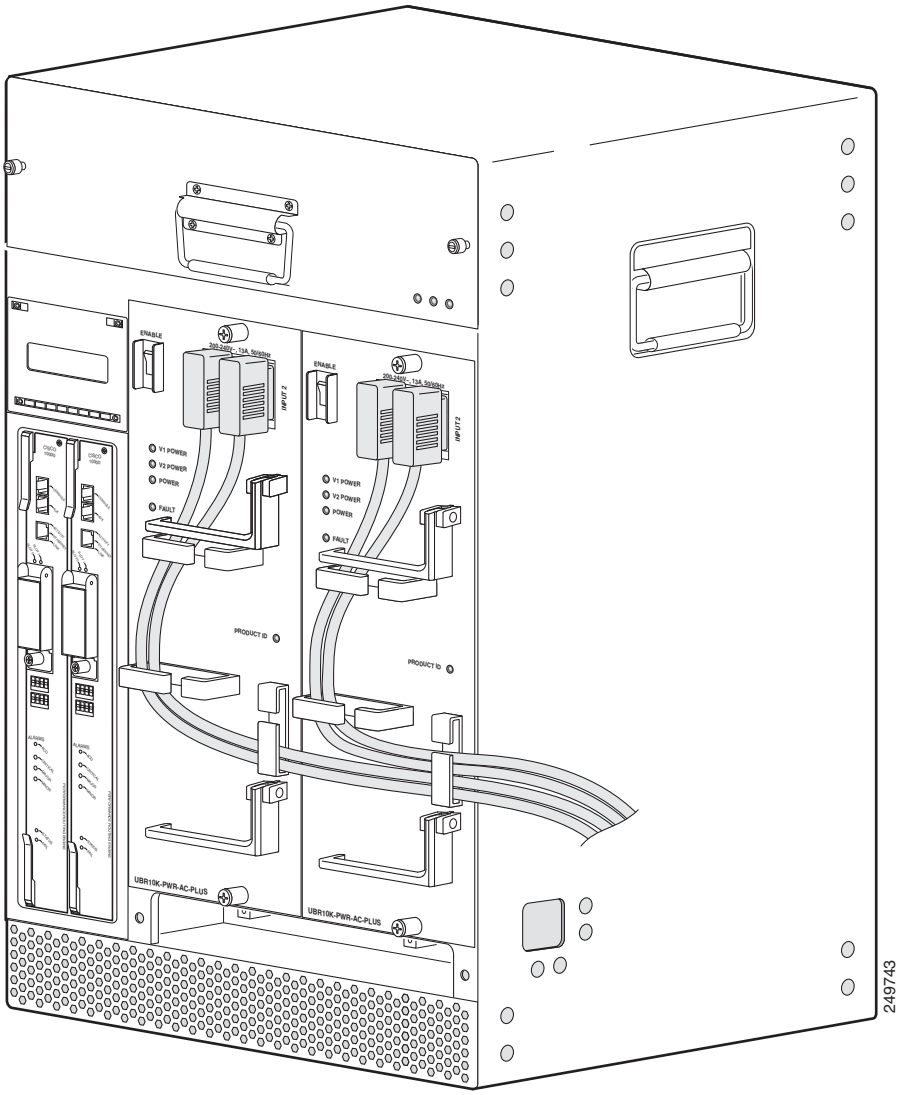
Step 5 Repeat Step 1 to Step 4 to connect the second AC PEM module.

Step 6 Route the AC power cables on the AC PEM modules.

- UBR10-PWR-AC= module—Route the power cables up at the front of the AC PEM module and clip it into the two retaining clips. The power cables go out through the notch on the right side of the front cover when it is installed.
- UBR10-PWR-AC-PLUS= module—Route the power cables down to the front of the AC PEM module and clip it down into the three retaining clips. (See Figure 21.)

Note Ensure that you lift the handles and route the cables underneath the handles and through the power cord clips of the UBR10-PWR-AC-PLUS= AC PEM modules as shown in Figure 21 so that the front cover fits on the Cisco uBR10012 chassis.

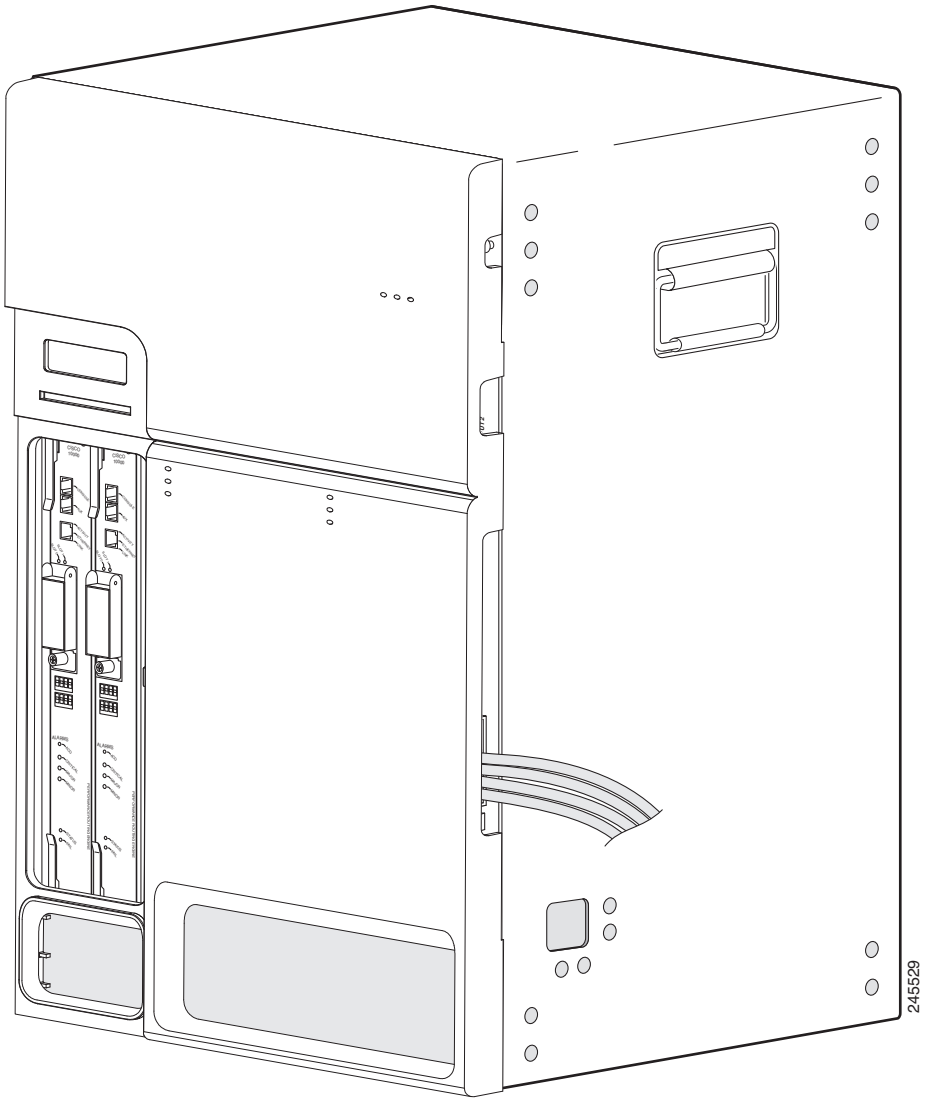
Figure 21 Routing the AC Cables on the UBR10-PWR-AC-PLUS= Module



Step 7 Install the U-CHAS-COVER-PLUS= front cover on the UBR-PWR-AC-PLUS= AC PEM modules for proper routing of the AC cables.

Step 8 Route the cables through the notch provided on the right of the front cover. Figure 22 shows the AC power cables routed from the UBR10-PWR-AC-PLUS= modules going out through the notch on the right side of the front cover when it is installed.

Figure 22 Routing of the AC cables From the Front Cover



Installing the Fan Assembly Module

The installation procedure is the same for both the fan assembly modules (UBR10-FAN-ASSY= and UBR10012-FAN-PLUS=). Figure 23 is a sample representation of the fan assembly module (UBR10012-FAN-ASSY=) installation procedure.

Note The UBR10012-FAN-PLUS= fan assembly module is preinstalled with EMI gaskets. If you are installing the fan module (UBR10012-FAN-PLUS=, Spare) in an existing Cisco uBR10012 router chassis, ensure that the EMI gaskets on the Cisco uBR10012 router chassis (if present) are removed before mounting the fan assembly module.

Caution Do not remove the required EMI gaskets from the UBR10012-FAN-PLUS= fan assembly module.

Note The EMI gaskets on the Cisco uBR10012 router chassis are used with the UBR10-FAN-ASSY= fan assembly module. For information on installing EMI gaskets, see *Installing EMI Gaskets and RF Absorber Material on the Cisco uBR10012 Universal Broadband Router*.

To install the fan assembly module from the Cisco uBR10012 router:

Step 1 Using both your hands, pick up the fan assembly module.

Step 2 Align the module with the rails in the chassis. (See Figure 23.)

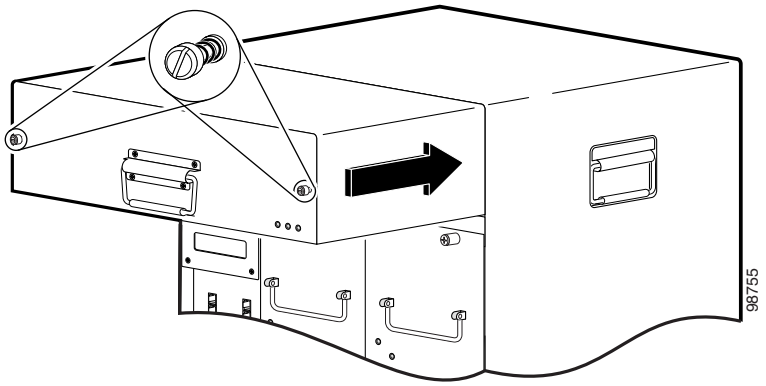
Step 3 Push the fan module back firmly into the chassis, making sure that the module securely connects to the backplane.

Step 4 Tighten the captive screws on each side of the fan assembly module.

Note To tighten the captive screws on the fan assembly modules, the installation torque used should be 8 in-lbs.

Caution The total service window for removal and replacement of the fan tray is 3 minutes before possible system shutdown. Ensure that you complete the replacement procedure within this time limit.

Figure 23 Installing the Fan Assembly



Installing the Line Cards and Uplink Cards

To install the line and uplink cards in the Cisco uBR10012 router:

Step 1 Align the upper and lower edges of the card with the upper and lower guides in the chassis. (See Figure 24.)

Tip Grasp the faceplate of the card with one hand and place your other hand under the card carrier to support the weight of the card. The cards can weigh up to 16 lbs (7.3 kg).

Step 2 Slide the card into the slot until you can feel it seat in the backplane connectors.

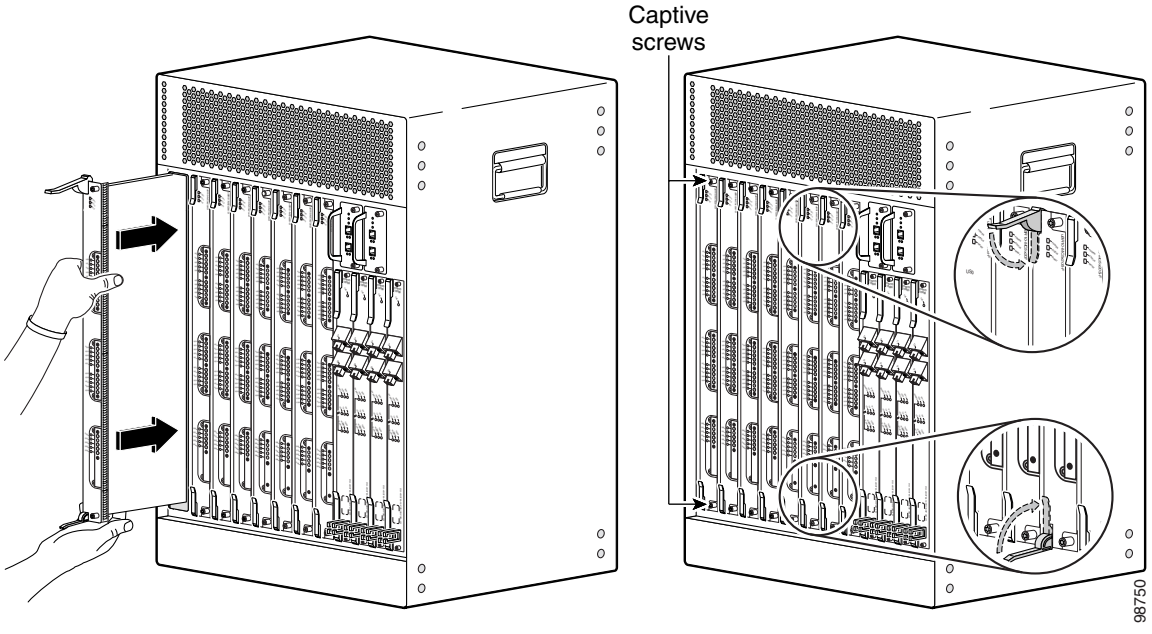
Step 3 Close the ejector levers to secure the card in the backplane, and tighten the captive screws to secure the card in the chassis.

Note To tighten the captive screws on the line cards, the installation torque used should be 8 in-lbs.

Caution To ensure that there is adequate space for additional cable interface line cards, always tighten the captive screws on each newly installed card before you insert any additional cards. The captive screws prevent accidental removal and provide proper grounding for electromagnetic interference (EMI) shielding.

Step 4 Repeat Step 1 through Step 3 for each cable interface line card and network uplink line card.

Figure 24 Installing the Line Cards and Uplink Cards



Installing the HHGE Line Cards

Caution Always install the HHGE line cards in a slot splitter. Slot splitters must be installed in Slot 3 or Slot 4 of the chassis. If you have a blank slot, always install a blank slot cover. Use half-height slot covers when you have a single open HHGE slot. Use full-height slot covers in all other situations.

To install the HHGE line cards in the Cisco uBR10012 router:

Step 1 Grasp the faceplate of the line card with one hand and place your other hand under the card carrier (to support the weight of the card). Position the card in front of the slot splitter.

Step 2 Carefully align the upper and lower edges of the line card with the upper and lower guides in the slot splitter, and slide the line card about half-way into the splitter.

Step 3 Be sure the ejectors are in the open position and continue to push the line card into the splitter until you can feel it begin to seat in the backplane connectors.

Step 4 Verify that the captive screws are properly aligned with the captive screw holes in the splitter. If the captive screws are not properly aligned, the card will not seat properly in the backplane.

Note To tighten the captive screws on the line cards, the installation torque used should be 8 in-lbs.

Step 5 Pivot both ejector levers toward each other (until they are parallel to the faceplate) to firmly seat the card in the backplane.

The HHGE line card cycles through its power-on self-test (POST). The FAIL LED illuminates during portions of the POST, but remains off after POST on a working line card. If the FAIL LED remains illuminated, go to the "Troubleshooting" section on page 63.

Connecting Cables

Tip To reduce the chance of interference, avoid crossing the power cables with any of the interface cables. Verify all cabling limitations (particularly distance) before powering on the system.

Connect the Console Port and the Auxiliary Port

The PRE module has two asynchronous serial (EIA/TIA-232) RJ-45 ports for connection to a console (an ASCII terminal or a PC running terminal emulation software) and modem for remote access. The cables and adapter are included in the accessory kit.

Equipment

- RJ–45 to RJ–45 crossover cable
- RJ–45 to DB–9 female DTE adapter (TERMINAL)
- RJ–45 to DB–25 male DCE adapter (MODEM)

Tip The crossover cable reverses the pins from one end of the cable to the other. The color of the wire at pin 1 is the same color as the wire at pin 8 on the opposite end of the cable (pin 2 to pin 7, pin 3 to pin 6, and so on).

Console Port

The console port provides local administrative access to the router and its command-line interface (CLI).

Note Each PRE module must have a console port connection (typically to a terminal server) when running a redundant configuration in the chassis.

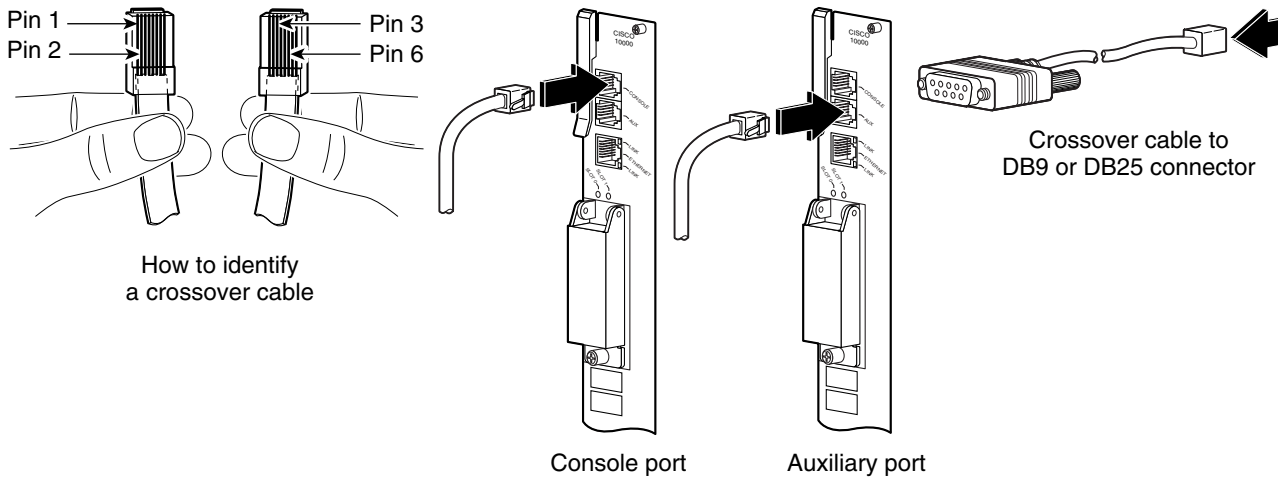
To connect the console and auxiliary port on the PRE module:

Step 1 Connect one end of the RJ-45 crossover cable to the serial RJ-45 port (labeled CONSOLE) on the PRE module.

Step 2 Run the other end of the crossover cable through the square hole at the front on the left side of the chassis, and connect it to the RJ-45-to-DB-9 adapter.

Step 3 Connect the adapter to the appropriate serial port on the PC or terminal to complete the console port cable connection. Figure 25 depicts the console and auxiliary port connection on the PRE module.

Figure 25 Console and Auxiliary Port Connection on the PRE Module



Auxiliary Port

The auxiliary port provides a connection for a modem to allow remote access to the router and its command-line interface (CLI). To connect the auxiliary port to the crossover cable:

Step 1 Connect one end of the RJ-45 crossover cable to the serial RJ-45 port (labelled AUX) on the PRE module (see Figure 25).

Step 2 Run the other end of the crossover cable through the square hole at the front on the left side of the chassis, and connect it to the RJ-45-to-DB-25 adapter.

Step 3 Connect the adapter to the serial port on the modem to complete the auxiliary port cable connection.

Connecting Ethernet Network Management Cables

The PRE module provides an Ethernet port to a LAN for a 10BASE-T or 100BASE-T connection for network management.

Note The PRE module also contains an internal Ethernet interface (ethernet0/0/0) that it uses for inter-module communications. This interface is invisible and transparent for normal operation. Do not confuse this internal interface, which is not user-accessible or user-configurable, with the PRE module's external Fast Ethernet interface (fastethernet0/0/0) of the PRE module.

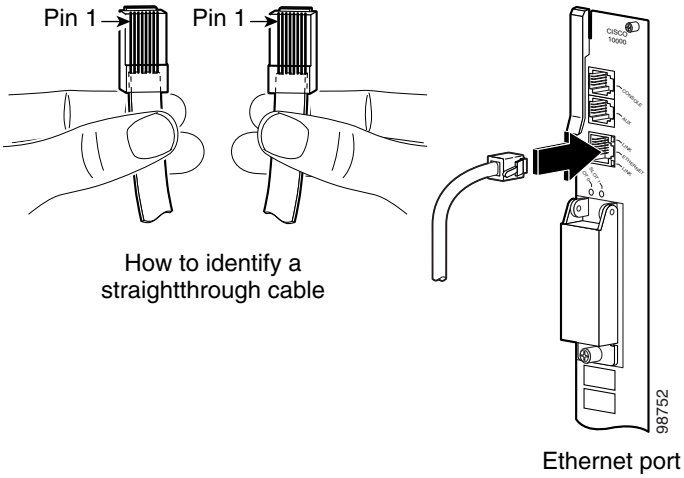
Note Each PRE module needs an Ethernet port connection (typically to the same Ethernet hub) if you are running a redundant configuration in the chassis. However, only the active PRE module has an active Ethernet connection to the network.

Equipment

- An Ethernet hub (such as a Cisco Micro Hub)
- An Ethernet cable that meets the following specifications:
  - RJ-45 (male) to RJ-45 (male) straight-through cable (see Figure 26)
  - 100-ohm category 3, 4, or 5, no longer than 328 feet (100 meters)

Tip The color of the wire connected to pin 1 (left-most) on the connector at one end of the cable, should be the same color as the wire connected to the left-most pin on the connector at the other end of the cable. The same rule applies to pin 2 through pin 8 on each connector.

Figure 26 Straight-Through Cable



10BASE-T Ethernet Network

To connect the PRE to a 10BASE-T Ethernet LAN:

Step 1 Connect one end of the Ethernet cable to the RJ-45 port on the primary PRE labeled Ethernet.

Step 2 Connect the other end of the cable to any unoccupied port on the Ethernet hub.

100BASE-T Ethernet Network

The RJ-45 port on the PRE is configurable for 100-Mbps full-duplex or half-duplex operation (half-duplex is the default) and supports IEEE 802.3, Ethernet, and IEEE 802.3u interfaces compliant with 100BASE-T specifications.

Caution If the Cisco uBR10012 router is used in an environment in which lightning-induced transients are likely to couple to the signal lines, use of shielded interconnection cables for the 100BASE-T ports is highly recommended. In addition, use of shielded interconnection cables for the 100BASE-T ports is required to meet Telcordia GR1089 CORE Section 4.5.9 and ETSI Section 5.2.2.2 (intra-building lightning surge).

To connect the PRE to a 100BASE-T Ethernet LAN:

Step 1 Connect one end of the Ethernet cable to the RJ-45 port on the primary PRE, labeled Ethernet.

Step 2 Run the cable up and through the cable management bracket and connect the other end of the Ethernet cable to any unoccupied port on the Ethernet hub.

Tip When power is applied to the chassis, check the LNK (Link) LED on the PRE faceplate port next to the Ethernet port. This LED illuminates (green) if the PRE is correctly connected to the Ethernet LAN.

Connecting the Data Network Cables

Upconverters

Table 11 lists the IF-to-RF upconverters that we recommend, and indicates whether a 10-dB attenuator is required.

Beginning with Cisco IOS Release 12.2(15)BC2, Cisco now supports IF muting with non-SNMP upconverters. In previous releases, IF muting was not available for non-SNMP upconverters and this limited the availability of N+1 redundancy in some circumstances. For additional information about IF muting and N+1 redundancy, refer to *N+1 Redundancy for the Cisco Cable Modem Termination System* at the following URL:

http://www.cisco.com/en/US/docs/cable/cmts/feature/guide/uFGnpls1.html

Table 11 Recommended IF-to-RF Upconverters

IF-to-RF Upconverter	Need 10-dB Attenuator?	URL
Motorola/General Instrument C6U, C8U	Yes	http://www.gi.com
Vecima MA4040B, Vecima HD4040	Yes	http://www.vecima.com
Scientific Atlanta Continuum 9860, 9861	No	http://www.scientificatlanta.com

Cable Interface Line Card Cables

Equipment

- Dense Connector cable kit
- F connector cables

To cable the cable interface line card:

Step 1 Connect the upstream (US) cables of the line card to an RF Switch or the other headend equipment.

Step 2 Connect the downstream (DS) cables to the IF-to-RF upconverter, if necessary. If you are using an attenuator, install it on the upconverter F connector before installing the cable.

Uplink Line Card Fiber-Optics Cables

Optical connectors are very sensitive to any dust particles or other contaminants. Cleaning the optical connections on the cables and verifying the output power of the interface module helps to prevent damage to the fiber optics and system failure. To keep the connections as clean and contaminant-free as possible, always clean fiber-optic connections before installing the cables and always use protective caps on the connectors that are not cabled. For cleaning information see *Inspection and Cleaning Procedures for Fiber-Optic Connections* at the following URL:
http://www.cisco.com/en/US/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml

Tip Inspect and clean the bulkhead connection first, and then inspect and clean the fiber cable just before you install it into the bulkhead connector.

Warning **Class 1 laser product.** Statement 1008.

Warning **Invisible laser radiation present.** Statement 1016.

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.** Statement 1051.

Equipment

- Fiber-optic cables

To connect the fiber cable to the uplink line card:

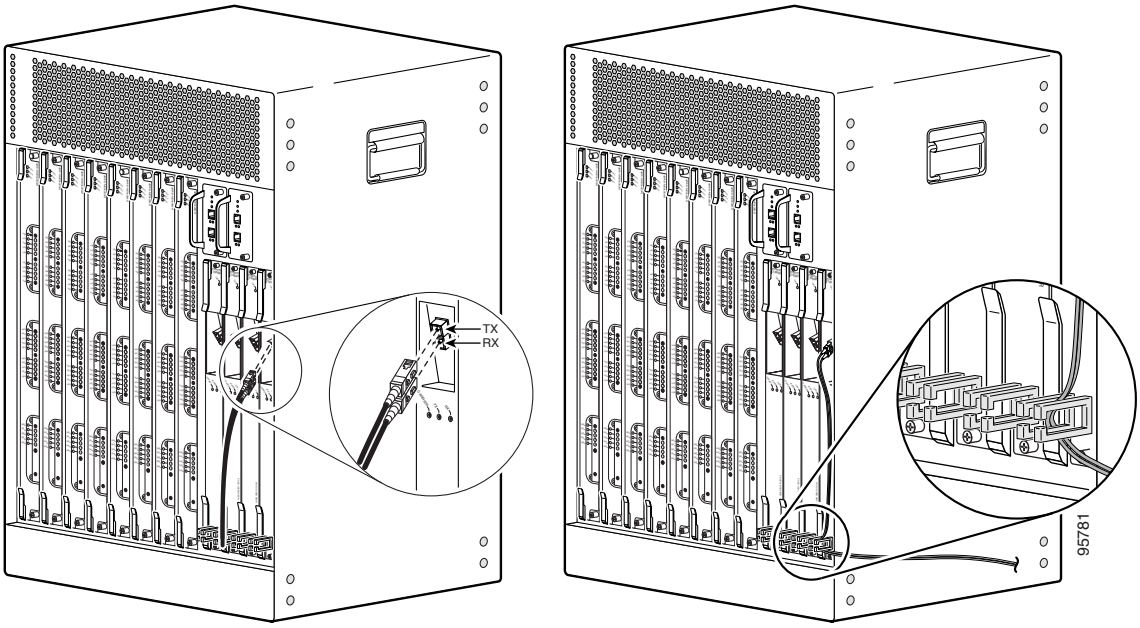
Step 1 Remove the protective cap from the fiber-optic cable connectors.

Step 2 Clean the fiber-optic connections (bulkhead connector and cable).

Step 3 Attach the fiber- optic cable to the port receptacles (see Figure 27). Ensure that you connect the TX and RX ends of the cable to the corresponding TX and RX connectors on the port.

Step 4 Run the cable through the cable bracket at the bottom of the line card and then out to the left or right of the chassis.

Figure 27 Installing the Fiber-Optic Cables



Powering On the Cisco uBR10012 Router

After all of the interfaces and other cables are connected, perform a visual check of all connections and ensure the following:

- All captive screws on all line cards and modules are tight.
- The ejector levers on every card are in the locked position.
- All the cables are connected (power, data link, network, and Ethernet).
- The console terminal or modem is cabled and powered on.
- A PCMCIA flash memory card is installed in the PRE module.

You are now ready to power on the system for the first time using the following procedure.

Power On the DC Power Entry Module

The power-on procedure is the same for both the DC PEM modules (UBR10-PWR-DC= and UBR10-PWR-DC-PLUS=).

To power on the DC PEM module:

Step 1 Verify if the DC power cables are connected, see "Connecting the DC Power Cables to the Cisco uBR10012 Router" section on page 33. If you are using the UBR10-PWR-DC-PLUS= modules, verify if the safety covers are installed on the DC terminal blocks on the PEMs.

Step 2 Verify that DC PEM power switch on each PEM is in Standby(0) position.

Step 3 Remove the tape from the circuit breaker switch handle.

Step 4 Power on the power source that is suppling the DC power to the chassis.

Note If you are using the external AC-input power shelf, this step requires plugging in multiple AC power cords into the back of the unit and into the outlets providing the AC power source.

Note The internal fans on the UBR10-PWR-DC-PLUS= PEM module start running and are audible as soon as the DC-input power cables are connected to the facility power source and the facility power is turned on, although the DC power enable switch is in Standby (0) position.

Step 5 After powering on the DC power source, verify the LEDs on the DC PEMs.

- UBR10-PWR-DC= module—The FAULT LED on each PEM illuminates (yellow) indicating that the PEM is receiving power from the DC power source but is not yet supplying power to the chassis (because its power switch is off).
- UBR10-PWR-DC-PLUS= module—The V1 POWER and V2 POWER LEDs on each PEM should illuminate (green). These LEDs only indicate that an input voltage is present on the PEMs and not that the PEM is powered on. In addition, the FAULT LED on each PEM illuminates (yellow).

If the FAULT LED on the PEMs do not illuminate (yellow), see the "Troubleshooting" section on page 63.

Tip The label on the chassis indicates the actual provided voltage range.

Step 6 Turn the power switch on each DC PEM to the ON (|) position.

Figure 28 is a sample representation of the DC power switch on the UBR10-PWR-DC= module. Figure 29 is a sample representation of the DC power switch on the UBR10-PWR-DC-PLUS= module.

Figure 28 DC Power Switch on UBR10-PWR-DC=

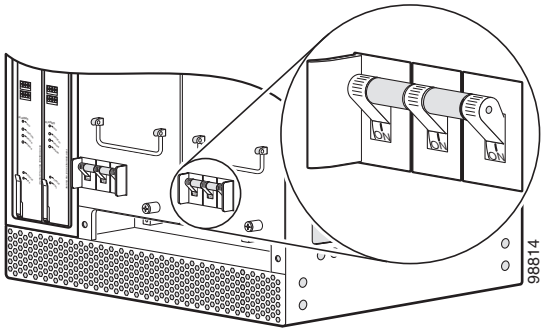
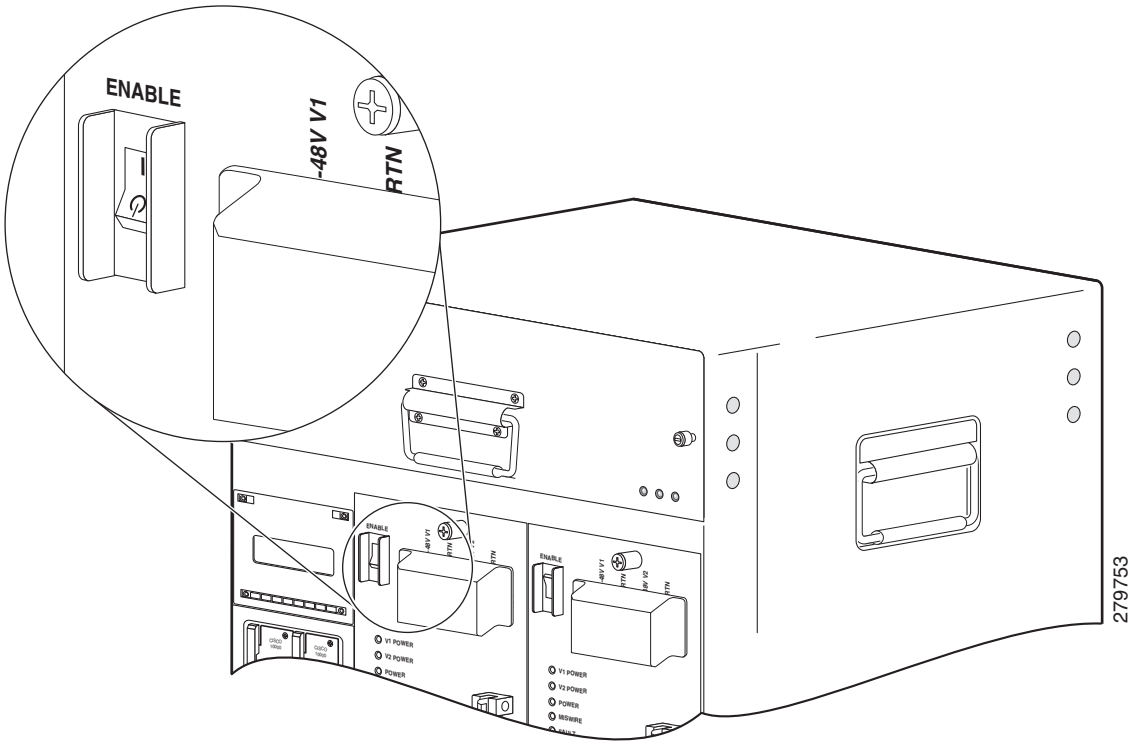


Figure 29 DC Power Switch on UBR10-PWR-DC-PLUS=



Step 7 Verify that the following LEDs are illuminated properly:

DC PEM modules

- UBR10-PWR-DC= module—The POWER LED on each PEM is illuminated (green), indicating that power is being received and is being delivered to the chassis.
- UBR10-PWR-DC-PLUS= module—The V1 POWER and V2 POWER LEDs on each PEM are illuminated (green). In addition, the POWER LED on each PEM is illuminated (green), indicating that power is being received and is being delivered to the chassis.

Note If the other LEDs on the DC PEM (MISWIRE or FAULT) illuminate (yellow), see the "Troubleshooting" section on page 63.

Fan assembly modules

- Listen to the fans as power is applied. When you first apply power to the chassis, the fans in the fan assembly module initially operate at high speed. If all fans are operating correctly, and if the temperature of the chassis is in the nominal operating range, the fans slow down to their normal operating speed.
- The FAN OK LED on the fan assembly module is illuminated (green), indicating that all fans are operating properly. You should be able to feel air being taken in at the bottom front of the chassis and being blown out at the top rear of the chassis.
- If either the SINGLE-FAN-FAIL LED or the MULTIPLE-FAN-FAIL LED illuminates (yellow), see the "Troubleshooting" section on page 63.

PRE modules

- The Fail LED on each PRE module illuminates (yellow) briefly during the power-on sequence, but then should turn off.
- If the Fail LED does not turn off on either PRE, verify that the ejector levers are fully closed and that the captive screws have been tightened. If necessary, remove the PRE from the chassis and reinsert it or replace it.

When the power-on sequence is complete, the PRE begins to initialize the line cards. Continue with the next section, "Configuring the Cisco uBR10012 Router at Startup, page 58," to configure the line cards.

Power On the AC Power Entry Module

The power-on procedure is the same for both the AC PEM modules (UBR10-PWR-AC= and UBR10-PWR-AC-PLUS=).

To power on the AC PEM modules:

Step 1 Ensure that the AC power cables are plugged into the facility power source, see "Installing the AC Power Entry Modules" section on page 40.

Note If you are using the UBR10-PWR-AC-PLUS= module, two AC power cables must be installed for the unit to operate.

Step 2 Remove any tape and power on the power source that is suppling the AC power for the chassis.

Note The internal fans of the UBR10-PWR-AC-PLUS= PEM module start running and are audible as soon as the AC-input power cables are connected to the facility power source and the facility power is turned on, although the AC power enable switch is in Standby (0) position.

Step 3 After powering on the AC power source, verify the LEDs on the AC PEMs:

- UBR10-PWR-AC= module—The FAULT LED on each PEM illuminates (yellow), indicating that the PEM is receiving power from the AC power source but is not yet supplying power to the chassis (because its power switch is off).
- UBR10-PWR-AC-PLUS= module—The V1 POWER and V2 POWER LEDs on each PEM should illuminate (green). These LEDs only indicate that an input voltage is present on the PEMs and not that the PEM is powered on. In addition, the FAULT LED on each PEM illuminates (yellow).

Step 4 Turn the power switch on the AC PEMs to the ON position.

Figure 30 is a sample representation of the AC power switch on the UBR10-PWR-AC= module. Figure 31 is a sample representation of the AC power switch on the UBR10-PWR-AC-PLUS= module.

Figure 30 AC Power Switch UBR-10-PWR-AC=

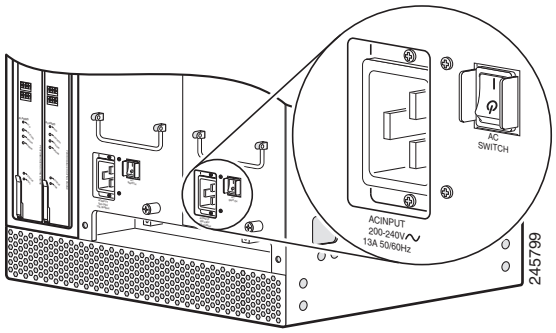
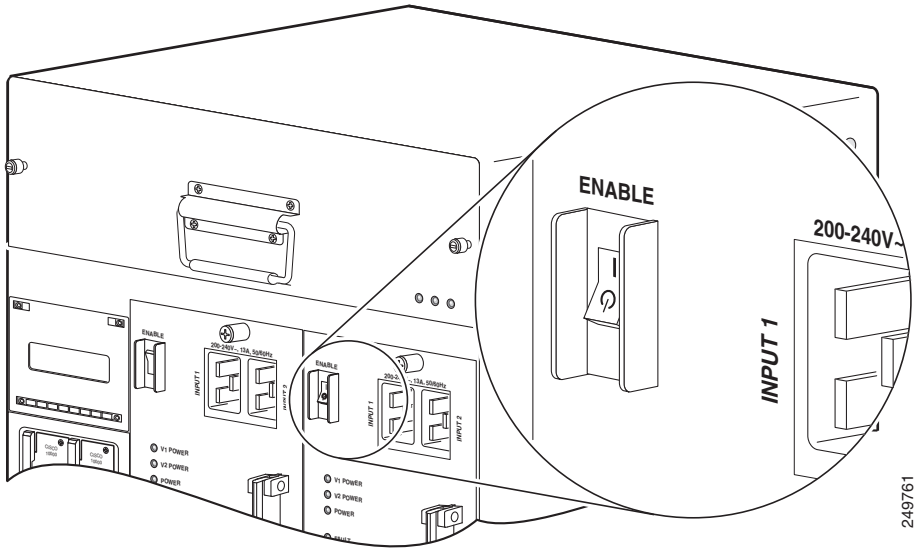


Figure 31 AC Power Switch UBR10-PWR-AC-PLUS=



Step 5 Verify that the following LEDs are illuminated properly:

AC PEM modules

- UBR10-PWR-AC= module—The POWER LED on each PEM is illuminated (green) indicating that power is being received and is being delivered to the chassis. If the FAULT LED illuminates (yellow), see the "Troubleshooting" section on page 63.
- UBR10-PWR-AC-PLUS= module—The V1 POWER and V2 POWER LEDs on each PEM are illuminated (green). In addition, the POWER LED on each PEM is illuminated (green) indicating that power is being received and is being delivered to the chassis. If the FAULT LED illuminates (yellow), see the "Troubleshooting" section on page 63.

Fan assembly modules

- Listen to the fans as power is applied. When you first apply power to the chassis, the fans in the fan assembly module initially operate at high speed. If all fans are operating correctly, and if the temperature of the chassis is in the nominal operating range, the fans slow down to their normal operating speed.
- The FAN OK LED on the fan assembly module is illuminated (green), indicating that all fans are operating properly. You should be able to feel air being taken in at the bottom front of the chassis and being blown out at the top rear of the chassis.
- If either the SINGLE-FAN-FAIL LED or the MULTIPLE-FAN-FAIL LED illuminate (yellow), see the "Troubleshooting" section on page 63.

PRE modules

- The Fail LED on each PRE module illuminates (yellow) briefly during the power-on sequence, but then should turn off.
- If the Fail LED does not turn off on either PRE, verify that the ejector levers are fully closed and that the captive screws have been tightened. If necessary, remove the PRE from the chassis and reinsert it or replace it.

When the power-on sequence is complete, the PRE begins to initialize the line cards. Continue with the next section, "Configuring the Cisco uBR10012 Router at Startup, page 58," to configure the line cards.

Configuring the Cisco uBR10012 Router at Startup

This section explains how to create a basic running configuration for your Cisco uBR10012 router using the Cisco uBR10012 router setup facility or the Cisco IOS command-line interface (CLI).

PC Console or Terminal Default Settings

To configure a Cisco uBR10012 router from the console, you must connect a terminal or terminal server to the router's console port. The terminal emulation software or the terminal should have the following default settings:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity
- No flow control

Example Startup Display

When you power on your Cisco uBR10012 router or execute the **reload** command, the console screen displays a message similar to the following:

```
Restricted Rights Legend
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
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           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706

Cisco Internetwork Operating System Software
IOS (tm) 10012 Software (UBR10K-P6-M), Released Version 12.2(1)
Copyright (c) 1986-2001 by cisco Systems, Inc.
Compiled Thu 19-Apr-01 13:47 by samants
Image text-base: 0x60008960, data-base: 0x612B0000

ROM: System Bootstrap, Version 12.0(9r)SL1, RELEASE SOFTWARE (fc1)
BOOTFLASH: 10012 Software (C10K-EBOOT-M), Released Version 12.1(5)

System returned to ROM by reload at 12:59:35 PDT Thu Apr 19 2001
System restarted at 13:00:51 PDT Thu Apr 19 2001
cisco C10012 (PRE-RP) processor with 98304K/32768K bytes of memory.
Processor board ID ABCDEFEDCBA
R7000 CPU at 262Mhz, Implementation 39, Rev 2.1, 256KB L2, 2048KB L3 Cache
Backplane version 1.0, 16 slot

Last reset from unexpected value
Toaster processor tmc0 is running.
Toaster processor tmc1 is running.
1 Ethernet/IEEE 802.3 interface(s)
1 FastEthernet/IEEE 802.3 interface(s)
```

```
1 Gigabit Ethernet/IEEE 802.3 interface(s)
3 Cable Modem network interface(s)
509K bytes of non-volatile configuration memory.

16384K bytes of Flash PCMCIA card at slot 1 (Sector size 128KB).
32768K bytes of Flash internal SIMM (Sector size 256KB).
Press RETURN to get started!
```

Basic Configuration Using the Setup Facility

The first time you power on a Cisco uBR10012 router, the setup facility starts. You can also initiate the facility by running the **setup** command in privileged EXEC mode. This facility helps you enhance a default configuration that already exists on the Cisco uBR10012 router. The setup facility uses a question and answer sequence called the System Configuration Dialog to walk you through configuring the router.

You do not have to configure the interfaces immediately; however, you cannot enable the interfaces or connect them to any networks until you have configured them.

Tip Basic configuration setup is often used as a quick way to achieve network connectivity, allowing you to retrieve a configuration file from a TFTP server.

System Configuration Dialog

Use the System Configuration Dialog to help you perform a basic configuration. Proceed through the dialog by answering questions and then pressing the **Enter** key. In most cases, you can get additional information by entering a question mark (?). Throughout the dialog, default values are shown in square brackets [ ].

Tip If you have experience using Cisco routers, consider configuring the router by using the procedure described in the <z_TOC#>Basic Configuration in Global Configuration Mode section.

To cancel the configuration dialog, press **Ctrl-C**, or you can let the dialog help you perform one of two configuration types:

- Basic configuration setup configures connectivity that is sufficient for the management of the system.
- Extended setup prompts you to configure each interface and is not appropriate for configuring the Cisco uBR10012 router. For configuration information, see the *Cisco CMTS Configuration Commands* at the following URL:

  http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

You can run the setup facility at any time when you are at the enable prompt (#) by entering the command **setup**.

Configuring the System Using the System Configuration Dialog

To perform a basic configuration using the System Configuration Dialog, follow this procedure:

Step 1 The dialog starts by prompting you want to continue with the configuration dialog. Enter **Yes**. To return to the enable prompt, enter **No**.

```
--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: yes
```

Step 2 Enter **Yes** to perform a basic management setup. Enter **No** to perform an extended configuration setup.

```
Would you like to enter basic management setup? [yes/no]: yes
```

Step 3 Specify a host name. The host name becomes part of the IOS prompt.

```
Enter host name [Router]: my-router
```

Step 4 Specify a secret password. It appears in encrypted form in the configuration file.

```
Enter enable secret: my_secret
```

Step 5 Specify the enable password. It is used if you did not assign a secret one.

```
Enter enable password: my_password
```

Step 6 Specify the password to use for Telnet sessions.

```
Enter virtual terminal password: my_vt
```

Step 7 At the Configure System Management prompt, enter **No**.

```
Configure System Management? [yes/no]: no
```

Step 8 If you want to access the router using SNMP, enter **Yes** at the prompt:

```
Configure SNMP Network Management? [yes]: yes
```

Step 9 Specify an SNMP community string.

```
Community string [public]: public
```

Setting up the Interface

After you respond to the SNMP questions, the setup script lists the interfaces. Table 12 lists typical interfaces found on a Cisco uBR10012 router.

Table 12 Typical Interfaces on the Cisco uBR10012 Router

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0/0/0	unassigned	Yes	uset	up	up
FastEthernet0/0/0	unassigned	No	uset	up	up
GigabitEthernet3/0/0	unassigned	No	uset	up	up
Cable6/1/0	unassigned	No	uset	up	up
Cable6/1/1	unassigned	No	uset	up	up
Cable7/0/0	unassigned	No	uset	up	up

Tip Interfaces that are not okay (No) have an invalid configuration or are not configured.

To set up an interface on the Cisco uBR10012 router:

Step 1 Enter the interface for the Fast Ethernet interface to achieve network connectivity.

```
Enter interface name used to connect to the management network from the above interface
summary: FastEthernet0/0/0
```

Step 2 Accept the default value for the type of connector. RJ-45 is the only connector that can be used on the Cisco uBR10012 router Ethernet port.

```
Configuring interface FastEthernet0/0/0:
Use the 100 Base-TX (RJ-45) connector? [yes]: yes
```

Step 3 Configure both the Cisco uBR10012 router and the remote device to use the same mode.

```
Operate in full-duplex mode? [no]: no
```

Step 4 Enter the IP address to achieve network connectivity.

```
Configure IP on this interface? [yes]: yes
```

Step 5 Specify the IP address.

```
IP address for this interface: 172.27.48.209
```

Step 6 Enter the subnet mask for the IP address.

```
Subnet mask for this interface [255.255.0.0] : 255.255.0.0
```

The system displays the information you entered as well as several default commands, such as the **no shutdown** command. For example:

```
The following configuration command script was created:
hostname c10012
enable secret 5 $$1$uror$EFU0hKOBQXhk975qKFZlL0
enable password <xxx>
line vty 0 4
password <xxx>
no snmp-server
!
no ip routing
!
interface FastEthernet0/0/0
no shutdown
media-type 100BaseX
half-duplex
ip address 172.27.48.209 255.255.0.0
!
end
```

Step 7 Exit the setup script without saving, start the setup script, or save the configuration file:

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]:
```

Step 8 Enter global configuration mode after you complete the configuration, and enable ip routing by entering the **ip routing** command:

```
router(config)# ip routing
```

Basic Configuration in Global Configuration Mode

The following command sequence allows you to perform a configuration similar to that generated by the **setup** command:

```
Router> configure terminal
Router(config)# hostname c10012
Router(config)# enable secret <my_router>
Router(config)# enable password <my_rtr>
Router(config)# snmp-server community public
Router(config)# ip routing
Router(config)# interface FastEthernet0/0/0
Router(config-if)# no shutdown
Router(config-if)# media-type 100BaseX
Router(config-if)# half-duplex
Router(config-if)# ip address 192 255.255.0.0
Router# copy running-config startup-config
```

You can now configure the line cards. For specific information on system and interface configuration, refer to the *Cisco uBR10012Universal Broadband Router Software Configuration Guide* at the following URL:

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/configuration/guide/scg.html

Formatting Flash Memory Cards and Disks

The flash memory disk card that shipped with your router contains the default Cisco IOS image for booting your router. This section explains how to format a flash memory disk.

Caution The formatting procedure erases all information on the flash memory disks or cards.

Note The Cisco uBR10012 router uses 48 MB or 128 MB PCMCIA memory cards.

Flash memory disks and flash memory cards use similar commands. The primary syntax change is that disk0: or disk1: refers to flash memory disks while slot0: or slot1: refers to flash memory cards.

To format a flash memory disk:

Step 1 Ensure that there is a flash memory disk in the PCMCIA Slot 0 or Slot 1 of the PRE.

Step 2 Enter the **format diskn:** command at the privileged EXEC mode prompt to format the disk.

The following example shows the display after you enter the **format disk0:** command:

```
Router# format disk0:

All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewdisk
Formatting sector 1
Format device slot0 completed
Router#
```

The flash memory disk is ready for use.

Troubleshooting

The following section provides troubleshooting tips and procedures that you can use to verify your system setup.

Before You Call for Technical Assistance

If you are unable to solve the problem easily, contact a Cisco customer service representative for assistance and further instructions. See the "Obtaining Documentation and Submitting a Service Request" section on page 71. Provide the representative with the following information:

- Date you received the router
- Chassis serial number
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

Normal Startup Sequence

When you start up the router for the first time, observe the startup sequence described in the "Powering On the Cisco uBR10012 Router" section on page 52.

The LEDs indicate all system states in the startup sequence. By checking the state of the LEDs, you can determine when and where the system failed in the startup sequence.

When you start up the system by turning the power supply switch to the ON (|) position, the following should occur:

1. Fans—The fans start operating. The FAN OK LED on the fan assembly module illuminates (green).
2. DC PEM
   - UBR10-PWR-DC= module—If you are using this module, the POWER LED on the DC PEM illuminates (green) to indicate that the PEM is connected to an active DC power source and is supplying power to the chassis.
   - UBR10-PWR-DC-PLUS= module—If you are using this module, the V1 POWER and V2 POWER LEDs on each DC PEM module illuminate (green) to indicate that the DC PEM module is connected to active DC power sources. These LEDs only indicate that an input voltage is present on the PEMs and not that the PEM is powered on. These LEDs serve as a warning that a voltage is currently applied to the AC PEM module. In addition, the POWER LED on the modules illuminates (green) to indicate that it is supplying the required power to the Cisco uBR10012 chassis.
3. AC PEM
   - UBR10-PWR-AC= module—If you are using this module, the POWER LED on the AC PEM illuminates (green) to indicate that the PEM is connected to an active AC power source and is supplying power to the chassis.
   - UBR10-PWR-AC-PLUS= module—If you are using this module, the V1 POWER and V2 POWER LEDs on each AC PEM module illuminates (green) to indicate that the AC PEM module is connected to active AC power sources. These LEDs only indicate that an input voltage is present on the PEMs and not that the PEM is powered on. These LEDs serve as a warning that a voltage is currently applied to the AC PEM module. In addition, the POWER LED on the modules illuminates (green) to indicate that it is supplying the required power to the Cisco uBR10012 chassis.
4. TCC+ card—The POWER LED illuminates (green), the STATUS LED illuminates yellow then turns green (active) or blinking green (backup). PRESENT LED comes illuminates (green).
5. DTCC card—The POWER LED illuminates (green), the STATUS LED comes on yellow then turns green (active) or blinking green (backup). PRESENT LED illuminates (green).
6. PREs—The FAIL LEDs on the PRE modules briefly illuminate during the power-on sequence and then go off and the STATUS LEDs illuminate green.

Note The Slot 0 and Slot 1 LEDs on the PRE illuminate only when the PCMCIA card slots are being accessed by the system. These LEDs remain off during normal operation of the router and do not indicate startup problems.

7. Line cards/adapter cards and uplink cards—ENABLED LEDs turn green and then goes off.

Note Each line card has an ENABLED LED that comes on initially at power-on and then goes off. The LED then comes on and remains on when the corresponding port is enabled and configured for operations.

8. The initial system banner appears on the console screen.

Solving Startup Problems by Using a Subsystems Approach

Because a startup problem is usually caused by a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each component in the system. For these troubleshooting procedures, consider the following subsystems:

- Power subsystem—Includes the power supplies (DC PEMs or AC PEMs) and the external power cables
- Processor subsystem—Includes the PRE processor card and TCC+ or DTCC card
- Cooling subsystem—Includes the fan assembly
- Card subsystem—Includes the cable interface cards and uplink cards, and cables

Troubleshooting Tips

For more information, refer to the troubleshooting section of the *Cisco uBR10012 Hardware Installation Guide* at the following URL:

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/installation/guide/u10ktrb.html

You can use the **show environment** command to display the general health of the power system. For additional tips, see Table 13.

```
Router# show environment

Temperature normal: chassis inlet measured at 29C/84F
Temperature normal: chassis core measured at 42C/107F
Fan:                                              OK
Power Entry Module 0 type DC status:              OK
Power Entry Module 1 type DC status:              OK
Router#
```

Table 13 Troubleshooting Tips

Symptom	Action
System fails to power on	Check that all the power cords are properly connected to the router and at the power source. 1. The DC PEM power switches are powered on and the POWER LED is illuminated (green). 2. The AC PEM power switches are powered on and the POWER LED is illuminated (green). 3. The fan module is fully inserted, and the FAN OK LED is illuminated (green).
System fails to boot up properly	If the system has power, check the FAIL LED on the PRE and any information on the alphanumeric display.
You cannot establish a console or Telnet connection to the system.	1. Verify that you have the correct (cross-connect) cable. 2. Verify that the Ethernet cable is connected to the correct port on the PRE and the hub. 3. Ensure that the PRE has booted properly.

Table 13 Troubleshooting Tips (continued)

Symptom	Action

Ethernet port is not configured properly.	If you have a working console connection, perform the following steps:
	1. At the router prompt, enter **show int fast0/0/0**. If the port is administratively down, enter these commands to enable it:
	`switch> configure terminal`
	`Enter configuration commands, one per line. End with CNTL/Z.`
	`router(config-if)# int fast0/0/0`
	`router(config-if)# no shut`
	`router(config-if)# exit`
	`router(config)# exit`
	`router#`
	2. Check that the Ethernet port in question has a valid IP address assigned to it.

FAULT LED on the AC or DC PEM modules illuminates (yellow) and the AC or DC PEM module shuts down. **Note** This applies to UBR10-PWR-AC=, UBR10-PWR-AC-PLUS=, UBR10-PWR-DC=, and UBR10-PWR-DC-PLUS= PEM modules.	• The FAULT LED illuminates when the PEM module detects an over-voltage or over-current condition, or when the PRE issues the command to shut down the PEM module (this could occur due to overheating). Ensure that none of these conditions exist in the system, and then try to switch the PEM module off and switch it on again. • If another PEM module exists in the system that powers up the chassis, and the FAULT LED is not illuminated on that module, then ensure that the PRE does not issue the command to shut down the PEM module. • If the problem persists, try another working unit. Else, see the "Obtaining Documentation and Submitting a Service Request" section on page 71.
DC PEM MISWIRE LED is illuminated. **Note** This applies to both UBR10-PWR-DC= and UBR10-PWR-DC-PLUS= modules.	• If the MISWIRE LED is illuminated, the –48/–60 VDC and return (RTN+) wires are reversed. Ensure that the facility power source is turned off immediately, see "Connecting the DC Power Cables to the Cisco uBR10012 Router" section on page 33 to reconnect the wires correctly before powering on the PEM module.
DC PEM V1 POWER or V2 POWER LEDs on the UBR10-PWR-DC-PLUS= module illuminates but no other LEDs illuminate.	• If the V1 POWER or the V2 POWER LEDs on the DC PEMs do not illuminate, verify the input voltage of the source. • If the FAULT LED does not illuminate when the DC power switch is in Standby (0) position, it indicates that the FAULT LED could be malfunctioning. The POWER LED will be off. • If DC power switch is turned ON, and POWER LED does not illuminate (green), the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71. • If the system is receiving power (the internal fans are working) and the second DC PEM module is not supplying power to the chassis, the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71.

Table 13 Troubleshooting Tips (continued)

Symptom	Action
DC PEM POWER LED does not illuminate. **Note** This applies to both UBR10-PWR-DC= and UBR10-PWR-DC-PLUS= modules.	1. Check if the FAULT LED is illuminated (yellow) and check the position of the DC power switch. The power switch may be in Standby (0) position, thus the POWER LED is not illuminated. 2. Switch the DC power switch to ON (|) position and check if the POWER LED illuminates. 3. If the DC power switch is turned ON, and the POWER LED still does not illuminate (green), the POWER LED may be defective. If the system is receiving DC power (the internal fans are working) and the second DC PEM module is not supplying power to the chassis, then the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71.
AC PEM V1 POWER or V2 POWER LEDs on the UBR10-PWR-AC-PLUS= module illuminates but no other LEDs illuminate.	• If the V1 POWER or the V2 POWER LEDs on the AC PEMs do not illuminate, verify the input voltage of the source. • If the FAULT LED does not illuminate (yellow) when the AC power switch is in Standby (0) position, it indicates that the FAULT LED could be malfunctioning. The POWER LED will be off. • If AC power switch is turned ON, and POWER LED does not illuminate (green), the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71. • If the system is receiving power (the internal fans are working) and the second AC PEM module is not supplying power to the chassis, the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71.
AC PEM POWER LED does not illuminate. **Note** This applies to both UBR10-PWR-AC= and UBR10-PWR-AC-PLUS= modules.	1. Check if the FAULT LED is illuminated (yellow) and check the position of the AC power switch. The power switch may be in Standby (0) position, thus the POWER LED is not illuminated (green). 2. Switch the AC power switch to ON (|) position and check if the POWER LED illuminates. 3. If the AC power switch is turned ON, and the POWER LED still does not illuminate (green), the POWER LED may be defective. If the system is receiving AC power (the internal fans are working) and the second AC PEM module is not supplying power to the chassis, then the POWER LED may be defective. See the "Obtaining Documentation and Submitting a Service Request" section on page 71
PRE alarms–Critical, Minor, or Major LED on the PRE is on	Enter the **`show facility-alarm status`** command at the console to identify the problem.

Table 13 Troubleshooting Tips (continued)

Symptom	Action
Fans do not function at startup.	1. Verify that the system has power. 2. Remove the fan assembly module, check the fan cables, and reinsert the module. **Caution** The total service window for removal and replacement of the fan tray is 3 minutes before possible system shutdown. Therefore, ensure that you complete the replacement procedure within this time limit to avoid system shutdown.
Fan alarm LEDs illuminate. **Note** This applies to both UBR10-FAN-ASSY= and UBR10012-FAN-PLUS= modules.	• If the Single Fan Failure LED is illuminated, one fan has failed, but the system is still able to adequately cool the chassis. The fan assembly module must be repaired or replaced as soon as possible. • If the Multiple Fan Failure LED is illuminated, more than one fan has failed, and the fan assembly module is no longer able to adequately cool the Cisco uBR10012 chassis. Replace the fan assembly module immediately. **Caution** The total service window for removal and replacement of the fan module is 3 minutes before possible system shutdown. Ensure that you complete the replacement procedure within this time limit.
PRODUCT ID LED/switch on fan assembly module (UBR10012-FAN-PLUS=) is green and a FAN-MISSING alarm is randomly being triggered.	If you are running a Cisco IOS Release that does not support the PRODUCT ID LED/switch feature, then ensure that the PRODUCT ID LED/switch is not pressed and is not illuminated. Upgrade to a supported Cisco IOS Release on the chassis. **Note** If you cannot upgrade to a supported Cisco IOS Release, then ensure that the PRODUCT ID LED/switch is not pressed and not illuminated (green). If you are running a Cisco IOS Release that supports this feature, but the FAN-MISSING alarm is still being triggered, then follow the steps below to clear the alarm so that the software recognizes the fan module: 1. Ensure that the PRODUCT ID LED/switch is pressed and illuminated (green). 2. Remove the fan assembly module. 3. Wait for 1 minute and reinsert the fan assembly module. If the alarm is still being triggered, and the software still does not recognize the fan, then the fan may be faulty, you may have to replace the fan module. If none of the above solves the problem, see the "Obtaining Documentation and Submitting a Service Request" section on page 71.

Table 13 Troubleshooting Tips (continued)

Symptom	Action

System overheats.
 	
Tip When the fans are operating, you can hear them. You can also feel air being drawn in at the bottom front and expelled at the top rear of the chassis.
	1. Check for fan failure by checking the fan status LEDs and running the **show environment** command.
	
	`Router# show environment`
	
	`Temperature normal: chassis inlet measured at 29C/84F`
	`Temperature normal: chassis core measured at 42C/107F`
	`Fan: OK`
	`Power Entry Module 0 type DC status: OK`
	`Power Entry Module 1 type DC status: OK`
	`Router#`
	2. Ensure that no alarms are triggered on the fan assembly module.
	3. Check if there is sufficient ventilation on the chassis intake and chassis exhaust.
	4. Verify if the ambient temperature is within the specified range.
	5. If the problem persists, see the "Obtaining Documentation and Submitting a Service Request" section on page 71.

STATUS LED on the primary PRE did not illuminate (solid green) at the end of the boot-up sequence.	Check the other LEDs on other modules in the chassis. If no other LEDs are illuminated, check for a problem in the power subsystem.
If no LEDs on the PRE are illuminated but LEDs on other modules are illuminated.	Remove the PRE from the slot, check for any bent or broken pins on the backplane connectors; then reinsert the PRE, ensuring that it makes solid contact with the backplane and is securely locked in by firmly closing both the locking levers.
The FAIL LED on the PRE is illuminated (yellow).	Remove the PRE and reinsert it. If that fails, insert a new PRE. Repeat the process for the redundant PRE, except that its STATUS LED should be off and its alphanumeric display should read IOS STBY if it is operating correctly. 1. If both PREs are operating correctly, check the Power LEDs on each TCC+ or DTCC cards. Are they both illuminated (green)? a. Is the STATUS LED on the primary TCC+ or DTCC illuminated (solid green) indicating that it is the primary card? b. Is the STATUS LED on the secondary TCC+ or DTCC flashing (green) indicating that it is the redundant card? c. If none of the above solves the problem, verify the Cisco IOS Release on the router supports the TCC+ or DTCC card.
The STATUS lights on the TCC+ or DTCC cards are off.	1. Check whether at least one PRE card is present in the system. 2. Try reseating the TCC+ or the DTCC card, making sure that it firmly connects to the backplane and that both captive screws are tightly connected. 3. If the problem persists, then replace the card. See the "Obtaining Documentation and Submitting a Service Request" section on page 71.

Table 13 Troubleshooting Tips (continued)

Symptom	Action
ENABLED LED on the line cards or on the uplink cards do not illuminate.	1. If the ENABLED LED is off, first verify that the card has been enabled; the ENABLED LED remains off when a card has not been configured and enabled. 2. If a port has been enabled but its corresponding ENABLED LED is still off, reseat the card in its slot (you do not have to turn off the system power when removing or replacing the card). After the system reinitializes the interfaces, the ENABLED LED on the card should illuminate. 3. If the ENABLED LED does not illuminate after the above checks, it is likely that the system has detected a processor hardware failure. See the "Obtaining Documentation and Submitting a Service Request" section on page 71.
FAIL (yellow) on the HHGE—This LED illuminates during portions of the POST (Power-On Self Test), but remains off after the POST on a properly working HHGE. If it fails during operation, this LED illuminates and an alarm event occurs.	FAIL LED blinks during the following SFP faults: • Non-Cisco SFP GBIC inserted • Non-Gigabit-Ethernet SFP GBIC is inserted • Hardware problem with a valid SFP GBIC
FAIL LED does not illuminate during portions of the POST	The HHGE is not properly seated in the slot splitter.

Using CLI Commands to Troubleshoot

For more information about error messages and troubleshooting commands, refer to the following:

- *Cisco CMTS Debugging Commands* at the following URL:
  http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_21_debug.html
- *Cisco CMTS Error Messages* at the following URL:
  http://www.cisco.com/en/US/docs/cable/cmts/system/message/uberrmes.html
- *Cisco uBR10012 Universal Broadband Router Software Configuration Guide* at the following URL:
  http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/configuration/guide/scg.html
- *Cisco Broadband Cable Command Reference Guide* at the following URL:
  http://www.cisco.com/en/US/docs/ios/cable/command/reference/cbl_book.html

Related Documentation

Chassis Installation Documentation

Cisco uBR10012 Universal Broadband Hardware Installation Guide at the following URL:

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/installation/guide/hig.html

FRU Documentation

For documentation about the different modules used with the Cisco uBR10012 router, go to the following URL:

http://www.cisco.com/en/US/products/hw/cable/ps2209/prod_installation_guides_list.html

Cabling Information

Cabling the Cisco uBR-MC5X20S/U/H Cable Interface Line Card with UCH1 Quick Start Guide at the following URL:

http://www.cisco.com/en/US/docs/interfaces_modules/cable/broadband_processing_engines/ubr10_mc5x20s_u_h/quick/start/MC52_cbl.html

Cabling the Cisco uBR-MC5X20S/U/H Cable Interface Line Card Quick Start Guide with UCH2 at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/cable/ubr10k/ubr10012/qsg/mc52_cb2.pdf

Cabling the Cisco RF Switch with the Cisco uBR10012 CMTS at the following URL:

http://www.cisco.com/en/US/docs/interfaces_modules/cable/broadband_processing_engines/ubr10_mc5x20s_u_h/quick/start/MC52_cbl.html

Cable Specifications

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/installation/guide/u10kcbl.html

Frequency Allocation Tables

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/installation/guide/u10kfrq.html

Regulatory Compliance and Safety Information

http://www.cisco.com/en/US/docs/cable/cmts/ubr10012/regulatory/compliance/ub10rcsi.html

Inspection and Cleaning Procedures for Fiber-Optic Connections

http://www.cisco.com/en/US/tech/tk482/tk876/technologies_white_paper09186a0080254eba.shtml

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

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