



PEM Faults and Fan Assembly Failures

The following sections provide methods for troubleshooting faults involving the Cisco uBR10012 DC Power Entry Modules (PEMs), the optional 2400W AC-input power shelf, and fan assembly module. This chapter contains the following major sections:

- [AC PEM Faults, page 2-1](#)
- [DC PEM Faults, page 2-3](#)
- [2400W AC-Input Power Shelf, page 2-5](#)
- [Other Electrical Problems, page 2-6](#)
- [Fan Assembly Module Faults, page 2-7](#)

AC PEM Faults

On the Cisco uBR10012 router, two AC PEMs are installed in a redundant configuration, which allows one AC PEM to fail without affecting system operations. A single PEM can power the router for sufficient time to request and install a new PEM to replace the one that failed.



Tip

To quickly check the functional status of your PEMs, use the **show environment** command.

AC PEM faults can occur for the following reasons:

- PEM failure
- Invalid AC-input power being supplied by the power source
- Backplane interface failures or damage

[Figure 2-1](#) illustrates the AC PEM and its indicators. [Table 2-1](#) describes the indicators.

Figure 2-1 AC PEM Front Panel

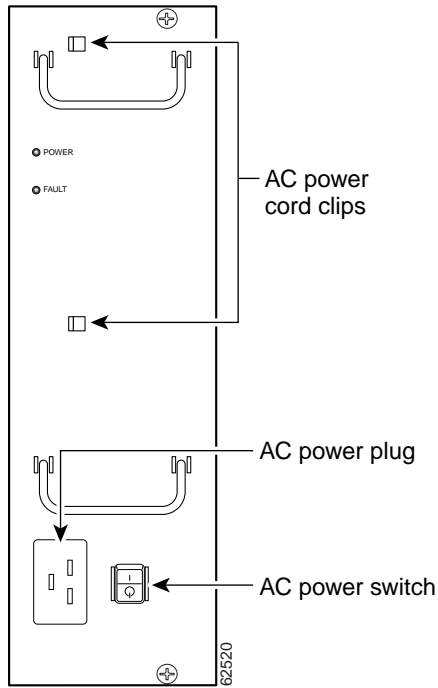


Table 2-1 AC PEM LEDs

LED	Color	Description
Power	Green	The PEM is on, is receiving power from the AC power source, and is providing power to the Cisco uBR10012 chassis (normal operations).
Fault	Yellow	Indicates that AC-input power is being received by the PEM, but that the PEM is not supplying power to the chassis, typically because the PEM’s power switch is turned to the standby position. If the Fault LED is lit when the power switch is in the ON position, the PEM is not operating correctly.

Table 2-2 lists the AC PEM fault symptoms and corrective actions.

Table 2-2 AC PEM Fault Symptoms and Corrective Action

Fault Symptom	Corrective Action
Green LED on PEM fails to light	<ol style="list-style-type: none"> 1. Make sure the power switch on the PEM is turned to the ON position. 2. Make sure the PEM is properly seated and that its captive screws have been tightened. 3. Make sure that the AC-input power cord is securely plugged into the power plug on the front panel of the PEM. Secure the cord in the clips to ensure the plug is not accidentally pulled out. 4. Check the external power source and verify that the AC-input power cord is correctly connected to the power outlet. 5. Move the PEM to the other PEM slot. If the PEM still fails, replace it.

Table 2-2 AC PEM Fault Symptoms and Corrective Action (continued)

PEM experiences problems in one slot but operates normally in a different slot	<ol style="list-style-type: none"> 1. Ensure that the input power to both slots is correct. 2. Verify that no connections have been made to the DC-power connectors underneath each PEM. 3. If the problem persists, contact Cisco TAC.
Fault LED is lit yellow	<ol style="list-style-type: none"> 1. Verify that no connections have been made to the DC-power connectors underneath each PEM. 2. Verify that the PEM is fully inserted into the power bay and that its captive screws have been tightened. 3. Check to see if the power switch is set to the standby position. If so, set the switch to the ON position. 4. If the problem persists, flip the power switch on the PEM to the standby position, wait several seconds, and then back to the ON position. 5. Replace PEM with a known good replacement. 6. Contact Cisco TAC.

**Tip**

Securely tighten the captive screws on your PEMs to prevent heightened levels of electromagnetic interference.

DC PEM Faults

On the Cisco uBR10012 router, two DC PEMs are in a redundant configuration, which allows one DC PEM to fail without affecting system operations. A single PEM can usually power the router for sufficient time to request and install a new PEM to replace the one that failed.

**Tip**

To quickly check the functional status of your PEMs, use the **show environment** command.

DC PEM faults can occur for the following reasons:

- PEM failure
- Reversed power cables
- Backplane interface failures or damage

Two models of the DC PEM exist.

- [Figure 2-2](#) shows the front panel of the original DC PEM (UBR10-PWR-DC) that was initially produced for the Cisco uBR10012 router.
- [Figure 2-3](#) shows the front panel of the DC PEM that is currently being produced for the Cisco uBR10012 router. The new model of the DC PEM (UBR10-PWR-DC-M) is identical in form and function to the first version, except that it includes a connector on the front panel for connecting to the alarm status connectors on the optional 2400-watt AC-input power shelf.

[Table 2-3](#) describes the indicators on the front panel of both models of DC PEM.

Figure 2-2 DC PEM Front Panel (original model, UBR10-PWR-DC)

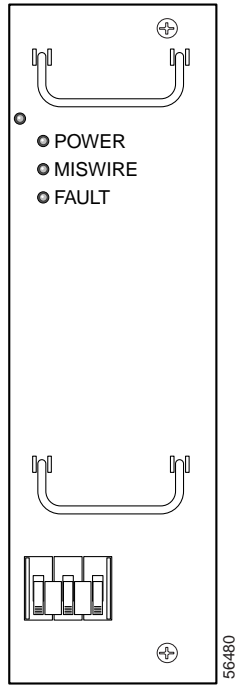


Figure 2-3 DC PEM Front Panel (current model with alarm connector, UBR10-PWR-DC-M)

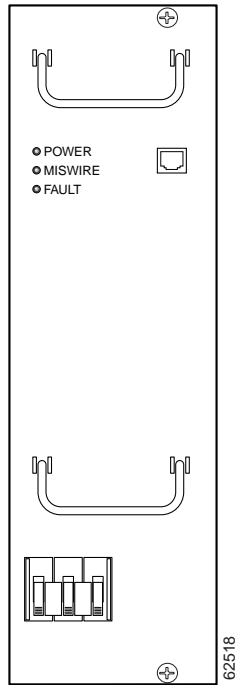


Table 2-3 DC PEM LEDs

LED	Description
Power (green)	PEM is powered on and is operational.
Fault (yellow)	PEM is not operating correctly or the circuit breaker is in the OFF position.
Miswire (yellow)	Input DC power cables are wired incorrectly and should be reversed.

Table 2-4 lists the DC PEM fault symptoms and corrective actions.

Table 2-4 DC PEM Fault Symptoms and Corrective Action

Fault Symptom	Corrective Action
Green LED on PEM fails to light	<ol style="list-style-type: none"> 1. Make sure the circuit breaker on the PEM is turned on. 2. Make sure the PEM is properly seated and screwed in place. 3. Make sure power leads are properly connected to power connectors on the backplane. If connections are loose or their polarity is reversed, the chassis does not receive power. 4. Check the external power source. 5. Move the PEM to the other PEM slot. If the PEM still fails, replace it.
PEM experiences problems in one slot but operates normally in a different slot	<ol style="list-style-type: none"> 1. Ensure that the input power to both slots is correct. 2. If the problem persists, contact Cisco TAC.
Fault LED is lit yellow	<ol style="list-style-type: none"> 1. Check to see if the circuit breaker (on/off switch) has tripped. If it has, return the switch to the ON position. 2. Replace PEM with a known good replacement. 3. Contact Cisco TAC.
Miswire LED is lit yellow	If the MISWIRE LED is on, the power cables are reversed. Power off the PEM and the external power source and reconnect the wires correctly. See the <i>Cisco uBR10012 Universal Broadband Router Hardware Installation Guide</i> .

**Tip**

Securely tighten the captive screws on your PEMs to prevent heightened levels of electromagnetic interference.

2400W AC-Input Power Shelf

The 2400W AC-input power shelf converts AC-output power from an external AC power source into DC power that is suitable for powering the Cisco uBR10012 router. The power shelf supplies –54 VDC output power to the two DC PEMs in the Cisco uBR10012 chassis.

The power shelf includes three 1200-watt (W) AC-input power modules that plug into a common power backplane in the 2400W AC-input power shelf. Two 1200W AC-input power modules are capable of powering a fully configured Cisco uBR10012 router. The third power module provides full redundancy.

During normal operation, the three AC-input power modules provide automatic load-sharing with each power module supporting 33 percent of the power load. When you remove one of the AC-input power modules, the remaining power modules immediately ramp up to full power and maintain uninterrupted system power for a limited time. This allows you to replace the affected module without impacting system operations.

Faults on the 2400W AC-input power shelf can occur for the following reasons:

- The AC-input power to one or more power modules has failed.
- The AC power plug to one or more power modules has been removed or unplugged.
- One or more power modules has failed and must be replaced.

Figure 2-4 illustrates the AC PEM and its indicators. Table 2-5 describes the indicators.

Figure 2-4 AC-Input Power Shelf Front Panel

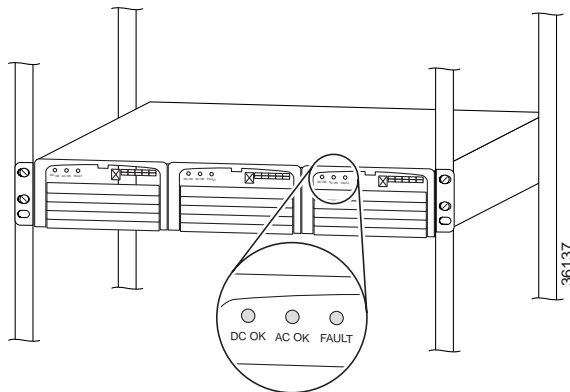


Table 2-5 AC-Input Power Shelf Module LEDs

LED	Color	Description
AC OK	Green	The AC-input power to the power module is present and is within the proper range.
DC OK	Green	The power module is producing DC output power in the proper range.
FAULT	Red	This particular power module has failed and must be replaced. The 2400W AC-input power shelf can continue operating with only two out of the three power modules installed, but the failed module should still be replaced as soon as possible.

Other Electrical Problems

If the electrical problem cannot be traced to a PEM, check the unit for:

- Improper power cable connections to the Cisco uBR10012 router
- Improper installation of other field-replaceable units (FRUs)

Check the site for:

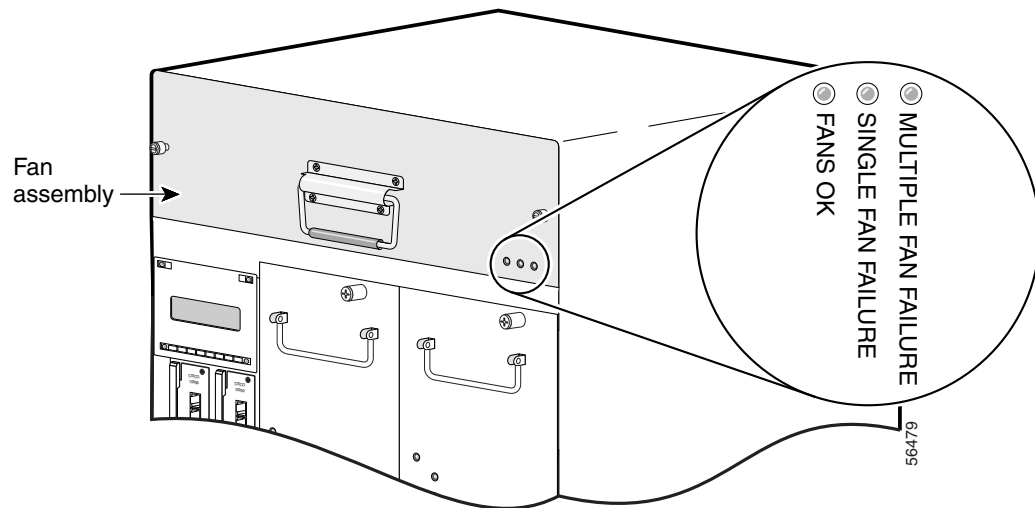
- Improperly grounded equipment, particularly equipment racks and power grounds
- Fluctuating voltage, which can result from excessive power drains caused by other equipment (such as air conditioning units)
- Cable corrosion or defective power panels, circuit breakers or fuses, or cable connections
- Undersized power cables or excessive power cable lengths
- Excessive power demand on backup power systems or batteries when alternate power sources are used

Fan Assembly Module Faults

The fan assembly module is critical to the operation of the Cisco uBR10012 router because it allows the router to maintain proper operating temperatures. Severe overheating can result in system failure, so a fan assembly module must always be present in the chassis while the router is operating.

Figure 2-5 shows the fan assembly module front panel and its LED indicators.

Figure 2-5 Fan Assembly Module

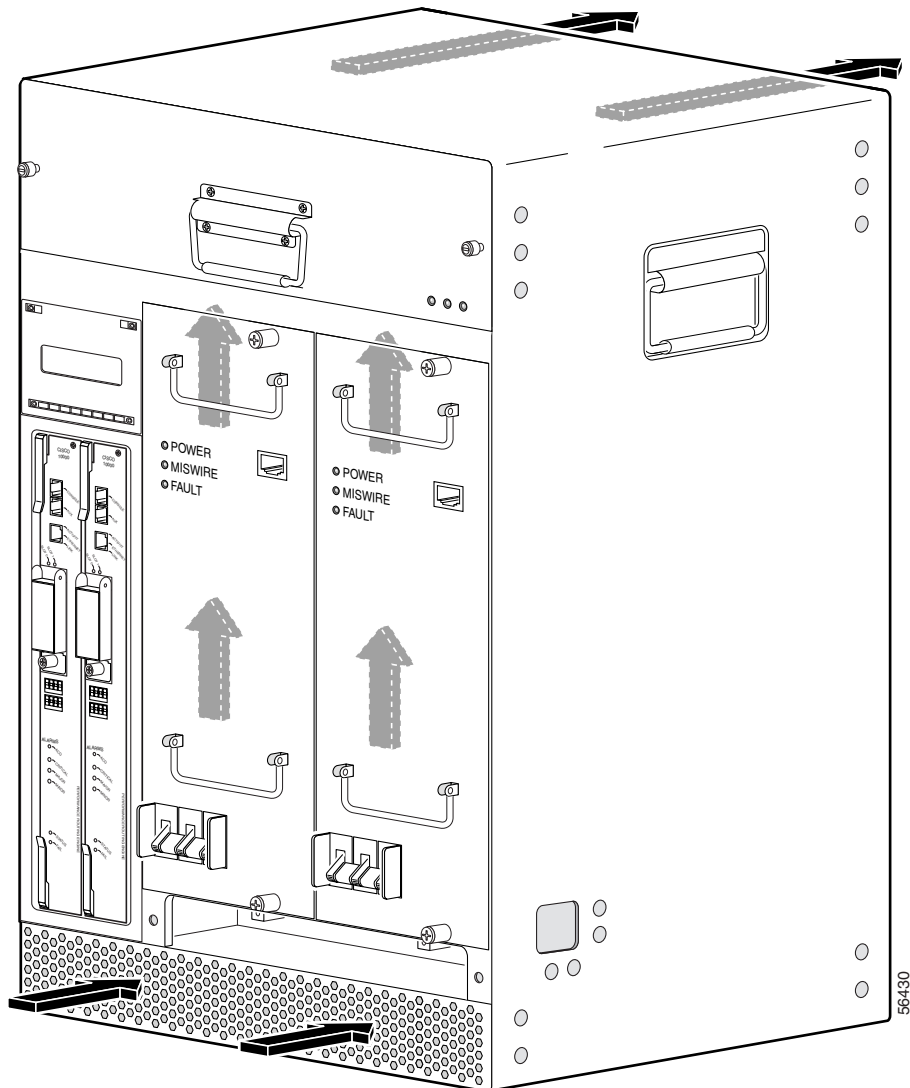


The Cisco uBR10012 fan assembly module contains four fans in a redundant configuration. One fan can fail without affecting system operations. If more than one fan fails, however, the fan assembly module must be replaced immediately to avoid overheating the system.

The fan assembly module draws air in from the bottom front of the Cisco uBR10012 router, through the air filter at the bottom of the front bezel. The air is drawn up through the line cards, and then exits through the vents at the top rear of the router.

Figure 2-6 shows the air circulation pattern of the Cisco uBR10012 router when two DC PEMs are installed. The air flow when two AC PEMs are installed is similar. The front bezel is not shown for clarity.

Figure 2-6 Fan Assembly Air Circulation Pattern



The LEDs on the front panel indicate the current status of the fans. [Table 2-6](#) lists the fan assembly module fault indications and recommended actions.

Table 2-6 Fan Assembly Module Fault Indications and Recommended Action

Symptom	Steps to Take
Fans OK LED is not lit	<ol style="list-style-type: none"> 1. Make sure the fan assembly module is fully inserted into the chassis. 2. Place your hand in front of the fan assembly module outlet to determine if the fans are operating. If the fans are running, remove the fan assembly module and inspect the wiring to the LEDs and fans to ensure that the wires are not nicked or cut. 3. Make sure that two AC PEM or two DC PEM modules are installed in the chassis. Although only one PEM is required to power the chassis, two PEMs should be installed for proper airflow. (If one PEM fails, leave the failed module in the chassis until the replacement module can be installed.) 4. If you use DC PEMs, make sure the wiring is not reversed. 5. Replace the fan assembly module.
SINGLE FAN FAILURE LED is lit	One fan in the fan assembly module has failed. The fan assembly can cool the chassis sufficiently with three working fans, but replace the failed fan as soon as possible.
MULTI-FAN FAILURE LED is lit	More than one fan has failed, and the fan assembly cannot sufficiently cool the chassis. Replace the failed fans immediately. If necessary, power down the chassis until replacements are available.
Fans run but the system overheats	<ol style="list-style-type: none"> 1. Make sure that all intake and exhaust vents on the front and rear of the chassis are free of blockages. 2. Make sure that the ambient temperature and other environmental factors in the system area are within the ranges specified in the “Displaying System Environment Information” section on page 1-4. 3. Make sure all line cards and blank faceplates are in place. Make sure two PEM modules are installed in the chassis. The cooling system cannot operate effectively unless the chassis is fully enclosed. 4. Check the air filter, and, if necessary, clean or replace it. 5. Reduce the ambient temperature of the area surrounding the Cisco uBR10012 chassis. This can be done using air conditioning, using fans to circulate the air in the room, and closing the blinds on any windows that are facing the sun.

