CHAPTER 4

Troubleshooting the Installation

This chapter provides troubleshooting guidelines for Cisco XR 12406 router. If the solutions provided in this chapter do not make the router fully functional, contact your Cisco service representative for assistance.

Identifying Startup Problems

Startup problems are commonly caused by the power source failures or by a card that is not seated properly in the backplane. Although an overtemperature condition is unlikely at initial startup, the environmental monitoring functions are included here because they also monitor internal voltages.

When you start up the router for the first time, you should observe the startup sequence. The normal startup sequence is as follows:

- Each card in the system has an MBus module and at least one DC-DC converter. Each MBus module controls the DC-DC converter for its card. The MBus module receives direct current voltage directly from the power supplies through the backplane. When the power supply is powered on, each MBus module boots from an onboard electrically erasable programmable read-only memory (EEPROM) device. Each MBus module processor reads a set of identification pins on the card to the backplane connector. These pins tell the MBus module processor what kind of card it is mounted on, which determines how the MBus module will function.
- The clock and scheduler card (CSC), containing the system clock, immediately powers up.
- The MBus module on the RP monitors the progress of the CSC power up. When the CSC has powered up, the MBus module on the RP turns on its DC-DC converter, powering up the RP.
- The RP sends instructions to each line card to power up. Each line card processor begins to perform its own boot process and notifies the RP when the boot process is complete through its MBus module.
- The RP sends a command to each switch fabric card to power up. As each switch fabric card powers up, its progress is monitored by its MBus module processor. When the power-up process is complete, the switch fabric card MBus module notifies the RP that the switch fabric card is online.
- As the boot process progresses for each card, the status of the card is shown on the alphanumeric LED displays. The left display is powered by the DC-DC converter on the card; the right display is powered by the DC voltage that powers the MBus module.

By checking the state of the LEDs on the power supplies and the alphanumeric displays on the RP and line cards, you can determine when and where the system failed in the startup sequence.

Using the System LEDs to Troubleshoot

You can determine when and where the system failed in the startup sequence by checking the state of the LEDs on the power modules and line cards, and on the alphanumeric displays on the RP.

Note You can use the **test gsr led** Cisco IOS software command to perform an LED lamp test, which turns on all of the system LEDs at the same time for a specified period. This test allows you to verify that there are no failed LEDs.

You should observe the following when you power on the router:

- INPUT OK LEDs—These LEDs should light immediately; they should remain on as long as the system is receiving power from the power source and the power switch is in the on position.

  The LEDs indicate the status of the PEM and internal DC voltages. If either LED does not light, or if they shut off while the power switch is on, there could be a problem with either the power source, the internal DC voltage used to power internal components, or the cooling subsystem.

  The LEDs remain on when all of the following conditions are met:

  – AC PEMs: The AC power source voltage is operating between 100-120 VAC and is using 15-Amp service for North America, or is operating between 185-264 VAC and is using 10-Amp service in an international environment.

  – DC PEMs: The DC power source is supplying power to the PEMs and the power switch is in the on position.

Note The amber OUTPUT FAIL LED is normally off, but lights if the PEM detects a fault.

  – The power supplies are providing –48 VDC to internal components.

  - All internal DC voltages are within tolerance.

    If the AC power source or any of the internal DC voltages exceed allowable tolerances, the OUTPUT OK LED shuts off, or will shut off shortly after you turn on the power. Because both the RP (which uses +2.5, +3.3 and +5 VDC), and the fan tray assembly (which uses –48 VDC) are required for operation, a problem with any of the internal DC lines can prevent the system from starting up or continuing operation.

    For example, if there is a problem with the –48 VDC line that supplies the fan tray, the system powers up, but will also recognize that the fans are not operating. The system will initiate a fan failure shutdown sequence, display the appropriate warning messages, and then shut down after two minutes.

    If there is a problem with any of the other DC lines, the RP will not be able to initialize the system software, so the system might attempt to start up and fail during the boot sequence.

- The blower module immediately begins operating.
- The alphanumeric LED displays on the RP indicate the following:
  - The left display indicates which RP software component is running.
  - The right display indicates the phase of the boot process that is currently occurring.

Problem-Solving with Subsystems

The key to solving router problems is to isolate the problem to a specific subsystem. The first step in solving startup problems is to compare what the system *is doing* to what it *should be doing*. Because a startup problem is usually attributable to a single component, it is more efficient to first isolate the problem to a subsystem rather than trying to troubleshoot each component in the system.

For troubleshooting purposes, the Cisco XR 12406 router consist of the following subsystems:

- Power subsystem—Includes the following components:
  - AC-input or DC-input power distribution unit (PDU)
  - AC or DC power entry modules (PEMs). The Cisco XR 12406 router can be configured for source AC or source DC power (you can not mix AC and DC power).
  - Chassis backplane power distribution. The –48 VDC power from the power supplies is transferred to the chassis backplane, which distributes –48 VDC power to the cards in the card cages through the backplane connectors. The blower module receives power from the chassis backplane and passes MBus data back to the chassis backplane through a PDU connector.

    DC-to-DC converters on the two alarm cards convert –48 VDC to +5 VDC and put it back on the chassis backplane, where it is picked up to power the MBus modules on other cards and the blower module.
  - DC-to-DC converters. Each card in the router is equipped with DC-to-DC converters. These converters are controlled by the MBus module on each card. The DC-to-DC converters take –48 VDC and convert it into the voltages required by the card circuitry.
- Processor subsystem—Includes the RP, up to five line cards (when no optional, redundant RP is installed) and two alarm cards. The RP downloads a copy of the Cisco XR IOS image to each line card processor. The system uses alphanumeric LED displays to display status and error messages, which can help in troubleshooting.
- Cooling subsystem—Consists of the blower module, which circulates air through the card cages to cool the cards, and the fan in each of the power modules, which circulates cooling air through the power module bays.

Caution Replace the blower module within 2 minutes of removing it from the chassis or the router will go into a critical failure mode and shutdown due to an overtemp condition.

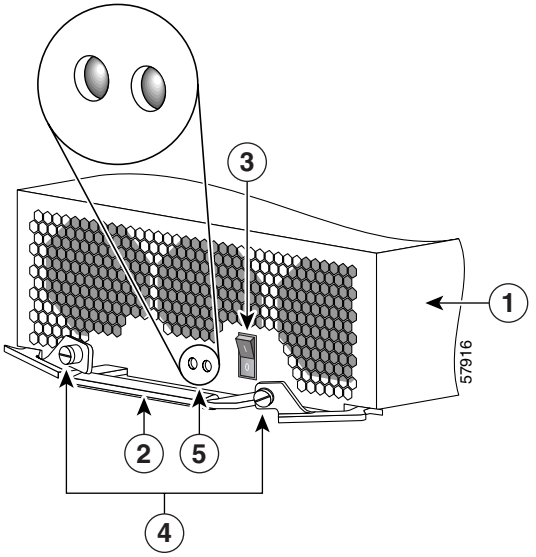
Troubleshooting an AC Power Subsystem

AC PEMs provide –48 VDC OUTPUT. The +5 VDC OUTPUT from the CSF powers the MBus module on each card in the system. The MBus module, in turn, control the DC-DC converters also present on each card in the system. The DC-DC converter takes –48 VDC from the power supply and converts it into +2.5, +3.3 and +5 VDC, which is distributed to the card circuitry.

AC PEMs are monitored by the MBus module and the RP for over- or undervoltage and over- or undercurrent conditions.

Begin checking the AC-input power subsystem by first looking at the LEDs on the AC-input power supplies. Figure 4-1 shows the location of the LEDs on the power supply.

Figure 4-1 AC-Input Power Supply LEDs



1	AC-input power supply	**4**	Captive screws on release levers
2	Handle	**5**	LEDs
3	Power standby switch	–	–

Table 4-1 summarizes the function of these indicators.

Table 4-1 AC-Input Power Supply LED indicators

LED Label	Function	State	Description
AC (Left LED)	Input power	On	AC power source is present and is within specified limits.
		Off	Power source is not within specified limits.
DC (Right LED)	Output Power	On	Power supply is operating normally in a power-on condition.
		Off	Power supply is operating in a fault condition and shutdown has occurred.

The following conditions must exist for an AC PEM to operate normally:

- The PEM is fully seated in its bay and the ejector levers are secured.
- AC-input power is within the required range is correctly connected to PEMs.
- The power switch on the PEM is switched on.
- The green LEDs labeled AC and DC on the PEM are on.

Follow these steps to help isolate a problem with an AC PEM.

Step 1 If the AC LED is off, verify that the power supply is fully seated in its bay, the ejector levers are flush with the power supply faceplate, and the captive screws are secured.

- If the AC LED goes on, go to Step 6.
- If the AC LED remains off, go to Step 2

Step 2 Check the AC power source.

- Check the AC power cord from the power source to the router.
  - Verify that the power cord is seated securely in the PDU and the AC outlet.
  - Verify that the power cord is not worn or damaged. If the insulation appears cracked or broken, or the plugs appear loose, replace the power cord with a new power cord.
- Make sure that the AC power source circuit breaker is on and has not tripped, and that the circuit breaker has the proper current rating.
- Verify that each power supply in the router is attached to a separate AC power source.
- If the router is connected to an uninterruptable power supply (UPS), verify that the UPS is functioning correctly.

Note There may be a UPS for each power supply in the system.

If the AC power source appears to be okay, but the power supply AC LED remains off, go to Step 3.

Step 3 Plug the power cord into a different, but compatible AC outlet.

- If the power supply AC LED goes on, the original AC outlet is faulty and cannot be used. Notify the appropriate facilities personnel and go to Step 6.
- If the power supply AC LED remains off, go to Step 4.

Step 4 Exchange the existing power cord for another power cord.

- If the power supply AC LED goes on, the original power cord is faulty and must be replaced. After replacing the power cord, go to Step 6.
- If the AC LED still fails to go on when connected to a different power source with a new power cord, the power supply is probably faulty. Go to Step 5.

Step 5 If a spare power supply is available, replace the existing module with the spare and restart the system.

- If the AC LED on the spare power supply goes on, the original power supply is faulty and should be returned for replacement. Go to Step 6.

Step 6 Is the power supply DC LED on?

- If yes, the power supply is functioning normally.
- If no, and there is no other system activity (blower module is off; line cards are unpowered), the power supply is faulty and needs to be replaced.
- If no, but the blower module is operating, it means all internal DC voltages are within tolerance. Suspect a faulty DC LED.
  - Use the **show environment** command to check the voltages on each card. The blower module uses –48 VDC.

Note In a Cisco XR 12406 router with two power supplies, the output power from the second power supply is adequate to maintain router operation.

If you are unable to resolve the problem or if you determine that either the power supply or power cable is faulty, contact a service representative for assistance.

Troubleshooting a DC Power Subsystem

The DC PEMs and PDUs provide DC power to the router which is distributed to the card circuitry.

Begin checking the power subsystem by first looking at the three LEDs on PEM. The INPUT OK LED on an DC PEM goes on when DC power is applied; the OUTPUT OK LED goes on when the PEM power switch is turned on.

- The amber OUTPUT FAIL LED is normally off, but goes on if the PEM detects a fault.
- The DC PEMs are monitored by the MBus module and the RP for over-or-under voltage and current conditions.

Figure 4-2 shows the location of the LEDs on the DC PEM.

Figure 4-2 DC-Input Power Entry Module LEDs

1	DC-input PEM	**4**	Captive screws on release levers
2	Handle	**5**	Air inlet for cooling fan
3	ON/OFF circuit breaker switch	—	

Table 4-2 summarizes the function of these indicators.

Table 4-2 DC-Input PEM LED Indicators

LED Label	Color	Function
OUTPUT OK	Green	PEM is operating normally in a powered-on condition.
INPUT OK	Green	DC power is present at the PEM input and within the specified limits.
MISWIRE	Amber	Indicates input is wired backward at the PDU input.

The following conditions must exists for a DC PEM to operate normally:

- The PEM is fully seated in its bay and the ejector levers are secured.
- DC-input power is within the required range is correctly connected to the chassis PDU terminal connector blocks.
- The circuit breaker on the PEM is switched on.
- The green LEDs labeled OUTPUT OK and INPUT OK on the PEM are on, and the amber LED labeled MISWIRE is off.

Follow these steps to help isolate a problem with a DC PEM:

Step 1 Is the MISWIRE LED on?

- If yes, the source DC positive and negative cable leads are connected in reverse order to the terminal connector block on the PDU. Power off the PEM circuit breaker switch and reconnect the cable leads correctly.
- If no, go to Step 2.

Step 2 If the INPUT OK LED is off, verify that the PEM is fully seated in its bay, the ejector levers are flush with the PEM faceplate, and the captive screws are secured.

- If the INPUT OK LED goes on, go to Step 6.
- If the INPUT OK LED remains off, go to Step 3.

Step 3 Verify that the PEM circuit breaker switch is on.

- If yes, go to Step 4.
- If no, switch the circuit breaker on.
  - If the INPUT OK LED remains off, go to Step 4.
  - If the INPUT OK LED goes on, go to Step 6.

Step 4 Power off the PEM circuit breaker switch and check the DC power source.

- Check the DC power wires from the power source to the router.
  - Verify that the power wires are fastened securely at the PDU and the DC source.
  - Verify that the power wires are not worn or damaged. If the insulation appears cracked or broken, have the power wires replaced.
- Make sure that the DC power source circuit breaker is on, and that it has the proper current rating.
- Verify that each PEM in the router is attached to a separate DC power source.
- Power on the PEM circuit breaker.
  - If the PEM INPUT OK LED goes on, go to Step 6.
  - If the PEM INPUT OK LED remains, go to Step 5.

Step 5 Remove the PEM and insert it in the second bay in the router, or into a bay on another Cisco XR 12406 router.

- If the INPUT OK LED remains off, the PEM is faulty and needs to be replaced.
- If the INPUT OK LED goes on, the input portion of the PEM is working normally, go to Step 6.

Step 6 Is the OUTPUT OK LED on?

- If yes, the power source is good and the PEM is operating normally.
- If no, and there is no other system activity (blower module is off; line cards are unpowered), the PEM is fault. Replace the PEM.
- If no, but the blower module is operating, it means all internal DC voltages are within tolerance. Suspect a faulty OUTPUT OK LED.
  - Use the **show environment** command to check the voltages on each card. The blower module uses –48 VDC.

Note In a Cisco XR 12406 router with two power supplies, the output power from the second power supply is adequate to maintain router operation.

If you are unable to resolve the problem or if you determine that either the PEM or power wiring is faulty, contact a service representative for assistance.

Troubleshooting the Processor Subsystem

The Cisco XR 12406 router processor subsystem consists of the RP, the line cards, and the alarm cards. The RP and the line cards each have two processors. One processor is the main processor; the other processor is a component in the MBus module.

- The MBus module begins operation as soon as power is applied to the system. The MBus module determines the type of card it is mounted on and whether it should turn on the DC-DC converter.
- The RP MBus module turns on card power after a brief delay; the line card MBus modules delay turning on power until they receive a command from the RP.

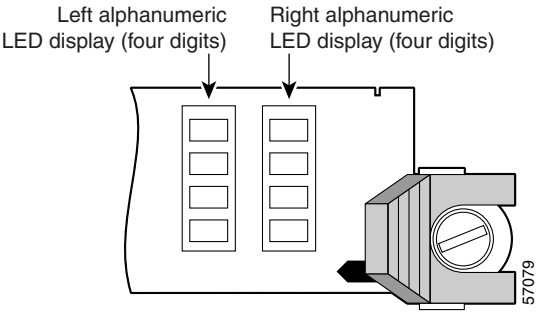
A Cisco XR 12406 router requires that one RP be installed, or the system cannot operate. A line card that is partially connected to the backplane will send incomplete signals to the RP, which could cause the system to hang. If necessary, you can troubleshoot individual line cards, but first ensure that the RP is installed properly and the system software has initialized successfully.

A power-on self-test (POST) runs immediately at power-on to determine the condition of the RP memory. Results are displayed in the alphanumeric LED display as a pass/fail message.

Troubleshooting the RP

The LEDs on the route processor can help you to isolate a problem with the route processor. Figure 4-3 shows the RP alphanumeric LED displays.

Figure 4-3 RP Alphanumeric LED Displays



Each four-digit display shows part of a two-line system message. During the RP boot process, the LED displays present a sequence of messages similar to that shown in Table 4-3.

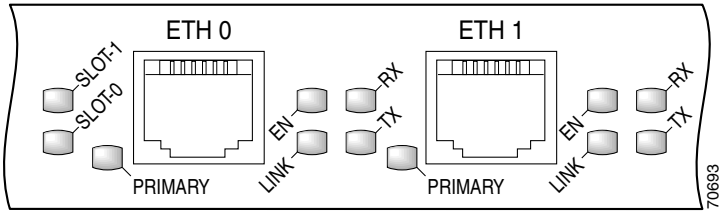
Table 4-3 RP LED Display, Definition, and Source

LED Display	Definition	Source
MROM *nnnn*	The MBus microcode begins to execute; *nnnn* is the microcode version number. For example, microcode version 1.17 displays as 0117.[1] **Note** This display might not be visible because it occurs for only a brief time.	MBus controller
LMEM TEST	Low memory on the RP is being tested.	RP ROM monitor
MEM INIT	The size of main memory on the RP is being discovered.	RP ROM monitor
RP RDY	The system is operational and ready to execute basic Cisco IOS XR software commands at the ROM monitor prompt (`rommon>`).	RP ROM monitor
RP UP	A valid Cisco IOS XR image is running.	RP IOS software
PRI RP	The RP is enabled and recognized as the system primary. A valid Cisco IOS image is running.	RP IOS software
SEC RP	The RP is enabled and recognized as the system secondary. A valid Cisco IOS image is running.	RP IOS software

1. The version of MBus microcode running on your system might be different.

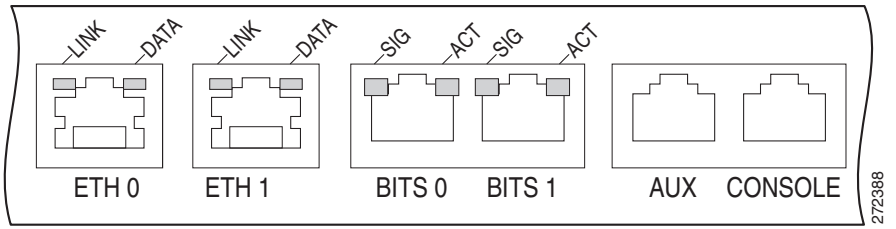
The RP has 8 device or port LED activity indicators that show the status of the Ethernet connections (Figure 4-4).

Figure 4-4 RP LEDs



LINK	Indicates link activity
EN	Indicates the port is enabled
TX	Indicates data transmission
RX	Indicates data reception

Figure 4-5 PRP-3 LEDs



The RJ-45 port LEDs on the RP indicate:

- Which Flash memory card slot is active.
  - Each LED lights when its corresponding PCMCIA slot is accessed (SLOT 0 and SLOT 1).
- Which Ethernet connection is in use.
  - 4 RJ-45 Ethernet port activity LEDs indicate link activity (LINK), port enabled (EN), data transmission (TX), and data reception (RX).

- What is occurring on the Ethernet interface.
  - 2 Ethernet port-selection LEDs (labeled PRIMARY) identify which of the Ethernet connections are selected. Because both ports are supported on the PRP, the LED on port ETH0 is always on. The LED on port ETH1 lights when it is selected.

Check the following to help isolate a problem with the RP:

- Are both alphanumeric LED displays on?
  - The two displays are powered separately. The left display receives power from the DC-DC converter on the RP. The right display is powered directly from the power supply. If the RP is not powered up, its right display may be on. If both displays are off, the RP may not be properly seated in the backplane connector. There also might be a problem with the MBus module on the RP, or the system power supply might be off.
- If both displays are on, check the message being displayed. As soon as the DC-DC converter is turned on by the MBus module, the processor on the RP begins the boot process. Status messages are displayed as the boot process continues. Table 4-4 lists messages that the RP alphanumeric LED can display. If one of the messages appears frozen, the boot process could be halted. Make a note of the message. Turn off the system power supply power switches, then turn them back on to reset the system. This starts the boot process again. If the system halts again, the RP could be faulty and might need to be replaced.
  - If the power modules and blower module appear operational, but none of the RP LEDs or displays are on, suspect that the RP has not been properly installed or that the +5 VDC output from the alarm card is faulty.
  - Turn the power switch for each PEM to the off position.
  - Loosen the two captive screws on the left and right sides of the RP faceplate, and use the ejector levers to eject and reseat the RP. Tighten the captive screws, then power up the system by turning the PEM power switches on.
- Is a critical, major, or minor alarm LED on the alarm card on?
  - If any of the three alarm card alarm LED pairs is on, a fault has been detected in the system. Check the console for messages indicating the source of the problem.

– There could be a false error indication originating from the RP (Table 4-4). Try reseating the RP. If that does not work you must replace the RP.

Caution The RP reset switch resets the RP and the entire system. To prevent system errors and problems, use it only at the direction of a Cisco-certified service representative.

Table 4-4 RP Alphanumeric LED Messages

LED Display[1]	Indications[2]
LMEM TEST	Low-memory test running
LCAH INIT	Lower 15k cache initialization
BSS INIT	Initialize main memory for ROM
NVRAM INIT	Initialize NVRAM
EXPT INIT	Initialize interrupt handlers
TLB INIT	Initialize TLB
CACH INIT	Initialize CPU data and instruction cache
CACH PARY	Enable CPU cache parity
MEM INIT	Initialize main memory
NVRAM SIZE	Size of the NVRAM
PCMC INIT	Initialize the PCMCIA

Table 4-4 RP Alphanumeric LED Messages (continued)

LED Display[1]	Indications[2]
EXIT INIT	Exit the initialization sequence
IOS UP	The Cisco XR IOS software is up and running
MSTR RP	The RP is enabled and recognized by the system

1. The messages shown do not indicate a specific sequence.
2. Some messages appear for a fraction of a second; others last several seconds.

PRP-3 Alphanumeric LEDs

The following section discusses the alphanumeric LED messages and the console output displayed in sequence for a single PRP-3 and for dual PRP-3. The alphanumeric LED messages help in identifying the state of the route processor and accordingly troubleshooting the problems faced.

Single PRP-3 Scenario

Table 4-5 displays the alphanumeric LED messages and the console output when the chassis is powered on or when the PRP-3 board is inserted into the slot.

Table 4-5 Single PRP-3 Alphanumeric Display LED—Chassis Is Powered ON/Inserting PRP-3

LED Display	Description or Console Message
02A8/HW OK/RIO	Immediately when the board is powered on.
OK/CPU SENT/RPT	Displays "1.330GHz dual-core MPC8641D Rev 2.1, 532MHz MPXclk".
INIT/MEM	Displays "Discovering memory in slot DIMM1 ..... Found 2GB DIMM Discovering memory in slot DIMM2 ..... Found 2GB DIMM"

LED Display	Description or Console Message
TEST/MEM	Displays "Testing low memory ..... OK Loading main ROMMON image ..... OK Verifying loaded image ..... OK Load succeeded; launching target ..... OK"
LNCH/RMON	Displays “Cisco ROMMON System Bootstrap, Version 0.16.0 (bld1) DEVELOPMENT SOFTWARE Compiled on 08/27/08 at 15:04:49 PDT [BLD-rommon] Copyright (c) 1994-2008 by Cisco Systems, Inc. MPC8641D platform with 4 GB of main memory"
RDY/RP	DISPLAYS "Loading disk0:c12k-os-mbi-3.8.0.15I/mbiprp-rp.vm (14809672 bytes)... !!!"

LED Display	Description or Console Message
RUN/IOX	Displays “RP/0/2/CPU0:Sep 10 15:56:29.018: syslogd_helper: [84]: dsc_event_handler: Got SysMgr dSC event : 1 RP/0/2/CPU0:Jan 1 00:00:04.809 : mbus-prp3[58]: mbus-prp3: mbus_platform_init() failed (0x6). RP/0/2/CPU0:Sep 10 15:56:07.015 : dumper[53]: No HDD Controller found by process dumper RP/0/2/CPU0:Sep 10 15:56:21.538 : sysmgr[85]: %OS-SYSMGR-5-NOTICE : Card is COLD started RP/0/2/CPU0:Sep 10 15:56:22.622 : dsc[169]: Memory Sanity Check Enabled RP/0/2/CPU0:Sep 10 15:56:29.007 : dsc[169]: %PLATFORM-DSC-3-ERR_I_AM_DSC : Setting myself as DSC RP/0/2/CPU0:Sep 10 15:57:20.071 : sysldr[370]: %PLATFORM-POWERMGR-3-ROM_ERROR_STATUS : Unable to get Mbus ROM status from SYSDB. Error ='sysdb' detected the 'warning' condition 'A SysDB client tried to access a nonexistent item or list an empty directory' RP/0/2/CPU0:Sep 10 15:57:25.078 : sysldr[370]: % PLATFORM-SYSLDR-6-INFO : Waiting for startup config to be applied before booting LCs Primary Clock is CSC_1 Fabric Clock is Redundant Bandwidth Mode : Full Bandwidth
RP/ACTV	When RP is up and running Cisco IOS XR software.

Table 4-6 displays the alphanumeric LED messages and the console output when the chassis is loaded from ROMMON.

Table 4-6 Single PRP-3 Scenario — Chassis loaded from ROMMON

LED Display	Description or Console Message
INIT/NV	Displays the LED message during the initialization of the NVRAM infra code.
OK/RIO	Displays the LED message immediately when the board is powered ON.
OK/CPU	Displays "1.330GHz dual-core MPC8641D Rev 2.1, 532MHz MPXclk".
CONT...	

Dual PRP-3 Scenario

If dual PRP-3 is installed and the chassis is powered on or a board is inserted, all the LED messages are same as for a single PRP-3, except for an LED message '1404/MRAM' that is displayed on the front panel when the console display is as follows:

```
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.
           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706
Cisco IOS XR Software for the Cisco XR PRP, Version 3.8.0.15I
Copyright (c) 2008 by Cisco Systems, Inc.
RP/0/2/CPU0:Sep 10 16:34:19.351: syslogd_helper: [84]:
dsc_event_handler: Got SysMgr dSC event : 1
```

Tip The LED message "I404/MRAM" is displayed between RDY/RP and RUN/IOX alphanumeric messages.

Table 4-7 displays the LED alphanumeric messages on a standby PRP-3, if the current active PRP-3 is reloaded.

Table 4-7 Dual PRP-3 Scenario

LED Display	Description or Console Message
INIT/NV	Displays the LED message during the initialization of the NVRAM infra code.
02A8/HW OK/RIO	LED message displayed immediately after the board is powered on.
OK/CPU SENT/RPT	Displays "1.330GHz dual-core MPC8641D Rev 2.1, 532MHz MPXclk".
INIT/MEM	Displays "Discovering memory in slot DIMM1 ..... Found 2GB DIMM Discovering memory in slot DIMM2 ..... Found 2GB DIMM"
TEST/MEM	Displays "Testing low memory ..... OK Loading main ROMMON image ..... OK Verifying loaded image ..... OK Load succeeded; launching target ..... OK"
LNCH/RMON	Displays “Cisco ROMMON System Bootstrap, Version 0.16.0 (bld1) DEVELOPMENT SOFTWARE Compiled on 08/27/08 at 15:04:49 PDT [BLD-rommon] Copyright (c) 1994-2008 by Cisco Systems, Inc. MPC8641D platform with 4 GB of main memory"
RDY/RP or PWRD	DISPLAYS "Loading disk0:c12k-os-mbi-3.8.0.15I/mbiprp-rp.vm (14809672 bytes)... !!!" **Tip** Instead of RDY/RP, sometimes PWRD is displayed in the normal booting process.

LED Display	Description or Console Message
RUN/MBI	Displays “Copyright (c) 2008 by Cisco Systems, Inc. Install (Node Preparation): Install device root is /disk0/ Install (Node Preparation): Using boot device sequence compactflash: from rommon Install (Node Preparation): Trying device disk0: Install (Node Preparation): Checking size of device disk0: Install (Node Preparation): OK Install (Node Preparation): Checking free space on disk0: Install (Node Preparation): OK Install (Node Preparation): Starting package and meta-data sync Install (Node Preparation): Cleaning packages not in sync list Install (Node Preparation): Complete Install (Node Preparation): Syncing package/meta-data contents: /disk0/instdb/ldpath Install (Node Preparation): Please Wait... Install (Node Preparation): Completed syncing: /disk0/instdb/ldpath Install (Node Preparation): Syncing package/meta-data contents: /disk0/instdb/ldpath.committed Install (Node Preparation): Please Wait... Install (Node Preparation): Completed syncing: /disk0/instdb/ldpath.committed Install (Node Preparation): Completed sync of all packages and meta-data.
RP/STBY	ios con0/2/CPU0 is in standby

Troubleshooting the Line Cards

As each line card powers up, a power-on self-test (POST) is performed on the line card memory. A full set of field diagnostics can also be run on a line card from the system console, providing a pass/fail message both in the line card alphanumeric LED display and on the system console.

To help isolate a problem with a line card, visually check the two alphanumeric LED displays.

- Are both alphanumeric LED displays on?

  The two displays are powered separately. The left display receives power from the DC-DC converter on the line card. The right display is powered directly from the backplane. Therefore, even if the line card has not powered up, the right display could be on.

- If both displays are off:
  - The line card may not be fully seated into the backplane connector.
  - There may be a problem with the MBus module on the line card.
  - The system power could be off.

- If both displays are on:
  - Check the message being displayed. As soon as the DC-DC converter is turned on by the MBus module, the processor on the line card begins the boot process. Status messages are displayed in the alphanumeric displays as the boot process continues on the line card.

The system attempts to boot identical line cards in parallel. In addition, the system boots line cards as soon as they are powered on and become available for backup.

During the line card boot process, which occurs immediately after the RP boot process, you can observe the alphanumeric LED displays on each line card (Table 4-8).

Table 4-8 Line Card LED Display, Definition, and Source

LED Display[1]	Definition	Source
MROM *nnnn*	MBus microcode begins to execute; *nnnn* is the microcode version number. For example, microcode version 1.17 would display as 0117.[2]	MBus controller
LMEM *TEST*	Low memory on the line card is being tested.	Line card ROM monitor
MEM *INIT*	Main memory on the line card is being discovered.	Line card ROM monitor
ROMI *GET*	ROM image is being loaded into line card memory.	RP Cisco IOS XR software
FABL WAIT	Line card is waiting for the fabric downloader to load.[3]	RP Cisco IOS XR software
FABL DNLD	Fabric downloader is being loaded into line card memory.	RP Cisco IOS XR software
FABL STRT	Fabric downloader is being launched.	RP Cisco IOS XR software
FABL RUN	Fabric downloader has been launched and is running.	RP Cisco IOS XR software
IOS DNLD	Cisco IOS XR software is being downloaded into line card memory.	RP Cisco IOS XR software
IOS STRT	Cisco IOS XR software is being launched.	RP Cisco IOS XR software
IOS UP	Cisco IOS XR software is running.	RP Cisco IOS XR software
IOS RUN	Line card is enabled and ready for use.	RP Cisco IOS XR software

1. The LED sequence shown in Table 4-8 might occur too quickly for you to view. The sequence in this table is provided as an example of how the line cards should function at startup.
2. The numeric display might not be visible, because it occurs for only a brief time.
3. The fabric downloader loads the Cisco IOS XR software image onto the line card.

Table 4-9 provides a list of messages that can be displayed by the line card alphanumeric LED display. Some of these messages are displayed only for a fraction of a second; others last for several seconds.

Table 4-9 Line Card Alphanumeric LED Display Messages

LED Display[1]	Indications[2]
MEM TEST	POST memory test running
LROM RUN	POST memory test has finished running
BSS INIT	Initialize main memory for ROM
RST SAVE	Save reset reason register
IO RST	Reset the I/O system on the card
EXPT INIT	Initialize interrupt handlers
TLB INIT	Initialize TLB
CACH INIT	Initialize CPU data and instruction cache
MEM INIT	Initialize main memory
LROM RDY	Ready to access download
ROMI GET	Getting ROM images
FABL WAIT	Wait for load of fabric downloader
FABL DNLD	The fabric downloader loads
FABL STRT	The fabric downloader launches

Table 4-9 Line Card Alphanumeric LED Display Messages (continued)

LED Display[1]	Indications[2]
FABL RUN	The fabric downloader launch is complete
IOS DNLD	The Cisco XR IOS software downloads
IOS STRT	The Cisco XR IOS software launches
IOS UP	The Cisco XR IOS software runs in DRAM
IOS RUN	The line card is enabled and ready for use

1. The messages shown do not indicate a specific sequence.
2. Some messages appear only for a fraction of a second; others last several seconds.

Troubleshooting the Alarm Cards

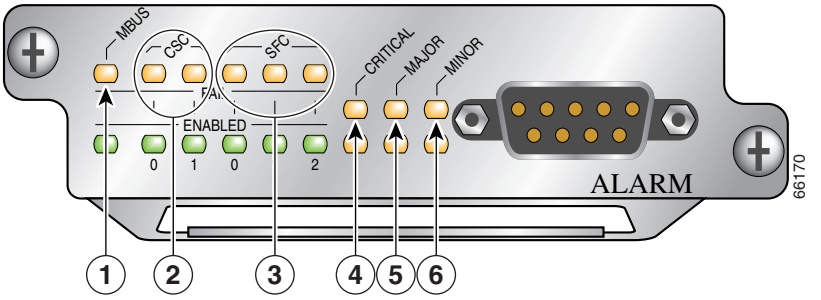
The Cisco XR 12406 router uses two alarm cards to monitor the status of the CSCs and SFCs and to indicate various alarm conditions. The alarm cards have four primary functions:

- Redundant generation of the DC MBus supply voltage for the line cards
- Power system monitoring functions
- OK/FAIL status indication of the CSCs and SFCs
- Hardware implementation of the alarm system relay outputs and indicators

To help isolate a problem, you can visually check the LEDs on the alarm cards.

Figure 4-6 shows the location of the alarm card LEDs.

Figure 4-6 Alarm Card LEDs



1	MBus status LED	**4**	Critical alarm LED
2	CSC status LEDs (two)	**5**	Major alarm LED
3	SFC status LEDs (three)	**6**	Minor alarm LED

The following LED conditions are displayed when the system is operating properly:

Note Green = ENABLED, amber = FAIL

- The following green LEDs are normally on:
  - The MBUS status LED
  - Two CSC status LEDs
  - Three SFC status LEDs
- The following amber LEDs are normally off:
  - The MBUS status LED
  - Two CSC status LED
  - Three SFC status LEDs
- The three amber router alarm (CRITICAL, MAJOR, MINOR) LEDs are normally off.

Monitoring Alarm Card Status

The MBUS LEDs indicate the operational status of the alarm card.

- A green MBUS LED indicates that the card has been detected by the system and is operating properly.
- An amber MBUS LED indicates that the system has detected a fault in the alarm card.

Monitoring Clock Scheduler Card Status

The CSC 0 and CSC 1 LEDs indicate the status of the clock scheduler cards:

- A green LED indicates that the CSC is operating properly.
- An amber LED indicates that there is a CSC fault and a warning message is logged on the system console describing the fault. The system will continue to operate during a CSC fault condition.

Monitoring Switch Fabric Card Status

The SFC 0, SFC 1, and SFC 2 LEDs indicate the status of the switch fabric cards.

- A green LED for each SFC indicates that the SFC is operating properly.
- An amber LED indicates that there is an SFC fault and a warning message is logged on the system console describing the fault. The system will continue to operate during a SFC fault condition.

Monitoring Critical, Major, and Minor Alarm Status

The alarm card uses three pairs of alarm status LEDs to identify system alarm conditions detected through the MBus. Those alarm conditions are:

- Critical
- Major
- Minor

Note The alarm status LEDs are paired for redundancy to protect against a single failed LED. If any of the six LEDs is on, check the system console for messages describing the fault.

Because there are two alarm cards in the Cisco XR 12406 router, a system alarm condition detected through the MBus causes the same LEDs to light on both alarm cards.

The alarms can warn of an overtemperature condition on a component in one of the card cages, a fan failure in a blower module, an overcurrent condition in a power supply, or an out-of-tolerance voltage on one of the cards in one of the card cages. The LEDs are driven by MBus software, which sets the threshold levels for triggering the different stages of alarms.

The RP continuously polls the system for temperature, voltage, current, and fan speed values. If an over-threshold value is detected, the RP:

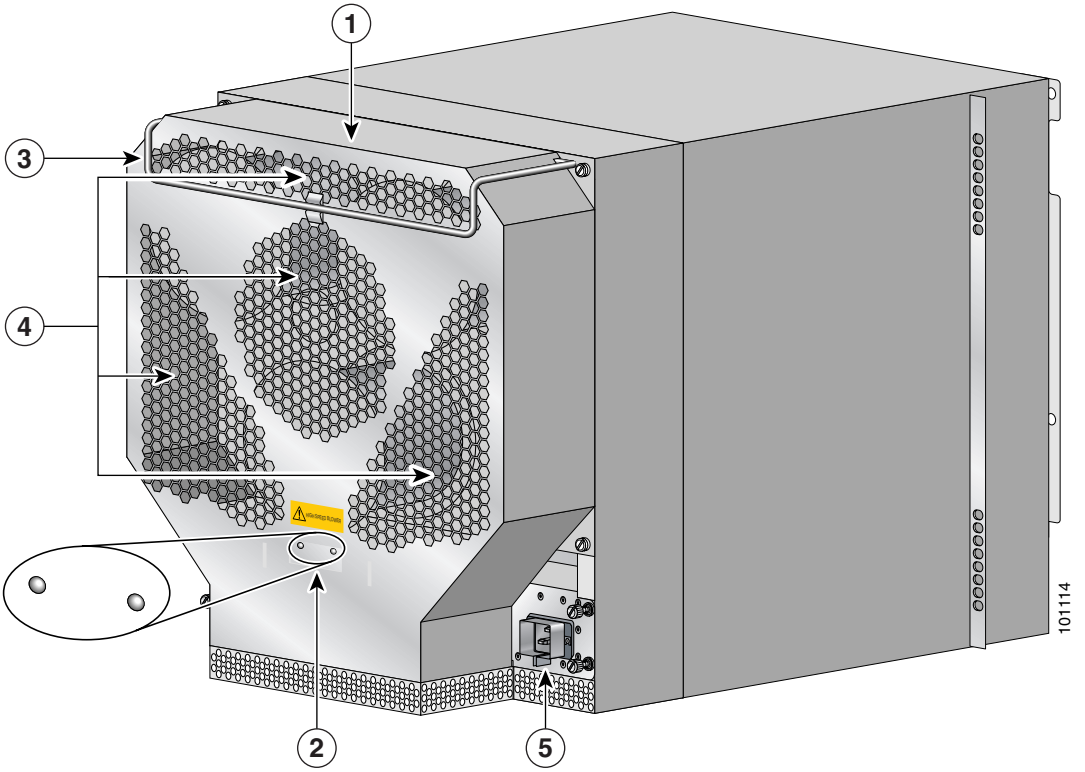
- Sets the appropriate alarm severity level on the alarm card
- Lights one of the LEDs on the alarm display
- Energizes the appropriate alarm display relays
- Activates any external audible or visual alarms wired to the alarm display
- Logs a message about the threshold violation on the system console

Troubleshooting the Cooling Subsystem

The Cisco XR 12406 router has a blower module located on the rear of the chassis, which provides cooling air for the router components. The blower module receives power and signals though a connector recessed in the blower module. This connector mates with a connector mounted on the PDU. The blower module contains three fans, one connector, and one controller card.

Figure 4-7 shows the location of the LEDs on the blower module.

Figure 4-7 Blower Module Location and Features



1	Blower module	**4**	Air exhaust vents
2	Blower module LEDs	**5**	Power distribution unit (PDU)
3	Blower module handle	—	

There are two LEDs on the blower module at the rear of the chassis.

- OK (green)—Indicates the blower module is functioning normally.
- FAIL (red)—Indicates there is a failure in the blower module. The FAIL LED should remain off during normal operation.

If the green LED is off and/or the red LED is on, check the following to help isolate a problem with the cooling system:

- Listen for the blower fans. In noisy environments, place your hand behind the blower module to feel for air being forced out the exhaust vents. If the blower module fans are on, the DC voltage from the power modules to the blower module is correct.
- If the blower module fans are not on, there could a problem with either the blower module or the DC power from the power modules.
  - Check the output power LED on each power module (DC LED on an AC PEM; OUTPUT OK LED on a DC PEM). If the output power LED on a power module is off, but the input power LED is on, the power module is probably faulty and should be replaced.
  - If the output power LED on the power module is on (DC output is OK), but the blower module remains off, make sure that the blower module is seated properly in the chassis.

    Remove the blower module by loosening the four captive screws holding it to the chassis, pull the blower module away from the chassis, then firmly push the blower module against the chassis to reseat the blower module. Tighten the four captive screws.
- If the blower module remains off, there could be a problem with the blower module controller card and the blower module should be replaced.
- The following console monitor message indicates that the system has detected an overtemperature or out-of-tolerance power condition in the router:

```
Queued messages:
%ENVM-1-SHUTDOWN: Environmental Monitor
initiated shutdown
```

  If an environmental shutdown results from an out-of-tolerance power condition, the output fail LED on the PEM will light before the system shuts down. Refer to the "Troubleshooting the Processor Subsystem" section on page 4-13."
- Although overheating is unlikely at initial startup, be sure that heated exhaust air from other equipment is not entering the air filter, and that there is sufficient clearance (at least 6 inches (15.24 cm)) around the front and rear of the chassis to allow cooling air to enter and hot air to exhaust.
- Check the condition of the two air filters located in slots on the right side of the chassis. If the air filters appear dirty, remove the filters and either vacuum them or replace them.

- The preceding message could also indicate a faulty component or temperature sensor. Before the system shuts down, use the **show environment all** or **show environment table** command to display the internal system environment, including voltages and temperatures measured at each card.

If you are still unable to resolve the problem, contact a service representative for assistance.