



## Maintenance

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This chapter describes basic maintenance for the Cisco uBR7100 series router. The chapter contains the following sections:

- [Online Insertion and Removal, page 6-1](#)
- [Environmental Monitoring and Reporting Functions, page 6-2](#)
- [Flash Memory Card Usage, page 6-5](#)
- [Upgrading the SDRAM Memory Modules, page 6-11](#)

### Online Insertion and Removal

The port adapter in the Cisco uBR7100 series router supports online insertion and removal (OIR). This function allows you to install and replace the port adapter while the universal broadband router is operating. In most instances, you do not need to shut down system power.

The following is a functional description of OIR; for specific procedures to install, configure, or replace a port adapter, refer to the appropriate port adapter documentation at the following URL:

[http://www.cisco.com/en/US/docs/interfaces\\_modules/port\\_adapters/roadmaps/11022pa.html](http://www.cisco.com/en/US/docs/interfaces_modules/port_adapters/roadmaps/11022pa.html)

The port adapter has a bus connector that connects it to the universal broadband router's midplane. Each midplane connector has a set of tiered pins in three lengths. The pins send specific signals to the system as they make contact with the port adapter. The system assesses the signals it receives and the order in which it receives them to determine if a board is being removed or inserted into the midplane. From these signals, the system determines whether to reinitialize a new interface or shut down a removed interface.

For example, when inserting a port adapter, the longest pins make contact with the port adapter first, and the shortest pins make contact last. The system recognizes the signals and the sequence in which it receives them.

When you remove or insert a port adapter in a Cisco uBR7100 series router, the midplane pins send signals to notify the system, which then performs as follows:

1. Rapidly scans the midplane for configuration changes.
2. Initializes the newly inserted port adapter, noting any removed interfaces and placing them in the administratively shutdown state.
3. Brings all previously configured interfaces on the port adapter back to the state they were in when they were removed. Any newly inserted interfaces are put in the administratively shutdown state, as if they were present (but not configured) at boot time. If a similar port adapter is reinserted into a slot, its ports are configured and brought online up to the port count of the original port adapter.

You can remove and replace a port adapter with the same type of component without interrupting the system. To replace a port adapter with a different type of port adapter (for example, replacing a HSSI adapter with an ATM adapter), you must copy your startup configuration to your running configuration on the Cisco uBR7100 series router to enable the interfaces on the port adapter.

## Environmental Monitoring and Reporting Functions

Environmental monitoring and reporting functions are controlled by the network processor and allow you to maintain normal system operation by identifying and resolving adverse conditions that might disrupt operation.

The environmental monitoring functions constantly monitor the internal chassis air temperature and power supply voltages and currents. The power supply monitors its own voltage and temperature and shuts itself down if it detects a critical condition within the power supply. The reporting functions periodically log the values of measured parameters so that you can retrieve them for analysis later, and the reporting functions display warnings on the console if any of the monitored parameters exceed defined thresholds.

The front and back of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis; we recommend at least 3 inches (7.6 cm) of clearance. Temperature sensors in the router monitor the internal air temperature and send warning messages when the internal air temperature exceeds the specified threshold.

### Environmental Monitoring

The environmental monitoring functions use four sensors to monitor the temperature of the cooling air as it moves through the chassis.

If the air temperature exceeds a defined threshold, the router displays warning messages on the console terminal. The system stores the present parameter measurements for both temperature and power voltage in NVRAM so you can retrieve them later.

In addition, the power supply monitors the internal power supply temperature and voltages. A power supply is either within tolerance (normal) or out of tolerance (critical). If the internal power supply temperature or voltage reaches a critical level, the power supply shuts down without any interaction with the system processor.

The environmental monitoring functions use the following levels of status conditions to monitor the system:

- Normal—All monitored parameters are within normal tolerances.
- Warning—The system has exceeded a specified threshold. The system continues to operate, but operator action is recommended to bring the system back to a normal state.
- Critical—An out-of-tolerance temperature or voltage condition exists. The system continues to operate; however, immediate operator action is required.

[Table 6-1](#) lists the typical temperature thresholds for each network processor type, and [Table 6-2](#) lists the power thresholds for the normal, warning, and critical (power supply-monitored) levels.

**Table 6-1 Typical Processor-Monitored Temperature Thresholds**

Parameter	High Warning	High Critical
Core	120°F (49°C)	129°F (54°C)
Chassis inlet	109°F (43°C)	118°F (48°C)
Chassis outlet 1	114°F (46°C)	123°F (51°C)
Chassis outlet 2	116°F (47°C)	125°F (52°C)

**Note**

If the system reports temperatures in the critical range, you must manually shut down the router. The processor does not shut down the router automatically.

**Table 6-2 Typical Power Supply-Monitored Voltage Thresholds**

Parameter	Low Critical	Low Warning	High Warning	High Critical
+2.5 V	+2.35 V	+2.39 V	+2.69 V	+2.72 V
+3.3 V	+3.11 V	+3.19 V	+3.39 V	+3.47 V
+5.15 V	+4.88 V	+5.00 V	+5.23 V	+5.39 V
+12.3 V	+11.53 V	+11.77 V	+12.76 V	+13.05 V
+12.3 V	+11.53 V	+11.77 V	+12.76 V	+13.05 V
-12.5 V	-10.20 V	-11.24 V	-13.71 V	-14.33 V

## Displaying Environmental Status Reports

Cisco uBR7100 series routers display warning messages on the console if chassis interface-monitored parameters exceed a desired threshold. You can also retrieve and display environmental status reports with the **show environment**, **show environment all**, **show environment last**, and **show environment table** commands. Parameters are measured and reporting functions are updated every 60 seconds. A brief description of each of these commands follows.

**Caution**

To prevent overheating the chassis, ensure that your system is drawing cool inlet air. Overtemperature conditions can occur if the system is drawing in the exhaust air of other equipment. Ensure adequate clearance around the sides of the chassis so that cooling air can flow through the chassis interior unimpeded and exhaust air exits the chassis and is not drawn into the inlet vent of other device.

The **show environment** command displays the current environmental status of the system. The report displays parameters that are out of the normal values. No parameters are displayed if the system status is normal. The example that follows shows the display for a system in which all monitored parameters are within normal range:

```
Router# show environment
All measured values are normal
```

If the environmental status is *not* normal, the system reports the worst-case status level. Following is a sample overvoltage warning:

```
Router# show environment
Warning: +3.3 V measured at +3.41 V
```

The **show environment last** command retrieves and displays the NVRAM log, which provides a record of environmental status readings. Air temperature is measured and displayed, and the voltage supplied by the power supply is also displayed.

Following is sample output of the **show environment last** command:

```
Router# show environment last

chassis core           previously measured at 34C/93F
chassis inlet         previously measured at 28C/82F
chassis outlet 1     previously measured at 31C/87F
chassis outlet 2     previously measured at 33C/91F
+2.5 V                previously measured at +2.59
+3.3 V                previously measured at +3.32
+5.15 V              previously measured at +5.13
+12.3 V              previously measured at +12.99
+12.3 V              previously measured at +12.33
-12.5 V              previously measured at -12.43
```

The **show environment table** command displays the temperature and voltage thresholds for each temperature sensor and for each monitored status level, which are related to those thresholds listed in [Table 6-1](#) and [Table 6-2](#).

Following is sample output of the **show environment table** command:

```
Router# show environment table

Sample Point      LowCritical  LowWarning  HighWarning  HighCritical
chassis core           49C/120F    54C/129F
chassis inlet         43C/109F    48C/118F
chassis outlet 1     46C/114F    51C/123F
chassis outlet 2     47C/116F    52C/125F
+2.5 V                +2.35       +2.39       +2.69       +2.72
+3.3 V                +3.11       +3.19       +3.39       +3.47
+5.15 V              +4.88       +5.00       +5.23       +5.39
+12.3 V              +11.53      +11.77      +12.76      +13.05
+12.3 V              +11.53      +11.77      +12.76      +13.05
-12.5 V              -10.20      -11.24      -13.71      -14.33
```



#### Note

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Temperature ranges and values are subject to change.

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The **show environment all** command displays an extended report that includes temperature readings and voltage readings.

Following is sample output of the **show environment all** command:

```
Router# show environment all

Power Supply:
  Power supply is standard power supply. Unit is on.
Temperature readings:
  chassis core       measured at 33C/91F
  chassis inlet     measured at 27C/80F
  chassis outlet 1  measured at 30C/86F
  chassis outlet 2  measured at 32C/89F
```

```
Voltage readings:
+2.5 V measured at +2.59 V
+3.3 V measured at +3.32 V
+5.15 V measured at +5.13 V
+12.3 V measured at +12.29 V
+12.3 V measured at +12.33 V
-12.5 V measured at -12.43 V

Envm stats saved 2 time(s) since reload
```

## Fan Failures

When the system power is on, all four fans should be operational. The system continues to operate if a fan fails; however, if the air temperature exceeds a defined threshold, the router displays warning messages on the console terminal.

For complete descriptions and instructions of the environmental monitor commands, refer to the *Cisco IOS Configuration Fundamentals Configuration Guide* at the following URL:

[http://www.cisco.com/en/US/docs/ios/12\\_2/configfun/configuration/guide/ffun\\_c.html](http://www.cisco.com/en/US/docs/ios/12_2/configfun/configuration/guide/ffun_c.html)

and the *Cisco IOS Configuration Fundamentals Command Reference* at the following URL:

[http://www.cisco.com/en/US/docs/ios/12\\_2/configfun/command/reference/ffun\\_r.html](http://www.cisco.com/en/US/docs/ios/12_2/configfun/command/reference/ffun_r.html)

## Flash Memory Card Usage

The Cisco uBR7100 series router has two Personal Computer Memory Card International Association (PCMCIA) slots for Type II flash memory cards. Slot 0 is the lower PCMCIA card slot and slot 1 is the upper PCMCIA card slot.

The following sections describe how to insert, remove, and format a flash memory card

## Inserting a Flash Memory Card

To insert a flash memory card in either PCMCIA slot of the Cisco uBR7100 series router, use the following procedure. You do not need to power off the system to insert a flash memory card.



### Note

To avoid potential problems when inserting spare flash memory cards in your Cisco uBR7100 series universal broadband router, we recommend that you reformat all of your flash memory cards during your regularly scheduled service times. The “[Formatting a Flash Memory Card](#)” section on page 6-8 contains instructions that explain how to reformat a flash memory card.

### Step 1

Locate the PCMCIA card slots. For proper electromagnetic compliance (EMC), the slots have a cover that is secured with a captive screw. (See [Figure 6-1](#).)

### Step 2

Use a flat-head screwdriver to loosen the captive screw that secures the protective cover, and lift the protective cover. (See [Figure 6-2](#).)

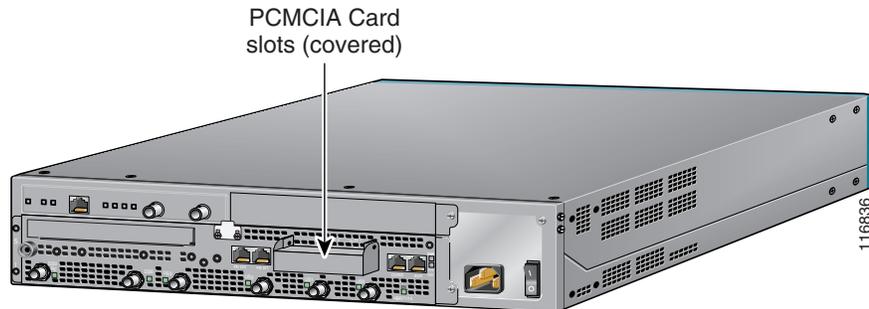


### Tip

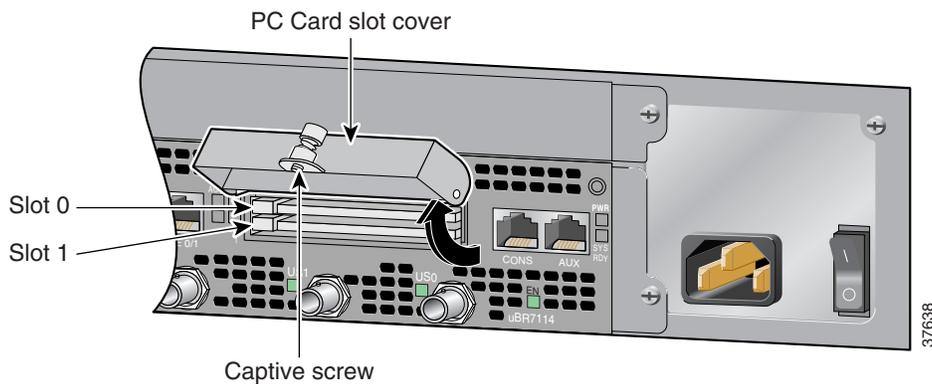
The flash disk memory card slots are labelled slot 0 and slot 1 on the chassis, but the flash disk memory cards themselves are addressed as disk0 and disk1, respectively, when using Cisco IOS commands.

- Step 3** Orient the flash memory card so that its connector end faces the appropriate slot. Make sure that the back label is facing up. (See [Figure 6-3](#).)

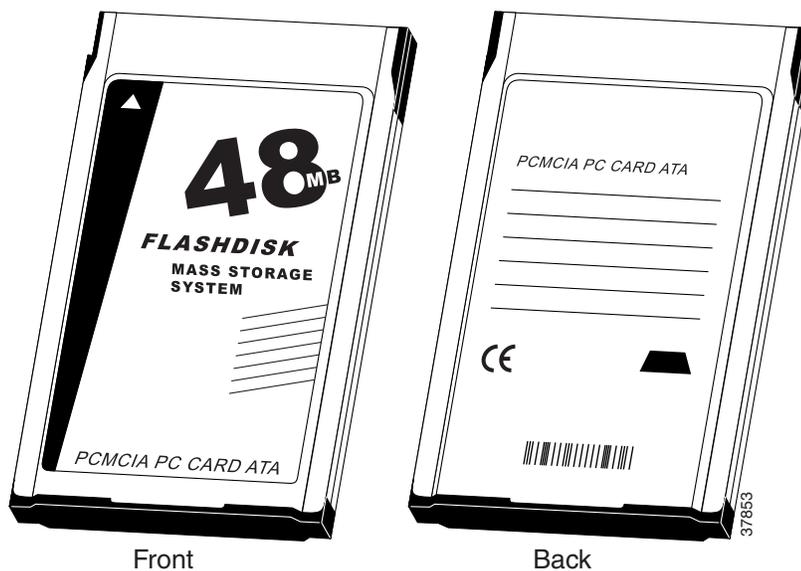
**Figure 6-1** Location of the PCMCIA Card Slot



**Figure 6-2** Removing the PCMCIA Card Slot Cover



**Figure 6-3** Flash Disk Card



Front

Back

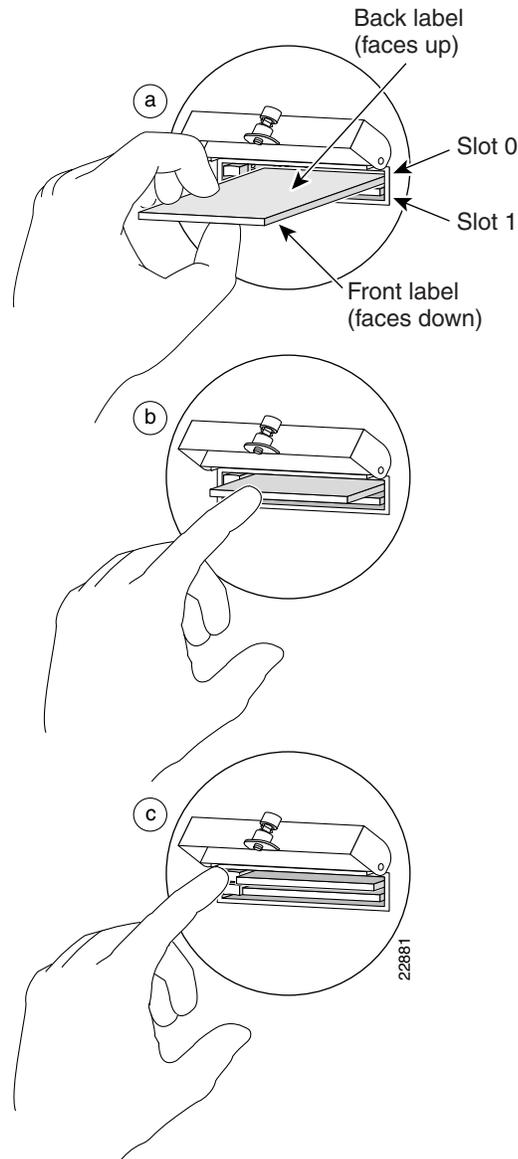
**Note**

The flash disk PC card must be installed with the back label facing up. The card is keyed and cannot be seated the wrong way.

**Step 4**

Carefully guide the card into the slot until it mates with the slot's connector and the eject button for the slot pops out toward you. (See [Figure 6-4](#).)

**Figure 6-4** Inserting and Ejecting a Flash Disk Memory Card

**Note**

Flash memory cards do not insert all the way into the PCMCIA slots; the end of the card protrudes from the slot. Do *not* attempt to force the card past this point.

## Removing a Flash Memory Card

To remove a flash memory card from either PCMCIA slot:

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- Step 1** Use a flat-head screwdriver to loosen the captive screw that secures the protective cover, and lift the protective cover.
  - Step 2** Press the ejector button on the slot. (See [Figure 6-4c.](#))
  - Step 3** Grasp the card and pull it from the slot and place the card in an antistatic bag.
- 

## Formatting a Flash Memory Card

The flash memory card that shipped with your router contains the Cisco IOS software image you need to boot your router. In some cases, you might need to insert a new flash memory card and copy images or backup configuration files onto it. Before you can use a new flash memory card, you must format it. (Use only Type II PCMCIA flash memory cards provided by Cisco.)



### Tip

To avoid potential problems when inserting spare flash memory cards in your Cisco uBR7100 series router, we recommend that you reformat all your flash memory cards during your regularly scheduled service times.



### Caution

The following formatting procedure erases all information on the flash memory card. To prevent the loss of important data that might be stored on a flash memory card, proceed carefully. If you want to save the data on a flash memory card, copy the data to a server before you format the card.



### Note

The following procedure assumes that you have already booted your router.

To format a new flash memory card:

- 
- Step 1** Using the procedure described in the [“Inserting a Flash Memory Card”](#) section on page 6-5, insert the flash memory card into slot 0. (If slot 0 is not available, use slot 1.)
  - Step 2** To format the flash memory card, use the **format disk0:** (or **format disk1:**) command as follows:

```
Router# format disk0:
```

```
All sectors will be erased, proceed? [confirm]
Enter volume id (up to 30 characters): MyNewCard
Formatting sector 1
Format device disk0 completed
Router#
```

The system counts down the sectors as they are formatted. For example, a 48-MB flash memory card contains 384 sectors, and the display counts backwards from 384 to 1.

When the format routine reaches sector 1, the new flash memory card is formatted and ready to use.

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```
Router(config)# boot system flash disk0:new.image
Router(config)# ^z
Router# copy running-config startup-config
Router# reload
```



---

**Note** In this example, the exclamation points (!!!) appear as the file is downloaded, and the “C” characters signify calculation of the checksum, which is a verification that the file has been correctly downloaded to the flash memory card.

---

When the system reloads, it boots the new.image file from the flash memory card.

---

## Copying Bootable Images Between Flash Memory Cards

As future releases of Cisco IOS images become available, you will receive these images either as a file booted from a network server, a file on floppy disk, or a file on a flash memory card.

The following scenario describes how to use a newly released image on a flash memory card in a system that has an older image on a flash memory card in slot 0 and a default boot image in the onboard flash memory SIMM.

For this scenario, the filenames are as follows:

- The new image on the new flash memory card is new.image.
- The old image on the flash memory card in slot 0 (which is addressed as **disk0:**) is old.image.
- The bootable image in onboard flash memory is boot.image.

You will copy the new image from the new flash memory card onto the flash memory card that contains the old image.



---

**Note** The scenario assumes that the new image will fit on the flash memory card in slot 0, alongside the old image. If there is not enough available space, use the **delete** command to delete files from the flash memory card to make sufficient room for the new image; however, do *not* delete the image.old file. Then use the **squeeze** command to remove these deleted files from the flash memory card. If, after you have deleted files and used the **squeeze** command, the two files cannot coexist on the flash memory card in slot 0, remove this card (place it in an antistatic bag and store it in a safe place), then insert the new flash memory card (with the file new.image) in slot 0. Proceed to [Step 5](#) and use the **boot system flash slot0:new.image** command to designate the file new.image as the default boot image.

---

**Step 1** Boot the Cisco uBR7100 series universal broadband router. By default, the file boot.image is used.

**Step 2** Enable the router as follows:

```
Router> enable
Password: <password>
Router#
```

**Step 3** Insert the new flash memory card into slot 1.

- Step 4** Use the following command to copy the file `new.image` in slot 1 to the flash memory card in slot 0, *only if* there is enough memory space for the two images to coexist. If there is not enough memory space, proceed to [Step 5](#).

```
Router# copy disk1:new.image disk0:new.image
```



**Note** You can also enter the preceding command as `copy disk1:new.image disk0:`.

- Step 5** Use the following series of commands to designate the file `new.image` (which is on the flash memory card in slot 0) as the default boot image:

```
Router# configure terminal
Router(config)# no boot system
Router(config)# boot system flash disk0:new.image
Router(config)# ^z
Router# copy running-config startup-config
Router# reload
```

When the system reloads, it boots the file `new.image` from the flash memory card in slot 0.

## Upgrading the SDRAM Memory Modules

The Cisco uBR7100 series router has upgradable memory modules on the network processing card located *inside* the router. To access these modules, you must remove the top cover of the chassis. Review the safety information before starting this procedure.



**Note**

SDRAM system memory defaults to 128 MB and can be upgraded to either 192 MB or 256 MB. (SDRAM packet memory is fixed at 64 MB.)



**Warning**

**Before performing any of the following procedures, ensure that power is removed from the DC circuit.** Statement 1003



**Warning**

**Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.** Statement 1034



**Warning**

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



**Warning**

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

**Warning**

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

## Removing the Chassis Cover

To remove the top cover, use the following procedure:

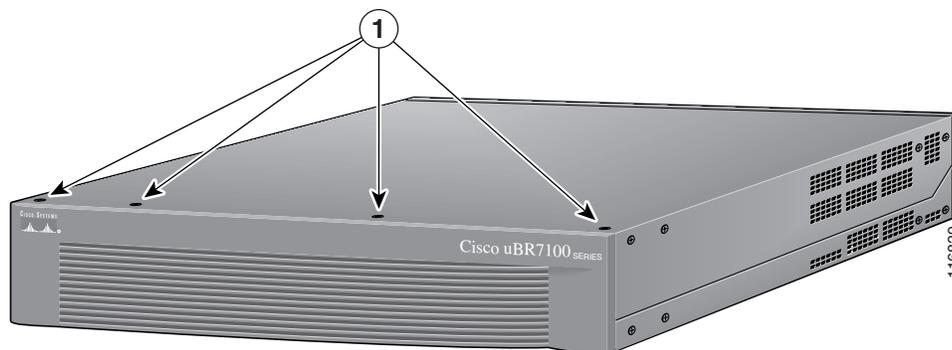
- 
- Step 1** Make sure that you are properly grounded.
  - Step 2** Remove *all* power from the chassis.
  - Step 3** Remove all the network connections.
  - Step 4** Remove the chassis from the rack (if necessary) and place the it on a tabletop or workbench.

**Caution**

If you are moving the chassis to a workbench or other work area, it is a good idea to reconnect the chassis ground to help prevent ESD damage to the chassis components.

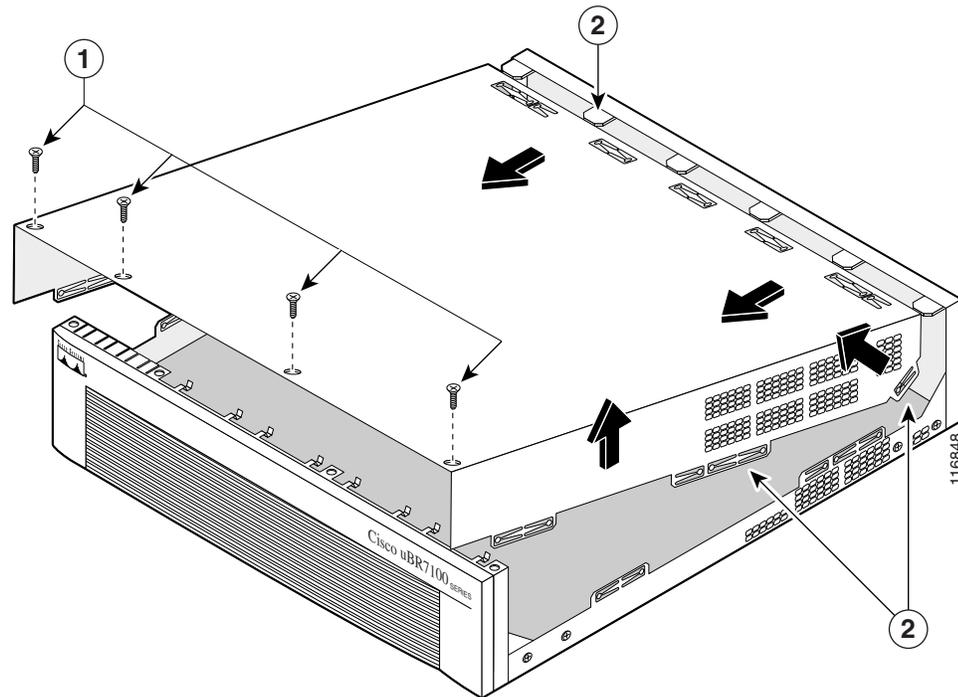
- 
- Step 5** Unscrew the four cover screws at the front of the chassis and place the screws in a safe, easily accessible location. See [Figure 6-5](#).
  - Step 6** Using both hands (one on either side of the cover), lift up the front of the cover and pull it towards you until it is clear of the bezel at the rear of the chassis. See [Figure 6-7](#).
  - Step 7** Place the cover in a safe location.
- 

**Figure 6-5 Locating the Screw**



<b>1</b>	Cover screws		
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Figure 6-6 Removing the Cover



<b>1</b>	Cover screws
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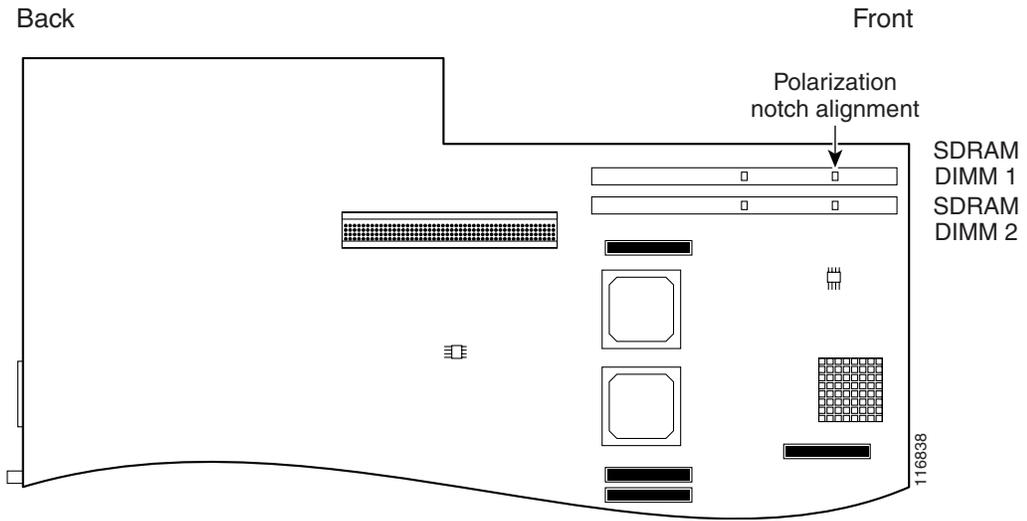
<b>2</b>	Tabs
----------	------

## Removing the SDRAM DIMM

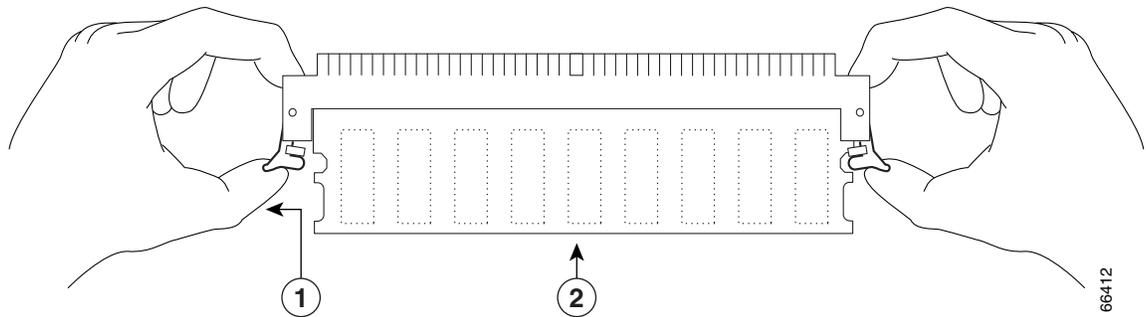
To remove the existing DIMM, use the following procedure:

- 
- Step 1** Make sure that you are properly grounded.
  - Step 2** Locate the DIMM and position the chassis so that you are facing the DIMM module you want to remove.
  - Step 3** Open the DIMM latches on the DIMM to release the DIMM from the socket. (See [Figure 6-8](#)) The DIMM is under tension in the socket; therefore, the DIMM might be released from the socket with some force.

**Figure 6-7 Locating the SDRAM DIMM 1 and SDRAM DIMM 2**



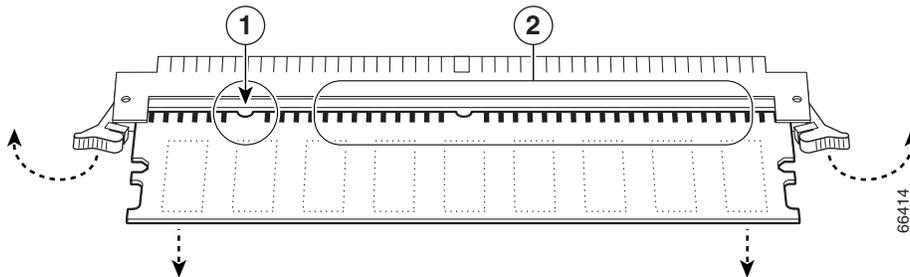
**Figure 6-8 Opening DIMM Latches**



<b>1</b>	Release latches	<b>2</b>	SDRAM DIMM
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**Step 4** With the DIMM latches open, grasp the ends of the DIMM between your thumbs and forefingers and pull the DIMM completely out of the socket.

**Figure 6-9 Removing the DIMM**

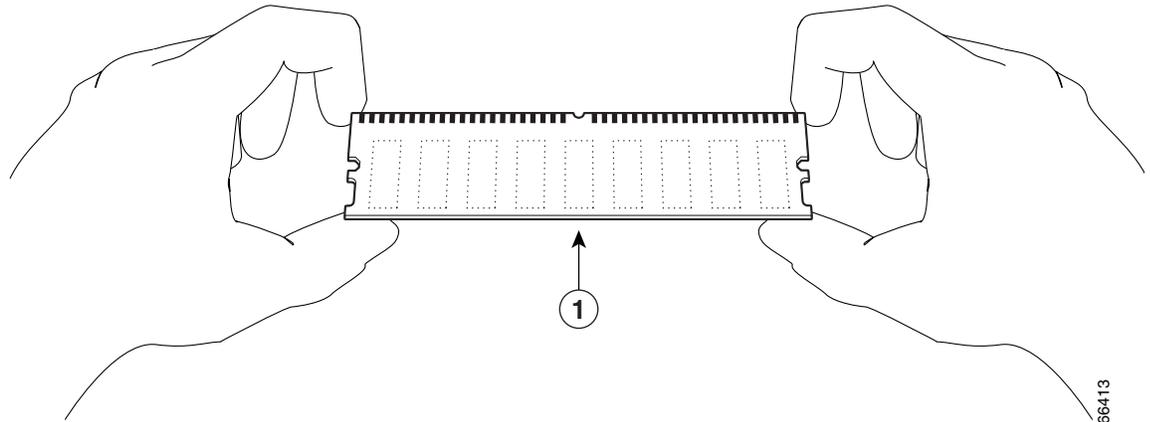


<b>1</b>	Notch	<b>2</b>	Metal fingers
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**Caution**

Handle the edges of the DIMM only; avoid touching the memory module, pins, or traces (the metal fingers along the connector edge of the DIMM).

**Figure 6-10 Handling the DIMM**



<b>1</b>	SDRAM DIMM
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**Caution**

To prevent ESD damage when working with DIMMs: handle the DIMM by the card edges only, place a removed DIMM on an antistatic mat, and store it in an antistatic container.

**Step 5**

Place the DIMM in an antistatic container to protect it from ESD damage.

## Replacing the SDRAM DIMM

**Note**

The network processor card contains two SDRAM slots for user-configurable system memory, DIMM 1 and DIMM 2.

- The amount of memory installed in slot DIMM 1 must be greater than or equal to the memory installed in slot DIMM 2.
- Slot DIMM 2 is zero for the default memory configuration of 128 MB.
- Slot DIMM 0 is used only for packet memory and is fixed at 64 MB in the factory.

To replace the SRAM DIMM, do the following:

**Step 1**

Make sure that you are properly grounded.

**Step 2**

Remove the new DIMM from its antistatic container.

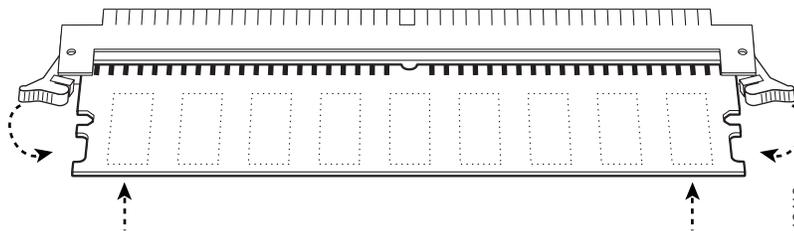
- Step 3** Hold the DIMM between your thumbs and forefingers and insert the connector edge of the DIMM straight into the socket. See [Figure 6-10](#).

**Caution**

When inserting the DIMM, use firm but not excessive pressure. If the socket is damaged, the chassis must be returned to the factory for repair.

- Step 4** Gently push the DIMM into the socket until the socket latches close over the ends of the DIMM. (See [Figure 6-11](#).) If necessary, rock the DIMM gently back and forth to seat it properly.

**Figure 6-11** Inserting the DIMM



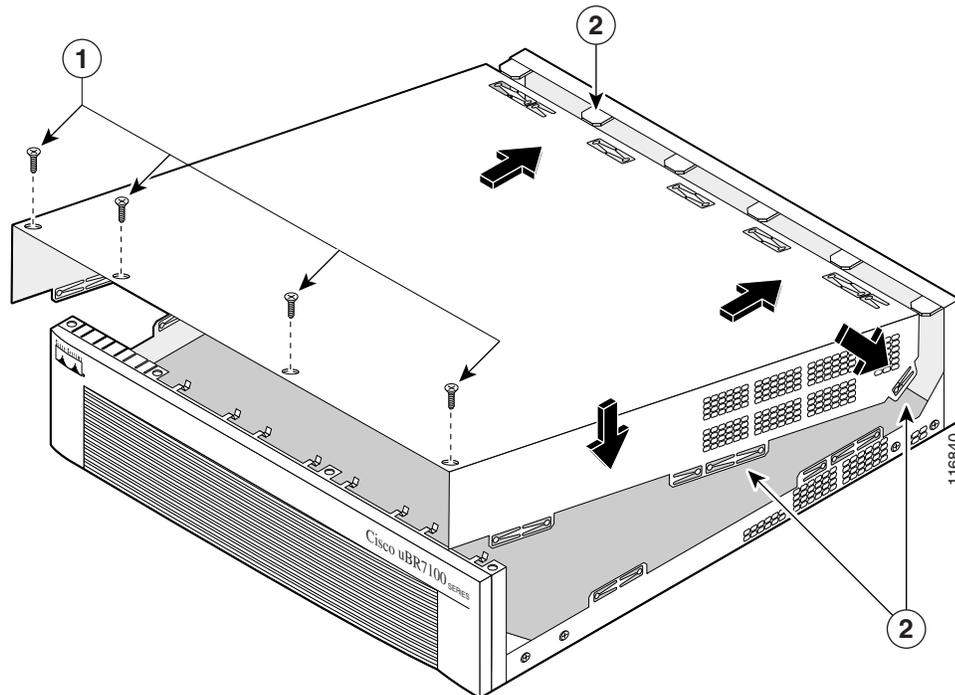
- Step 5** When the DIMM is installed, check to see if it is seated properly. If the DIMM appears misaligned, carefully remove it and reseat it in the socket. Push the DIMM firmly back into the socket until first one and then the other latch moves into place.
- Step 6** Repeat Step 2 through Step 5 to replace the second DIMM.

## Replacing the Chassis Cover

To replace the cover on the Cisco uBR7100 series router, do the following:

- Step 1** Using both hands, carefully hold the cover at an angle and insert it back into the cover tab slots at the rear of the chassis. See [Figure 6-12](#).
- Step 2** Settle the cover in place making sure that the side tabs are correctly inserted into the side slots.
- Step 3** Gently push the cover down until you hear it snap into place.
- Step 4** Replace the screws in chassis cover (at the front). Do not overtighten the screws. (The recommended torque is 5 to 7 in. lbs [0.564 to 0.790 nm].)
- Step 5** Replace the chassis in the rack (if necessary). See the [“Rack-Mounting the Chassis”](#) section on [page 3-3](#).)

Figure 6-12 Replacing the Chassis Cover



1	Cover screws	2	Tabs
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## Powering On the Router

To return power to the router, do the following:

- 
- Step 1** Verify that the chassis is properly grounded. Replace the ground connection, if necessary. See the “Attaching the Ground Wire” section on page 3-5.
  - Step 2** Reconnect the network connections. See the “Connecting to the Network” section on page 3-8 and the “Connecting the Console Port and Auxiliary Port” section on page 3-10.
  - Step 3** Connect the power cord to the chassis. See the “Connecting the Power” section on page 3-12.
  - Step 4** Connect the power cord to the AC outlet or other power source.
- 



### Note

For more information, also see *Memory Replacement Instructions for the Network Processing Engine or Network Services Engine and Input/Output Controller* at the following URL:

[http://www.cisco.com/en/US/docs/routers/7200/install\\_and\\_upgrade/npe-nse\\_memory\\_install/memory.html](http://www.cisco.com/en/US/docs/routers/7200/install_and_upgrade/npe-nse_memory_install/memory.html)

