Maintaining Cisco CSP 2100 X2

This chapter describes how to diagnose Cisco CSP 2100 X2 system problems using LEDs. It also provides information about how to install or replace hardware components, and it includes the following sections:

- Cisco CSP 2100 X2 Monitoring and Management Tools, page 8-1
- Status LEDs and Buttons, page 8-2
- Preparing for Cisco CSP 2100 X2 Component Installation, page 8-9
- Installing or Replacing Cisco CSP 2100 X2 Components, page 8-13

Cisco CSP 2100 X2 Monitoring and Management Tools

Cisco Integrated Management Interface

You can monitor the Cisco CSP 2100 X2 inventory, health, and system event logs by using the built-in Cisco Integrated Management Controller (Cisco IMC) GUI or CLI interfaces. See the user documentation for your firmware release at the following URL:

http://www.cisco.com/en/US/products/ps10739/products_installation_and_configuration_guides_list.html

Cisco CSP 2100 X2 Configuration Utility

The Configuration Utility for Cisco CSP 2100 X2 can aid and simplify the following tasks:

- Monitoring Cisco CSP 2100 X2 inventory and health
- Diagnosing common Cisco CSP 2100 X2 problems with diagnostic tools and logs
- Setting the BIOS booting order
- Configuring some RAID configurations
- Installing operating systems

You can also download the ISO image from Cisco.com. See the user documentation for your version of the utility at the following URL:

http://www.cisco.com/en/US/products/ps10493/products_user_guide_list.html

Status LEDs and Buttons

This section describes the location and meaning of LEDs and buttons and includes the following topics

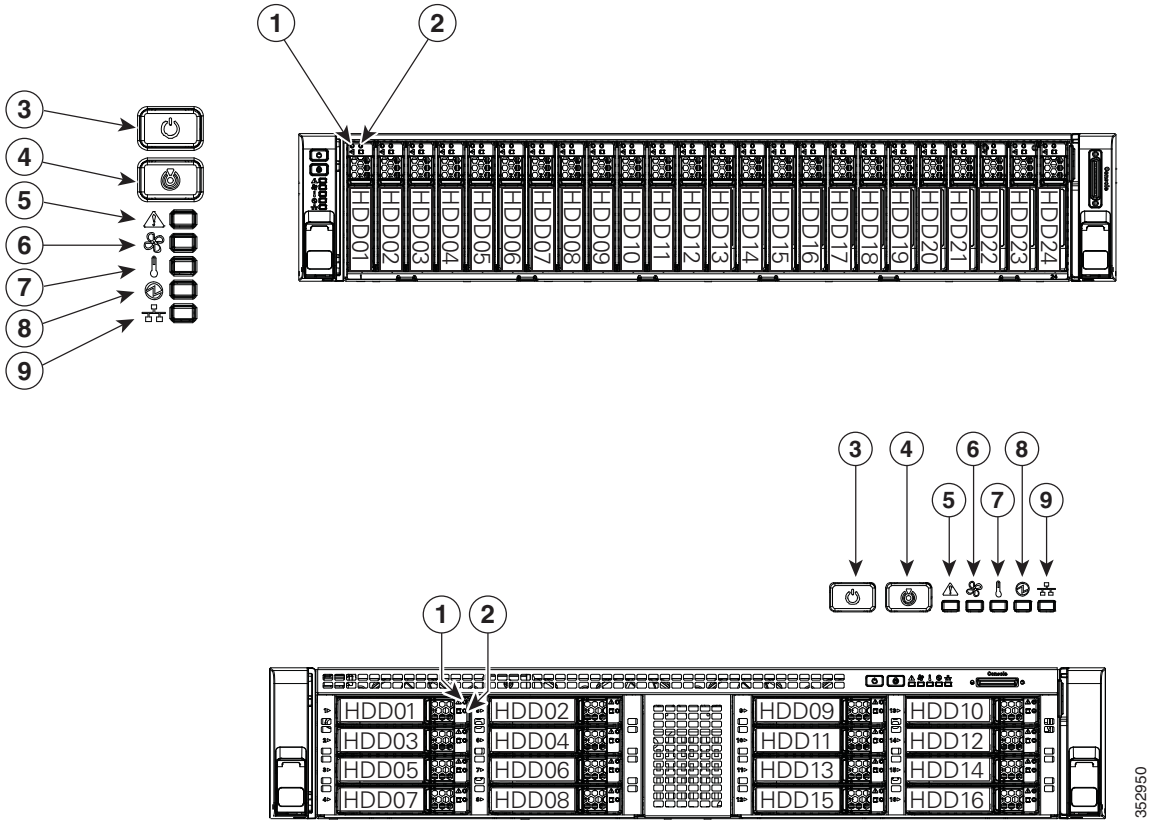
- Front Panel LEDs, page 8-2
- Rear Panel LEDs and Buttons, page 8-5
- Internal Diagnostic LEDs, page 8-8

Front Panel LEDs

Figure 8-1 shows the front panel LEDs. Table 8-1 defines the LED states.

The small form factor (SFF) drives, 24-drive version and the SFF drives, 16-drive version are shown.

Figure 8-1 Front Panel LEDs



1	Hard drive fault LED (on each drive tray)	**6**	Fan status LED
2	Hard drive activity LED (on each drive tray)	**7**	Temperature status LED
3	Power button/power status LED	**8**	Power supply status LED
4	Unit Identification button/LED	**9**	Network link activity LED
5	System status LED		

Table 8-1 Front Panel LEDs, Definitions of States

	LED Name	State
1 **SAS**	Hard drive fault	• Off—The hard drive is operating properly. • Amber—Drive fault detected. • Amber, blinking—The device is rebuilding. • Amber, blinking with one-second interval—Drive locate function activated.
2 **SAS**	Hard drive activity	• Off—There is no hard drive in the hard drive tray (no access, no fault). • Green—The hard drive is ready. • Green, blinking—The hard drive is reading or writing data.
1 **PCIe**	PCIe activity	• Off—The drive is not in use and can be safely removed. • Green—The drive is in use and functioning properly. • Green, blinking—the driver is initializing following insertion or the driver is unloading following an eject command. • Amber—The drive has failed. • Amber, blinking—A drive Locate command has been issued in the software.
2 **PCIe**	PCIe activity	• Off—No drive activity. • Green, blinking—There is drive activity.
3	Power button/LED	• Off—There is no AC power to Cisco CSP 2100 X2. • Amber—Cisco CSP 2100 X2 is in standby power mode. Power is supplied only to the Cisco IMC and some motherboard functions. • Green—Cisco CSP 2100 X2 is in main power mode. Power is supplied to all Cisco CSP 2100 X2 components.
4	Unit Identification	• Off—The unit identification function is not in use. • Blue—The unit identification function is activated.
5	System status	• Green—Cisco CSP 2100 X2 is running in a normal operating condition. • Green, blinking—Cisco CSP 2100 X2 is performing system initialization and memory check. • Amber, steady—Cisco CSP 2100 X2 is in a degraded operational state. For example: – Power supply redundancy is lost. – CPUs are mismatched. – At least one CPU is faulty. – At least one DIMM is faulty. – At least one drive in a RAID configuration failed. • Amber, blinking—Cisco CSP 2100 X2 is in a critical fault state. For example: – Boot failed. – Fatal CPU and/or bus error is detected. – Cisco CSP 2100 X2 is in an over-temperature condition.

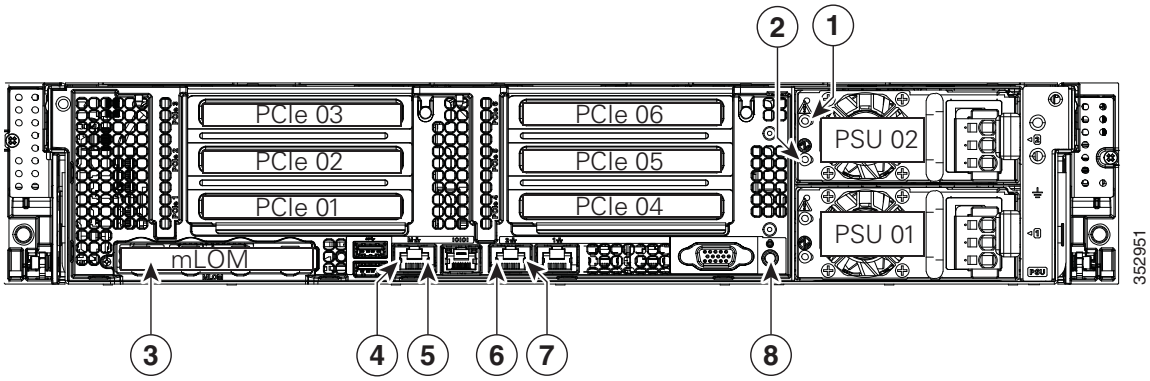
Table 8-1 Front Panel LEDs, Definitions of States (continued)

	LED Name	State
6	Fan status	• Green—All fan modules are operating properly. • Amber, steady—One or more fan modules breached the critical threshold. • Amber, blinking—One or more fan modules breached the non-recoverable threshold.
7	Temperature status	• Green—Cisco CSP 2100 X2 is operating at normal temperature. • Amber, steady—One or more temperature sensors breached the critical threshold. • Amber, blinking—One or more temperature sensors breached the non-recoverable threshold.
8	Power supply status	• Green—All power supplies are operating normally. • Amber, steady—One or more power supplies are in a degraded operational state. • Amber, blinking—One or more power supplies are in a critical fault state.
9	Network link activity	• Off—The Ethernet link is idle. • Green—One or more Ethernet LOM ports are link-active, but there is no activity. • Green, blinking—One or more Ethernet LOM ports are link-active, with activity.

Rear Panel LEDs and Buttons

Figure 8-2 shows the rear panel LEDs and buttons. Table 8-2 defines the LED states.

Figure 8-2 Rear Panel LEDs and Buttons



1	Power supply fault LED	**5**	1-Gb Ethernet dedicated management link status LED
2	Power supply AC status LED	**6**	1-Gb Ethernet link speed LED
3	Optional mLOM card LEDs (not shown)	**7**	1-Gb Ethernet link status LED
4	1-Gb Ethernet dedicated management link speed LED	**8**	Unit Identification button/LED

Table 8-2 Rear Panel LEDs, Definitions of States

	LED Name	State
1	Power supply fault This is a summary; for advanced power supply LED information, see Table 8-3.	• Off—The power supply is operating normally. • Amber, blinking—An event warning threshold has been reached, but the power supply continues to operate. • Amber, solid—A critical fault threshold has been reached, causing the power supply to shut down (for example, a fan failure or an over-temperature condition).
2	Power supply status This is a summary; for advanced power supply LED information, see Table 8-3.	AC power supplies: • Off—There is no AC power to the power supply. • Green, blinking—AC power OK; DC output not enabled. • Green, solid—AC power OK; DC outputs OK. DC power supplies: • Off—There is no DC power to the power supply. • Green, blinking—DC power OK; DC output not enabled. • Green, solid—DC power OK; DC outputs OK.

Table 8-2 Rear Panel LEDs, Definitions of States (continued)

	LED Name	State
4	1-Gb Ethernet dedicated management link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
5	1-Gb Ethernet dedicated management link status	• Off—No Link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
6	1-Gb Ethernet link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
7	1-Gb Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
8	Unit Identification	• Off—The unit identification function is not in use. • Blue—The unit identification function is activated.

In Table 8-3, read the status and fault LED states together in each row to determine the event that cause this combination.

Table 8-3 Rear Power Supply LED States

Green PSU Status LED State	Amber PSU Fault LED State	Event
• Solid on	• Off	12V main on (main power mode)
• Blinking	• Off	12Vmain off (standby power mode)
• Off	• Off	No AC power input (all PSUs present)
• Off	• On	No AC power input (redundant supply active)
• Blinking	• Solid on	12V over-voltage protection (OVP)
• Blinking	• Solid on	12V under-voltage protection (UVP)
• Blinking	• Solid on	12V over-current protection (OCP)
• Blinking	• Solid on	12V short-circuit protection (SCP)
• Solid on	• Solid on	PSU fan fault/Lock (before OTP)
• Blinking	• Solid on	PSU fan fault/Lock (after OTP)
• Blinking	• Solid on	Over-temperature protection (OTP)
• Solid on	• Blinking	OTP warning
• Solid on	• Blinking	OCP warning
• Blinking	• Off	12V main off (CR slave PSU is in sleep mode)

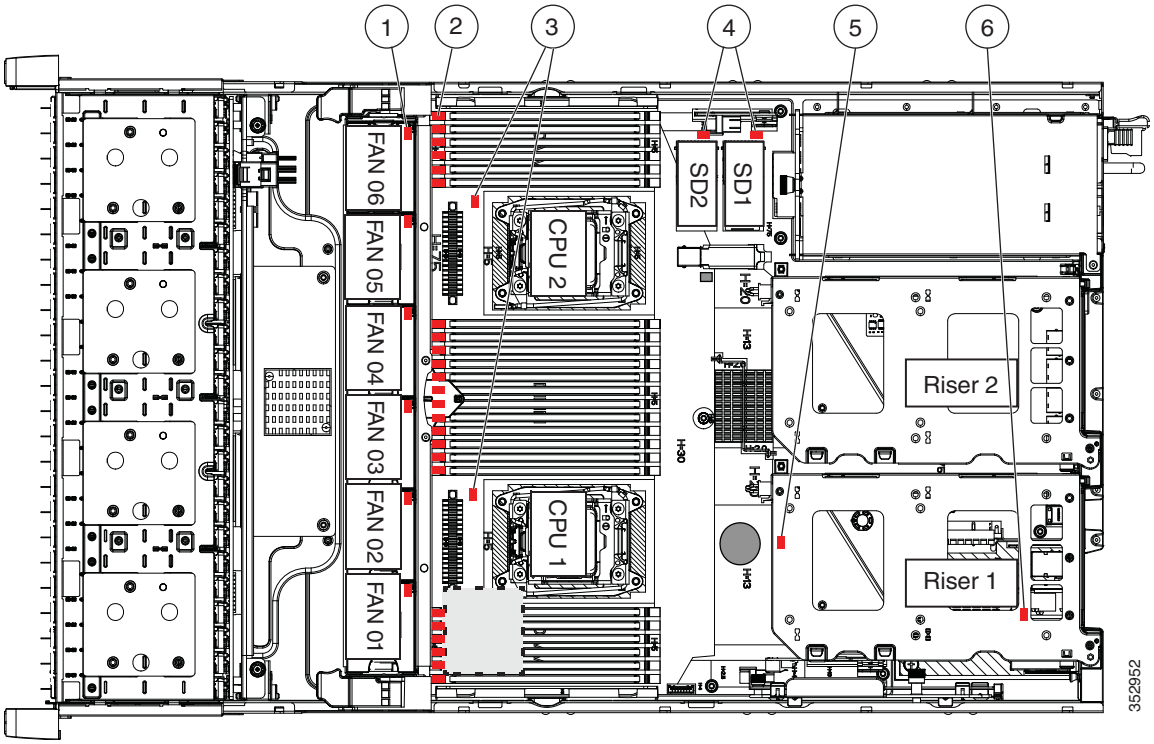
Internal Diagnostic LEDs

Cisco CSP 2100 X2 is equipped with a supercap voltage source that can activate internal component fault LEDs up to 30 minutes after AC power is removed. Cisco CSP 2100 X2 has internal fault LEDs for CPUs, DIMMs, fan modules, SD cards, the RTC battery, and the mLOM card.

To use these LEDs to identify a failed component, press the front or rear Unit Identification button (see Figure 8-1 or Figure 8-2) with AC power removed. An LED lights amber to indicate a faulty component.

See Figure 8-3 for the locations of these internal LEDs.

Figure 8-3 Internal Diagnostic LED Locations



1	Fan module fault LEDs (one on each fan module)	**4**	SD card fault LEDs
2	DIMM fault LEDs (one directly in front of each DIMM socket on the motherboard)	**5**	RTC battery fault LED (under PCIe riser 1)
3	CPU fault LEDs	**6**	mLOM card fault LED (under PCIe riser 1)

Table 8-4 Internal Diagnostic LEDs, Definition of States

LED Name	State
Internal diagnostic LEDs (all)	• Off—Component is functioning normally. • Amber—Component has a fault.

Preparing for Cisco CSP 2100 X2 Component Installation

This section describes how to prepare for component installation, and it includes the following topics:

- Required Equipment, page 8-9
- Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9
- Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10
- Serial Number Location, page 8-12
- Hot-Swap Replacement, page 8-12

Required Equipment

The following equipment is used to perform the procedures in this chapter:

- Number 2 Phillips-head screwdriver
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

Shutting Down and Powering Off the Cisco CSP 2100 X2

Cisco CSP 2100 X2 can run in two power modes:

- Main power mode—Power is supplied to all Cisco CSP 2100 X2 components and any operating system on your drives can run.
- Standby power mode—Power is supplied only to the service processor and the cooling fans and it is safe to power off the Cisco CSP 2100 X2 from this mode.

You can invoke a graceful shutdown or a hard shutdown by using either of the following methods:

- Use the Cisco IMC management interface.
- Use the **Power** button on the Cisco CSP 2100 X2 front panel. To use the **Power** button, follow these steps:

Step 1 Check the color of the Power Status LED (see the "Front Panel LEDs" section on page 8-2).

- Green—Cisco CSP 2100 X2 is in main power mode and must be shut down before it can be safely powered off. Go to Step 2.
- Amber—Cisco CSP 2100 X2 is already in standby mode and can be safely powered off. Go to Step 3.

Step 2 Invoke either a graceful shutdown or a hard shutdown:

Caution To avoid data loss or damage to your operating system, you should always invoke a graceful shutdown of the operating system.

- Graceful shutdown—Press and release the **Power** button. The operating system performs a graceful shutdown and the Cisco CSP 2100 X2 goes to standby mode, which is indicated by an amber Power Status LED.
- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.

Step 3 Disconnect the power cords from the power supplies in your Cisco CSP 2100 X2 to completely power off the Cisco CSP 2100 X2.

Removing and Replacing the Cisco CSP 2100 X2 Top Cover

Step 1 Remove the top cover (see Figure 8-4).

a. If the cover latch is locked, use a screwdriver to turn the lock 90-degrees counterclockwise to unlock it. See Figure 8-4.

b. Lift on the end of the latch that has the green finger grip. The cover is pushed back to the open position as you lift the latch.

c. Lift the top cover straight up from the Cisco CSP 2100 X2 and set it aside.

Step 2 Replace the top cover:

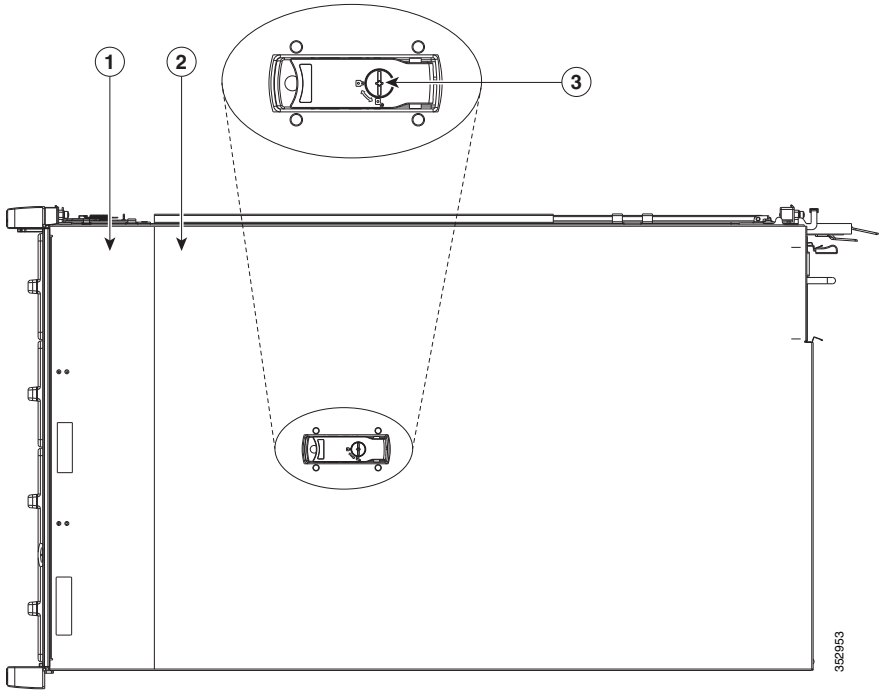
Note The latch must be in the fully open position when you set the cover back in place, which allows the opening in the latch to sit over a peg that is on the fan tray.

a. With the latch in the fully open position, place the cover on top of the Cisco CSP 2100 X2 about one-half inch (1.27 cm) behind the lip of the front cover panel. The opening in the latch should fit over the peg that sticks up from the fan tray.

b. Press the cover latch down to the closed position. The cover is pushed forward to the closed position as you push down the latch.

c. If desired, lock the latch by using a screwdriver to turn the lock 90-degrees clockwise.

Figure 8-4 Removing the Top Cover



1	Front cover panel	**3**	Locking cover latch
2	Top cover		

Serial Number Location

The serial number (SN) for Cisco CSP 2100 X2 is printed on a label on the top of the Cisco CSP 2100 X2, near the front.

Hot-Swap Replacement

Some components can be removed and replaced without powering off and removing AC power from the Cisco CSP 2100 X2. For hot-swap replacement, you do not have to precondition or shut down the component in the software before you remove it for the following components:

- SAS/SATA hard drives or SSDs
- Cooling fan modules
- Power supplies (when 1+1 redundant)

Installing or Replacing Cisco CSP 2100 X2 Components

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

Caution When handling Cisco CSP 2100 X2 components, wear an ESD strap to avoid damage.

Tip You can press the Unit Identification button on the front panel or rear panel to turn on a flashing Unit Identification LED on the front and rear panels of the Cisco CSP 2100 X2. This button allows you to locate the specific Cisco CSP 2100 X2 that you are servicing when you go to the opposite side of the rack. You can also activate these LEDs remotely by using the Cisco IMC interface. See the "Status LEDs and Buttons" section on page 8-2 for locations of these LEDs.

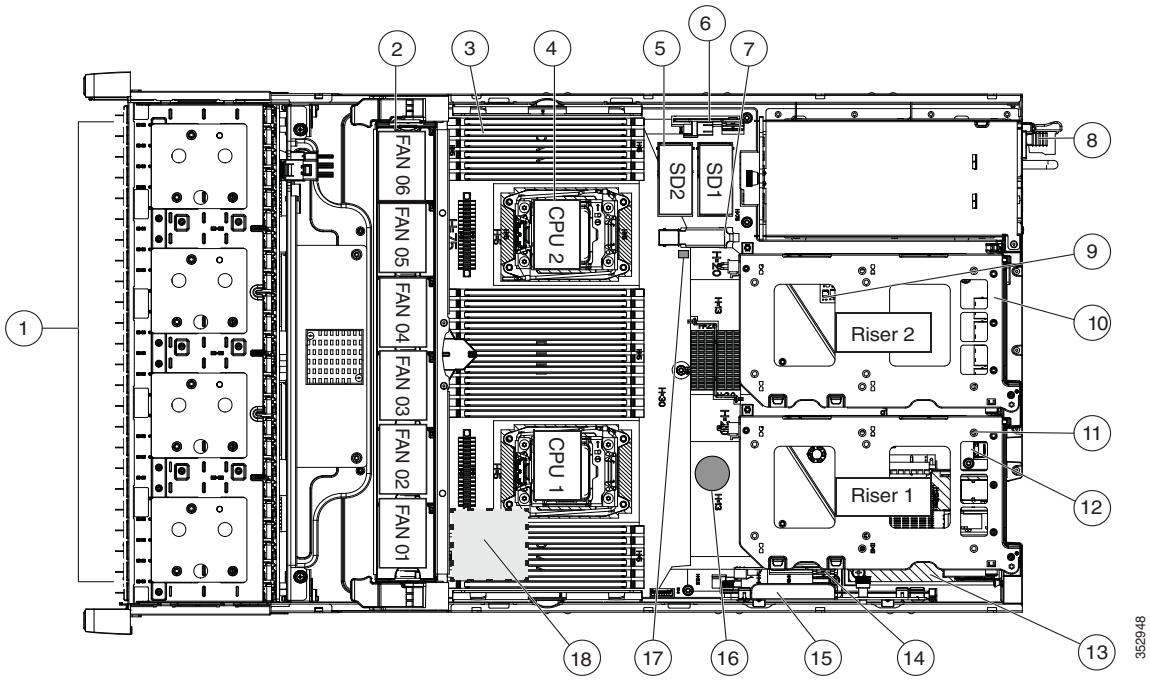
This section describes how to install and replace Cisco CSP 2100 X2 components, and it includes the following topics:

- Replaceable Component Locations, page 8-14
- Replacing SAS/SATA Hard Drives or Solid State Drives, page 8-15
- Replacing Fan Modules, page 8-18
- Replacing DIMMs, page 8-20
- Replacing CPUs and Heatsinks, page 8-24
- Replacing a Cisco Modular RAID Controller Card, page 8-29
- Replacing a Modular RAID Controller Transportable Memory Module (TMM), page 8-31
- Replacing the Supercap Power Module (RAID Backup Battery), page 8-33
- Replacing a Software RAID 5 Key Module, page 8-35
- Replacing the Motherboard RTC Battery, page 8-37
- Replacing an Internal SD Card, page 8-38
- Enabling or Disabling the Internal USB Port, page 8-39
- Replacing a PCIe Riser, page 8-40
- Replacing a PCIe Card, page 8-42
- Installing a Trusted Platform Module (TPM), page 8-47
- Replacing Power Supplies, page 8-52
- Replacing an mLOM Card, page 8-56

Replaceable Component Locations

Figure 8-5 shows the locations of the components that are supported as field-replaceable. The view shown is from the top down, with the top covers and air baffle removed.

Figure 8-5 Replaceable Component Locations



1	Drives bays. All drive bays support SAS/SATA drives.	**10**	PCIe riser 2 (PCIe slots 4, 5, 6)
2	Fan modules (six, hot-swappable)	**11**	PCIe riser 1 (PCIe slots 1, 2, 3)
3	DIMM sockets on motherboard (up to 24 DIMMs)	**12**	SATA boot drives (two sockets available only on PCIe riser 1 option 1C)
4	CPUs and heatsinks (two)	**13**	mLOM card socket on motherboard under PCIe riser 1
5	Cisco SD card slots on motherboard (two)	**14**	Socket for embedded RAID interposer board
6	PCIe interposer board socket	**15**	Cisco modular RAID controller PCIe slot (dedicated slot and bracket)
7	USB 3.0 slot on motherboard	**16**	RTC battery on motherboard
8	Power supplies (hot-swappable, accessed through rear panel)	**17**	Embedded RAID header for RAID 5 key
9	Trusted platform module (TPM) socket on motherboard, under PCIe riser 2	**18**	Supercap power module (RAID backup) mounting location on air baffle (not shown)

Replacing SAS/SATA Hard Drives or Solid State Drives

This section includes the following information:

- SAS/SATA Drive Population Guidelines, page 8-15
- Replacing SAS/SATA Drives, page 8-17

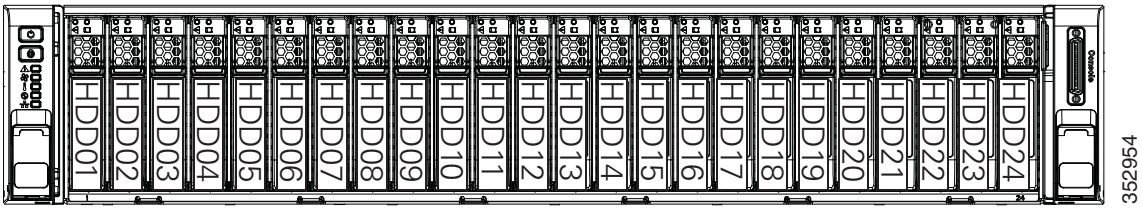
SAS/SATA Drive Population Guidelines

Cisco CSP 2100 X2 supports the small form-factor (SFF) drives with 24-drive backplane and expander. Cisco CSP 2100 X2 holds up to 24 2.5-inch SAS/SATA hard drives or solid state drives (SSDs). SAS/SATA drives are hot-swappable.

Note You cannot change the backplane type after-factory. To change a front panel/backplane configuration, a chassis replacement is required.

The drive-bay numbering is shown in Figure 8-6.

Figure 8-6 Drive Numbering, SFF Drives, 24-Drive Version



Observe these drive population guidelines for optimal performance:

- When populating drives, add drives in the lowest numbered bays first.
- Keep an empty drive blanking tray in any unused bays to ensure optimal airflow and cooling.
- You can mix hard drives and solid state drives in the same Cisco CSP 2100 X2. However, you cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. That is, when you create a logical volume, it must contain all hard drives or all SSDs.

4K Sector Format Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. See Setting Up Booting in UEFI Mode in the BIOS Setup Utility, page 8-16 or Setting Up Booting in UEFI Mode in the Cisco IMC GUI, page 8-16.
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- Operating system support on 4K sector drives is as follows: Windows: Win2012 and Win2012R2; Linux: RHEL 6.5, 6.6, 6.7, 7.0, 7.2; SLES 11 SP3, and SLES 12. ESXi/Vmware is not supported.

Setting Up Booting in UEFI Mode in the BIOS Setup Utility

Step 1 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

Step 2 Go to the **Boot Options** tab.

Step 3 Set **UEFI Boot Options** to **Enabled**.

Step 4 Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.

Step 5 Go to the **Advanced** tab.

Step 6 Select **LOM and PCIe Slot Configuration**.

Step 7 Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.

Step 8 Press **F10** to save changes and exit the BIOS setup utility. Allow the Cisco CSP 2100 X2 to reboot.

Step 9 After the OS installs, verify the installation:

a. Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.

b. Go to the **Boot Options** tab.

c. Under **Boot Option Priorities**, verify that the OS you installed is listed as your **Boot Option #1**.

Setting Up Booting in UEFI Mode in the Cisco IMC GUI

Step 1 Use a web browser and the IP address of the Cisco CSP 2100 X2 to log into the Cisco IMC GUI management interface.

Step 2 Navigate to **Server > BIOS**.

Step 3 Under **Actions**, click **Configure BIOS**.

Step 4 In the Configure BIOS Parameters dialog box, select the **Advanced** tab.

Step 5 Go to the **LOM and PCIe Slot Configuration** section.

Step 6 Set the **PCIe Slot: HBA Option ROM** to **UEFI Only**.

Step 7 Click **Save Changes**. The dialog box closes.

Step 8 Under **BIOS Properties**, set **Configured Boot Order** to **UEFI**.

Step 9 Under **Actions**, click **Configure Boot Order**.

Step 10 In the Configure Boot Order dialog box, click **Add Local HDD**.

Step 11 In the Add Local HDD dialog box, enter the information for the 4K sector format drive and make it first in the boot order.

Step 12 Save changes and reboot the Cisco CSP 2100 X2. The changes you made will be visible after the system reboots.

Replacing SAS/SATA Drives

Tip You do not have to shut down or power off the Cisco CSP 2100 X2 to replace SAS/SATA hard drives or solid state drives (SSDs) because they are hot-swappable.

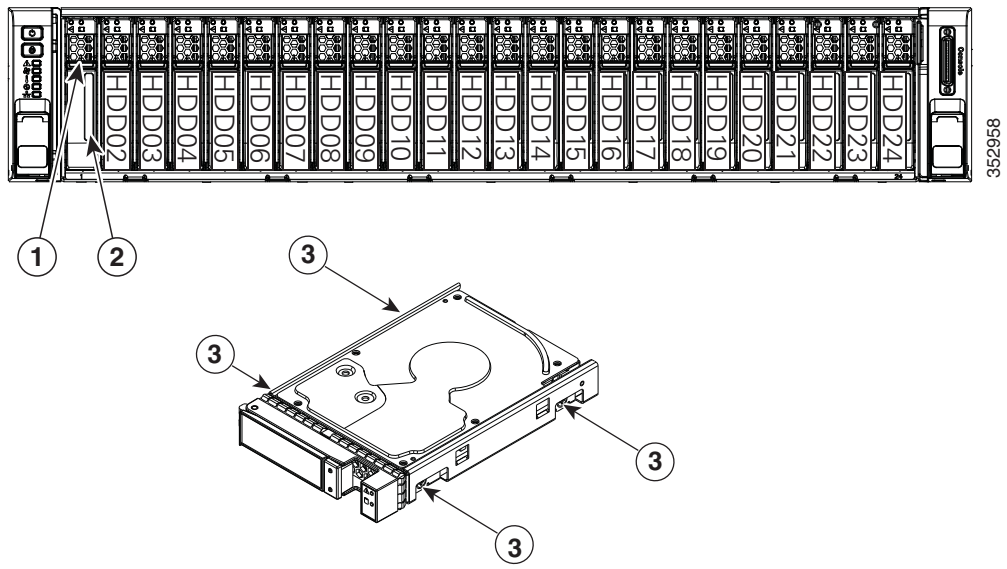
Step 1 Remove the drive that you are replacing or remove a blank drive tray from an empty bay:

- **a.** Press the release button on the face of the drive tray. See Figure 8-7.
- **b.** Grasp and open the ejector lever and then pull the drive tray out of the slot.
- **c.** If you are replacing an existing drive, remove the four drive-tray screws that secure the drive to the tray and then lift the drive out of the tray.

Step 2 Install a new drive:

- **a.** Place a new drive in the empty drive tray and replace the four drive-tray screws.
- **b.** With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
- **c.** Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

Figure 8-7 Replacing Drives



1	Release button	**3**	Drive tray securing screws (four)
2	Ejector lever		–

Replacing Fan Modules

The six hot-swappable fan modules in the Cisco CSP 2100 X2 are numbered as follows when you are facing the front of the Cisco CSP 2100 X2.

Figure 8-8 Fan Module Numbering

FAN 6	FAN 5	FAN 4	FAN 3	FAN 2	FAN 1

Tip A fault LED is on the top of each fan module that lights amber if the fan module fails. To operate these LEDs from the SuperCap power source, remove AC power cords and then press the Unit Identification button. See also Internal Diagnostic LEDs, page 8-8.

Caution You do not have to shut down or power off the Cisco CSP 2100 X2 to replace fan modules because they are hot- swappable. However, to maintain proper cooling, do not operate the Cisco CSP 2100 X2 for more than one minute with any fan module removed.

Step 1 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 2 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 3 Identify a faulty fan module by looking for a fan fault LED that is lit amber (see Figure 8-9).

Step 4 Remove a fan module that you are replacing (see Figure 8-9):

a. Grasp the top of the fan and pinch the green plastic latch toward the center.

b. Lift straight up to remove the fan module from Cisco CSP 2100 X2.

Step 5 Install a new fan module:

a. Set the new fan module in place, aligning the connector on the bottom of the fan module with the connector on the motherboard.

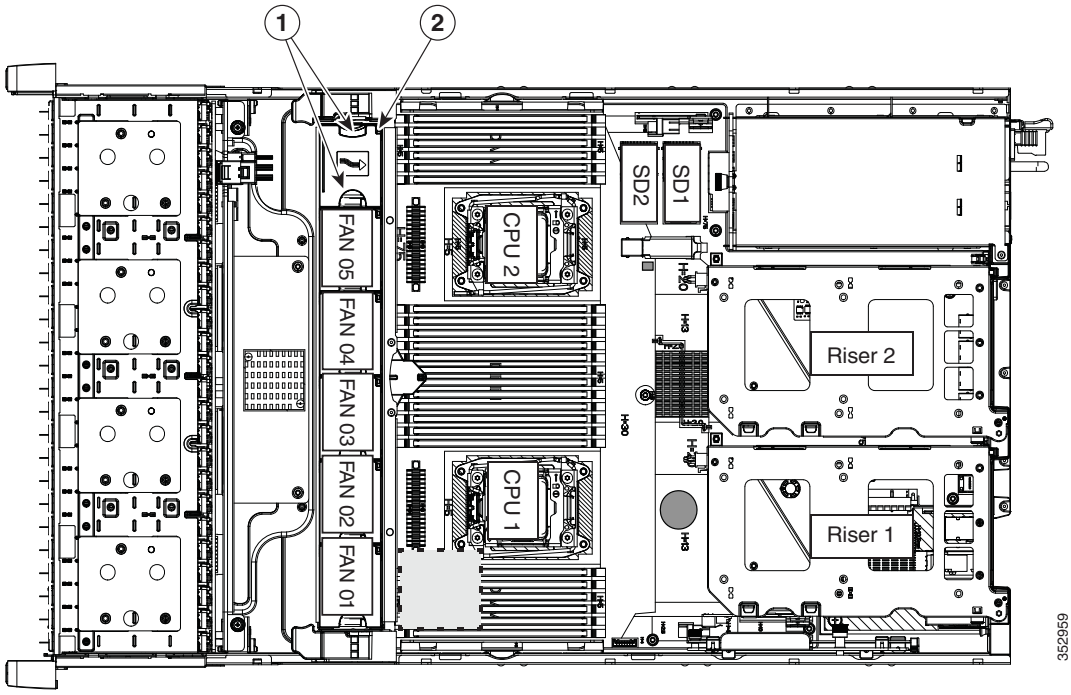
Note The arrow label on the top of the fan module, which indicates the direction of airflow, should point toward the rear of the Cisco CSP 2100 X2.

b. Press down gently on the fan module until the latch clicks and locks in place.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack.

Figure 8-9 Fan Modules Latch and Fault LED



1	Finger latch (on each fan module)	**2**	Fan module fault LED (on each fan module)

Replacing DIMMs

This section includes the following topics:

- Memory Performance Guidelines and Population Rules, page 8-20
- DIMM Replacement Procedure, page 8-23

Caution DIMMs and their sockets are fragile and must be handled with care to avoid damage during installation.

Caution Cisco does not support third-party DIMMs. Using non-Cisco DIMMs in Cisco CSP 2100 X2 might result in system problems or damage to the motherboard.

Note To ensure the best performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace the memory.

Memory Performance Guidelines and Population Rules

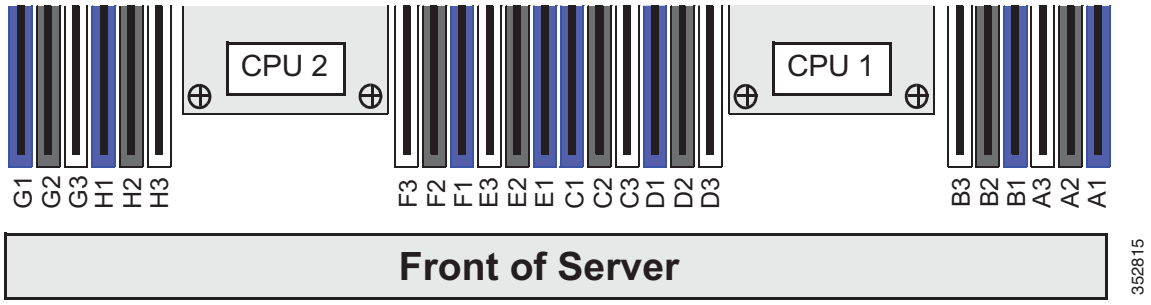
This section describes the type of memory that Cisco CSP 2100 X2 requires and its effect on performance. The section includes the following topics:

- DIMM Socket Numbering, page 8-21
- DIMM Population Rules, page 8-21
- Memory Mirroring and RAS, page 8-22
- Lockstep Channel Mode, page 8-22

DIMM Socket Numbering

Figure 8-10 shows the numbering of the DIMM sockets and CPUs.

Figure 8-10 CPUs and DIMM Socket Numbering on Motherboard



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- Each CPU supports four memory channels.
  - CPU1 supports channels A, B, C, and D.
  - CPU2 supports channels E, F, G, and H.
- Each channel has three DIMM sockets (for example, channel A = slots A1, A2, and A3).
  - A channel can operate with one, two, or three DIMMs installed.
  - If a channel has only one DIMM, populate slot 1 first (the blue slot).
- When both CPUs are installed, populate the DIMM sockets of each CPU identically.
  - Fill blue #1 slots in the channels first: A1, E1, B1, F1, C1, G1, D1, H1
  - Fill black #2 slots in the channels second: A2, E2, B2, F2, C2, G2, D2, H2
  - Fill white #3 slots in the channels third: A3, E3, B3, F3, C3, G3, D3, H3
- Any DIMM installed in a DIMM socket for which the CPU is absent is not recognized. In a single-CPU configuration, populate the channels for CPU1 only (A, B, C, D).
- Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. When memory mirroring is enabled, you must install DIMMs in sets of 4, 6, 8, or 12 as described in Memory Mirroring and RAS, page 8-22.
- The Tesla P100 GPU can support more than 1 TB of memory in Cisco CSP 2100 X2. All other NVIDIA GPUs can support only 1 TB or less of memory in Cisco CSP 2100 X2. Therefore, do not install more than fourteen 64-GB DIMMs when using an NVIDIA GPU card (other than Tesla P100) in Cisco CSP 2100 X2.
- Observe the DIMM mixing rules shown in Table 8-5.

Table 8-5 DIMM Mixing Rules for Cisco CSP 2100 X2

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
DIMM Capacity: RDIMM = 8 or 16 GB LRDIMM = 32 or 64 GB	You can mix different capacity DIMMs in the same channel (for example, A1, A2, A3).	You can mix different capacity DIMMs in the same bank. However, for optimal performance DIMMs in the same bank (for example, A1, B1, C1, D1) should have the same capacity.
DIMM Speed: 2133 or 2400 MHz	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPUs installed in the channel.	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPUs installed in the bank.
DIMM Type: RDIMMs or LRDIMMs	You cannot mix DIMM types in a channel.	You cannot mix DIMM types in a bank.

Memory Mirroring and RAS

The Intel E5-2600 CPUs within the Cisco CSP 2100 X2 support memory mirroring only when an even number of channels are populated with DIMMs. If one or three channels are populated with DIMMs, memory mirroring is automatically disabled. Furthermore, if memory mirroring is used, DRAM size is reduced by 50 percent for reasons of reliability.

The memory mirroring configuration for Cisco CSP 2100 is similar to that of Cisco UCS C-Series servers. You can refer to Cisco UCS C-Series Rack Server specification sheet for details on populating recommended memory mirroring configurations:

- Cisco UCS C240 M4 High Density Rack Server (Small Form-Factor Disk Drive Model) Specification Sheet

Lockstep Channel Mode

When you enable lockstep channel mode, each memory access is a 128-bit data access that spans four channels.

Lockstep channel mode requires that all four memory channels on a CPU must be populated identically with regard to size and organization. DIMM socket populations within a channel (for example, A1, A2, A3) do not have to be identical but the same DIMM slot location across all four channels must be populated the same.

For example, DIMMs in sockets A1, B1, C1, and D1 must be identical. DIMMs in sockets A2, B2, C2, and D2 must be identical. However, the A1-B1-C1-D1 DIMMs do not have to be identical with the A2-B2-C2-D2 DIMMs.

DIMM Replacement Procedure

This section includes the following topics:

- Identifying a Faulty DIMM, page 8-23
- Replacing DIMMs, page 8-23

Identifying a Faulty DIMM

Each DIMM socket has a corresponding DIMM fault LED, directly in front of the DIMM socket. See Figure 8-3 for the locations of these LEDs. The LEDs light amber to indicate a faulty DIMM. To operate these LEDs from the SuperCap power source, remove AC power cords and then press the Unit Identification button.

Replacing DIMMs

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove the air baffle that sits over the DIMM sockets and set it aside.

Step 5 Identify the faulty DIMM by observing the DIMM socket fault LEDs on the motherboard (see Figure 8-3).

Step 6 Remove the DIMMs that you are replacing. Open the ejector levers at both ends of the DIMM socket, and then lift the DIMM out of the socket.

Step 7 Install a new DIMM:

Note Before installing DIMMs, see the population guidelines. See Memory Performance Guidelines and Population Rules, page 8-20.

a. Align the new DIMM with the empty socket on the motherboard. Use the alignment key in the DIMM socket to correctly orient the DIMM.

b. Push down evenly on the top corners of the DIMM until it is fully seated and the ejector levers on both ends lock into place.

Step 8 Replace the air baffle.

Step 9 Replace the top cover.

Step 10 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Replacing CPUs and Heatsinks

This section contains the following topics:

- Special Information For Upgrades to Intel Xeon v4 CPUs, page 8-24
- CPU Configuration Rules, page 8-25
- Replacing a CPU and Heatsink, page 8-25
- Additional CPU-Related Parts to Order with RMA Replacement Motherboards, page 8-28

Special Information For *Upgrades* to Intel Xeon v4 CPUs

Caution You must upgrade your firmware to the required minimum level *before* you upgrade to Intel v4 CPUs. Older firmware versions cannot recognize the new CPUs and this results in a non-bootable server.

The minimum software and firmware versions required for the Cisco CSP 2100 X2 to support Intel v4 CPUs are as follows:

Table 8-6 Minimum Requirements For Intel Xeon v4 CPUs

Software or Firmware	Minimum Version
Server CIMC	2.0(10)
Server BIOS	2.0(10)
Cisco UCS Manager (UCSM-managed system only)	2.2(7) or 3.1(1)

Note Cisco UCS Manager Release 2.2(4) introduced a server pack feature that allows Intel v4 CPUs to run with Cisco UCS Manager Release 2.2(4) or later.
The UCS Manager Capability Catalog must be updated to 2.2(7c) or later.
The server Cisco IMC/BIOS must be running the minimum version or later as described in Table 8-6.

Do one of the following actions:

- If your Cisco CSP 2100 X2's firmware and/or Cisco UCS Manager software are already at the required levels shown in Table 8-6, you can replace the CPU hardware by using the procedure in this section.
- If your Cisco CSP 2100 X2's firmware and/or Cisco UCS Manager software is earlier than the required levels, use the instructions in the Cisco UCS C-Series Servers Upgrade Guide for Intel Xeon v4 CPUs to upgrade your software. After you upgrade the software, return to the procedure in this section as directed to replace the CPU hardware.

CPU Configuration Rules

Cisco CSP 2100 X2 has two CPU sockets. Each CPU supports four DIMM channels (12 DIMM sockets). See Figure 8-10.

- Cisco CSP 2100 X2 can operate with one CPU or with two identical CPUs installed.
- The minimum configuration is that Cisco CSP 2100 X2 must have at least CPU1 installed. Install CPU1 first, and then CPU2.
- The following restrictions apply when using a single-CPU configuration:
  - The maximum number of DIMMs is 12 (only CPU1 channels A, B, C, and D).
  - PCIe riser 2, which contains PCIe slots 4, 5, and 6 is unavailable.
  - The PCIe SSD interposer board is unavailable.

Replacing a CPU and Heatsink

Caution CPUs and their motherboard sockets are fragile and must be handled with care to avoid damaging pins during installation. The CPUs must be installed with heatsinks and their thermal grease to ensure proper cooling. Failure to install a CPU correctly might result in damage to the Cisco CSP 2100 X2.

Note Cisco CSP 2100 X2 uses the new independent loading mechanism (ILM) CPU sockets, so no Pick-and-Place tools are required for CPU handling or installation. Always grasp the plastic frame on the CPU when handling.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove the plastic air baffle that sits over the CPUs.

Step 5 Remove the heatsink that you are replacing:

a. Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heatsink.

Note Alternate loosening each screw evenly to avoid damaging the heatsink or CPU.

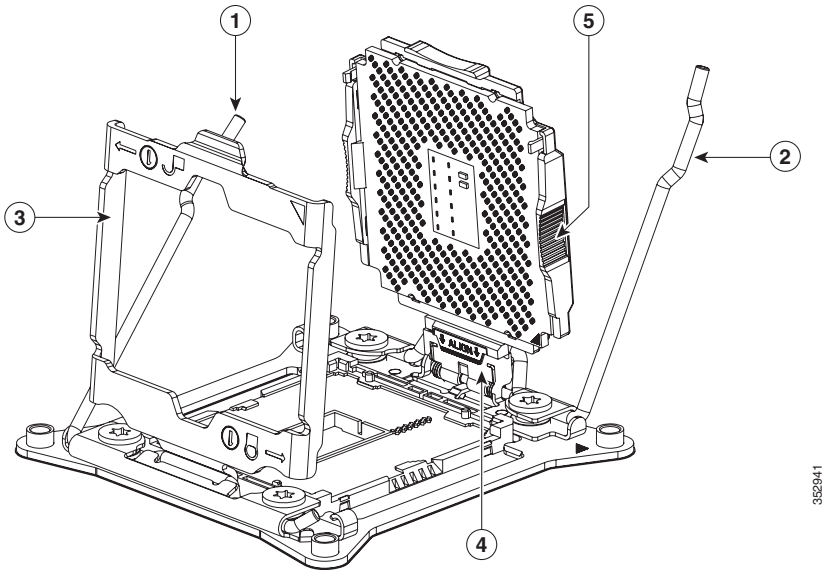
b. Lift the heatsink off of the CPU.

Step 6 Open the CPU retaining mechanism:

a. Unclip the first retaining latch labeled with the icon, and then unclip the second retaining latch labeled with the icon. See Figure 8-11.

b. Open the hinged CPU cover plate.

Figure 8-11 CPU Socket



1	CPU retaining latch	**4**	Hinged CPU seat
2	CPU retaining latch	**5**	Finger-grips on plastic CPU frame
3	Hinged CPU cover plate		

Step 7 Remove any existing CPU:

a. With the latches and hinged CPU cover plate open, swing the CPU in its hinged seat up to the open position, as shown in Figure 8-11.

b. Grasp the CPU by the finger-grips on its plastic frame and lift it up and out of the hinged CPU seat.

c. Set the CPU aside on an antistatic surface.

Step 8 Install a new CPU:

a. Grasp the new CPU by the finger-grips on its plastic frame and align the tab on the frame that is labeled “ALIGN” with the hinged seat, as shown in Figure 8-12.

b. Insert the tab on the CPU frame into the seat until it stops and is held firmly.

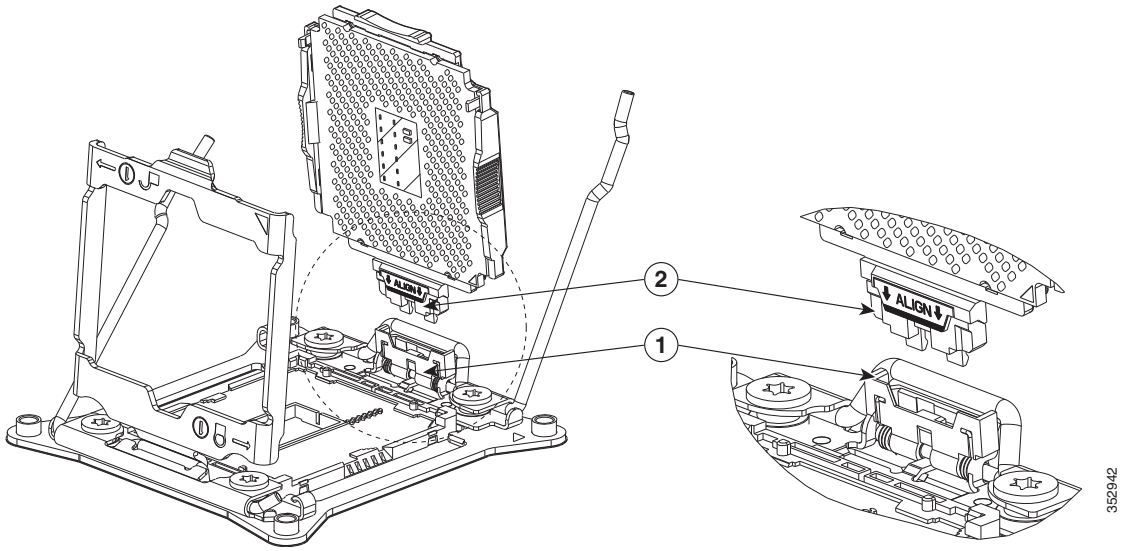
The line below the word “ALIGN” should be level with the edge of the seat, as shown in Figure 8-12.

c. Swing the hinged seat with the CPU down until the CPU frame clicks in place and holds flat in the socket.

d. Close the hinged CPU cover plate.

e. Clip down the CPU retaining latch with the icon, and then clip down the CPU retaining latch with the icon. See Figure 8-11.

Figure 8-12 CPU and Socket Alignment Features



1	SLS mechanism on socket	2	Tab on CPU frame (labeled ALIGN)

Step 9 Install a heat sink:

Caution The heat sink must have new thermal grease on the heat sink-to-CPU surface to ensure proper cooling. If you are reusing a heat sink, you must remove the old thermal grease from the heatsink and the CPU surface. If you are installing a new heat sink, skip to Step c.

a. Apply the cleaning solution, which is included with the heatsink cleaning kit (UCSX-HSCK=, shipped with spare CPUs), to the old thermal grease on the heatsink and CPU and let it soak for a least 15 seconds.

b. Wipe all of the old thermal grease off the old heat sink and CPU using the soft cloth that is included with the heatsink cleaning kit. Be careful to not scratch the heat sink surface.

Note New heatsinks come with a pre-applied pad of thermal grease. If you are reusing a heatsink, you must apply thermal grease from a syringe (UCS-CPU-GREASE3=).

c. Align the four heatsink captive screws with the motherboard standoffs, and then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.

Note Alternate tightening each screw evenly to avoid damaging the heatsink or CPU.

Step 10 Replace the air baffle.

Step 11 Replace the top cover.

Step 12 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Additional CPU-Related Parts to Order with RMA Replacement Motherboards

When a return material authorization (RMA) of the motherboard or CPU is done on a Cisco CSP 2100 X2, additional parts might not be included with the CPU or motherboard spare bill of materials (BOM). The TAC engineer might need to add the additional parts to the RMA to help ensure a successful replacement.

Note Cisco CSP 2100 X2 uses the new independent loading mechanism (ILM) CPU sockets, so no Pick-and-Place tools are required for CPU handling or installation. Always grasp the plastic frame on the CPU when handling.

- Scenario 1—You are reusing the existing heatsinks:
  - Heat sink cleaning kit (UCSX-HSCK=)
  - Thermal grease kit for C240 M4 (UCS-CPU-GREASE3=)
- Scenario 2—You are replacing the existing heatsinks:
  - Heat sink (UCSC-HS-C240M4=)
  - Heat sink cleaning kit (UCSX-HSCK=)

A CPU heatsink cleaning kit is good for up to four CPU and heatsink cleanings. The cleaning kit contains two bottles of solution, one to clean the CPU and heatsink of old thermal interface material and the other to prepare the surface of the heatsink.

New heatsink spares come with a pre-applied pad of thermal grease. It is important to clean the old thermal grease off of the CPU prior to installing the heatsinks. Therefore, when you are ordering new heatsinks, you must order the heatsink cleaning kit.

Replacing a Cisco Modular RAID Controller Card

Cisco CSP 2100 X2 has an internal, dedicated PCIe slot on the motherboard for a Cisco modular RAID controller card (see Figure 8-13).

See also:

- Replacing a Modular RAID Controller Transportable Memory Module (TMM), page 8-31
- Replacing the Supercap Power Module (RAID Backup Battery), page 8-33

Note You cannot use a hardware RAID controller card and the embedded RAID controller at the same time.

RAID Card Firmware Compatibility

If the PCIe card that you are installing is a RAID controller card, firmware on the RAID controller must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the Cisco CSP 2100 X2. If not compatible, upgrade or downgrade the RAID controller firmware accordingly using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring Cisco CSP 2100 X2 components to compatible levels: HUU Guides

Replacement Procedure

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove an existing RAID controller card:

a. Disconnect the data cable from the card. Depress the tab on the cable connector and pull.

b. Disconnect the supercap power module cable from the transportable memory module (TMM), if present.

c. Lift straight up on the metal bracket that holds the card. The bracket lifts off of two pegs on the chassis wall.

d. Loosen the two thumbscrews that hold the card to the metal bracket and then lift the card from the bracket.

Step 5 Install a new RAID controller card:

Caution When installing the card to the bracket, be careful so that you do not scrape and damage electronic components on the underside of the card on features of the bracket. Also avoid scraping the card when you install the bracket to the pegs on the chassis wall.

a. Set the new card on the metal bracket, aligned so that the thumbscrews on the card enter the threaded standoffs on the bracket. Tighten the thumbscrews to secure the card to the bracket.

b. Align the two slots on the back of the bracket with the two pegs on the chassis wall.

The two slots on the bracket must slide down over the pegs at the same time that you push the card into the motherboard socket.

c. Gently press down on both top corners of the metal bracket to seat the card into the socket on the motherboard.

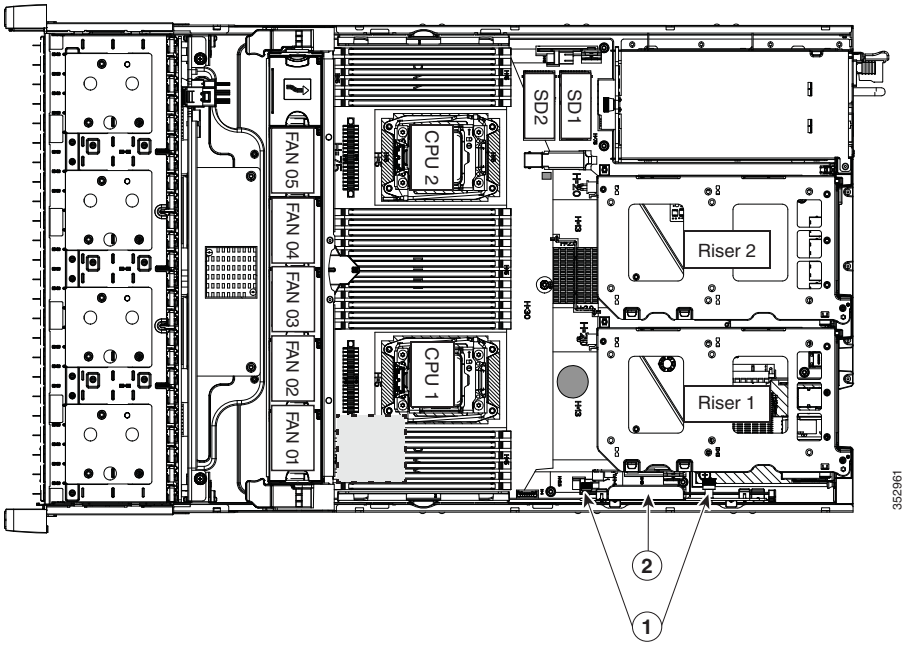
d. Connect the supercap power module cable to its connector on the TMM, if present.

e. Connect the single data cable to the card.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-13 Modular RAID Controller Card Location



1	Thumbscrews on card	**2**	Cisco modular RAID controller bracket

Replacing a Modular RAID Controller Transportable Memory Module (TMM)

The transportable memory module (TMM) that attaches to the modular RAID controller card can be installed or replaced after-factory.

See also:

- Replacing a Cisco Modular RAID Controller Card, page 8-29
- Replacing the Supercap Power Module (RAID Backup Battery), page 8-33

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove the modular RAID controller card from the Cisco CSP 2100 X2:

a. Lift straight up on the metal bracket that holds the card. The bracket lifts off of two pegs on the chassis wall (see Figure 8-13).

b. Disconnect the supercap power module cable from the TMM that is attached to the card.

Step 5 Remove the TMM from the modular RAID controller card (see Figure 8-14):

a. The plastic bracket on the card has a securing plastic clip at each end of the TMM. Gently spread each clip away from the TMM.

b. Pull straight up on the TMM to lift it off the two plastic guide pegs and the socket on the card.

Step 6 Install a TMM to the modular RAID controller card (see Figure 8-14):

a. Align the TMM over the bracket on the card. Align the connector on the underside of the TMM with the socket on the card. Align the two guide holes on the TMM over the two guide pegs on the card.

Caution In the next step, keep the TMM level and parallel with the surface of the card to avoid damaging the connector or socket.

b. Gently lower the TMM so that the guide holes on the TMM go over the guide pegs on the card.

c. Press down on the TMM until the plastic clips on the bracket close over each end of the TMM.

d. Press down on the TMM to fully seat its connector with the socket on the card.

Step 7 Install the modular RAID controller card back into the Cisco CSP 2100 X2:

Note If this is a first-time installation of your TMM, you must also install a supercap power module (SCPM). The SCPM cable attaches to a connector on the TMM. See Replacing the Supercap Power Module (RAID Backup Battery), page 8-33.

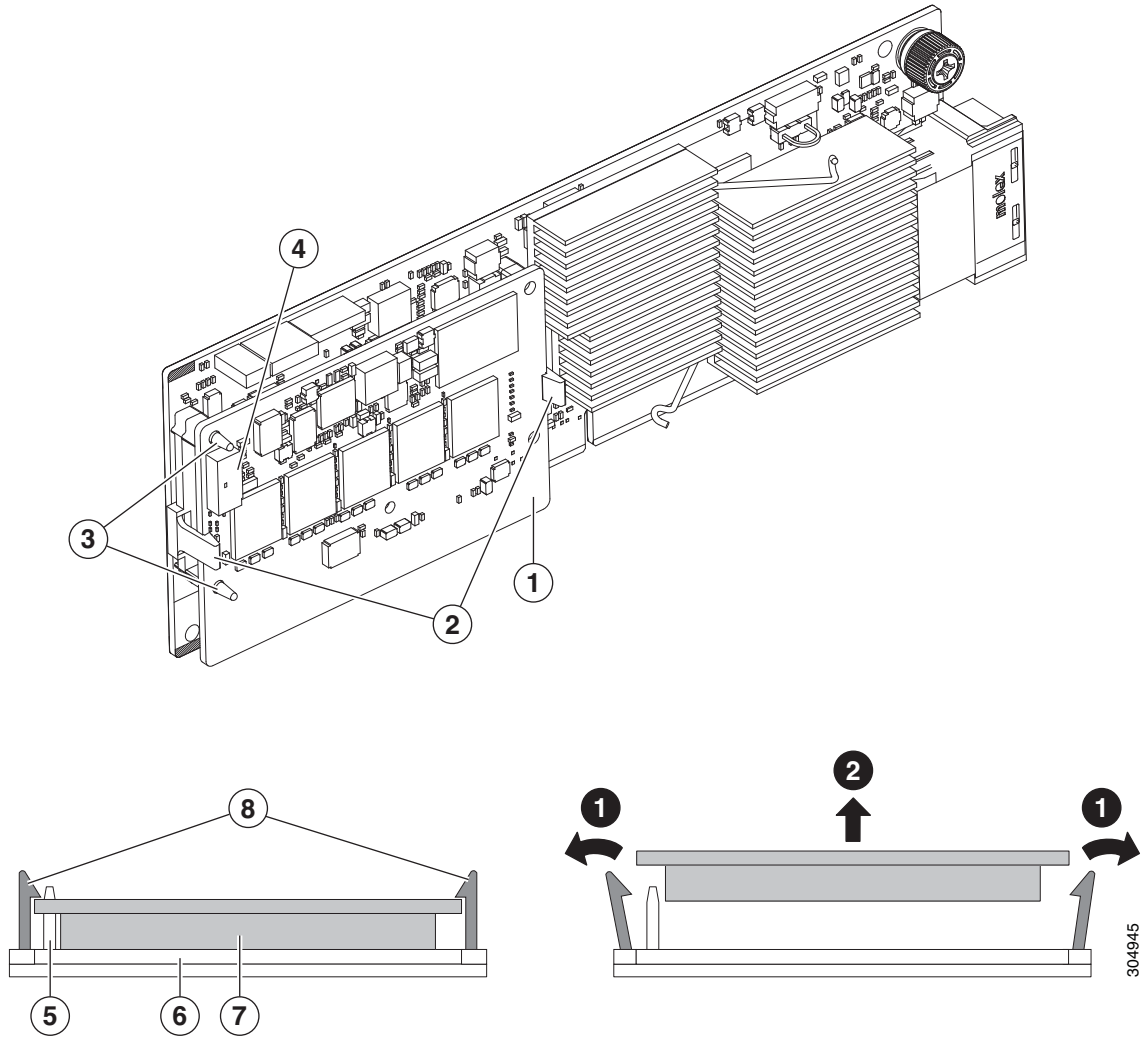
a. Connect the cable from the supercap power module (RAID battery) to the connector on the TMM (see Figure 8-14).

b. Align the two slots on the back of the RAID card bracket with the two pegs on the chassis wall.

The two slots on the bracket must slide down over the pegs at the same time that you push the card into the motherboard socket.

c. Gently press down on both top corners of the metal bracket to seat the card into the socket on the motherboard.

Figure 8-14 TMM on Modular RAID Controller Card



1	TMM on modular RAID card	**5**	Side view, guide peg
2	Securing bracket clips	**6**	Side view, socket on modular RAID card
3	Guide pegs on bracket protruding through guide holes on TMM	**7**	Side view, connector on underside of TMM
4	SCPM cable connector on TMM	**8**	Side view, securing clips

Replacing the Supercap Power Module (RAID Backup Battery)

Cisco CSP 2100 X2 supports installation of one supercap power module (SCPM). The unit mounts to a clip on the removable air baffle (see Figure 8-15). The SCPM requires that you have a transportable memory module (TMM) attached to your RAID controller card because the connector for the SCPM cable is on the TMM.

See also:

- Replacing a Cisco Modular RAID Controller Card, page 8-29
- Replacing a Modular RAID Controller Transportable Memory Module (TMM), page 8-31

The SCPM provides approximately three years of backup for the disk write-back cache DRAM in the case of a sudden power loss by offloading the cache to the NAND flash.

Warning **There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.**
Statement 1015

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove an existing SCPM:

a. Disconnect the existing SCPM cable from the transportable memory module (TMM) that is attached to the modular RAID controller card.

b. Pull back the plastic clip that closes over the SCPM slightly, and then slide the SCPM free of the clips on the air baffle mounting point (see Figure 8-15).

Step 5 Install a new SCPM:

a. Slide the new backup unit into the holder on the air baffle mounting point until the clip clicks over the top edge of the SCPM.

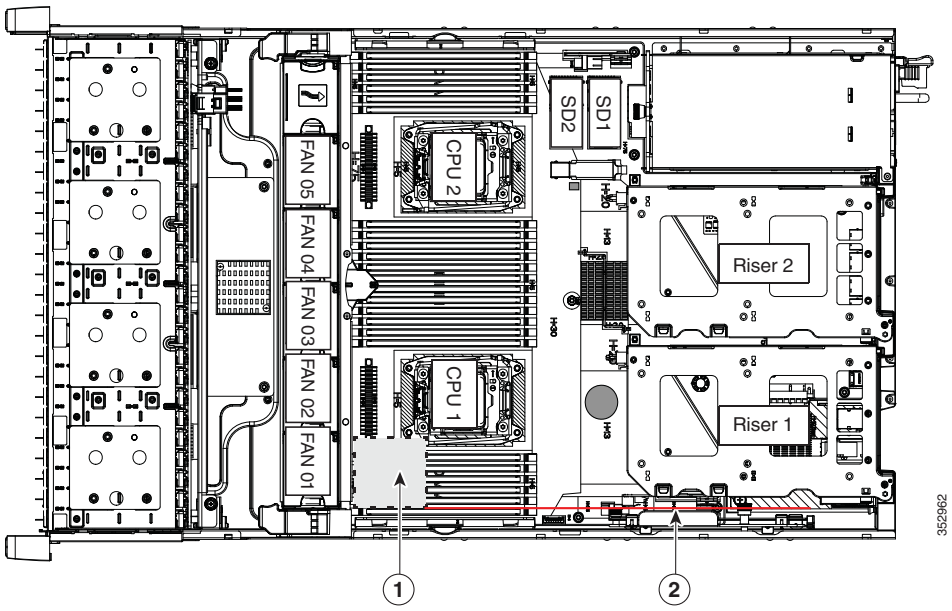
b. Connect the cable from the SCPM to the TMM that is attached to the modular RAID controller card.

Note Put the cable through the opening on the rear of the air baffle (rather than over the air baffle) to keep the cable from interfering with the top cover of the Cisco CSP 2100 X2.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-15 SCPM (RAID Backup Unit) Mounting Point and Cable Path



1	SCPM mounting point on removable air baffle (air baffle not shown)	**2**	SCPM cable routing path (the red line)

Replacing a Software RAID 5 Key Module

Cisco CSP 2100 X2 has a two-pin header on the motherboard for a RAID 5 key module.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

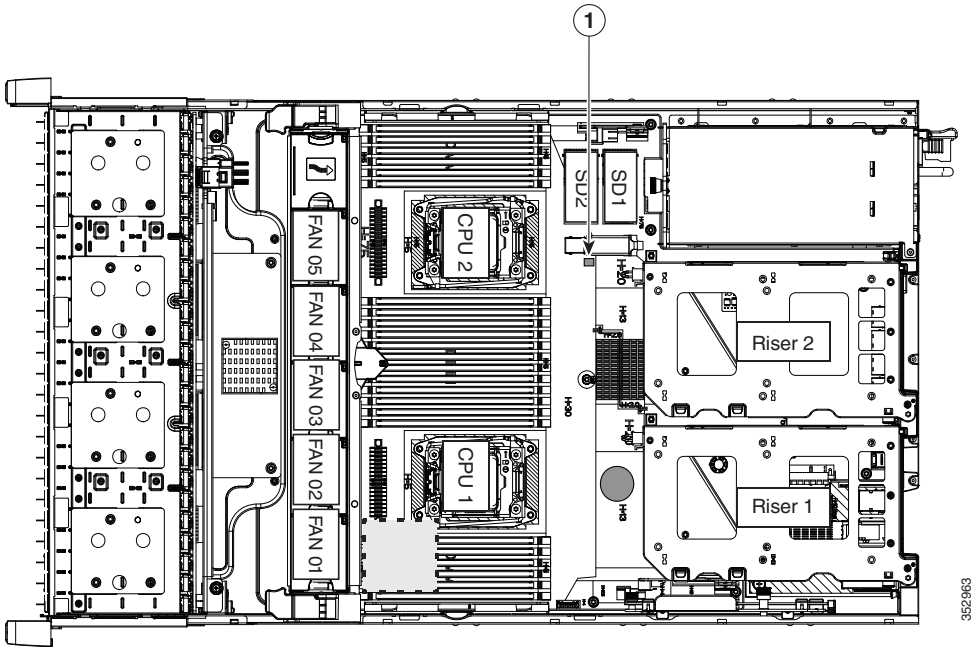
Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove any existing software RAID key module:

a. Locate the module on the motherboard (see Figure 8-16).

b. Hold the retention clips on the header open while you grasp the RAID key board and pull straight up (see Figure 8-17).

Figure 8-16 RAID 5 Key Header Location on Motherboard



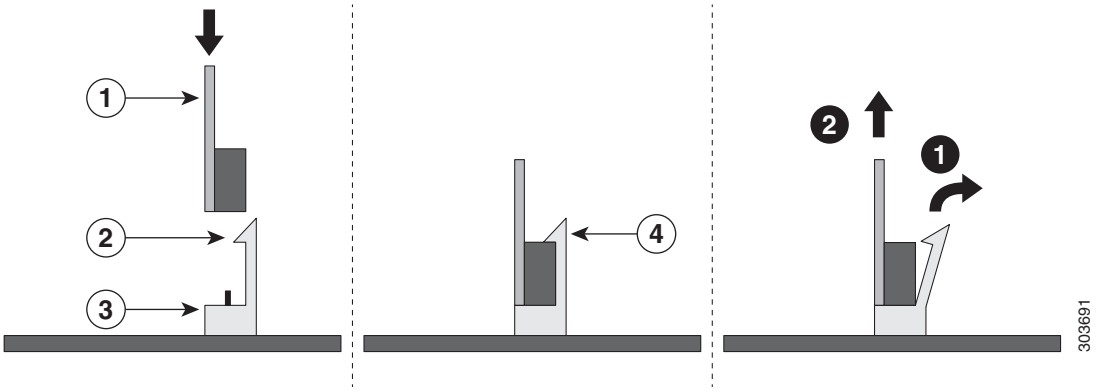
1	Software RAID 5 key header (adds RAID 5 support)		

Step 5 Install a new software RAID key module:

a. Align the module with the pins in the motherboard header.

b. Gently press down on the module until it is seated and the retention clip locks over the module (see Figure 8-17).

Figure 8-17 Software RAID 5 Key Module Retention Clip



1	Printed circuit board on module	**3**	Motherboard header
2	Retention clip on motherboard header	**4**	Retention clip in installed position

Replacing the Motherboard RTC Battery

Warning **There is danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** [Statement 1015]

The real-time clock (RTC) battery retains system settings when the Cisco CSP 2100 X2 is disconnected from power. The battery type is CR2032. Cisco supports the industry-standard CR2032 battery, which can be purchased from most electronic stores.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove the battery from its holder on the motherboard (see Figure 8-18):

a. Use a small screwdriver or pointed object to press inward on the battery at the prying point (see Figure 8-18).

b. Lift up on the battery and remove it from the holder.

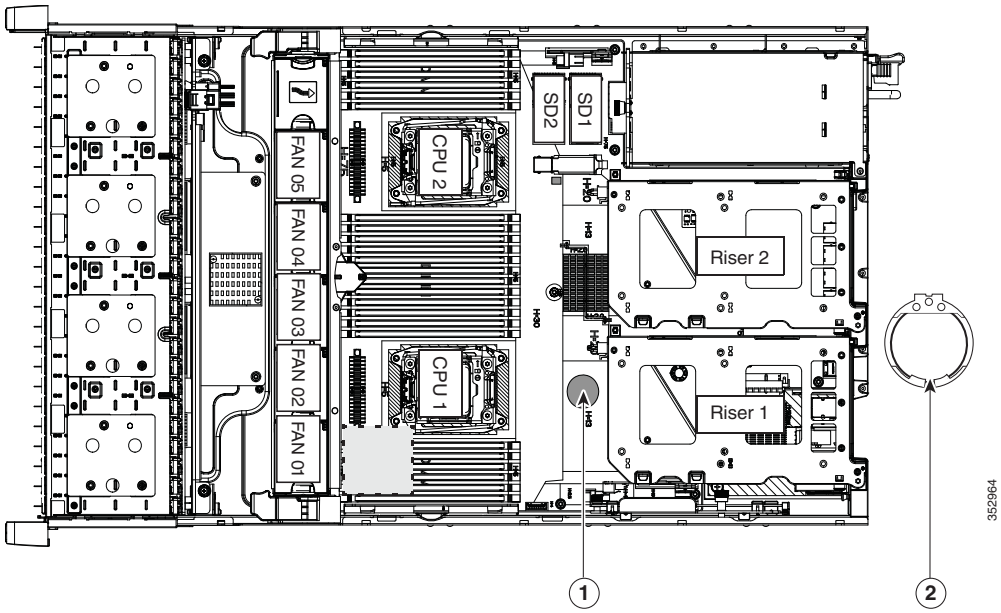
Step 5 Install an RTC battery. Insert the battery into its holder and press down until it clicks in place.

Note The positive side of the battery marked "3V+" should face upward.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-18 RTC Battery Location and Prying Point



1	RTC battery holder on motherboard	2	Prying point

Replacing an Internal SD Card

Cisco CSP 2100 X2 has two internal SD card bays on the motherboard.

Dual SD cards are supported. RAID 1 support can be configured through the Cisco IMC interface.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove an SD card (see Figure 8-19).

a. Push on the top of the SD card, and then release it to allow it to spring out from the slot.

b. Remove the SD card from the slot.

Step 5 Install an SD card:

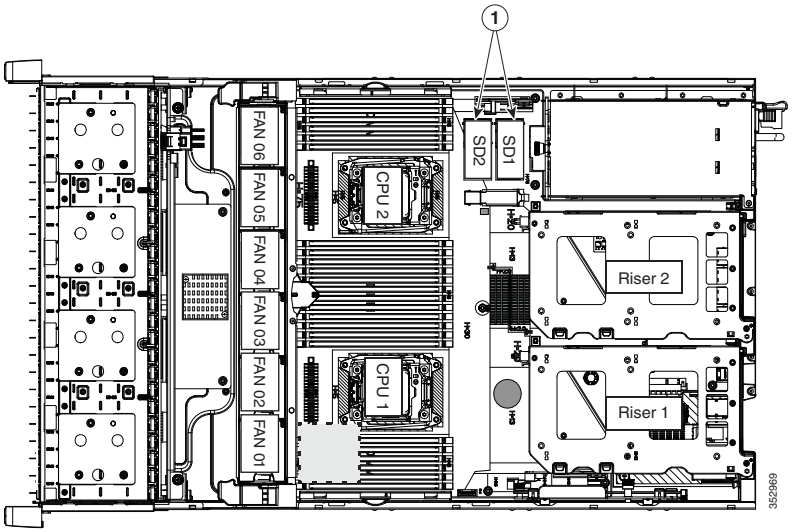
a. Insert the SD card into the slot with the label side facing up.

b. Press on the top of the card until it clicks in the slot and stays in place.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-19 SD Card Bay Location and Numbering on the Motherboard



1	SD card bays SD1 and SD2		

Enabling or Disabling the Internal USB Port

Caution We do not recommend that you hot-swap the internal USB drive while the Cisco CSP 2100 X2 is powered on.

The factory default is for all USB ports on the Cisco CSP 2100 X2 to be enabled. However, the internal USB port can be enabled or disabled in the BIOS. See Figure 8-5 for the location of the internal USB 3.0 slot on the motherboard.

Step 1 Enter the BIOS Setup Utility by pressing the **F2** key when prompted during bootup.

Step 2 Navigate to the **Advanced** tab.

Step 3 On the Advanced tab, select **USB Configuration**.

Step 4 On the USB Configuration page, choose **USB Ports Configuration**.

Step 5 Scroll to **USB Port: Internal**, press **Enter**, and then choose either **Enabled** or **Disabled** from the dialog box.

Step 6 Press **F10** to save and exit the utility.

Replacing a PCIe Riser

Cisco CSP 2100 X2 contains two toolless PCIe risers for horizontal installation of PCIe cards. See Replacing a PCIe Card, page 8-42 for the specifications of the PCIe slots on the risers.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove the PCIe riser that you are replacing (see Figure 8-20):

a. Grasp the top of the riser and lift straight up on both ends to disengage its circuit board from the socket on the motherboard. Set the riser on an antistatic mat.

b. If the riser has a card installed, remove the card from the riser. See Replacing a PCIe Card, page 8-42.

Step 5 Install a new PCIe riser:

a. If you removed a card from the old PCIe riser, install the card to the new riser (see Replacing a PCIe Card, page 8-42).

b. Position the PCIe riser over its socket on the motherboard and over its alignment slots in the chassis (see Figure 8-20). There are also two alignment pegs on the motherboard for each riser.

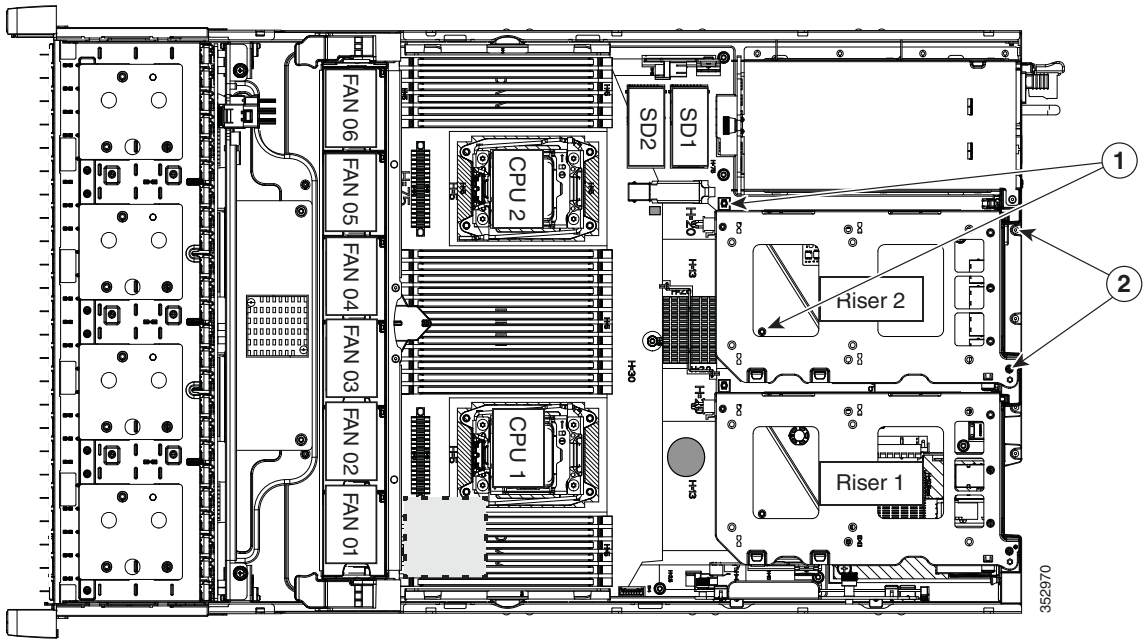
Note The PCIe risers are not interchangeable. If you plug a PCIe riser into the wrong socket, the Cisco CSP 2100 X2 will not boot. Riser 1 must plug into the motherboard socket labeled “RISER1.” Riser 2 must plug into the motherboard socket labeled “RISER2.”

c. Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-20 PCIe Riser Alignment Features



1	Alignment peg locations on motherboard (two for each riser)	**2**	Alignment channel locations on chassis (two for each riser)

Replacing a PCIe Card

Caution Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards not qualified or sold by Cisco are the responsibility of the customer. Although Cisco will always stand behind and support the Cisco CSP 2100, customers using standard, off-the-shelf, third-party cards must go to the third-party card vendor for support if any issue with that particular third-party card occurs.

This section includes the following topics:

- PCIe Slots, page 8-42
- Replacing a PCIe Card, page 8-43
- Installing Multiple PCIe Cards and Resolving Limited Resources, page 8-45

PCIe Slots

Cisco CSP 2100 X2 contains two toolless PCIe risers for horizontal installation of PCIe cards (see Figure 8-21).

- Riser 1 B’
- Riser 2

Figure 8-21 Rear Panel, Showing PCIe Slots

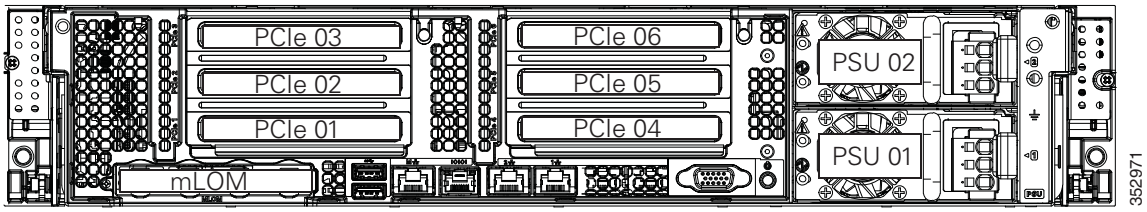


Table 8-7 Riser 1B[1] (UCSC-PCI-1B-240M4) PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Card Length	Card Height	NCSI Support
1	Gen-3 x8	x16 connector	3/4 length	Full height	No
2	Gen-3 x8	x24 connector	Full length	Full height	Yes
3	Gen-3 x8	x16 connector	Full length	Full height	No

1. GPU cards are not supported in this riser 1B version. There is no GPU power connector in this version. Use riser version 1A or 1C for GPU cards.

Table 8-8 Riser 2 (UCSC-PCI-2-240M4) PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Card Length	Card Height	NCSI Support
4	Gen-3 x8	x24 connector	3/4 length	Full height	Yes
5	Gen-3 x16	x24 connector	Full length	Full height	Yes[1]
6	Gen-3 x8	x16 connector	Full length	Full height	No

1. NCSI is supported in only one slot at a time in this riser version. If a GPU card is present in slot 5, NCSI support automatically moves to slot 4.

Replacing a PCIe Card

To install or replace a PCIe card, follow these steps:

Step 1 Shut down and power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove a PCIe card (or a blanking panel) from the PCIe riser:

- **a.** Lift straight up on both ends of the riser to disengage its circuit board from the socket on the motherboard. Set the riser on an antistatic mat.
- **b.** On the bottom of the riser, loosen the single thumbscrew that holds the securing plate (see Figure 8-22).
- **c.** Swing open the securing plate and remove it from the riser to provide access.
- **d.** Swing open the card-tab retainer that secures the back-panel tab of the card (see Figure 8-22).
- **e.** Pull evenly on both ends of the PCIe card to disengage it from the socket on the PCIe riser (or remove a blanking panel) and then set the card aside.

Step 5 Install a PCIe card:

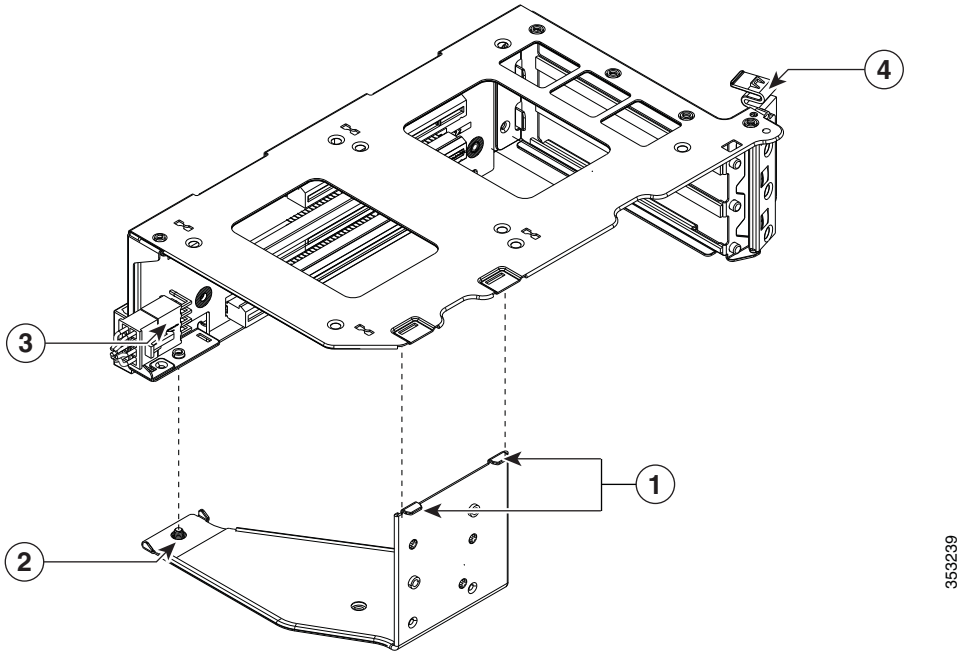
- **a.** Align the new PCIe card with the empty socket on the PCIe riser.
- **b.** Push down evenly on both ends of the card until it is fully seated in the socket.

  Ensure that the card rear panel tab sits flat against the PCIe riser rear panel opening.
- **c.** Close the card-tab retainer (see Figure 8-22).
- **d.** Return the securing plate to the riser. Insert the two hinge-tabs into the two slots on the riser, and then swing the securing plate closed.
- **e.** Tighten the single thumbscrew on the bottom of the securing plate.
- **f.** Position the PCIe riser over its socket on the motherboard and over its alignment features in the chassis (see Figure 8-20).
- **g.** Carefully push down on both ends of the PCIe riser to fully engage its circuit board connector with the socket on the motherboard.

Step 6 Replace the top cover.

Step 7 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-22 PCIe Riser Securing Features (Three-Slot Riser Shown)



1	Securing plate hinge-tabs	**3**	GPU card power connector
2	Securing plate thumbscrew (knob not visible on underside of plate)	**4**	Card-tab retainer in open position

Installing Multiple PCIe Cards and Resolving Limited Resources

When a large number of PCIe add-on cards are installed in the Cisco CSP 2100 X2, the system might run out of the following resources required for PCIe devices:

- Option ROM memory space
- 16-bit I/O space

The topics in this section provide guidelines for resolving the issues related to these limited resources:

- Resolving Insufficient Memory Space to Execute Option ROMs, page 8-45
- Resolving Insufficient 16-Bit I/O Space, page 8-46

Resolving Insufficient Memory Space to Execute Option ROMs

The system has very limited memory to execute PCIe legacy option ROMs, so when a large number of PCIe add-on cards are installed in the Cisco CSP 2100 X2, the system BIOS might not able to execute all of the option ROMs. The system BIOS loads and executes the option ROMs in the order that the PCIe cards are enumerated (slot 1, slot 2, slot 3, and so on).

If the system BIOS does not have sufficient memory space to load any PCIe option ROM, it skips loading that option ROM, reports a system event log (SEL) event to the Cisco IMC controller and reports the following error in the Error Manager page of the BIOS Setup utility:

```
ERROR CODE  SEVERITY    INSTANCE    DESCRIPTION
146         Major       N/A         PCI out of resources error.
                                    Major severity requires user
                                    intervention but does not
                                    prevent system boot.
```

To resolve this issue, disable the Option ROMs that are not needed for system booting. The BIOS Setup Utility provides the setup options to enable or disable the Option ROMs at the PCIe slot level for the PCIe expansion slots and at the port level for the onboard NICs. These options can be found in the BIOS Setup Utility **Advanced** > **PCI Configuration** page.

- **Guidelines for RAID controller booting**

  If the Cisco CSP 2100 X2 is configured to boot primarily from RAID storage, make sure that the option ROMs for the slots where your RAID controllers installed are enabled in the BIOS, depending on your RAID controller configuration.

  If the RAID controller does not appear in the system boot order even with the option ROMs for those slots are enabled, the RAID controller option ROM might not have sufficient memory space to execute. In that case, disable other option ROMs that are not needed for the system configuration to free up some memory space for the RAID controller option ROM.

- **Guidelines for onboard NIC PXE booting**

  If the system is configured to primarily perform PXE boot from onboard NICs, make sure that the option ROMs for the onboard NICs to be booted from are enabled in the BIOS Setup Utility. Disable other option ROMs that are not needed to create sufficient memory space for the onboard NICs.

Resolving Insufficient 16-Bit I/O Space

The system has only 64 KB of legacy 16-bit I/O resources available. This 64 KB of I/O space is divided between the CPUs in the system because the PCIe controller is integrated into the CPUs. Cisco CSP 2100 X2 BIOS has the capability to dynamically detect the 16-bit I/O resource requirement for each CPU and then balance the 16-bit I/O resource allocation between the CPUs during the PCI bus enumeration phase of the BIOS POST.

When a large number of PCIe cards are installed in the system, the system BIOS might not have sufficient I/O space for some PCIe devices. If the system BIOS is not able to allocate the required I/O resources for any PCIe devices, the following symptoms have been observed:

- The system might get stuck in an infinite reset loop.
- The BIOS might appear to hang while initializing PCIe devices.
- The PCIe option ROMs might take excessive time to complete, which appears to lock up the system.
- PCIe boot devices might not be accessible from the BIOS.
- PCIe option ROMs might report initialization errors. These errors are seen before the BIOS passes control to the operating system.
- The keyboard might not work.

To work around this problem, rebalance the 16-bit I/O load using the following methods:

1. Physically remove any unused PCIe cards.
2. If the system has one or more Cisco virtual interface cards (VICs) installed, disable the PXE boot on the VICs that are not required for the system boot configuration by using the Network Adapters page in Cisco IMC Web UI to free up some 16-bit I/O resources. Each VIC uses a minimum 16 KB of 16-bit I/O resource, so disabling PXE boot on Cisco VICs would free up some 16-bit I/O resources that can be used for other PCIe cards that are installed in the system.

Installing a Trusted Platform Module (TPM)

The trusted platform module (TPM) is a small circuit board that connects to a motherboard socket and is secured by a one-way screw.

TPM 2.0 Considerations

Trusted platform module (TPM) version 2.0 is supported on Intel v3- or Intel v4-based platforms.

If there is an existing TPM 1.2 installed in the Cisco CSP 2100 X2, you cannot upgrade to TPM 2.0.

If there is no existing TPM in the Cisco CSP 2100 X2, you can install TPM 2.0. You must first upgrade to Intel v4 code, regardless of whether the installed CPU is Intel v3 or v4. TPM 2.0 requires Intel v4 code or later.

Caution If your Intel v3 or Intel v4 system is currently supported and protected by TPM version 2.0, a potential security exposure might occur if you downgrade the system software and BIOS to a version earlier than those shown in Table 8-9.

Note If the TPM 2.0 becomes unresponsive, reboot the Cisco CSP 2100 X2.

Table 8-9 TPM Matrix by Intel CPU Version

Intel CPU	TPM Version Supported	Minimum Cisco IMC Version	Minimum UCS Manager (UCSM) Version
Intel v3	TPM 1.2	2.0(3)	2.2(3)
	TPM 2.0	2.0(10)	2.2(7) or 3.1(1)
Intel v4	TPM 1.2	2.0(10)	2.2(7) or 3.1(1)
	TPM 2.0	2.0(10)	2.2(7) or 3.1(1)

Installing the TPM Hardware

This section contains the following procedures, which must be followed in this order when installing and enabling a TPM:

1. Installing the TPM Hardware, page 8-48
2. Enabling TPM Support in the BIOS, page 8-50
3. Enabling the Intel TXT Feature in the BIOS, page 8-51

Note For security purposes, the TPM is installed with a one-way screw. It cannot be removed with a standard screwdriver.

Step 1 Prepare the Cisco CSP 2100 X2 for component installation:

Step 2 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 3 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 4 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 5 Remove PCIe riser 2 to provide clearance. See Replacing a PCIe Riser, page 8-40 for instructions.

Step 6 Install a TPM:

a. Locate the TPM socket on the motherboard, as shown in Figure 8-23.

b. Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole and standoff on the TPM board with the screw hole that is adjacent to the TPM socket.

c. Push down evenly on the TPM to seat it in the motherboard socket.

d. Install the single one-way screw that secures the TPM to the motherboard.

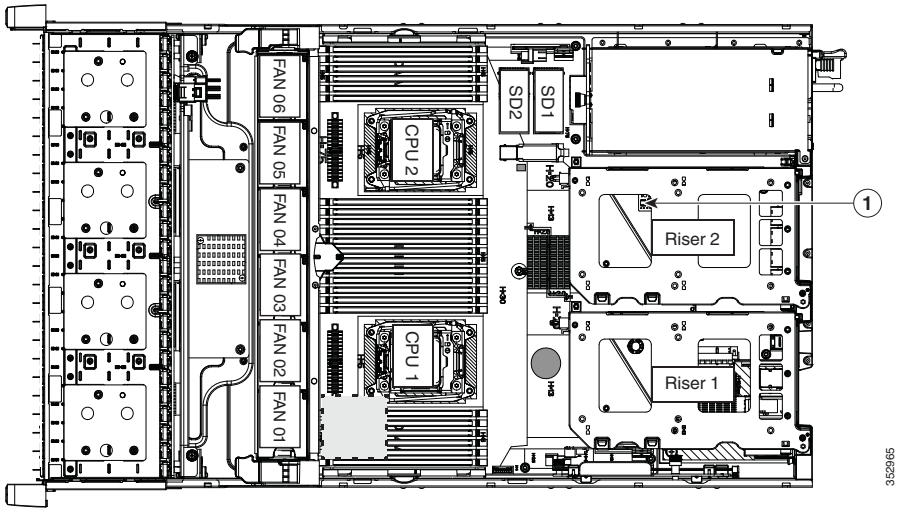
Step 7 Replace PCIe riser 2 to the Cisco CSP 2100 X2. See Replacing a PCIe Riser, page 8-40 for instructions.

Step 8 Replace the top cover.

Step 9 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Step 10 Continue with Enabling TPM Support in the BIOS, page 8-50.

Figure 8-23 TPM Socket Location on Motherboard



1	TPM socket location on the motherboard (under PCIe riser 2)		–

Enabling TPM Support in the BIOS

Note After hardware installation, you must enable TPM support in the BIOS:

Step 1 Enable TPM support:

a. Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.

b. Log in to the BIOS Setup Utility with your BIOS Administrator password.

c. On the BIOS Setup Utility window, choose the **Advanced** tab.

d. Choose **Trusted Computing** to open the TPM Security Device Configuration window.

e. Change TPM SUPPORT to **Enabled**.

f. Press **F10** to save your settings and reboot the Cisco CSP 2100 X2.

Step 2 Verify that TPM support is now enabled:

a. Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.

b. Log into the BIOS Setup utility with your BIOS Administrator password.

c. Choose the **Advanced** tab.

d. Choose **Trusted Computing** to open the TPM Security Device Configuration window.

e. Verify that TPM SUPPORT and TPM State are Enabled.

Step 3 Continue with Enabling the Intel TXT Feature in the BIOS, page 8-51.

Enabling the Intel TXT Feature in the BIOS

Intel Trusted Execution Technology (TXT) provides greater protection for information that is used and stored on the business server. A key aspect of that protection is the provision of an isolated execution environment and associated sections of memory where operations can be conducted on sensitive data, invisibly to the rest of the system. Intel TXT provides for a sealed portion of storage where sensitive data such as encryption keys can be kept, helping to shield them from being compromised during an attack by malicious code.

Step 1 Reboot the Cisco CSP 2100 X2 and watch for the prompt to press F2.

Step 2 When prompted, press **F2** to enter the BIOS Setup utility.

Step 3 Verify that the prerequisite BIOS values are enabled:

a. Choose the **Advanced** tab.

b. Choose **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support window.

c. Verify that the following items are listed as Enabled:

   – VT-d Support (default is Enabled)

   – VT Support (default is Enabled)

   – TPM Support

   – TPM State

- If VT-d Support and VT Support are already enabled, skip to Step 4.
- If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.

d. Press **Escape** to return to the BIOS Setup utility **Advanced** tab.

e. On the Advanced tab, choose **Processor Configuration** to open the Processor Configuration window.

f. Set Intel (R) VT and Intel (R) VT-d to **Enabled**.

Step 4 Enable the Intel Trusted Execution Technology (TXT) feature:

a. Return to the Intel TXT(LT-SX) Hardware Support window if you are not already there.

b. Set TXT Support to **Enabled**.

Step 5 Press **F10** to save your changes and exit the BIOS Setup utility.

Replacing Power Supplies

Cisco CSP 2100 X2 can have one or two power supplies. When two power supplies are installed they are redundant as 1+1 and hot-swappable.

- Replacing an AC Power Supply, page 8-52
- Replacing a DC Power Supply, page 8-53
- Installation Grounding, page 8-54
- See Power Specifications, page 9-2 for more information about the supported power supplies.
- See Rear Panel LEDs and Buttons, page 8-5 for information about the power supply LEDs.
- See Replacing a DC Power Supply, page 8-53 for information about wiring a DC power supply.

Replacing an AC Power Supply

Note If you have ordered a Cisco CSP 2100 X2 with power supply redundancy (two power supplies), you do not have to power off the Cisco CSP 2100 X2 to replace power supplies because they are redundant as 1+1 and hot-swappable.

Note Do not mix power supply types in the Cisco CSP 2100 X2. Both power supplies must be the same wattage and Cisco product ID (PID).

Step 1 Remove the power supply that you are replacing or a blank panel from an empty bay:

a. Perform one of the following actions:

- If your Cisco CSP 2100 X2 has only one power supply, shut down and power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.
- If your Cisco CSP 2100 X2 has two power supplies, you do not have to shut down the Cisco CSP 2100 X2.

b. Remove the power cord from the power supply that you are replacing.

For a DC power supply, release the electrical connector block from the power supply by pushing the orange plastic button on the top of the connector inward toward the power supply. Pull the connector block from the power supply.

c. Grasp the power supply handle while pinching the green release lever towards the handle.

d. Pull the power supply out of the bay.

Step 2 Install a new power supply:

a. Grasp the power supply handle and insert the new power supply into the empty bay.

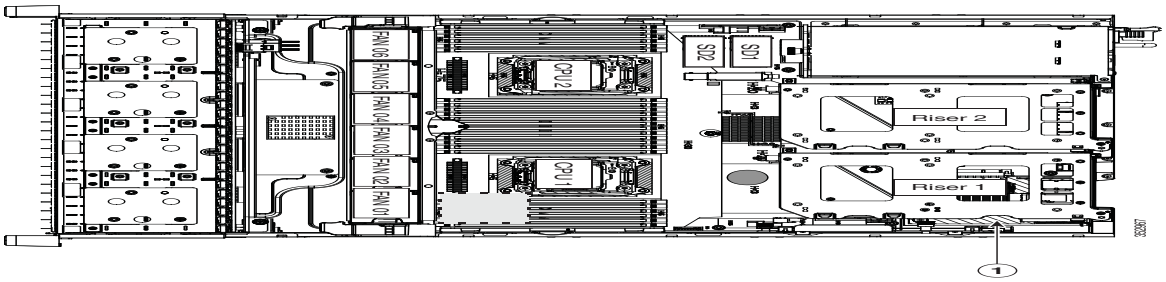
b. Push the power supply into the bay until the release lever locks.

c. Connect the power cord to the new power supply.

For a DC power supply, push the electrical connector block into the power supply.

d. If you shut down the Cisco CSP 2100 X2, press the **Power** button to return the Cisco CSP 2100 X2 to main power mode.

Figure 8-24 Power Supplies



1	Power supply handle	3	Screw holes for grounding lug
2	Power supply release lever		

Replacing a DC Power Supply

- Installing a Version 2 930W DC Power Supply, UCSC-PSU2V2-930DC, page 8-54
- Installation Grounding, page 8-54

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

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

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

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

Warning **Hazardous voltage or energy may be present on DC power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1075**

Installing a Version 2 930W DC Power Supply, UCSC-PSU2V2-930DC

If you are using the Version 2 930W DC power supply, you connect power using a 3-wire cable with a keyed connector that plugs into a fixed power input socket on the power supply. .

Caution Before beginning this wiring procedure, turn off the DC power source from your facility's circuit breaker to avoid electric shock hazard.

Step 1 Turn off the DC power source from your facility's circuit breaker to avoid electric shock hazard.

Step 2 Wire the supplied 3-wire connector cable to your facility's DC power source.

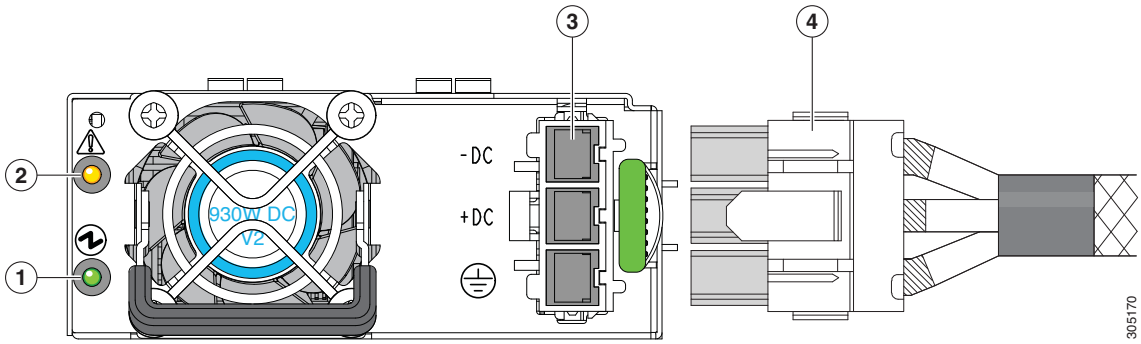
Note The supplied connector cable contains 8 AWG gauge wires. The recommended facility wire gauge is 8 AWG. The minimum facility wire gauge is 10 AWG.

Step 3 Plug the supplied connector cable into the power input socket on the power supply. The connector is keyed to the socket so that the polarity is aligned correctly.

Step 4 Return power from your facility's DC power source at the circuit breaker.

Step 5 See Installation Grounding, page 8-54 for additional information about chassis grounding.

Figure 8-25 Version 2 930 W, –48 VDC Power Supply Connector Block



1	Power supply status LED	**3**	Fixed power input socket
2	Power supply fault LED	**4**	Supplied connector cable

Installation Grounding

The AC power supplies have internal grounding and so no additional grounding is required when the supported AC power cords are used.

When using a DC power supply, additional grounding of Cisco CSP 2100 X2 chassis to the earth ground of the rack is available. Screw holes for use with your grounding lugs and grounding wires are supplied on the chassis rear panel.

Note The grounding points on the chassis are sized for M5 screws. The grounding points are spaced at 0.625 inches (15.86 mm). You must provide your own screws, grounding lug, and grounding wire. The grounding lug required is a Panduit LCD10-14AF-L or equivalent. The grounding cable that you provide must be 14 AWG (2 mm), minimum 60° C wire, or as permitted by the local code.

See Figure 8-24 for the location of the grounding lug screw-holes on the chassis rear panel.

Replacing an mLOM Card

Cisco CSP 2100 X2 can use an mLOM card to provide additional connectivity. The mLOM card socket remains powered when the Cisco CSP 2100 X2 is in 12 V standby power mode and it supports the network communications services (NCSI) protocol.

Step 1 Power off the Cisco CSP 2100 X2 as described in Shutting Down and Powering Off the Cisco CSP 2100 X2, page 8-9.

Step 2 Slide the Cisco CSP 2100 X2 out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

Caution If you cannot safely view and access the component, remove the Cisco CSP 2100 X2 from the rack.

Step 3 Remove the top cover as described in Removing and Replacing the Cisco CSP 2100 X2 Top Cover, page 8-10.

Step 4 Remove PCIe riser 1 to provide clearance. See Replacing a PCIe Riser, page 8-40 for instructions.

Step 5 Remove any existing mLOM card or a blanking panel (see Figure 8-26):

- **a.** Loosen the single thumbscrew that secures the mLOM card to the chassis floor.
- **b.** Slide the mLOM card horizontally to disengage its connector from the motherboard socket.

Step 6 Install a new mLOM card:

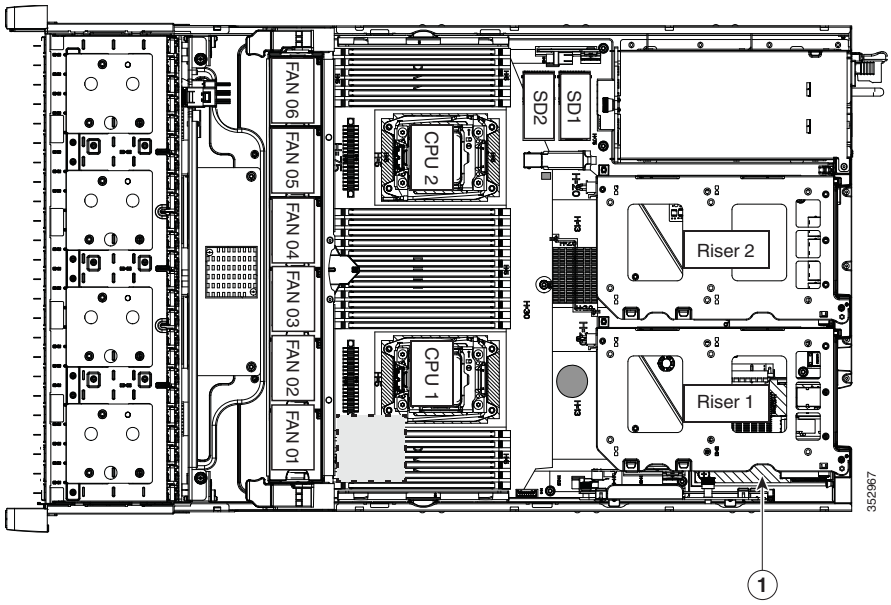
- **a.** Set the mLOM card on the chassis floor so that its connector is aligned with the motherboard socket and its thumbscrew is aligned with the standoff on the chassis floor.
- **b.** Push the card's connector into the motherboard socket horizontally.
- **c.** Tighten the thumbscrew to secure the card to the chassis floor.

Step 7 Return PCIe riser 1 to the Cisco CSP 2100 X2. See Replacing a PCIe Riser, page 8-40 for instructions.

Step 8 Replace the top cover.

Step 9 Replace the Cisco CSP 2100 X2 in the rack, replace cables, and then power on the Cisco CSP 2100 X2 by pressing the **Power** button.

Figure 8-26 mLOM Card Location



1	mLOM card socket location on motherboard (under PCIe riser 1)		