Cisco HX 220c M6 HyperFlex Node Installation Guide (Hybrid, All-Flash, and All-NVMe Models)

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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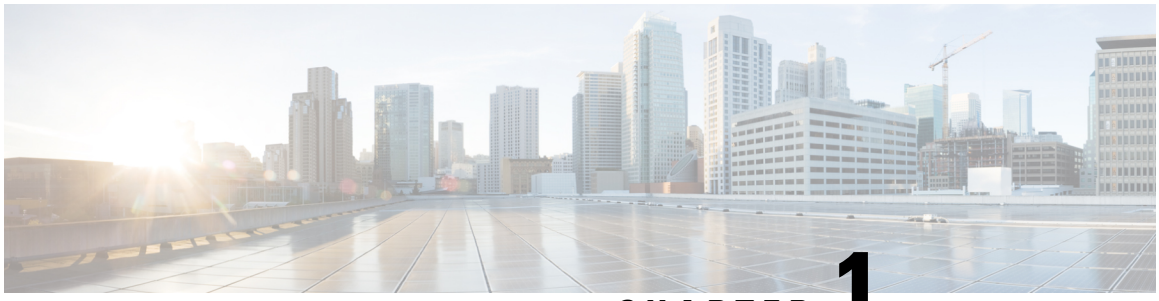
Communications, Services, Bias-free Language, and Additional Information



CHAPTER 1

Overview

Overview

The Cisco HX C220 M6 node is a one-rack unit node that can be used standalone, or as part of the Cisco Unified Computing System, which unifies computing, networking, management, virtualization, and storage access into a single integrated architecture. Cisco HX also enables end-to-end node visibility, management, and control in both bare metal and virtualized environments. Each Cisco HX C220 M6 node supports:

- a maximum of two 3rd Generation Intel Xeon processors.
- 32 DDR4 DIMMs (16 per CPU) for a total system memory of either 8 TB (32 256 GB DDR4 DIMMs) or 12 TB (16 x 256 GB DDR4 DIMMs1 and 16 x 512 GB Intel® Optane™ Persistent Memory Module. (PMEMs)).
- 3 PCI Express riser connectors, which provide slots for “full height” and “half height” PCI-e adapters.
- Two Titanium (80 PLUS rated) power supplies with support for N and N+1 power redundancy modes.
- 2 10GBase-T Ethernet LAN over Motherboard (LOM) ports for network connectivity, plus one 1 Gigabit Ethernet dedicated management port
- One mLOM/VIC card provides 10G/25G/40G/50G/100G connectivity. Supported cards are:
  - Cisco HX VIC 15428 Quad Port CNA MLOM (HX-M-V5Q50G) supports:
    - a x16 PCIe Gen4 Host Interface to the rack node
    - four 10G/25G/50G SFP56 ports
    - 4GB DDR4 Memory, 3200 MHz
    - Integrated blower for optimal ventilation
  - Cisco HX VIC 1467 Quad Port 10/25G SFP28 mLOM (HX-M-V25-04) supports:
    - a x16 PCIe Gen3 Host Interface to the rack node

    - four 10G/25G QSFP28 ports
    - 2GB DDR3 Memory, 1866 MHz

  - Cisco HX VIC 1477 Dual Port 40/100G QSFP28 (HX-M-V100-04)
    - a x16 PCIe Gen3 Host Interface to the rack node
    - two 10G/25G QSFP28 ports
    - 2GB DDR3 Memory, 1866 MHz

- One KVM port on the front of the node.
- Two different front-loading hardware configurations are available:
  - The Cisco HX C220 M6 SFF (HX-C220-M6S): This model supports only small form-factor (SFF) drives and has a 10-drive backplane. Supports up to 10 front-loading 2.5-inch SAS/SATA drives, and up to 4 of the drives can be NVMe.
  - The Cisco HX C220 M6 NVMe (HX-C220-M6N): This model supports only small form-factor (SFF) drives and has a 10-drive backplane. Supports up to 10 front-loading 2.5-inch NVMe-only SSDs.
- Rear PCI risers are supported as one to three half-height PCIe risers, or one to two full-height PCIe risers.
- The node provides an internal slot for one of the following:
  - SATA Interposer to control SATA drives from the PCH (AHCI), or
  - Cisco 12G RAID controller with cache backup to control SAS/SATA drives, or
  - Cisco 12G SAS pass-through HBA to control SAS/SATA drives

External Features

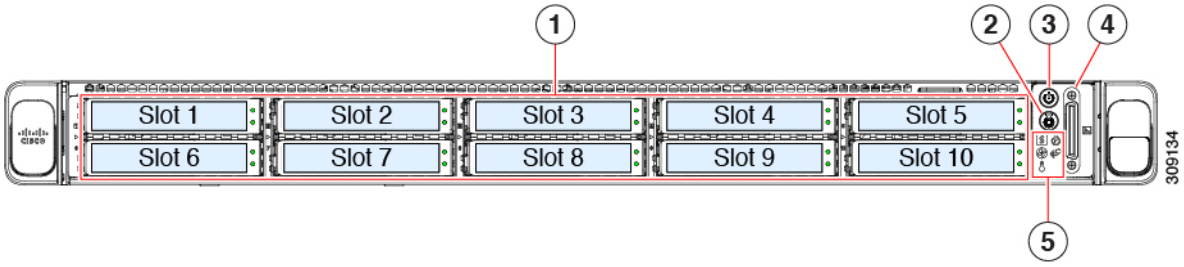
This topic shows the external features of the server versions.

Cisco UCS C220 M6 Server Front Panel Features

The following figure shows the front panel features of the small form-factor drive versions of the server.

For definitions of LED states, see Front-Panel LEDs, on page 34.

Figure 1: Cisco UCS C220 M6 Server Front Panel



1	Drive bays 1 – 10 support SAS/SATA hard disk drives (HDDs) and solid-state drives (SSDs). As an option, drive bays 1-4 can contain up to 4 NVMe drives in any number up to 4. Drive bays 5 through 10 support only SAS/SATA HDDs or SSDs. NVMe drives are supported in a dual CPU server only.	**2**	Unit identification button/LED
3	Power button/power status LED	**4**	KVM connector (used with KVM cable that provides one DB-15 VGA, one DB-9 serial, and two USB 2.0 connectors)
5	System LED cluster: • Fan status LED • System status LED • Power supply status LED • Network link activity LED • Temperature status LED For more information, see Front-Panel LEDs, on page 34		-

Cisco UCS C220 M6 Server Rear Panel Features

The rear panel features can be different depending on the number and type of PCIe cards in the server.

By default, single CPU servers come with only one half-height riser 1 installed, and dual CPU servers support all three half-height risers.

Rear PCIe risers can be one of the following configurations:

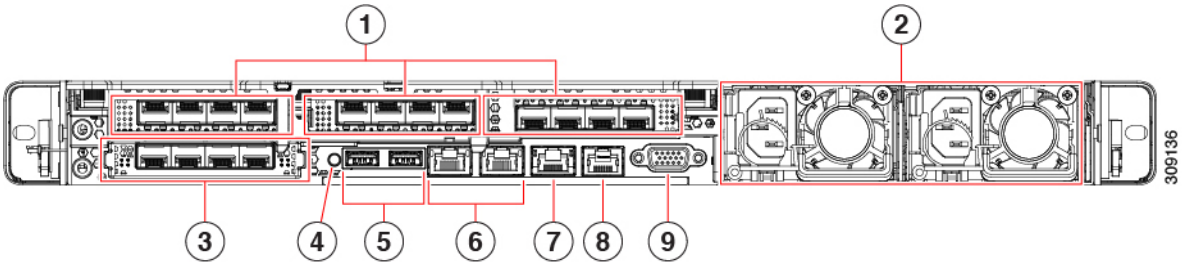
- Half-height risers:
  - one half-height, ¾ length riser (not shown). With this configuration, PCIe slot (slot 1) supports one half-height, ¾ length, x16 lanes PCIe card and is controlled by CPU 1.

- three half-height, ¾ length risers. See "UCS C220 M6 Server Rear Panel, Half Height, ¾ Length PCIe Cards" below.

- Full-height risers: Two full height, ¾ length risers. See "Cisco UCS C220 M6 Server Rear Panel, Full Height, ¾ Length PCIe Cards" below.

Note For definitions of LED states, see Rear-Panel LEDs, on page 36.

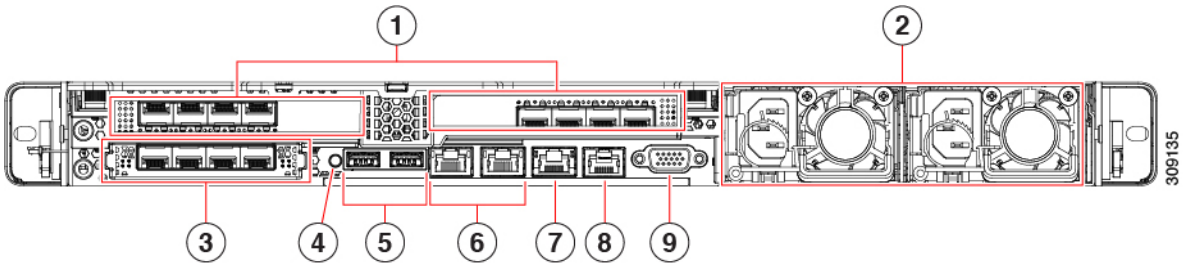
Figure 2: Cisco UCS C220 M6 Server Rear Panel, Half Height, ¾ Length PCIe Cards



1	PCIe slots, three This configuration accepts three card in riser slots 1, 2, and 3 as follows: • Riser 1, which is controlled by CPU 1: • Supports one PCIe slot (slot 1) • Slot 1 is half-height, 3/4 length, x16 • Riser 2, which is controlled by CPU 1: • Supports one PCIe slot (slot 2) • Slot 2 is half-height, 3/4 length, x16 • Riser 3, which is controlled by CPU 2: • Supports one PCIe slot (slot 3) • Slot 3 is half-height, 3/4 length, x16	**2**	Power supply units (PSUs), two which can be redundant when configured in 1+1 power mode.
3	Modular LAN-on-motherboard (mLOM) card bay (x16 PCIe lane) USB 3.0 ports (two)	**4**	System identification button/LED
5	USB 3.0 ports (two)	**6**	Dual 1-Gb/10-Gb Ethernet ports (LAN1 and LAN2) The dual LAN ports can support 1 Gbps and 10 Gbps, depending on the link partner capability.
7	1-Gb Ethernet dedicated management port	**8**	COM port (RJ-45 connector)

9	VGA video port (DB-15 connector)		

Figure 3: Cisco UCS C220 M6 Server Rear Panel, Full Height, ¾ Length PCIe Cards

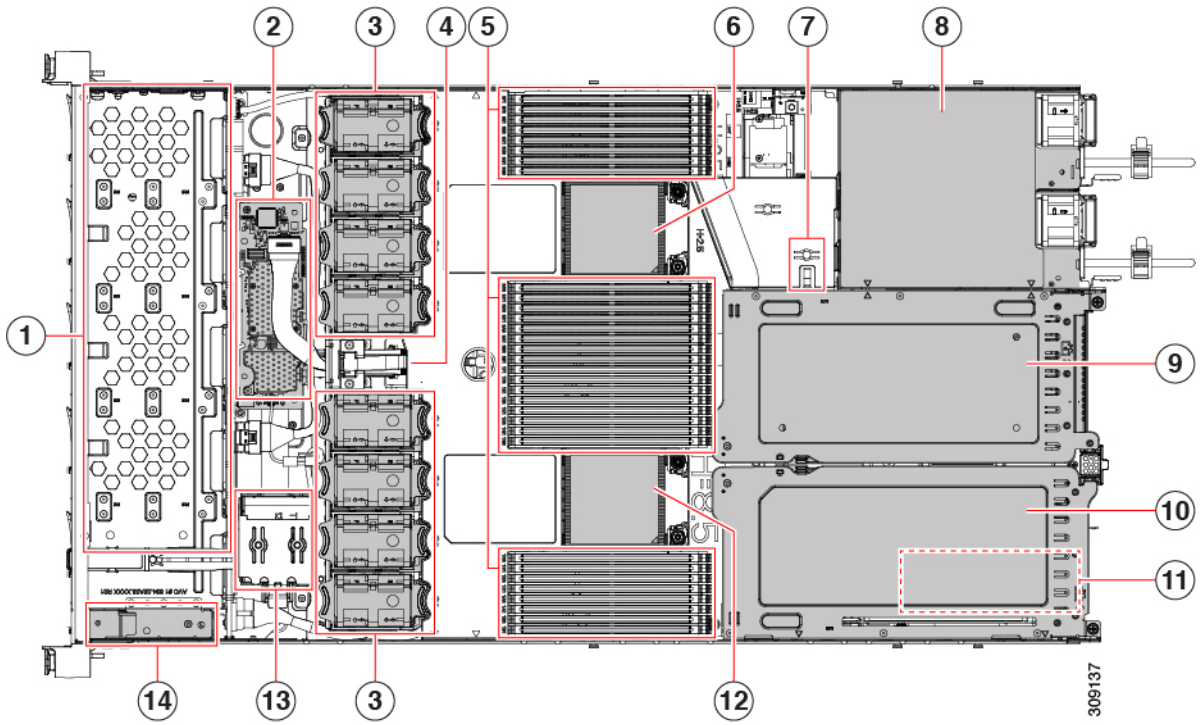


1	PCIe slots, two This configuration accepts two cards in riser slots 1 and 2 as follows: • Riser 1, which is controlled by CPU 1: • Plugs into riser 1 motherboard connector • Supports one full-height, 3/4 length, x16 PCIe card • Riser 2, which is controlled by CPU 2: • Plugs into riser 3 motherboard connector • Supports one full-height, 3/4 length, x16 PCIe card	**2**	Power supply units (PSUs), two which can be redundant when configured in 1+1 power mode.
3	Modular LAN-on-motherboard (mLOM) card bay (x16 PCIe lane)	**4**	Unit identification button/LED
5	USB 3.0 ports (two)	**6**	Dual 1-Gb/10-Gb Ethernet ports (LAN1 and LAN2) The dual LAN ports can support 1 Gbps and 10 Gbps, depending on the link partner capability.
7	1-Gb Ethernet dedicated management port	**8**	COM port (RJ-45 connector)
9	VGA video port (DB-15 connector)		

Serviceable Component Locations

This topic shows the locations of the field-replaceable components and service-related items. The view in the following figure shows the node with the top cover removed.

Figure 4: Cisco HX C220 M6 node, Full Height, Full Width PCIe Cards, Serviceable Component Locations



1	Front-loading drive bays 1–10 support SAS/SATA drives.	**2**	M6 modular RAID card or SATA Interposer card
3	Cooling fan modules, eight. Each fan is hot-swappable	**4**	SuperCap module mounting bracket The SuperCap module (not shown) that mounts into this location provides RAID write-cache backup.
5	DIMM sockets on motherboard, 32 total, 16 per CPU Eight DIMM sockets are placed between the CPUs and the node sidewall, and 16 DIMM sockets are placed between the two CPUs.	**6**	Motherboard CPU socket two (CPU2)
7	M.2 module connector Supports a boot-optimized RAID controller with connectors for up to two SATA M.2 SSDs	**8**	Power Supply Units (PSUs), two
9	PCIe riser slot 2 Accepts 1 full height, full width PCIe riser card. Includes PCIe cable connectors for front-loading NVMe SSDs (x8 lane)	**10**	PCIe riser slot 1 Accepts 1 full height, full width (x16 lane) PCIe riser card

11	Modular LOM (mLOM) card bay on chassis floor (x16 PCIe lane) The mLOM card bay sits below PCIe riser slot 1.	**12**	Motherboard CPU socket one (CPU1)
13	Front Panel Controller board		

The view in the following figure shows the individual component locations and numbering, including the FHFW PCIe

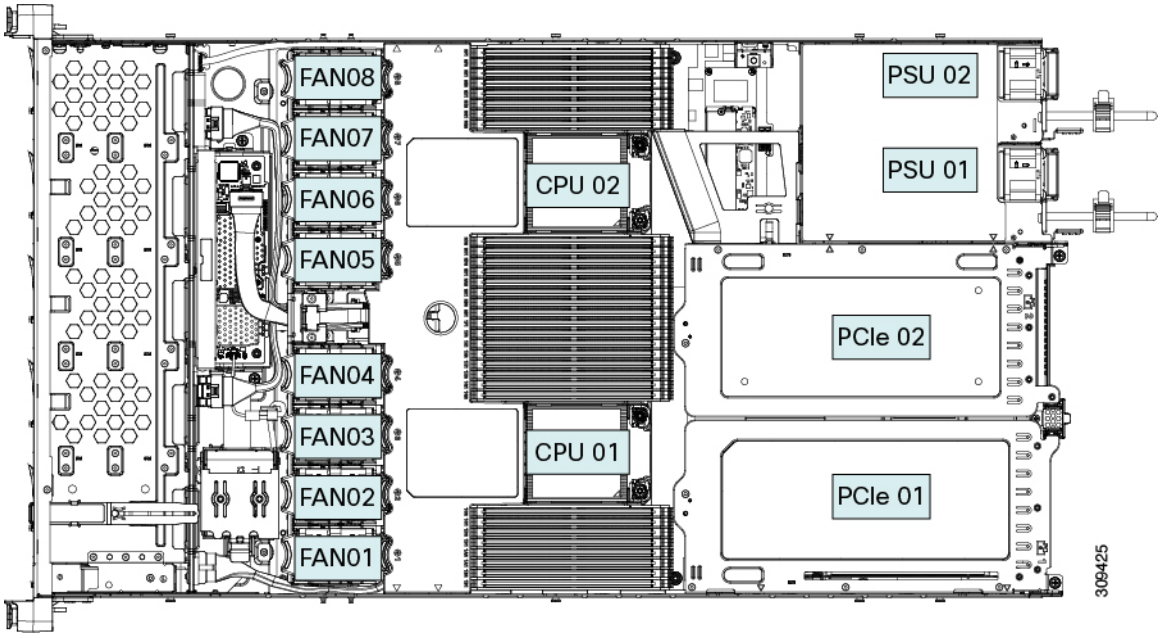
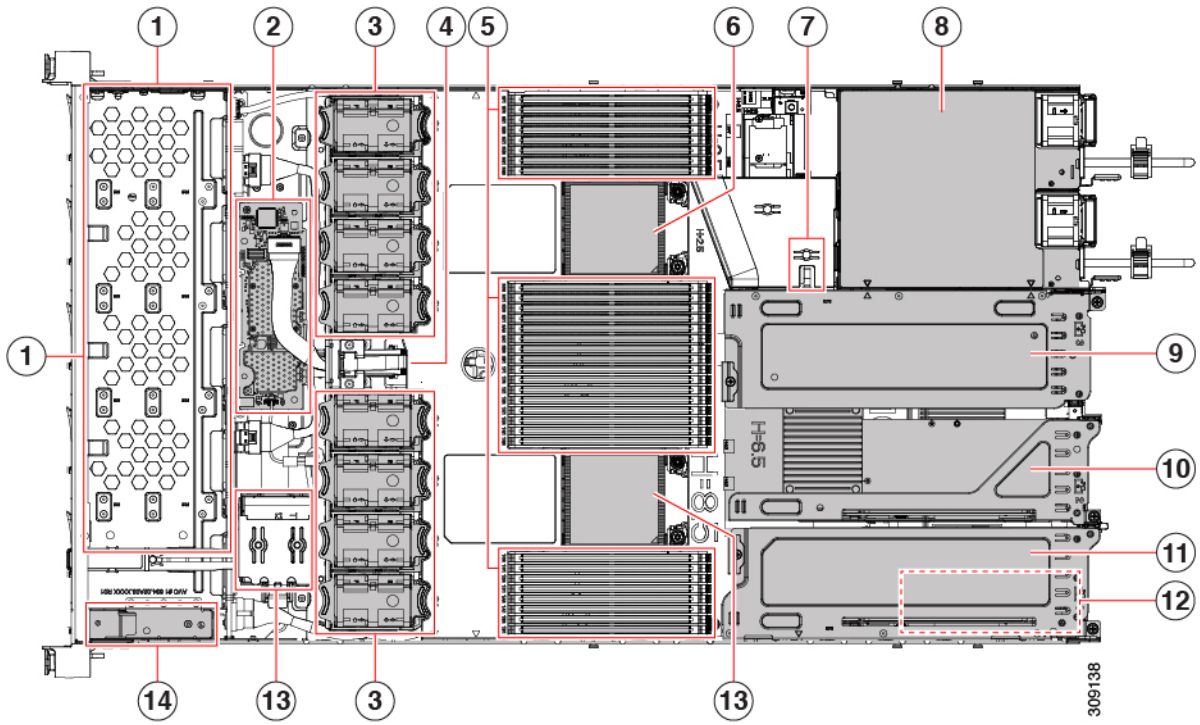


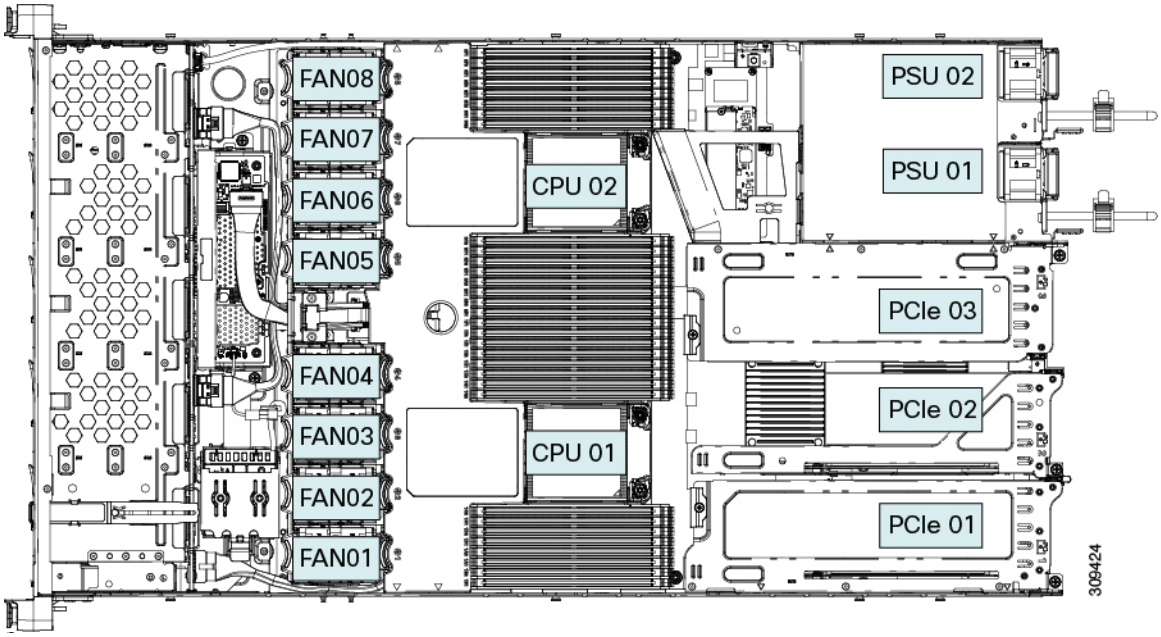
Figure 5: Cisco HX C220 M6 node, Full Height, Full Width PCIe Cards, Serviceable Component Locations



1	Front-loading drive bays 1–10 support SAS/SATA drives.	**2**	M6 modular RAID card or SATA Interposer card
3	Cooling fan modules, eight. Each fan is hot-swappable	**4**	SuperCap module mounting bracket The SuperCap module (not shown) that mounts into this location provides RAID write-cache backup.
5	DIMM sockets on motherboard, 32 total, 16 per CPU Eight DIMM sockets are placed between the CPUs and the node sidewall, and 16 DIMM sockets are placed between the two CPUs.	**6**	Motherboard CPU socket CPU2 is the top socket.
7	M.2 module connector Supports a boot-optimized RAID controller with connectors for up to two SATA M.2 SSDs	**8**	Power Supply Units (PSUs), two
9	PCIe riser slot 3 Accepts 1 half height, half width PCIe riser card.	**10**	PCIe riser slot 2 Accepts 1 half height, half width PCIe riser card.
11	PCIe riser slot 1 Accepts 1 half height, half width PCIe riser card	**12**	Modular LOM (mLOM) card bay on chassis floor (x16 PCIe lane) The mLOM card bay sits below PCIe riser slot 1.

13	Motherboard CPU socket CPU1 is the bottom socket	**14**	Front Panel Controller board

The view in the following figure shows the individual component locations and numbering, including the HHHL PCIe



The Technical Specifications Sheets for all versions of this node, which include supported component part numbers, are at Cisco HyperFlex M6 Technical Specifications Sheets (scroll down to *Technical Specifications*).

Summary of Node Features

The following table lists a summary of features.

Feature	Description
Chassis	One rack-unit (1RU) chassis
Central Processor	Up to two 3rd Generation Intel Xeon processors.
Memory	32 slots for registered DIMMs (RDIMMs), DDR4 DIMMs, 3DS DIMMs, and load-reduced DIMMs (LR DIMMs) up to 3200 MHz. Also supported is Intel® Optane™ Persistent Memory Modules (PMEMs)
Multi-bit error protection	This supports multi-bit error protection.

Feature	Description
Video	The Cisco Integrated Management Controller (CIMC) provides video using the Matrox G200e video/graphics controller: • Integrated 2D graphics core with hardware acceleration • DDR3 memory interface supports up to 512 MB of addressable memory (8 MB is allocated by default to video memory) • Supports display resolutions up to 1920 x 1200 16bpp @ 60Hz • High-speed integrated 24-bit RAMDAC • Single lane PCI-Express host interface running at Gen 2 speed
Network and management I/O	Rear panel: • One 1-Gb Ethernet dedicated management port (RJ-45 connector) • Two 1-Gb/10-Gb BASE-T Ethernet LAN ports (RJ-45 connectors) The dual LAN ports can support 10 Gbps, 1 Gbps, 100 Mbps, or 10 Mbps. The LAN ports autonegotiate to the correct link speed based on the link partner capability. • One RS-232 serial port (RJ-45 connector) • One VGA video connector port (DB-15 connector) • Two USB 3.0 ports Front panel: • One front-panel keyboard/video/mouse (KVM) connector that is used with the KVM breakout cable. The breakout cable provides two USB 2.0, one VGA, and one DB-9 serial connector.
Modular LOM	One dedicated socket (x16 PCIe lane) that can be used to add an mLOM card for additional rear-panel connectivity. As an optional hardware configuration, the Cisco CNIC mLOM module supports two 100G QSFP+ ports or 4 25 Gbps Ethernet ports.

Feature	Description
Power	Up to two of the following hot-swappable power supplies: • 1050 W (AC) • 1050 W (DC) • 1600 W (AC) • 2300 W (AC) One power supply is mandatory; one more can be added for 1 + 1 redundancy.
ACPI	The advanced configuration and power interface (ACPI) 4.0 standard is supported.
Front Panel	The front panel provides status indications and control buttons
Cooling	Eight hot-swappable fan modules for front-to-rear cooling.
InfiniBand	In addition to Fibre Channel, Ethernet and other industry-standards, the PCI slots in this support the InfiniBand architecture up HDR IB (200Gbps).
Expansion Slots	Three half-height riser slots • Riser 1 (controlled by CPU 1): One x16 PCIe Gen4 Slot, (Cisco VIC), half-height, 3/4 length • Riser 2 (controlled by CPU 1): One x16 PCIe Gen4 Slot, half-height, 3/4 length • Riser 3 (controlled by CPU 2): One x16 PCIe Gen4 Slot, (Cisco VIC), half-height, 3/4 length Two full-height riser slots • Riser 1 (controlled by CPU 1): One x16 PCIe Gen4 Slot,, full-height, 3/4 length • Riser 2 (controlled by CPU 2): One x16 PCIe Gen4 Slot, full-height, 3/4 length

Feature	Description

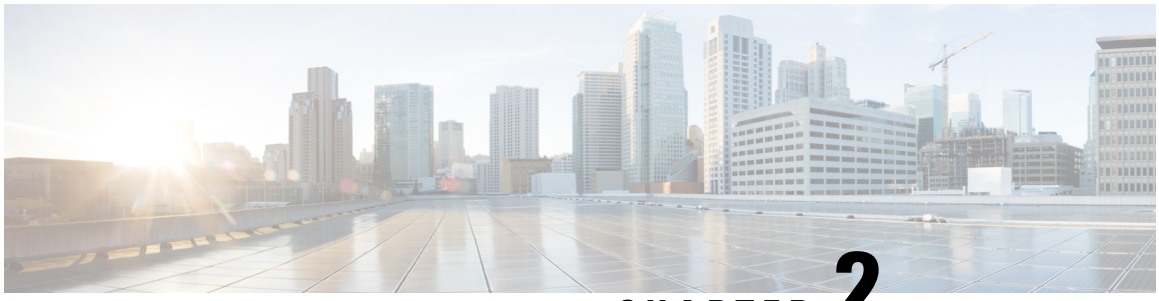
Interfaces	Rear panel:
	• One 1Gbase-T RJ-45 management port
	• Two 10Gbase-T LOM ports
	• One RS-232 serial port (RJ45 connector)
	• One DB15 VGA connector
	• Two USB 3.0 port connectors
	• One flexible modular LAN on motherboard (mLOM) slot that can accommodate various interface cards
	
	Front panel:
	• One KVM console connector, which supplies the pins for a KVM break out cable that supports the following:
	  • Two USB 2.0 connectors
	  • One VGA DB15 video connector
	  • One serial port (RS232) RJ45 connector

Integrated Management Processor	Baseboard Management Controller (BMC) running Cisco Integrated Management Controller (CIMC) firmware. Depending on your CIMC settings, the CIMC can be accessed through the 1GE dedicated management port, the 1GE/10GE LOM ports, or a Cisco virtual interface card (VIC). CIMC supports managing the entire platform, as well providing management capabilities for various individual subsystems and components, such as PSUs, Cisco VIC, GPUs, MRAID and HBA storage controllers, and so on.

Feature	Description

Storage Controllers	The SATA Interposer board, Cisco 12G SAS RAID Controller with 4GB FBWC, or Cisco 12G SAS HBA. Only one of these at a time can be used.
	A Cisco 9500-8e 12G SAS HBA can be plugged into available PCIe risers for external JBOD attach. This HBA can be used at the same time as one of the other storage controllers.
	• SATA Interposer board: AHCI support of up to eight SATA-only drives (slots 1-4 and 6-9 only)
	• Cisco 12G RAID controller
	  • RAID support (RAID 0, 1, 5, 6, 10) and SRAID0
	  • Supports up to 10 front-loading SFF drives
	• Cisco 12G SAS HBA
	  • No RAID support
	  • JBOD/Pass-through Mode support
	  • Supports up to 10 SFF front-loading SAS/SATA drives
	• Cisco 12G 9500-8e SAS HBA
	  • No RAID support
	  • Supports external JBOD attach (supports up to 1024 SAS/SATA devices or 32 NVMe devices)
	  • Plugs into an appropriate PCIe riser slot (up to two supported)
	For a detailed list of storage controller options, see Supported Storage Controllers and Cables. .

Modular LAN over Motherboard (mLOM) slot	The dedicated mLOM slot on the motherboard can flexibly accommodate the following cards: • Cisco Virtual Interface Cards (VICs) • Quad Port Intel i350 1GbE RJ45 Network Interface Card (NIC) **Note** The four Intel i350 ports are provided on an optional card that plugs into the mLOM slot, and are separate from the two embedded (on the motherboard) LAN ports
UCSM	Unified Computing System Manager (UCSM) runs in the Fabric Interconnect and automatically discovers and provisions some of the components.



CHAPTER 2

Installing the Node

Preparing for Installation

This section contains the following topics:

Installation Warnings and Guidelines

Note Before you install, operate, or service a server, review the Regulatory Compliance and Safety Information for Cisco UCS C-Series Servers for important safety information.

Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

Statement 1071

Warning **To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 35° C (95° F).**

Statement 1047

Warning **The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device.**

Statement 1019

Warning **This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 15 A.**

Statement 1005

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

Statement 1074

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock, and key, or other means of security.**

Statement 1017

Caution To ensure proper airflow it is necessary to rack the servers using rail kits. Physically placing the units on top of one another or "stacking" without the use of the rail kits blocks the air vents on top of the servers, which could result in overheating, higher fan speeds, and higher power consumption. We recommend that you mount your servers on rail kits when you are installing them into the rack because these rails provide the minimal spacing required between the servers. No additional spacing between the servers is required when you mount the units using rail kits.

Caution Avoid uninterruptible power supply (UPS) types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco UCS, which can have substantial current draw fluctuations from fluctuating data traffic patterns.

When you are installing a node, use the following guidelines:

- Plan your site configuration and prepare the site before installing the node. See the Cisco UCS Site Preparation Guide for the recommended site planning tasks.

- Ensure that there is adequate space around the node to allow for accessing the node and for adequate airflow. The airflow in this node is from front to back.
- Ensure that the air-conditioning meets the thermal requirements listed in the Environmental Specifications, on page 136.
- Ensure that the cabinet or rack meets the requirements listed in the Rack Requirements, on page 17.
- Ensure that the site power meets the power requirements listed in the Power Specifications, on page 137. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

Rack Requirements

The rack must be of the following type:

- A standard 19-in. (48.3-cm) wide, four-post EIA rack, with mounting posts that conform to English universal hole spacing, per section 1 of ANSI/EIA-310-D-1992.
- The rack-post holes can be square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), #12-24 UNC, or #10-32 UNC when you use the Cisco-supplied slide rails.
- The minimum vertical rack space per node must be one rack unit (RU), equal to 1.75 in. (44.45 mm).

Supported Cisco Slide Rail Kits

The node supports the following rail kit options:

- Cisco part HX-RAILB-M6= (ball-bearing slide rail kit)
- Cisco part HX-RAILF-M6= (friction slide rail kit)
- Cisco part HX-CMAF-M6= (cable management arm)

Rack Installation Tools Required

The slide rails sold by Cisco Systems for this node do not require tools for installation.

Slide Rail and Cable Management Arm Dimensions

The slide rails for this node have an adjustment range of 24 to 36 inches (610 to 914 mm).

The optional cable management arm (CMA) adds additional length requirements:

- The additional distance from the rear of the node to the rear of the CMA is 5.4 inches (137.4 mm).
- The total length of the node including the CMA is 35.2 inches (894 mm).

Installing the Node in a Rack

This section describes how to install the node in a rack using the supported rail kit (HX-RAIL-M6) that is sold by Cisco.

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

This unit should be mounted at the bottom of the rack if it is the only unit in the rack.

When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.

If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Statement 1006

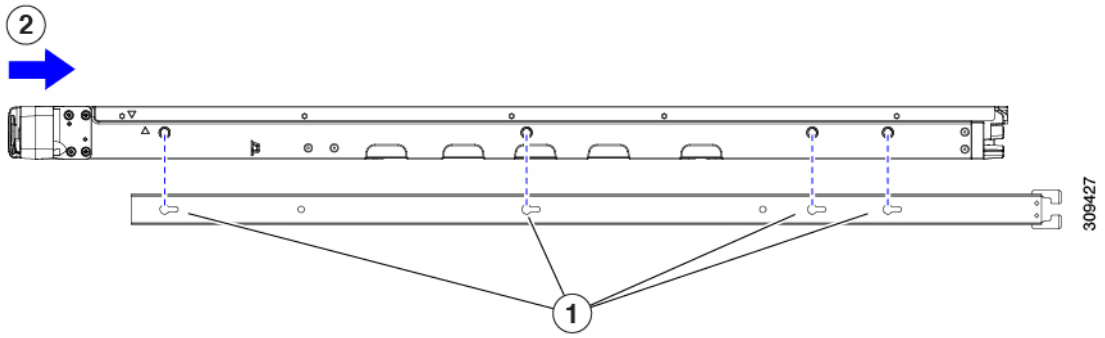
Step 1 Attach the inner rails to the sides of the node:

a) Align an inner rail with one side of the node so that the three keyed slots in the rail align with the three pegs on the side of the node.

b) Set the keyed slots over the pegs, and then slide the rail toward the front to lock it in place on the pegs.

c) Install the second inner rail to the opposite side of the node.

Figure 6: Attaching the Inner Rail to the Side of the Server

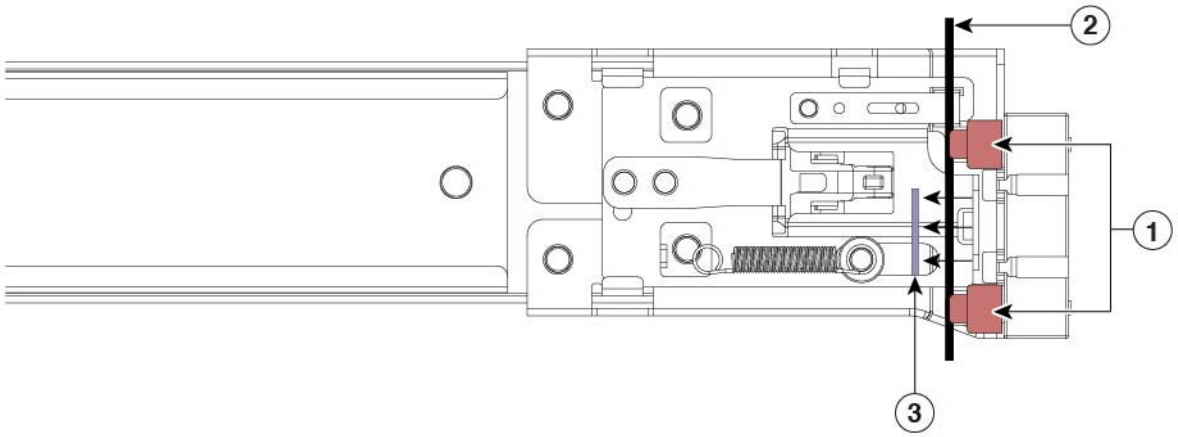


1	Keyed slots in rail	**2**	Front of node slides into keyed slots

Step 2 Open the front securing plate on both slide-rail assemblies. The front end of the slide-rail assembly has a spring-loaded securing plate that must be open before you can insert the mounting pegs into the rack-post holes.

On the *outside* of the assembly, push the green-arrow button toward the rear to open the securing plate.

Figure 7: Front Securing Mechanism, Inside of Front End



1	Front mounting pegs	**3**	Securing plate shown pulled back to the open position
2	Rack post between mounting pegs and opened securing plate	-	

Step 3 Install the outer slide rails into the rack:

a) Align one slide-rail assembly front end with the front rack-post holes that you want to use.

The slide rail front-end wraps around the outside of the rack post and the mounting pegs enter the rack-post holes from the outside-front.

Note The rack post must be between the mounting pegs and the *open* securing plate.

b) Push the mounting pegs into the rack-post holes from the outside-front.

c) Press the securing plate release button, marked PUSH. The spring-loaded securing plate closes to lock the pegs in place.

d) Adjust the slide-rail length, and then push the rear mounting pegs into the corresponding rear rack-post holes. The slide rail must be level front-to-rear.

The rear mounting pegs enter the rear rack-post holes from the *inside* of the rack post.

e) Attach the second slide-rail assembly to the opposite side of the rack. Ensure that the two slide-rail assemblies are at the same height and are level front-to-back.

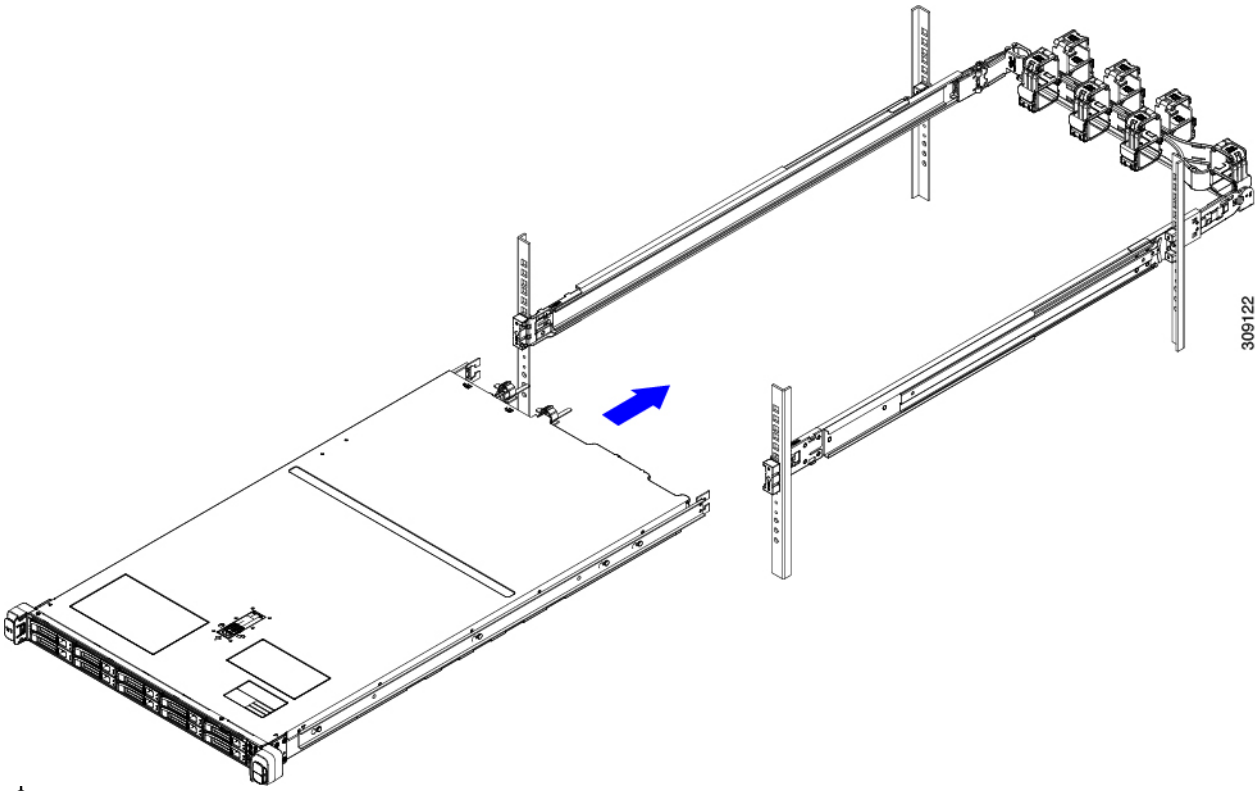
f) Pull the inner slide rails on each assembly out toward the rack front until they hit the internal stops and lock in place.

Step 4 Insert the node into the slide rails:

Caution This node can weigh up to 60 pounds (27 kilograms) when fully loaded with components. We recommend that you use a minimum of two people or a mechanical lift when lifting the node. Attempting this procedure alone could result in personal injury or equipment damage.

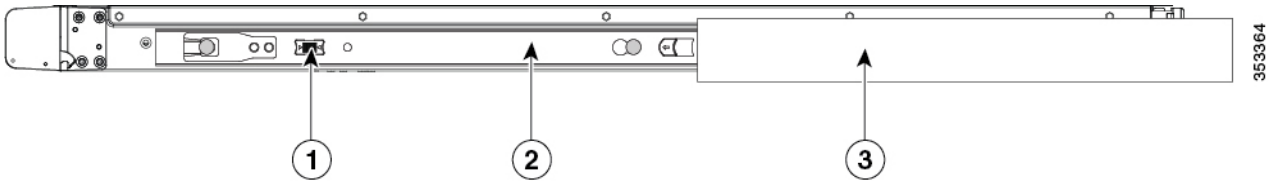
a) Align the rear ends of the inner rails that are attached to the node sides with the front ends of the empty slide rails on the rack.

b) Push the inner rails into the slide rails on the rack until they stop at the internal



c) Slide the inner-rail release clip toward the rear on both inner rails, and then continue pushing the node into the rack until its front slam-latches engage with the rack posts.

Figure 8: Inner-Rail Release Clip



1	Inner-rail release clip	**3**	Outer slide rail attached to rack post
2	Inner rail attached to node and inserted into outer slide rail	-	

Step 5 (Optional) Secure the node in the rack more permanently by using the two screws that are provided with the slide rails. Perform this step if you plan to move the rack with servers installed.

With the node fully pushed into the slide rails, open a hinged slam latch lever on the front of the node and insert a screw through the hole that is under the lever. The screw threads into the static part of the rail on the rack post and prevents the node from being pulled out. Repeat for the opposite slam latch.

Step 6 (Optional) If applicable, do the following:

a) Attach the cable management arm. Go to Installing the Cable Management Arm (Optional), on page 21 or Reversing the Cable Management Arm (Optional), on page 22.

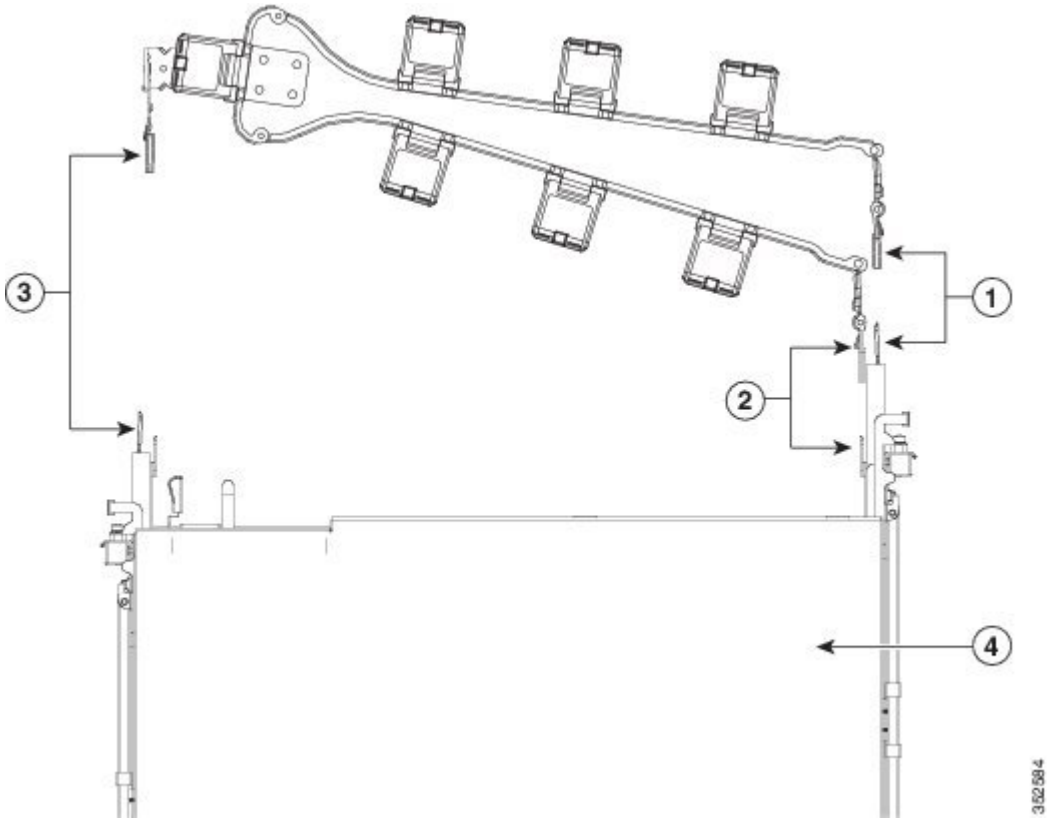
b) Attach the locking bezel.

Installing the Cable Management Arm (Optional)

Note The cable management arm (CMA, UCSC-CMA-C220M6) is reversible left-to-right. To reverse the CMA, see Reversing the Cable Management Arm (Optional), on page 22 before installation.

Step 1 With the node pushed fully into the rack, slide the CMA tab of the CMA arm that is farthest from the node onto the end of the stationary slide rail that is attached to the rack post. Slide the tab over the end of the rail until it clicks and locks.

Figure 9: Attaching the CMA to the Rear Ends of the Slide Rails



1	CMA tab on arm farthest from node attaches to end of stationary outer slide rail.	**3**	CMA tab on width-adjustment slider attaches to end of stationary outer slide rail.
2	CMA tab on arm closest to the node attaches to end of inner slide rail attached to node.	**4**	Rear of node

Step 2 Slide the CMA tab that is closest to the node over the end of the inner rail that is attached to the node. Slide the tab over the end of the rail until it clicks and locks

Step 3 Pull out the width-adjustment slider that is at the opposite end of the CMA assembly until it matches the width of your rack.

Step 4 Slide the CMA tab that is at the end of the width-adjustment slider onto the end of the stationary slide rail that is attached to the rack post. Slide the tab over the end of the rail until it clicks and locks.

Step 5 Open the hinged flap at the top of each plastic cable guide and route your cables through the cable guides as desired.

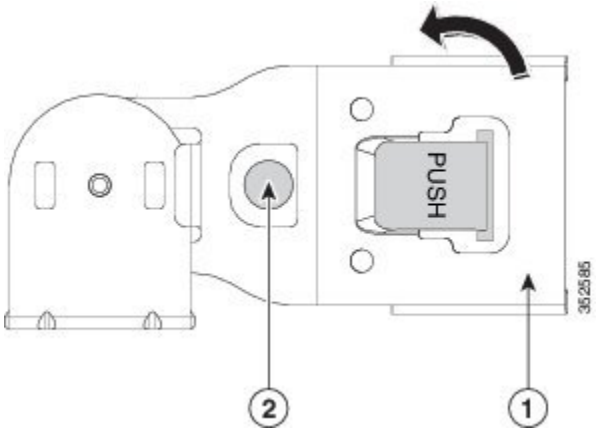
Reversing the Cable Management Arm (Optional)

Step 1 Rotate the entire CMA assembly 180 degrees, left-to-right. The plastic cable guides must remain pointing upward.

Step 2 Flip the tabs at the ends of the CMA arms so that they point toward the rear of the node.

Step 3 Pivot the tab that is at the end of the width-adjustment slider. Depress and hold the metal button on the outside of the tab and pivot the tab 180 degrees so that it points toward the rear of the node.

Figure 10: Reversing the CMA



1	CMA tab on end of width-adjustment slider	**2**	Metal button on outside of tab

Initial Server Setup

Note This section describes how to power on the node, assign an IP address, and connect to node management when using the node in standalone mode.

Server Default Settings

The node is shipped with these default settings:

- The NIC mode is *Shared LOM EXT*.

  Shared LOM EXT mode enables the 1-Gb/10-Gb Ethernet ports *and* the ports on any installed Cisco virtual interface card (VIC) to access the Cisco Integrated Management Interface (Cisco IMC). If you want to use the 10/100/1000 dedicated management ports to access Cisco IMC, you can connect to the node and change the NIC mode as described in Setting Up the System With the Cisco IMC Configuration Utility, on page 25.

- The NIC redundancy is *Active-Active*. All Ethernet ports are utilized simultaneously.
- DHCP is enabled.
- IPv4 is enabled.

Connection Methods

There are two methods for connecting to the system for initial setup:

- Local setup—Use this procedure if you want to connect a keyboard and monitor directly to the system for setup. This procedure can use a KVM cable (Cisco PID N20-BKVM) or the ports on the rear of the node.
- Remote setup—Use this procedure if you want to perform setup through your dedicated management LAN.

Note To configure the system remotely, you must have a DHCP node on the same network as the system. Your DHCP node must be preconfigured with the range of MAC addresses for this node node. The MAC address is printed on a label that is on the pull-out asset tag on the front panel. This node node has a range of six MAC addresses assigned to the Cisco IMC. The MAC address printed on the label is the beginning of the range of six contiguous MAC addresses.

This section contains the following topics:

Connecting to the Server Locally For Setup

This procedure requires the following equipment:

- VGA monitor
- USB keyboard
- Either the supported Cisco KVM cable (Cisco PID N20-BKVM); or a USB cable and VGA DB-15 cable

Step 1 Attach a power cord to each power supply in your server, and then attach each power cord to a grounded power outlet.

Wait for approximately two minutes to let the server boot to standby power during the first bootup. You can verify system power status by looking at the system Power Status LED on the front panel. The system is in standby power mode when the LED is amber.

Step 2 Connect a USB keyboard and VGA monitor to the server using one of the following methods:

- Connect an optional KVM cable (Cisco PID N20-BKVM) to the KVM connector on the front panel. Connect your USB keyboard and VGA monitor to the KVM cable.
- Connect a USB keyboard and VGA monitor to the corresponding connectors on the rear panel.

Step 3 Open the Cisco IMC Configuration Utility:

a) Press and hold the front panel power button for four seconds to boot the server.
b) During bootup, press **F8** when prompted to open the Cisco IMC Configuration Utility.

Note The first time that you enter the Cisco IMC Configuration Utility, you are prompted to change the default password. The default password is *password*. The Strong Password feature is enabled.

The following are the requirements for Strong Password:

- The password can have a minimum of 8 characters and a maximum of 14 characters.
- The password must not contain the user's name.
- The password must contain characters from three of the following four categories:
  - English uppercase letters (A through Z)
  - English lowercase letters (a through z)
  - Base 10 digits (0 through 9)
  - Non-alphabetic characters !, @, #, $, %, ^, &, *, -, _, =, ‘‘

Step 4 Continue with Setting Up the System With the Cisco IMC Configuration Utility, on page 25.

Connecting to the Server Remotely For Setup

This procedure requires the following equipment:

- One RJ-45 Ethernet cable that is connected to your management LAN.

Before you begin

Note To configure the system remotely, you must have a DHCP node on the same network as the system. Your DHCP node must be preconfigured with the range of MAC addresses for this node node. The MAC address is printed on a label that is on the pull-out asset tag on the front panel. This node node has a range of six MAC addresses assigned to the Cisco IMC. The MAC address printed on the label is the beginning of the range of six contiguous MAC addresses.

Step 1 Attach a power cord to each power supply in your node, and then attach each power cord to a grounded power outlet.

Wait for approximately two minutes to let the node boot to standby power during the first bootup. You can verify system power status by looking at the system Power Status LED on the front panel. The system is in standby power mode when the LED is amber.

Step 2 Plug your management Ethernet cable into the dedicated management port on the rear panel.

Step 3 Allow your preconfigured DHCP node to assign an IP address to the node node.

Step 4 Use the assigned IP address to access and log in to the Cisco IMC for the node node. Consult with your DHCP node administrator to determine the IP address.

Note The default username for the node is *admin*. The default password is *password*.

Step 5 From the Cisco IMC Server Summary page, click **Launch KVM Console**. A separate KVM console window opens.

Step 6 From the Cisco IMC Summary page, click **Power Cycle Server**. The system reboots.

Step 7 Select the KVM console window.

Note The KVM console window must be the active window for the following keyboard actions to work.

Step 8 When prompted, press **F8** to enter the Cisco IMC Configuration Utility. This utility opens in the KVM console window.

Note The first time that you enter the Cisco IMC Configuration Utility, you are prompted to change the default password. The default password is *password*. The Strong Password feature is enabled.

The following are the requirements for Strong Password:

- The password can have a minimum of 8 characters and a maximum of 14 characters.
- The password must not contain the user's name.
- The password must contain characters from three of the following four categories:
  - English uppercase letters (A through Z)
  - English lowercase letters (a through z)
  - Base 10 digits (0 through 9)
  - Non-alphabetic characters !, @, #, $, %, ^, &, *, -, _, =, ‘‘

Step 9 Continue with Setting Up the System With the Cisco IMC Configuration Utility, on page 25.

Setting Up the System With the Cisco IMC Configuration Utility

Before you begin

The following procedure is performed after you connect to the system and open the Cisco IMC Configuration Utility.

Step 1 Set the NIC mode to choose which ports to use to access Cisco IMC for node management:

- *Shared LOM EXT* (default)—This is the shared LOM extended mode, the factory-default setting. With this mode, the Shared LOM and Cisco Card interfaces are both enabled. You must select the default *Active-Active* NIC redundancy setting in the following step.

  In this NIC mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the system determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager system because the node is in standalone mode, further DHCP requests from the Cisco card are disabled. Use the Cisco Card NIC mode if you want to connect to Cisco IMC through a Cisco card in standalone mode.

- *Shared LOM*—The 1-Gb/10-Gb Ethernet ports are used to access Cisco IMC. You must select either the *Active-Active* or *Active-standby* NIC redundancy setting in the following step.
- *Dedicated*—The dedicated management port is used to access Cisco IMC. You must select the *None* NIC redundancy setting in the following step.
- *Cisco Card*—The ports on an installed Cisco UCS Virtual Interface Card (VIC) are used to access the Cisco IMC. You must select either the *Active-Active* or *Active-standby* NIC redundancy setting in the following step.

  See also the required VIC Slot setting below.

- *VIC Slot*—Only if you use the Cisco Card NIC mode, you must select this setting to match where your VIC is installed. The choices are Riser1, Riser2, or Flex-LOM (the mLOM slot).
  - If you select Riser1, you must install the VIC in slot 1.
  - If you select Riser2, you must install the VIC in slot 2.
  - If you select Flex-LOM, you must install an mLOM-style VIC in the mLOM slot.

Step 2 Set the NIC redundancy to your preference. This node has three possible NIC redundancy settings:

- *None*—The Ethernet ports operate independently and do not fail over if there is a problem. This setting can be used only with the Dedicated NIC mode.
- *Active-standby*—If an active Ethernet port fails, traffic fails over to a standby port. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.
- *Active-active* (default)—All Ethernet ports are utilized simultaneously. The Shared LOM EXT mode must use only this NIC redundancy setting. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.

Step 3 Choose whether to enable DHCP for dynamic network settings, or to enter static network settings.

Note Before you enable DHCP, you must preconfigure your DHCP node with the range of MAC addresses for this node. The MAC address is printed on a label on the rear of the node. This node has a range of six MAC addresses assigned to Cisco IMC. The MAC address printed on the label is the beginning of the range of six contiguous MAC addresses.

The *static* IPv4 and IPv6 settings include the following:

- The Cisco IMC IP address.

  For IPv6, valid values are 1 - 127.

- The gateway.

  For IPv6, if you do not know the gateway, you can set it as none by entering :: (two colons).

- The preferred DNS node address.

  For IPv6, you can set this as none by entering :: (two colons).

Step 4 (Optional) Make VLAN settings.

Step 5 Press **F1** to go to the second settings window, then continue with the next step.

From the second window, you can press **F2** to switch back to the first window.

Step 6 (Optional) Set a hostname for the node.

Step 7 (Optional) Enable dynamic DNS and set a dynamic DNS (DDNS) domain.

Step 8 (Optional) If you check the Factory Default check box, the node reverts to the factory defaults.

Step 9 (Optional) Set a default user password.

Note The factory default username for the node is *admin*. The default password is *password*.

Step 10 (Optional) Enable auto-negotiation of port settings or set the port speed and duplex mode manually.

Note Auto-negotiation is applicable only when you use the Dedicated NIC mode. Auto-negotiation sets the port speed and duplex mode automatically based on the switch port to which the node is connected. If you disable auto-negotiation, you must set the port speed and duplex mode manually.

Step 11 (Optional) Reset port profiles and the port name.

Step 12 Press **F5** to refresh the settings that you made. You might have to wait about 45 seconds until the new settings appear and the message, "Network settings configured" is displayed before you reboot the node in the next step.

Step 13 Press **F10** to save your settings and reboot the node.

Note If you chose to enable DHCP, the dynamically assigned IP and MAC addresses are displayed on the console screen during bootup.

What to do next

Use a browser and the IP address of the Cisco IMC to connect to the Cisco IMC management interface. The IP address is based upon the settings that you made (either a static address or the address assigned by your DHCP node).

Note The factory default username for the node is *admin*. The default password is *password*.

To manage the node, see the *Cisco UCS C-Series Rack-Mount Server Configuration Guide* or the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide* for instructions on using those interfaces for your Cisco IMC release. The links to the configuration guides are in the Cisco UCS C-Series Documentation Roadmap.

NIC Mode and NIC Redundancy Settings

Table 1: Valid NIC Redundancy Settings For Each NIC Mode

NIC Mode	Valid NIC Redundancy Settings
Shared LOM EXT	Active-active
Dedicated	None
Shared LOM	Active-active Active-standby
Cisco Card	Active-active Active-standby

This node has the following NIC mode settings that you can choose from:

- *Shared LOM EXT* (default)—This is the shared LOM extended mode, the factory-default setting. With this mode, the Shared LOM and Cisco Card interfaces are both enabled. You must select the default *Active-Active* NIC redundancy setting in the following step.

  In this NIC mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the system determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager system because the node is in standalone mode, further DHCP requests from the Cisco card are disabled. Use the Cisco Card NIC mode if you want to connect to Cisco IMC through a Cisco card in standalone mode.

- *Shared LOM*—The 1-Gb/10-Gb Ethernet ports are used to access Cisco IMC. You must select either the *Active-Active* or *Active-standby* NIC redundancy setting in the following step.

- *Dedicated*—The dedicated management port is used to access Cisco IMC. You must select the *None* NIC redundancy setting in the following step.

- *Cisco Card*—The ports on an installed Cisco UCS Virtual Interface Card (VIC) are used to access the Cisco IMC. You must select either the *Active-Active* or *Active-standby* NIC redundancy setting in the following step.

  See also the required VIC Slot setting below.

- *VIC Slot*—Only if you use the Cisco Card NIC mode, you must select this setting to match where your VIC is installed. The choices are Riser1, Riser2, or Flex-LOM (the mLOM slot).
  - If you select Riser1, you must install the VIC in slot 1.
  - If you select Riser2, you must install the VIC in slot 2.
  - If you select Flex-LOM, you must install an mLOM-style VIC in the mLOM slot.

This node has the following NIC redundancy settings that you can choose from:

- *None*—The Ethernet ports operate independently and do not fail over if there is a problem. This setting can be used only with the Dedicated NIC mode.
- *Active-standby*—If an active Ethernet port fails, traffic fails over to a standby port. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.
- *Active-active* (default)—All Ethernet ports are utilized simultaneously. The Shared LOM EXT mode must use only this NIC redundancy setting. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.

Updating the BIOS and Cisco IMC Firmware

Caution When you upgrade the BIOS firmware, you must also upgrade the Cisco IMC firmware to the same version, or the node does not boot. Do not power off the node until the BIOS and Cisco IMC firmware are matching or the node does not boot.

Cisco provides the *Cisco Host Upgrade Utility* to assist with simultaneously upgrading the BIOS, Cisco IMC, and other firmware to compatible levels.

The node uses firmware obtained from and certified by Cisco. Cisco provides release notes with each firmware image. There are several possible methods for updating the firmware:

- **Recommended method for firmware update:** Use the Cisco Host Upgrade Utility to simultaneously upgrade the Cisco IMC, BIOS, and component firmware to compatible levels.

  See the *Cisco Host Upgrade Utility Quick Reference Guide* for your firmware release at the documentation roadmap link below.
- You can upgrade the Cisco IMC and BIOS firmware by using the Cisco IMC GUI interface.

  See the *Cisco UCS C-Series Rack-Mount Server Configuration Guide*.
- You can upgrade the Cisco IMC and BIOS firmware by using the Cisco IMC CLI interface.

  See the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide*.

For links to the documents listed above, see the Cisco UCS C-Series Documentation Roadmap.

Accessing the System BIOS

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

Note The version and build of the current BIOS are displayed on the Main page of the utility.

Step 2 Use the arrow keys to select the BIOS menu page.

Step 3 Highlight the field to be modified by using the arrow keys.

Step 4 Press **Enter** to select the field that you want to change, and then modify the value in the field.

Step 5 Press the right arrow key until the Exit menu screen is displayed.

Step 6 Follow the instructions on the Exit menu screen to save your changes and exit the setup utility (or press **F10**). You can exit without saving changes by pressing **Esc**.

Smart Access Serial

This node supports the Smart Access Serial feature. This feature allows you to switch between host serial and Cisco IMC CLI.

- This feature has the following requirements:
  - A serial cable connection, which can use either the RJ-45 serial connector on the node rear panel, or a DB-9 connection when using the KVM cable (Cisco PID N20-BKVM) on the front-panel KVM console connector.
  - Console redirection must be enabled in the node BIOS.
  - Terminal type must be set to VT100+ or VTUFT8.
  - Serial-over-LAN (SOL) must be disabled (SOL is disabled by default).
- To switch from host serial to Cisco IMC CLI, press **Esc+9**.

  You must enter your Cisco IMC credentials to authenticate the connection.
- To switch from Cisco IMC CLI to host serial, press **Esc+8**.

Note You cannot switch to Cisco IMC CLI if the serial-over-LAN (SOL) feature is enabled.

- After a session is created, it is shown in the CLI or web GUI by the name `serial`.

Smart Access USB

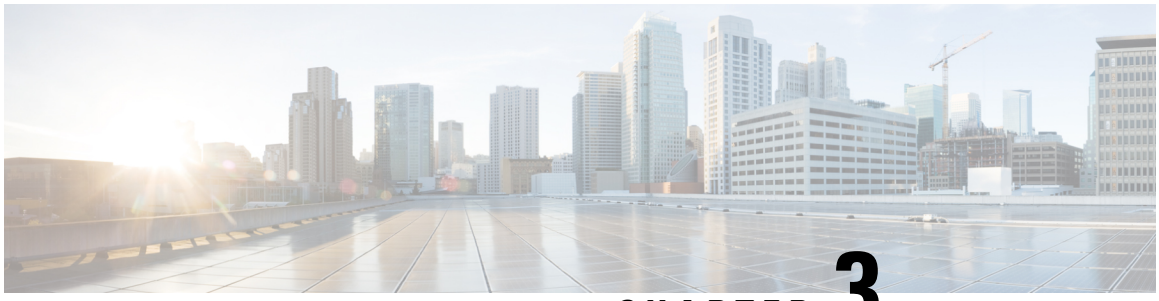
This node supports the Smart Access USB feature. The board management controller (BMC) in this node can accept a USB mass storage device and access the data on it. This feature allows you to use the front-panel USB device as a medium to transfer data between the BMC and the user without need for network connectivity. This can be useful, for example, when remote BMC interfaces are not yet available, or are not accessible due to network misconfiguration.

- This feature has the following requirements:
  - The KVM cable (Cisco PID N20-BKVM) connected to the front panel KVM console connector.
  - A USB storage device connected to one of the USB 2.0 connectors on the KVM cable. The USB device must draw less than 500 mA to avoid disconnect by the current-protection circuit.

Note Any mouse or keyboard that is connected to the KVM cable is disconnected when you enable Smart Access USB.

- You can use USB 3.0-based devices, but they will operate at USB 2.0 speed.
- We recommend that the USB device have only one partition.
- The file system formats supported are: FAT16, FAT32, MSDOS, EXT2, EXT3, and EXT4. NTFS is not supported.

- The front-panel KVM connector has been designed to switch the USB port between Host OS and BMC.
- Smart Access USB can be enabled or disabled using any of the BMC user interfaces. For example, you can use the Cisco IMC Configuration Utility that is accessed by pressing **F8** when prompted during bootup.
  - Enabled: the front-panel USB device is connected to the BMC.
  - Disabled: the front-panel USB device is connected to the host.
- In a case where no management network is available to connect remotely to Cisco IMC, a Device Firmware Update (DFU) shell over serial cable can be used to generate and download technical support files to the USB device that is attached to front panel USB port.



CHAPTER 3

Maintaining the Node

Status LEDs and Buttons

This section contains information for interpreting front, rear, and internal LED states.

Front-Panel LEDs

Figure 11: Front Panel LEDs

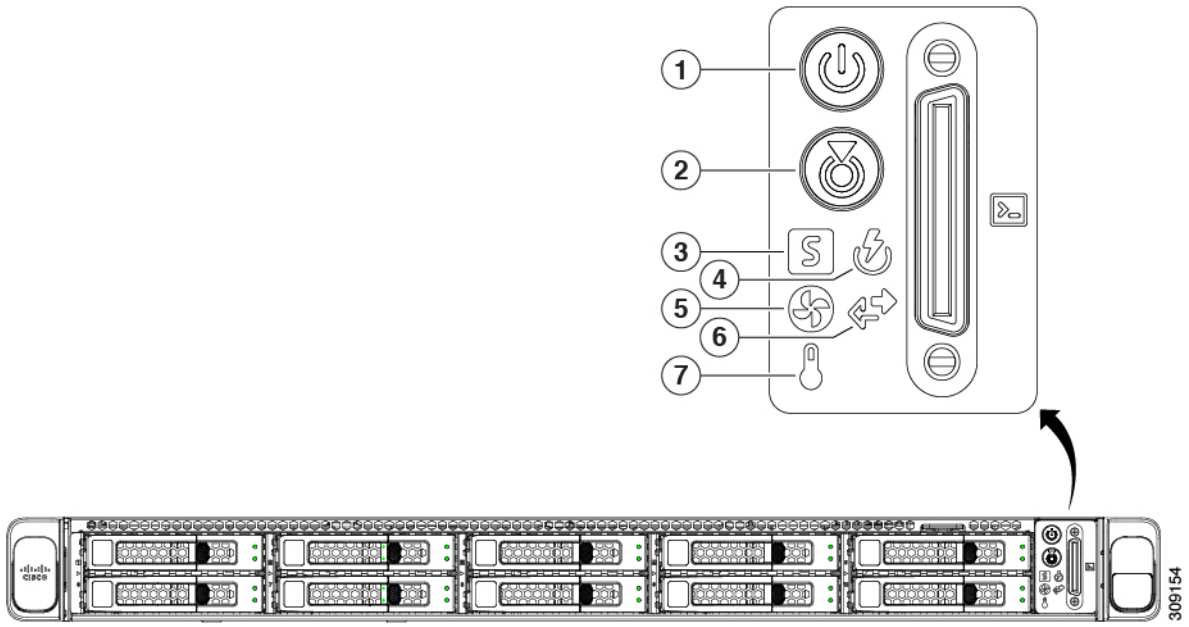


Table 2: Front Panel LEDs, Definition of States

	LED Name	States
1	Power button/LED ( )	• Off—There is no AC power to the server. • Amber—The server is in standby power mode. Power is supplied only to the Cisco IMC and some motherboard functions. • Green—The server is in main power mode. Power is supplied to all server components.
2	Unit identification ( )	• Off—The unit identification function is not in use. • Blue, blinking—The unit identification function is activated.

3	System health ()	• Green—The server is running in normal operating condition.
		• Green, blinking—The server is performing system initialization and memory check.
		• Amber, steady—The server is in a degraded operational state (minor fault). 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, 2 blinks—There is a major fault with the system board.
		• Amber, 3 blinks—There is a major fault with the memory DIMMs.
		• Amber, 4 blinks—There is a major fault with the CPUs.

4	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.
5	Fan status ()	• Green—All fan modules are operating properly. • Amber, blinking—One or more fan modules breached the non-recoverable threshold.
6	Network link activity ()	• Off—The Ethernet LOM port 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.
7	Temperature status ()	• Green—The server 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.

Rear-Panel LEDs

Figure 12: Rear Panel LEDs

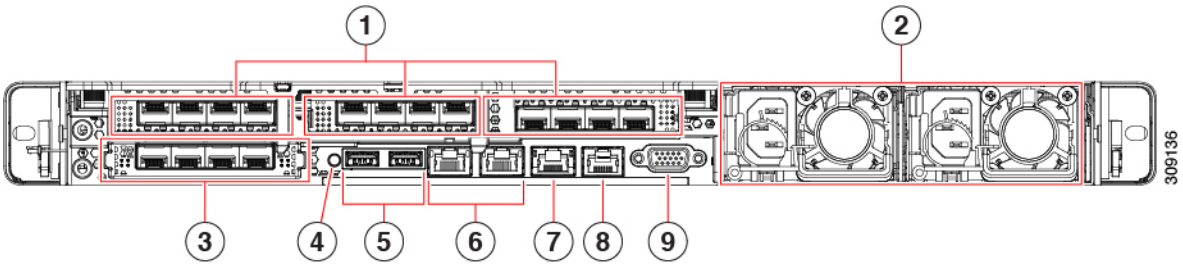


Table 3: Rear Panel LEDs, Definition of States

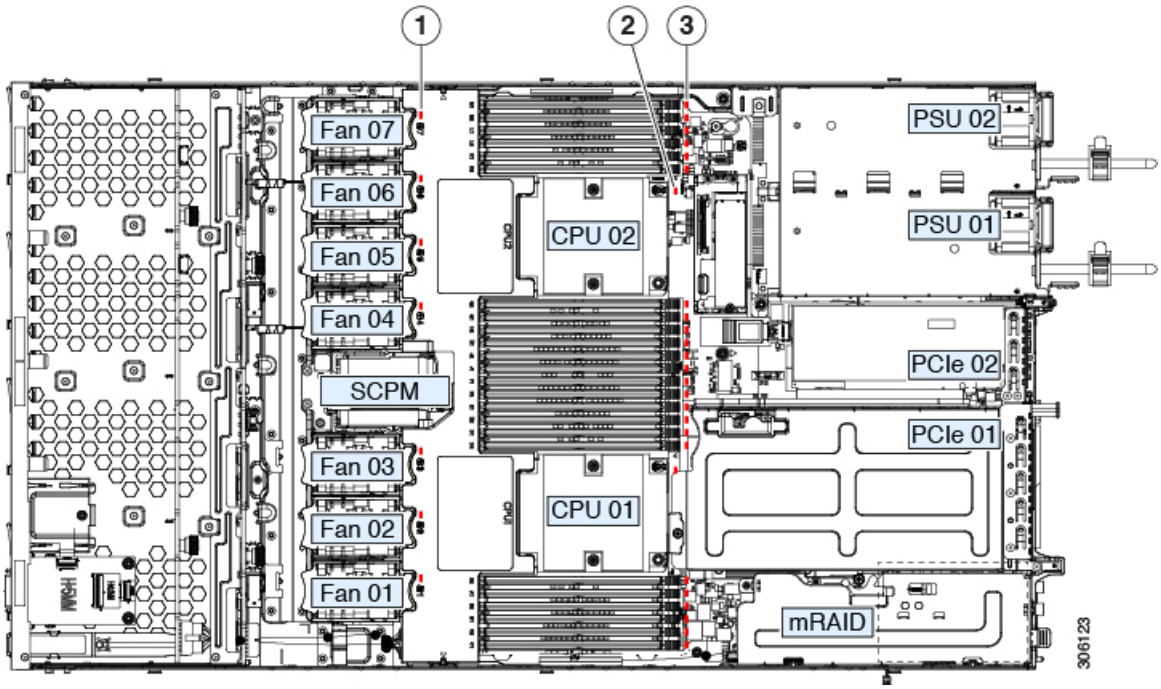
	LED Name	States
1	1-Gb/10-Gb Ethernet link speed (on both LAN1 and LAN2)	• Amber—Link speed is 100 Mbps. • Amber—Link speed is 1 Gbps. • Green—Link speed is 10 Gbps.
2	1-Gb/10-Gb Ethernet link status (on both LAN1 and LAN2)	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
3	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.
4	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.
5	Rear unit identification	• Off—The unit identification function is not in use. • Blue, blinking—The unit identification function is activated.

6	Power supply status (one LED each power supply unit)	**AC power supplies:** • Off—No AC input (12 V main power off, 12 V standby power off). • Green, blinking—12 V main power off; 12 V standby power on. • Green, solid—12 V main power on; 12 V standby power on. • Amber, blinking—Warning threshold detected but 12 V main power on. • Amber, solid—Critical error detected; 12 V main power off (for example, over-current, over-voltage, or over-temperature failure). **DC power supplies:** • Off—No DC input (12 V main power off, 12 V standby power off). • Green, blinking—12 V main power off; 12 V standby power on. • Green, solid—12 V main power on; 12 V standby power on. • Amber, blinking—Warning threshold detected but 12 V main power on. • Amber, solid—Critical error detected; 12 V main power off (for example, over-current, over-voltage, or over-temperature failure).
7	1-Gb Ethernet dedicated management port	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
8	COM port (RJ-45 connector)	-
9	VGA display port (DB15 connector)	-

Internal Diagnostic LEDs

The server has internal fault LEDs for CPUs, DIMMs, and fan modules.

Figure 13: Internal Diagnostic LED Locations



1	Fan module fault LEDs (one behind each fan connector on the motherboard) • Amber—Fan has a fault or is not fully seated. • Green—Fan is OK.	**3**	DIMM fault LEDs (one behind each DIMM socket on the motherboard) These LEDs operate only when the node is in standby power mode. • Amber—DIMM has a fault. • Off—DIMM is OK.
2	CPU fault LEDs (one behind each CPU socket on the motherboard). These LEDs operate only when the node is in standby power mode. • Amber—CPU has a fault. • Off—CPU is OK.	-	

Preparing For Component Installation

This section includes information and tasks that help prepare the node for component installation.

Required Equipment For Service Procedures

The following tools and equipment are used to perform the procedures in this chapter:

- T-30 Torx driver (supplied with replacement CPUs for heatsink removal)
- #1 flat-head screwdriver (supplied with replacement CPUs for heatsink removal)
- #1 Phillips-head screwdriver (for M.2 SSD and intrusion switch replacement)
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat

Shutting Down and Removing Power From the Node

The node can run in either of two power modes:

- Main power mode—Power is supplied to all node components and any operating system on your drives can run.
- Standby power mode—Power is supplied only to the service processor and certain components. It is safe for the operating system and data to remove power cords from the node in this mode.

Caution After a node is shut down to standby power, electric current is still present in the node. To completely remove power as directed in some service procedures, you must disconnect all power cords from all power supplies in the node.

You can shut down the node by using the front-panel power button or the software management interfaces.

Shutting Down Using the Power Button

Step 1 Check the color of the Power button/LED:

- Amber—The node is already in standby mode, and you can safely remove power.
- Green—The node is in main power mode and must be shut down before you can safely remove power.

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 node goes to standby mode, which is indicated by an amber Power button/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 If a service procedure instructs you to completely remove power from the node, disconnect all power cords from the power supplies in the node.

Shutting Down Using The Cisco IMC GUI

You must log in with user or admin privileges to perform this task.

Step 1 In the Navigation pane, click the **Server** tab.

Step 2 On the Node tab, click **Summary**.

Step 3 In the Actions area, click **Power Off Server**.

Step 4 Click **OK**.

The operating system performs a graceful shutdown, and the node goes to standby mode, which is indicated by an amber Power button/LED.

Step 5 If a service procedure instructs you to completely remove power from the node, disconnect all power cords from the power supplies in the node.

Shutting Down Using The Cisco IMC CLI

You must log in with user or admin privileges to perform this task.

Step 1 At the node prompt, enter:

Example:

node# **scope chassis**

Step 2 At the chassis prompt, enter:

Example:

node/chassis# **power shutdown**

The operating system performs a graceful shutdown, and the node goes to standby mode, which is indicated by an amber Power button/LED.

Step 3 If a service procedure instructs you to completely remove power from the node, disconnect all power cords from the power supplies in the node.

Removing Top Cover

Step 1 Remove the top cover:

a) If the cover latch is locked, slide the lock sideways to unlock it.

When the latch is unlocked, the handle pops up so that you can grasp it.

b) Lift on the end of the latch so that it pivots vertically to 90 degrees.

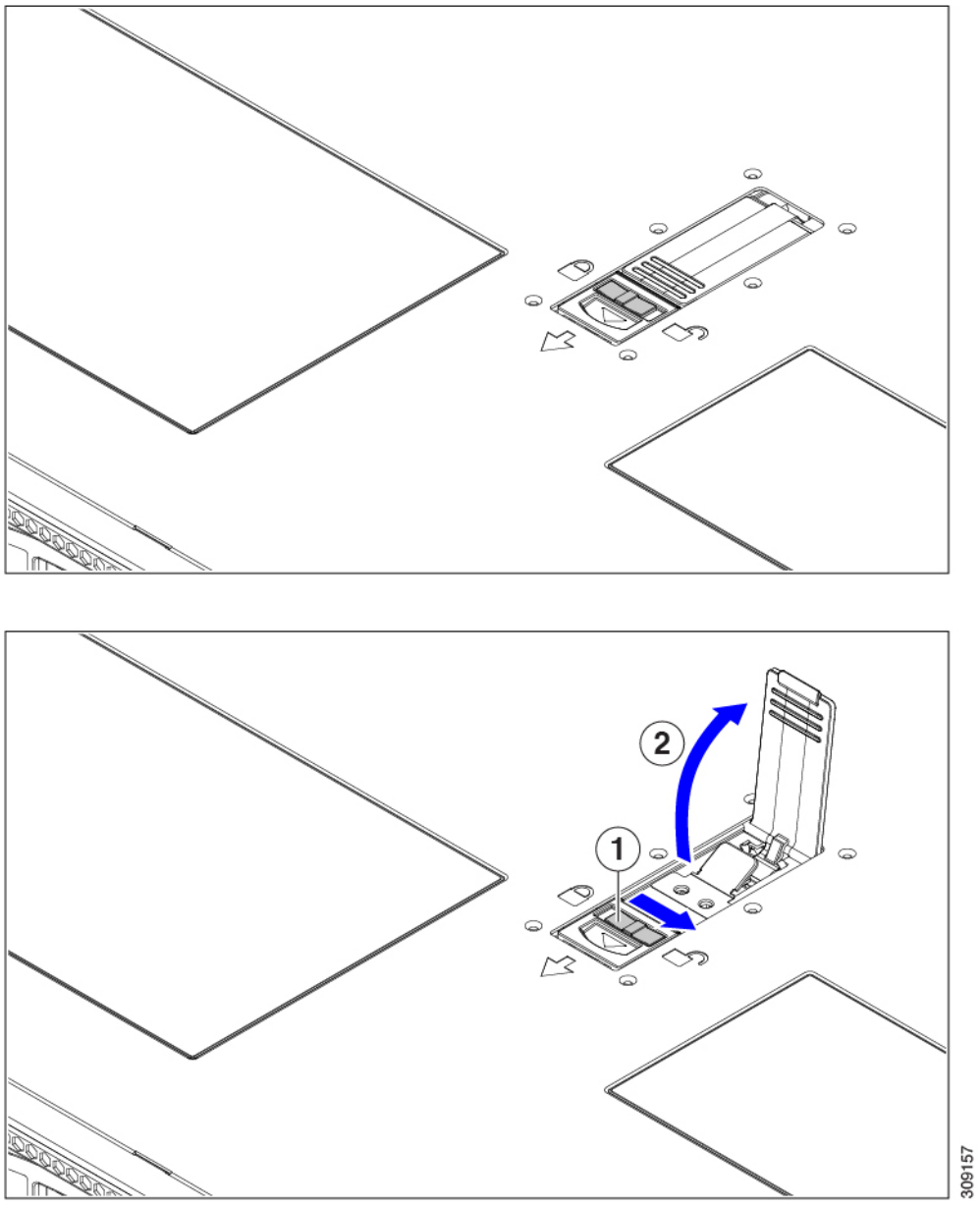
c) Simultaneously, slide the cover back and lift the top cover straight up from the node and set it aside.

Step 2 Replace the top cover:

a) With the latch in the fully open position, place the cover on top of the node a few inches behind the lip of the front cover panel.
b) Slide the cover forward until the latch makes contact.
c) Press the latch down to the closed position. The cover is pushed forward to the closed position as you push down the latch.
d) Lock the latch by sliding the lock button to sideways to the left.

   Locking the latch ensures that the node latch handle does not protrude when you install the blade.

Figure 14: Removing the Top Cover



1	Cover lock	**2**	Cover latch handle

Serial Number Location

The serial number for the node is printed on a label on the top of the node, near the front. See Removing Top Cover, on page 40.

Hot Swap vs Hot Plug

Some components can be removed and replaced without shutting down and removing power from the node. This type of replacement has two varieties: hot-swap and hot-plug.

- Hot-swap replacement—You do not have to shut down the component in the software or operating system. This applies to the following components:
  - SAS/SATA hard drives
  - SAS/SATA solid state drives
  - Cooling fan modules
  - Power supplies (when redundant as 1+1)
- Hot-plug replacement—You must take the component offline before removing it for the following component:
  - NVMe PCIe solid state drives

Removing and Replacing 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 node components, handle them only by carrier edges and use an electrostatic discharge (ESD) wrist-strap or other grounding device to avoid damage.

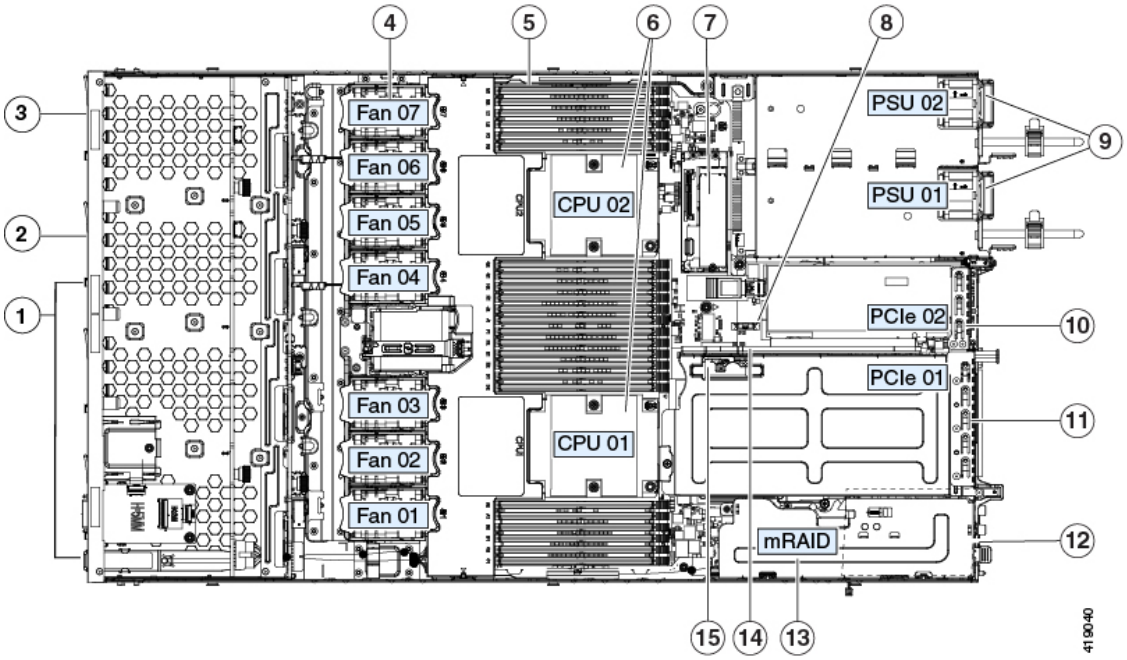
Tip You can press the unit identification button on the front panel or rear panel to turn on a flashing, blue unit identification LED on both the front and rear panels of the node. This button allows you to locate the specific node that you are servicing when you go to the opposite side of the rack. You can also activate these LEDs remotely by using the Cisco IMC interface.

This section describes how to install and replace node components.

Serviceable Component Locations

This topic shows the locations of the field-replaceable components and service-related items. The view in the following figure shows the node with the top cover removed.

Figure 15: Serviceable Component Locations



1	Drive bays 3 – 10: • HX220c Hybrid: persistent data HDDs • HX220c All-Flash: persistent data SSDs • HX220c All-NVMe: persistent data NVMe SSDs	**9**	Power supplies (one or two, hot-swappable when redundant as 1+1)
2	Drive bay 2: caching SSD	**10**	PCIe riser 2/slot 2 (half-height, x16 lane) Includes PCIe cable connectors for front-loading NVMe SSDs (x8 lane)

3	Drive bay 1: system SSD for logs	**11**	PCIe riser 1/slot 1 (full-height, x16 lane) Includes socket for Micro-SD card
4	Cooling fan modules (seven, hot-swappable)	**12**	Modular LOM (mLOM) card bay on chassis floor (x16 PCIe lane), not visible in this view
5	DIMM sockets on motherboard (12 per CPU)	**13**	Modular RAID (mRAID) riser, supports HBA storage controller
6	CPUs and heatsinks	**14**	PCIe cable connectors for front-loading NVMe SSDs on PCIe riser 2
7	Mini-storage module for SATA M.2 SSD Boot drive	**15**	Micro-SD card socket on PCIe riser 1
8	RTC battery, vertical socket	**-**	

Replacing SAS/SATA Hard Drives or Solid-State Drives

Note You do not have to shut down the node or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable. To replace an NVMe PCIe SSD drive, which must be shut down before removal, see Replacing a Front-Loading NVMe SSD, on page 46.

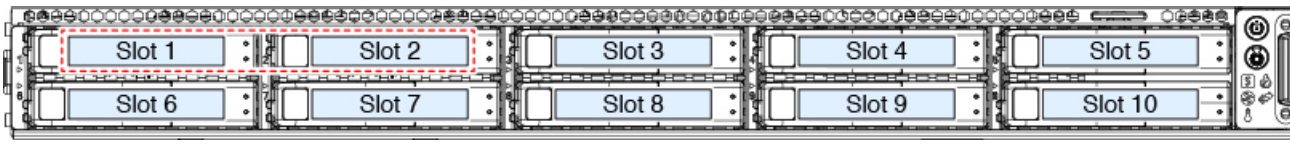
SAS/SATA Drive Population Guidelines

The server is orderable in two different versions, each with a different front panel/drive-backplane configuration.

- Cisco HX C220 M6 SAS/SATA—Small form-factor (SFF) drives, with 10-drive backplane. Supports up to 10 2.5-inch SAS/SATA drives.
- Cisco HX C220 M6 NVMe—SFF drives, with 10-drive backplane. Supports up to 10 2.5-inch NVMe-only SSDs.

Drive bay numbering is shown in the following figures.

Figure 16: Small Form-Factor Drive Versions, Drive Bay Numbering



Observe these drive population guidelines for optimum performance:

- When populating drives, add drives to the lowest-numbered bays first.
- Keep an empty drive blanking tray in any unused bays to ensure proper airflow.

- You can mix SAS/SATA hard drives and SAS/SATA SSDs in the same node. 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 SAS/SATA hard drives or all SAS/SATA SSDs.

4K Sector Format SAS/SATA Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. UEFI mode is the system default. Only if the mode has been changed and must be changed back to UEFI mode, see the following procedure.
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- For operating system support on 4K sector drives, see the interoperability matrix tool for your node: Hardware and Software Interoperability Matrix Tools

Setting Up UEFI Mode Booting in the BIOS Setup Utility

UEFI mode is the system default. Use this procedure if the mode has been changed and must be set back to UEFI mode.

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 **Boot Mode** to **UEFI Mode**.

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

Step 5 Press **F10** to save changes and exit the BIOS setup utility. Allow the node to reboot.

Step 6 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**.

Replacing a SAS/SATA Drive

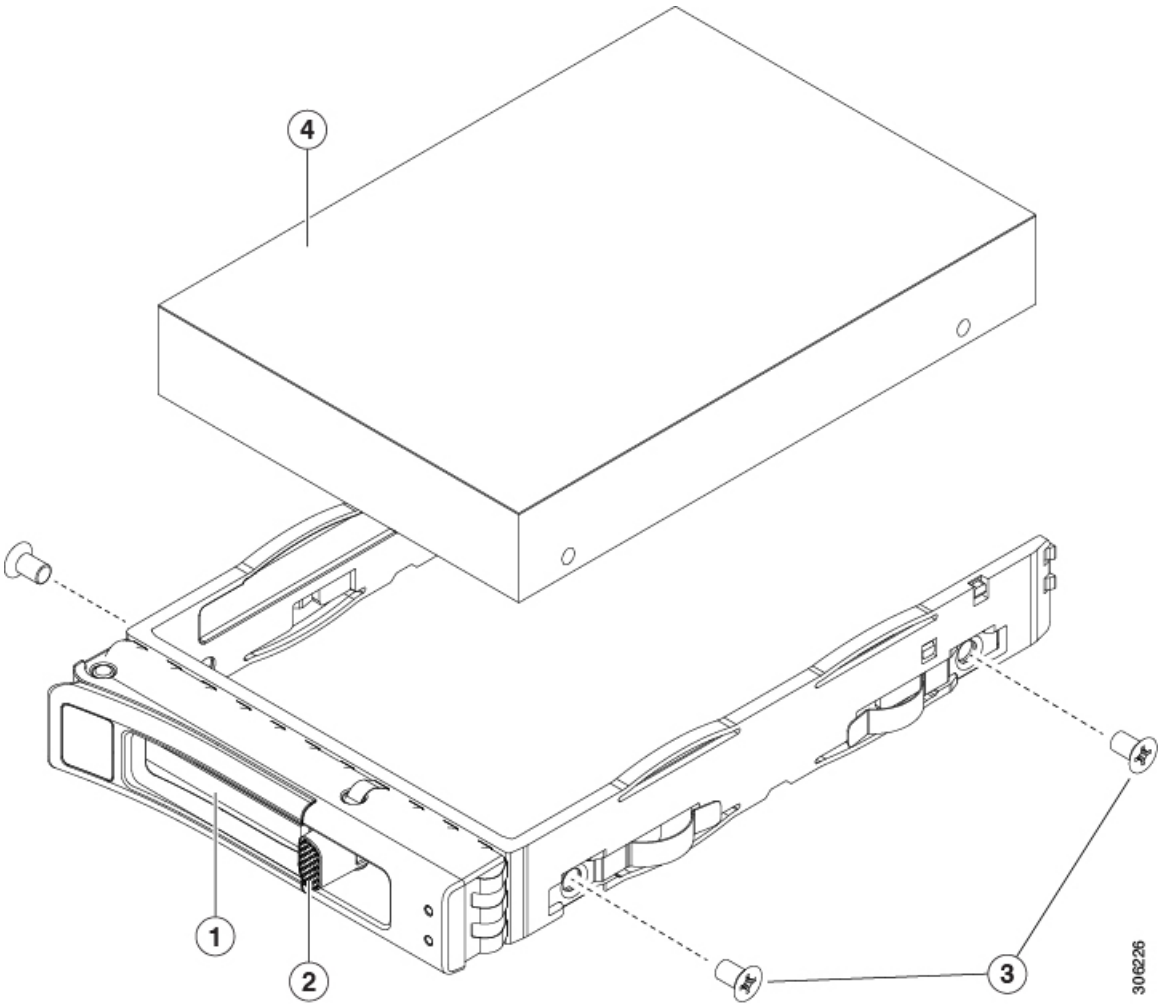
Step 1 Remove the drive that you are replacing or remove a blank drive tray from the bay:

a) Press the release button on the face of the drive tray.
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 install 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 17: Replacing a Drive in a Drive Tray



1	Ejector lever	**3**	Drive tray screws (two on each side)
2	Release button	**4**	Drive removed from drive tray

Replacing a Front-Loading NVMe SSD

This section is for replacing 2.5-inch form-factor NVMe solid-state drives (SSDs) in front-panel drive bays.

Front-Loading NVMe SSD Population Guidelines

The node supports the following front drive bay configurations with 2.5-inch NVMe SSDs:

- HX C220 M6 with SFF drives, a 10-drive backplane. Drive bay 1 - 10 support 2.5-inch NVMe-only SSDs.

Front-Loading NVME SSD Requirements and Restrictions

Observe these requirements:

- The node must have two CPUs. PCIe riser 2 is not available in a single-CPU system. PCIe riser 2 has connectors for the cable that connects to the front-panel drive backplane.
- PCIe cable CBL-NVME-C220FF. This is the cable that carries the PCIe signal from the front-panel drive backplane to PCIe riser 2. This cable is for all versions of this node.
- Hot-plug support must be enabled in the system BIOS. If you ordered the system with NVMe drives, hot-plug support is enabled at the factory.
- The NVMe-optimized, SFF 10-drive version, supports NVMe drives only. This version of the node comes with an NVMe-switch card factory-installed in the internal mRAID riser for support of NVMe drives in slots 3 - 10. The NVMe drives in slots 1 and 2 are supported by PCIe riser 2. The NVMe switch card is not orderable separately.

Observe these restrictions:

- NVMe SFF 2.5-inch SSDs support booting only in UEFI mode. Legacy boot is not supported. For instructions on setting up UEFI boot, see 4K Sector Format SAS/SATA Drives Considerations, on page 45.
- You cannot control NVMe PCIe SSDs with a SAS RAID controller because NVMe SSDs interface with the node via the PCIe bus.
- UEFI boot is supported in all supported operating systems. Hot-insertion and hot-removal are supported in all supported operating systems except VMWare ESXi.

Enabling Hot-Plug Support in the System BIOS

Hot-plug (OS-informed hot-insertion and hot-removal) is disabled in the system BIOS by default.

- If the system was ordered with NVMe PCIe SSDs, the setting was enabled at the factory. No action is required.
- If you are adding NVMe PCIe SSDs after-factory, you must enable hot-plug support in the BIOS. See the following procedures.

Enabling Hot-Plug Support Using the BIOS Setup Utility

Step 1 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
Step 2 Navigate to **Advanced > PCI Subsystem Settings > NVMe SSD Hot-Plug Support**.
Step 3 Set the value to **Enabled**.
Step 4 Save your changes and exit the utility.

Enabling Hot-Plug Support Using the Cisco IMC GUI

Step 1 Use a browser to log in to the Cisco IMC GUI for the server.
Step 2 Navigate to **Compute > BIOS > Advanced > PCI Configuration**.

Step 3 Set NVME SSD Hot-Plug Support to **Enabled**.

Step 4 Save your changes.

Replacing a Front-Loading NVMe SSD

This topic describes how to replace 2.5-inch form-factor NVMe SSDs in the front-panel drive bays.

Note OS-surprise removal is not supported. OS-informed hot-insertion and hot-removal are supported on all supported operating systems except VMware ESXi.

Note OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See Enabling Hot-Plug Support in the System BIOS, on page 47.

Step 1 Remove an existing front-loading NVMe SSD:

a) Shut down the NVMe SSD to initiate an OS-informed removal. Use your operating system interface to shut down the drive, and then observe the drive-tray LED:

- Green—The drive is in use and functioning properly. Do not remove.
- Green, blinking—the driver is unloading following a shutdown command. Do not remove.
- Off—The drive is not in use and can be safely removed.

b) Press the release button on the face of the drive tray.

c) Grasp and open the ejector lever and then pull the drive tray out of the slot.

d) Remove the four drive tray screws that secure the SSD to the tray and then lift the SSD out of the tray.

Note If this is the first time that front-loading NVMe SSDs are being installed in the node, you must install PCIe cable CBL-NVME-C220FF before installing the drive. See Installing a PCIe Cable For Front-Loading NVMe SSDs, on page 49.

Step 2 Install a new front-loading NVMe SSD:

a) Place a new SSD in the empty drive tray and install the four drive-tray screws.

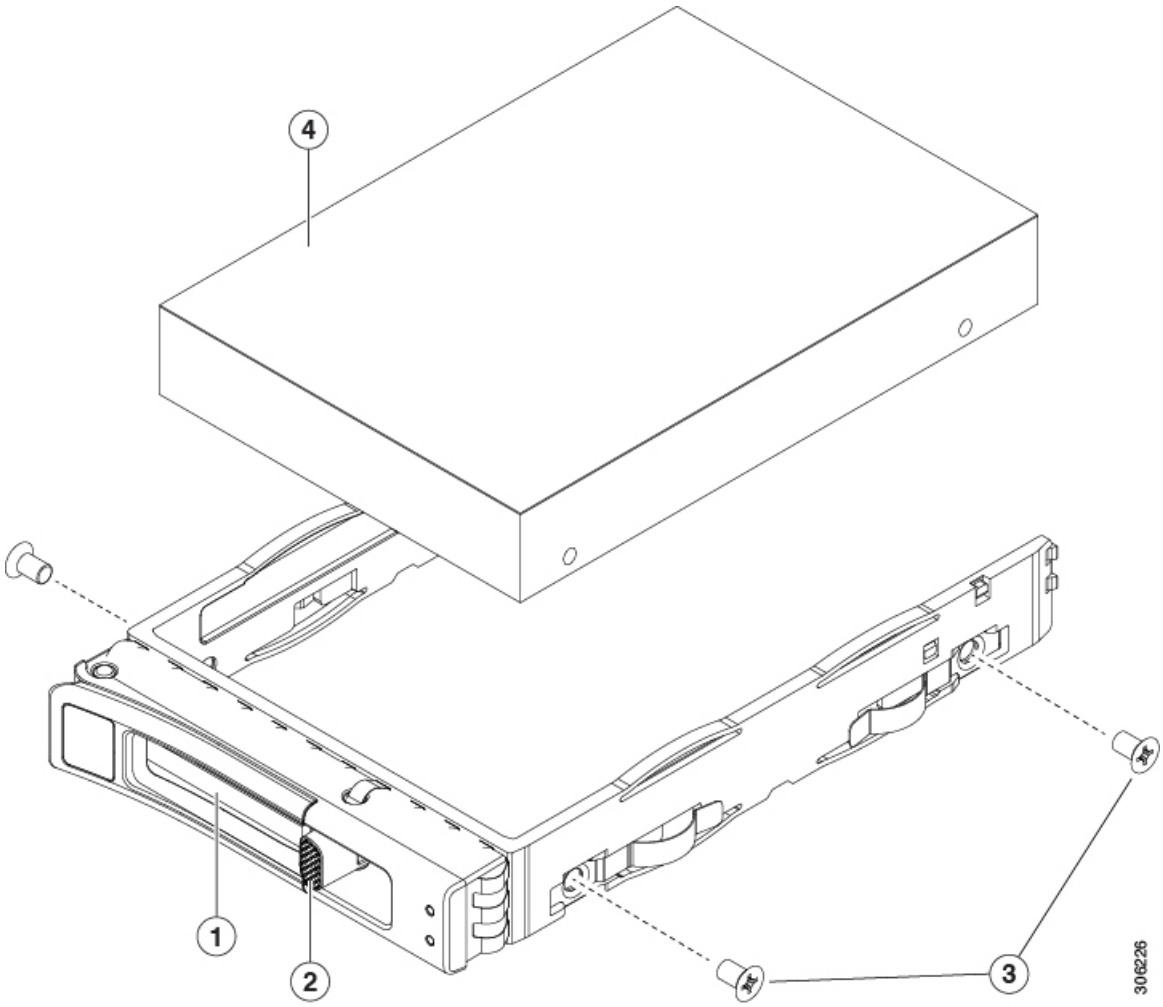
b) With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.

c) Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

Step 3 Observe the drive-tray LED and wait until it returns to solid green before accessing the drive:

- Off—The drive is not in use.
- Green, blinking—the driver is initializing following hot-plug insertion.
- Green—The drive is in use and functioning properly.

Figure 18: Replacing a Drive in a Drive Tray



1	Ejector lever	**3**	Drive tray screws (two on each side)
2	Release button	**4**	Drive removed from drive tray

Installing a PCIe Cable For Front-Loading NVMe SSDs

The front-loading NVMe SSDs interface with the node via the PCIe bus. Cable CBL-NVME-C220FF connects the front-panel drive backplane to the PCIe riser 2 board on the PCIe riser assembly.

- If the node was ordered with 2.5-inch form-factor NVMe SSDs, this cable was preinstalled at the factory. No action is required.
- If you are adding 2.5-inch form-factor NVMe SSDs for the first time, you must order and install the cable as described in the following procedure.

Step 1 Connect the two connectors on one end of the cable to the PCIE-A1 and PCIE-A2 connectors on the drive backplane.

Step 2 Route the cables through the chassis cable guides to the rear of the node as shown below.

Step 3 Connect the single connector on the other end of the cable to the PCIE-FRONT connector on PCIe riser 2.

Replacing Fan Modules

The eight fan modules in the node are numbered as shown in Front-Panel LEDs, on page 34.

Tip Each fan module has a fault LED next to the fan connector on the motherboard. This LED lights green when the fan is correctly seated and is operating OK. The LED lights amber when the fan has a fault or is not correctly seated.

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

Step 1 Remove an existing fan module:

a) Slide the node 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 node from the rack.

b) Remove the top cover from the node as described in Removing Top Cover, on page 40.

c) Grasp the fan module at its front and rear finger-grips. Lift straight up to disengage its connector from the motherboard.

Step 2 Install a new fan module:

a) Set the new fan module in place. The arrow printed on the top of the fan module should point toward the rear of the node.

b) Press down gently on the fan module to fully engage it with the connector on the motherboard.

c) Replace the top cover to the node.

d) Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Replacing Riser Cages

The server can support either three half-height PCIe riser cages or two full-height PCIe riser cages in the rear PCIe slots.

Note If you need to remove the MLOM to install riser cages, see Replacing an mLOM Card, on page 93.

By using a Cisco replacement kit, you can change your server's rear PCIe riser configuration from three half-height riser cages to full-height riser cages or three half-height riser cages to two full-height riser cages. To perform this replacement, see the following topics:

- Required Equipment for Replacing Riser Cages, on page 51
- Removing Half Height Riser Cages, on page 51
- Installing Half Height Riser Cages, on page 61
- Removing Full Height Riser Cages, on page 57
- Installing Full Height Riser Cages, on page 54

Required Equipment for Replacing Riser Cages

To replace the node's three half-height (HH) rear PCIe riser cages with two full-height (FH) rear PCIe riser cages, you will need to obtain the C220 M6 GPU Riser Bracket assembly kit (UCSC-GPURKIT-C220=), which contains the following required parts:

- FH rear wall (1)
- Countersink Phillips flathead screws, M3 x 0.5 (4)
- FH Riser Cage 1
- FH Riser Cage 2

Note To remove and install screws, you also need a #2 Phillips screwdriver, which is not provided by Cisco.

Removing Half Height Riser Cages

This task enables switching from 3 FH rear PCIe cages to 2 HH rear PCIe cages. To complete this procedure, make sure that you have the required equipment. See Required Equipment for Replacing Riser Cages, on page 51.

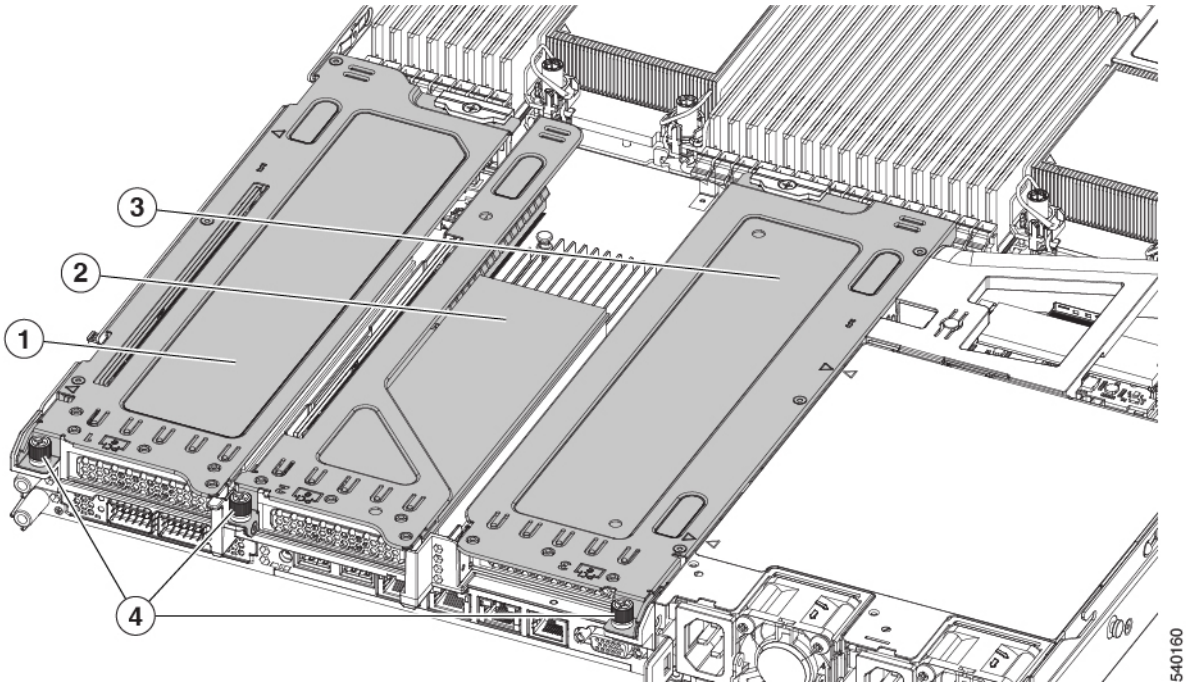
Step 1 Remove the server top cover to gain access to the PCIe riser cages.

See Removing Top Cover, on page 40.

Step 2 Remove the three rear PCIe riser cages.

a) Locate the riser cages.

b) Using a #2 Phillips screwdriver or your fingers, for each riser cage, loosen its captive thumbscrew.



1	Rear Riser Cage 1	**2**	Rear Riser Cage 2
3	Rear Riser cage 3	**4**	Riser Cage Thumbscrews, three total (one per riser cage)

Step 3 Using a #2 Phillips screwdriver, remove the four screws that secure the half height rear wall and mLOM bracket to the chassis sheet metal.

Note One of the screws is located behind the rear wall so it might be difficult to see. when you are facing the server's rear riser slots.

Figure 19: Locations of Securing Screws, Facing Rear Riser Slots

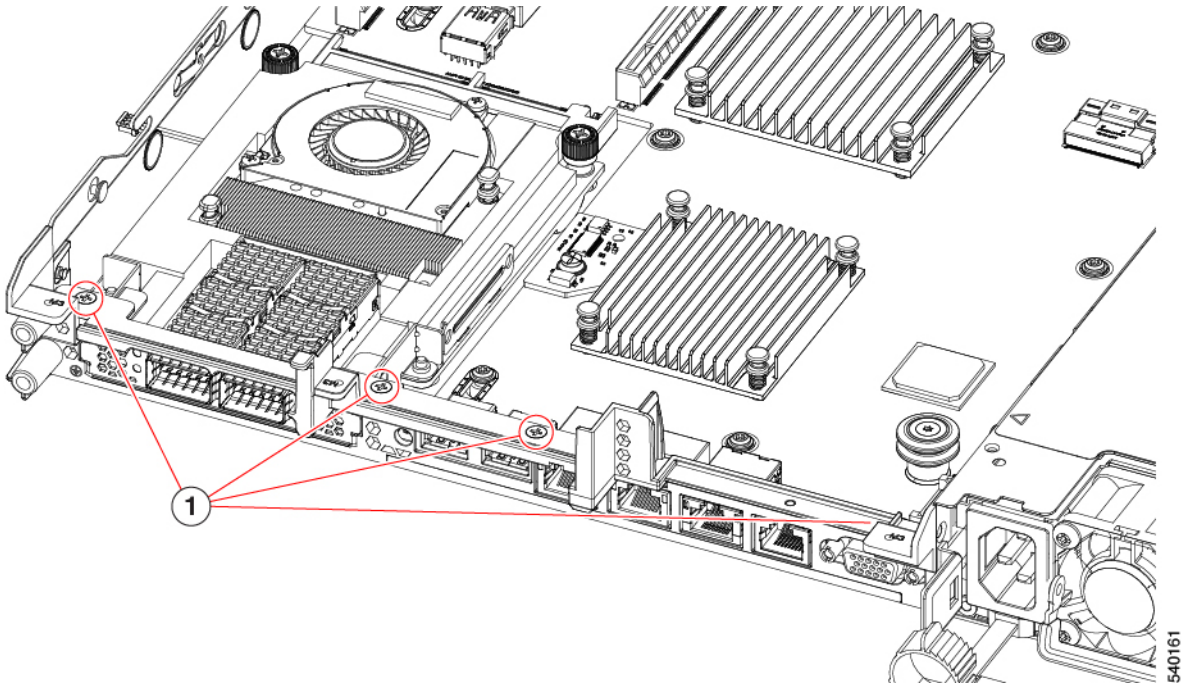
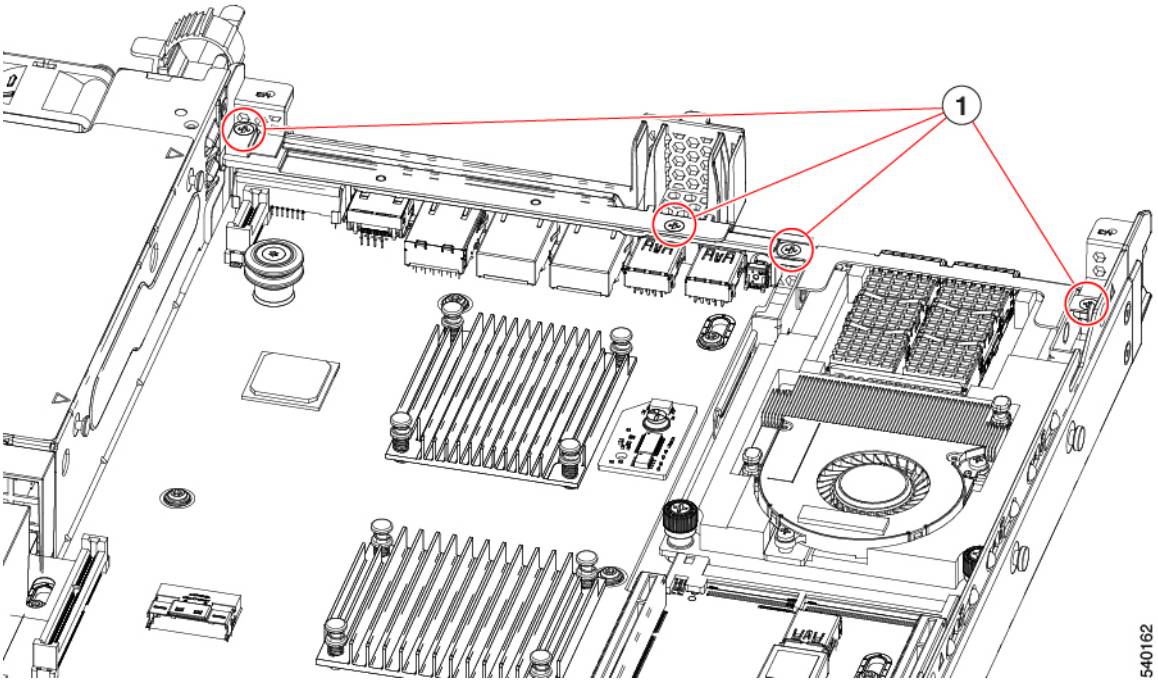


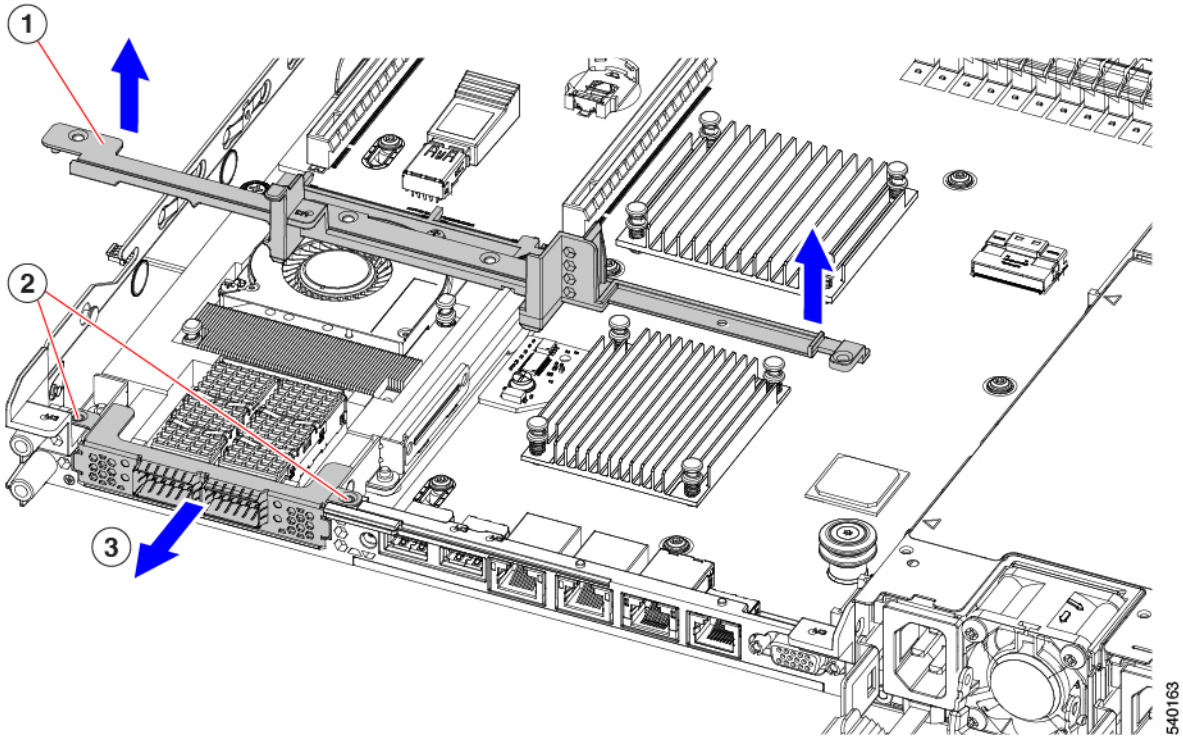
Figure 20: Locations of Securing Screws, Alternate View



Step 4 Remove the half height rear wall and mLOM bracket.

a) Grasp each end of the half height rear wall and remove it.

b) Grasp each end of the mLOM bracket and remove it.



Step 5 Save the three HH riser cages and the half height rear wall.

What to do next

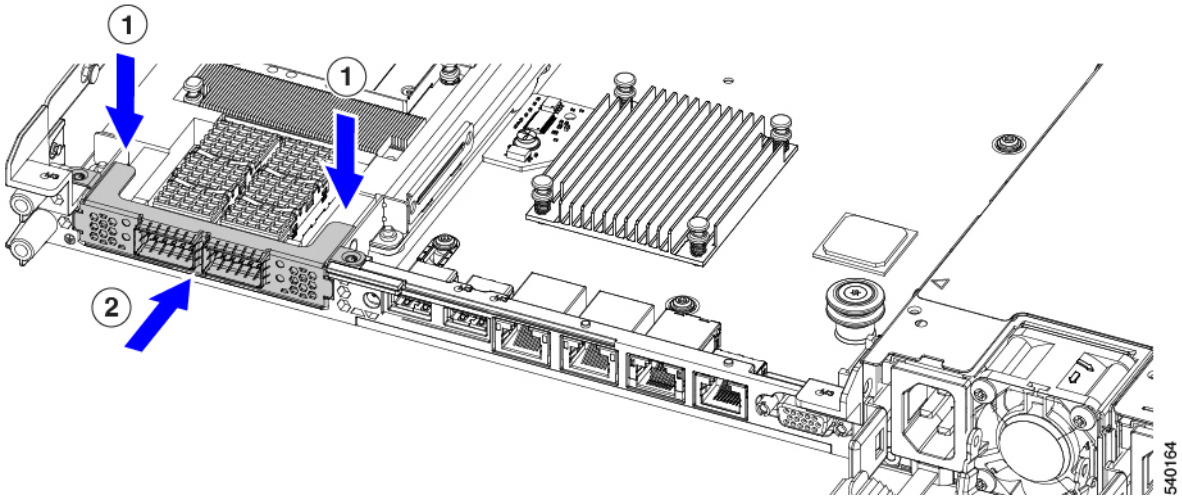
Install the two full-height riser cages. See Installing Full Height Riser Cages, on page 54.

Installing Full Height Riser Cages

Use this task to install 2 FH rear riser cages after 3 HH rear riser cages are removed.

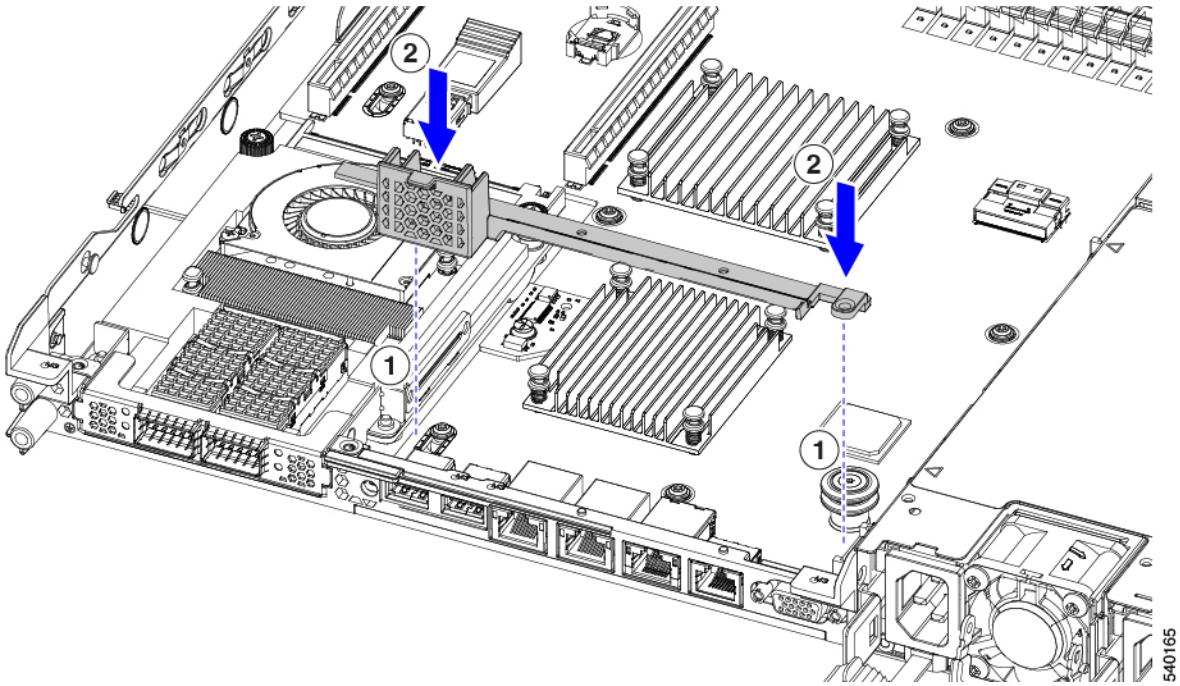
Before beginning this procedure, see Required Equipment for Replacing Riser Cages, on page 51.

Step 1 Install the mLOM bracket.



Step 2 Install the full-height rear wall.

a) Orient the full-height rear wall as shown, making sure the folded metal tab is facing up.
b) Align the screw holes in the FH rear wall with the screw holes in the node sheet metal.
c) Holding the rear wall level, seat onto the node sheet metal, making sure that the screw holes line up.



Step 3 Using a #2 Phillips screwdriver, install the four screws the secure the mLOM bracket and the FH rear wall to the node sheet metal.

Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.

Figure 21: Installing Securing Screws, Facing Rear Riser Slots

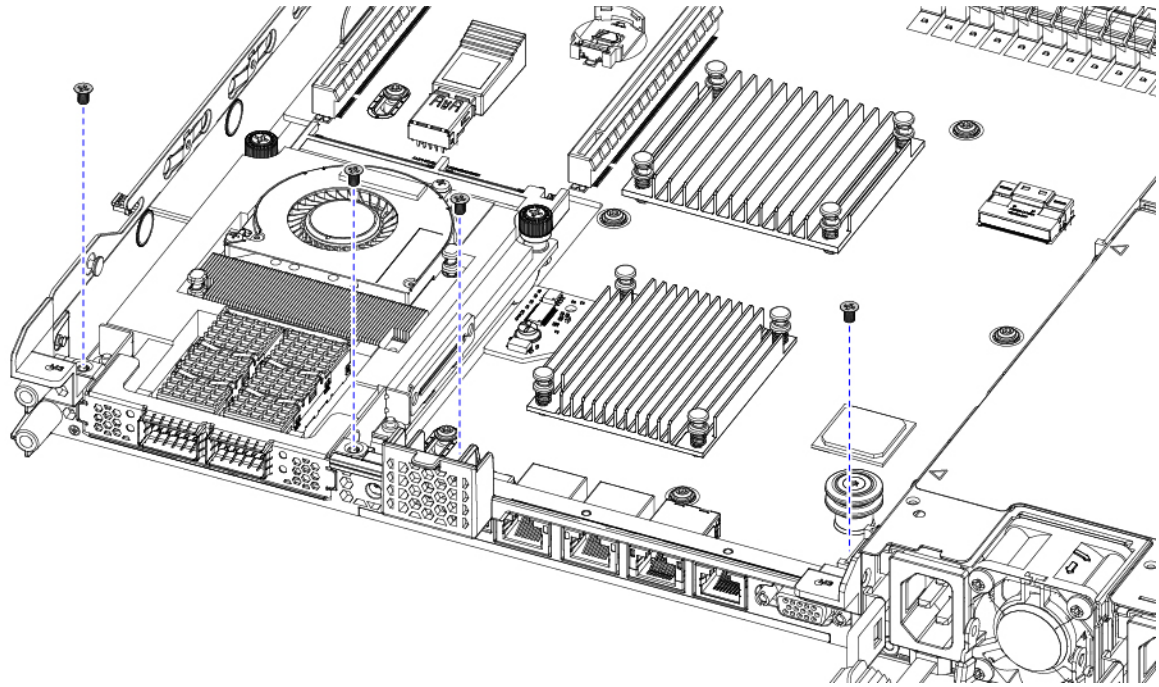
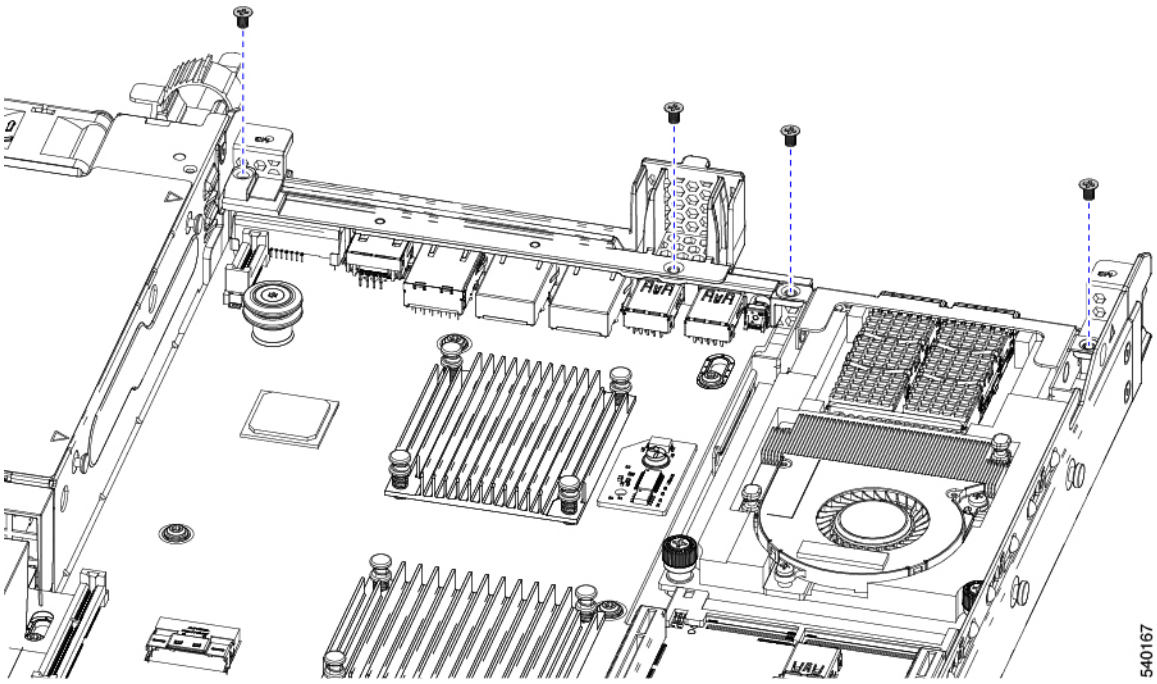


Figure 22: Installing Securing Screws, Alternative View

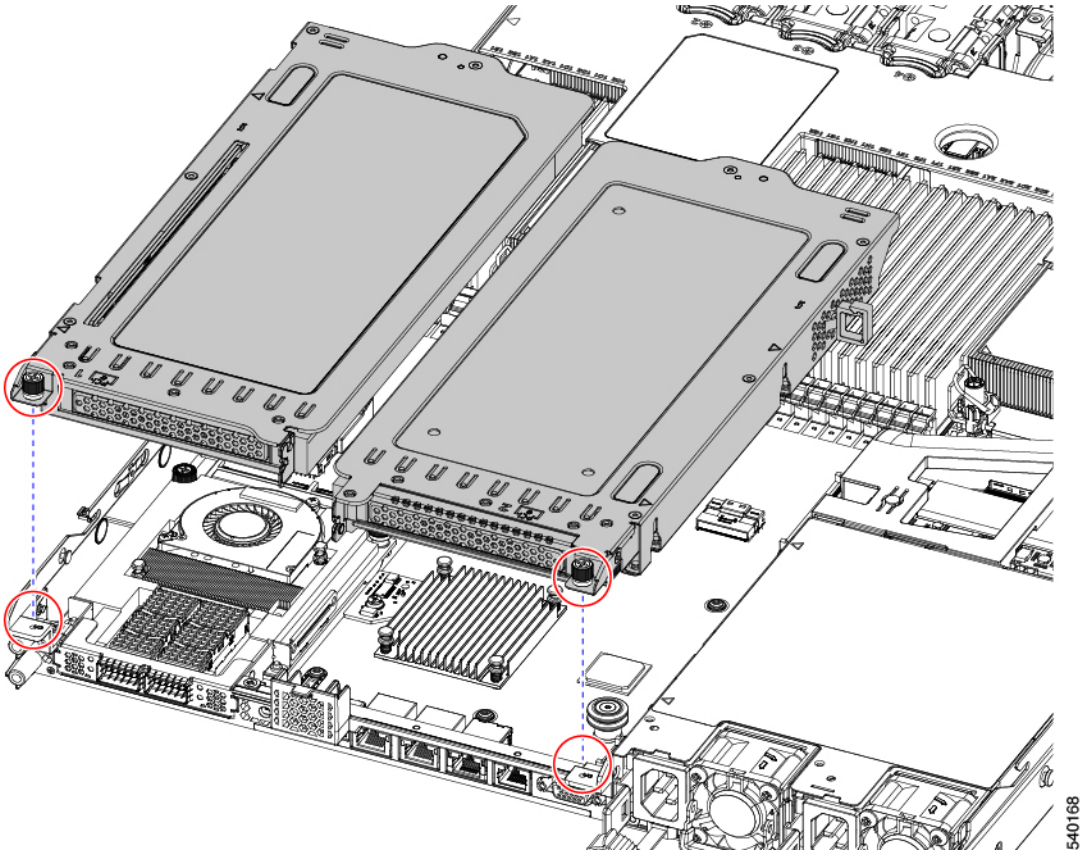


Step 4 Install the two full height riser cages.

a) Align riser cages 1 and 2 over their PCIe slots, making sure that the captive thumbscrews are aligned with their screw holes.

b) Holding each riser cage level, lower it into its PCIe slot, then tighten the thumbscrew by using a #2 Phillips screwdriver or your fingers.

Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.



Step 5 Replace the node's top cover.

Removing Full Height Riser Cages

This task enables switching from 2 FH rear PCIe cages to 3 HH rear PCIe cages. To complete this procedure, make sure that you have the required equipment. See Required Equipment for Replacing Riser Cages, on page 51.

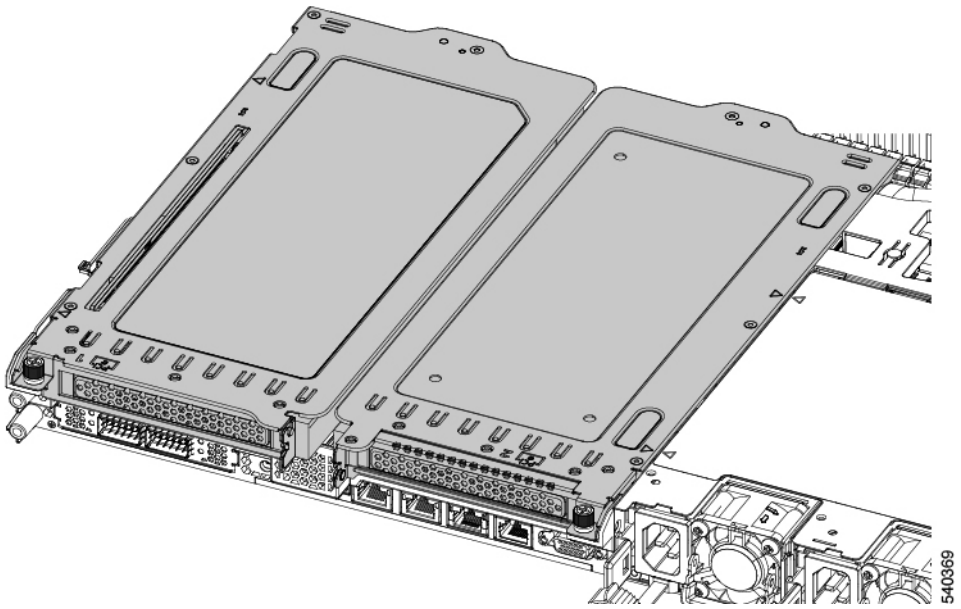
Step 1 Remove the node top cover to gain access to the PCIe riser cages.

See Removing Top Cover, on page 40.

Step 2 Remove the two rear PCIe riser cages.

a) Locate the riser cages.

b) Using a #2 Phillips screwdriver or your fingers, for each riser cage, loosen its captive thumbscrew.



1	Rear Riser Cage 1	**2**	Rear Riser Cage 2
3	Rear Riser cage 3	**4**	Riser Cage Thumbscrews, two total (one per riser cage)

Step 3 Using a #2 Phillips screwdriver, remove the four screws that secure the half height rear wall and mLOM bracket to the chassis sheet metal.

Note One of the screws is located behind the rear wall so it might be difficult to see. when you are facing the node's rear riser slots.

Figure 23: Locations of Securing Screws, Facing Rear Riser Slots

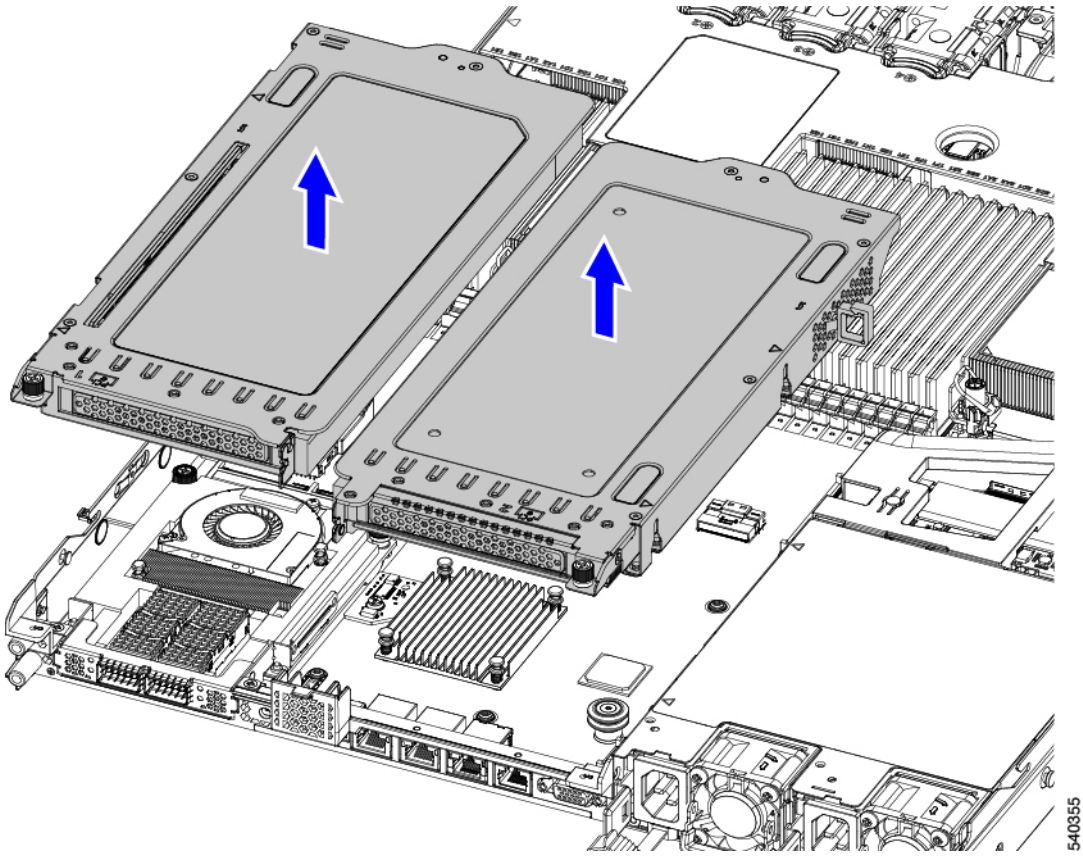
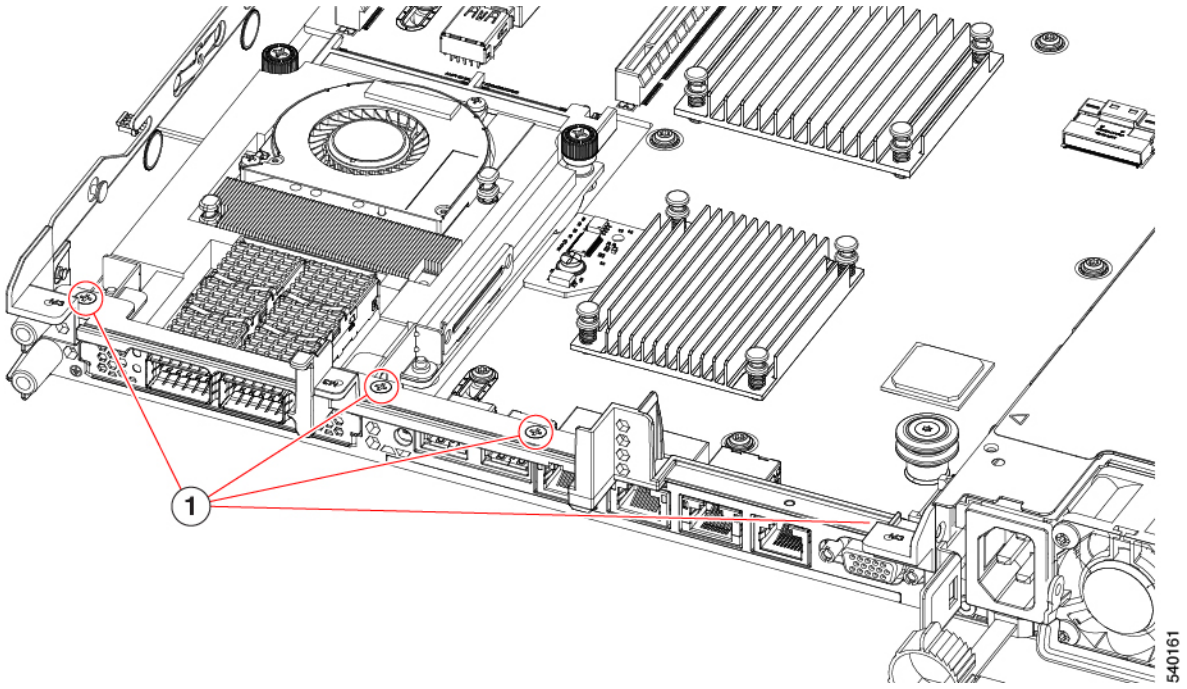


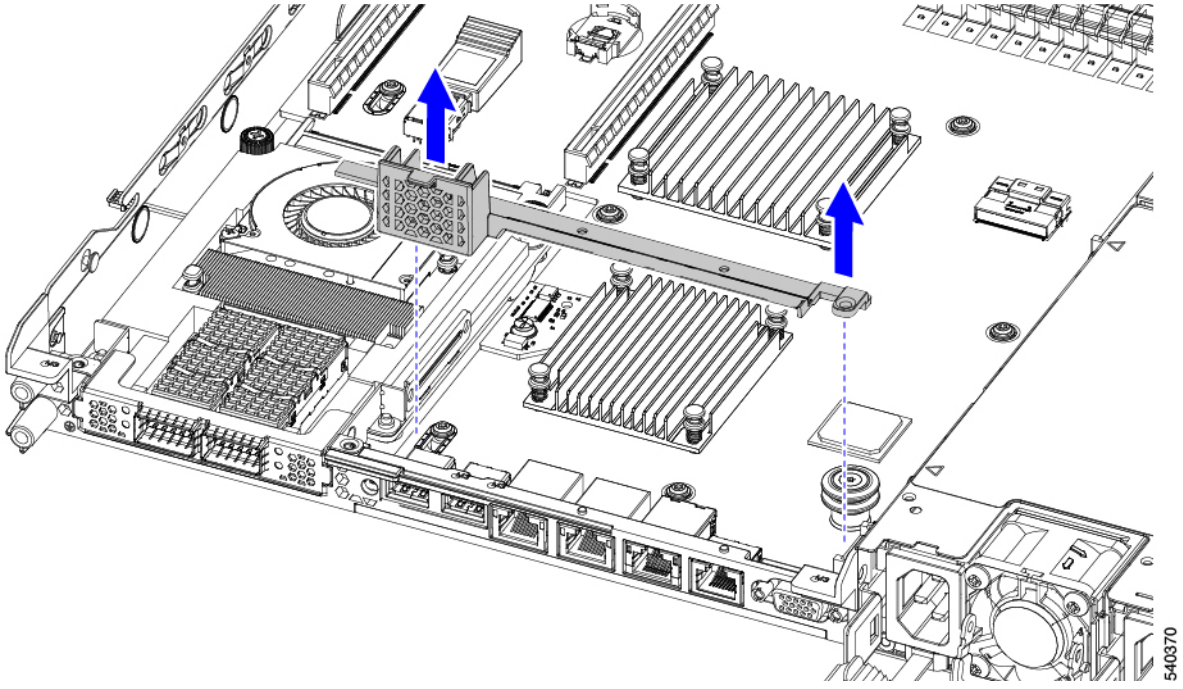
Figure 24: Locations of Securing Screws, Alternate View



Step 4 Remove the half height rear wall and mLOM bracket.

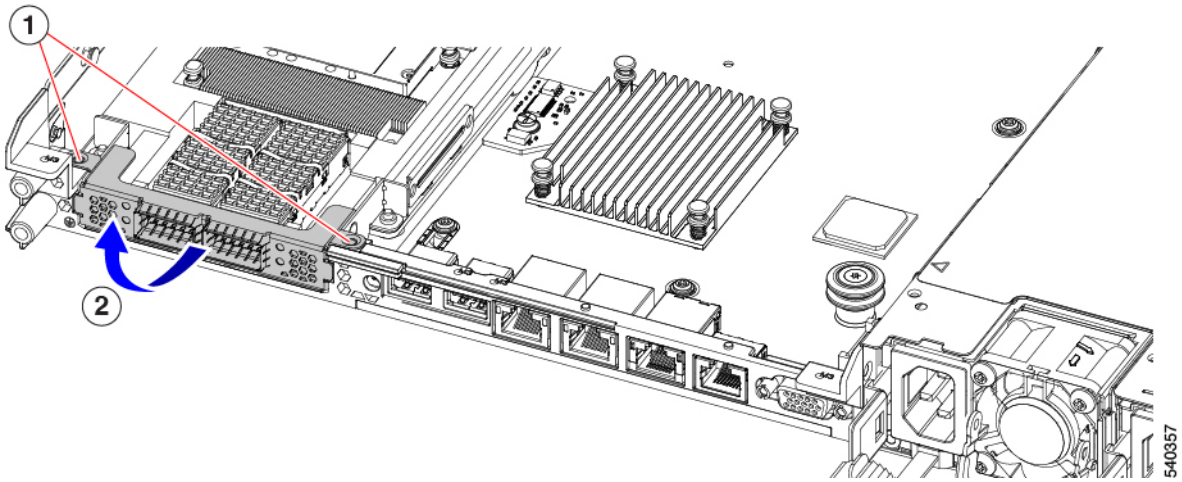
a) Grasp each end of the full height rear wall and remove it.

Figure 25: Removing the Full Height Rear Wall



b) Grasp each end of the mLOM bracket and remove it.

Figure 26: Remove mLOM Bracket



Step 5 Save the three FH riser cages and the full height rear wall.

What to do next

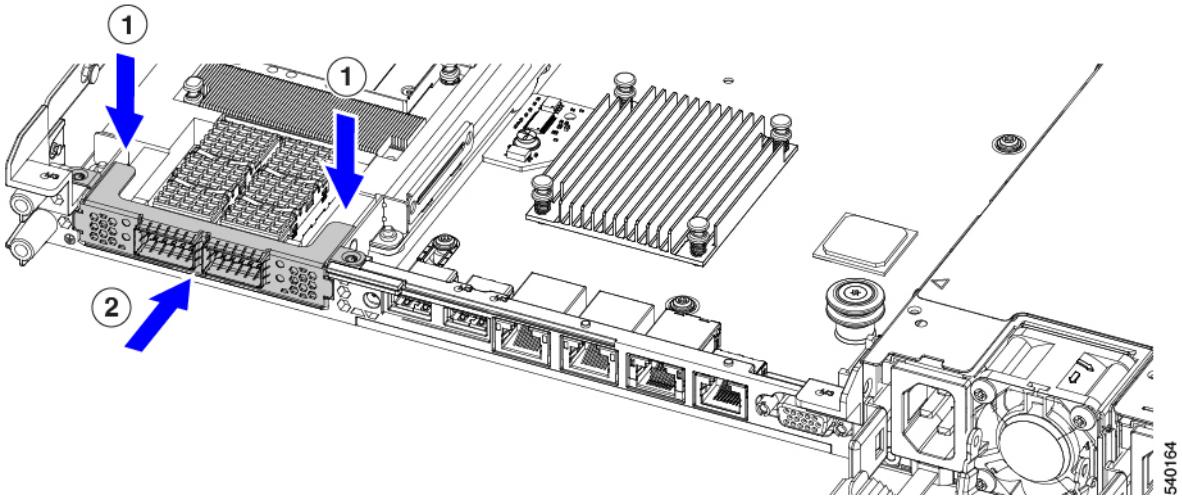
Install the two half-height riser cages. See Installing Half Height Riser Cages, on page 61 .

Installing Half Height Riser Cages

Use this task to install 3 HH rear riser cages after 2 FH rear riser cages are removed.

Before beginning this procedure, see Required Equipment for Replacing Riser Cages, on page 51.

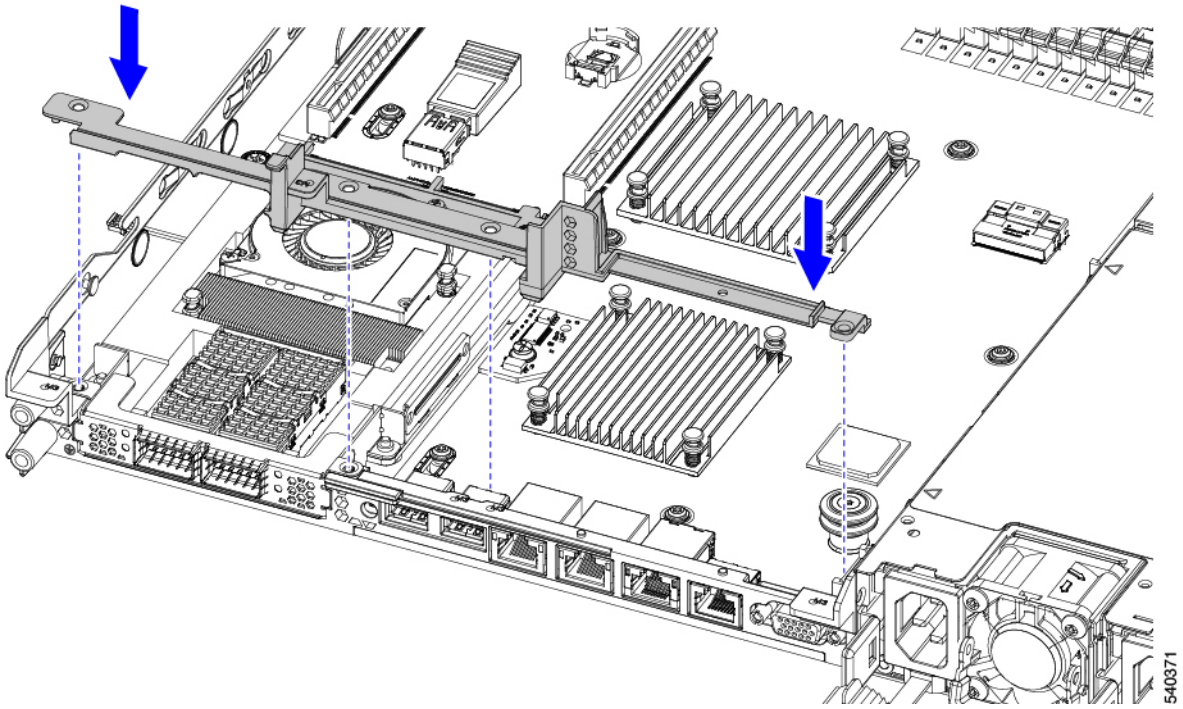
Step 1 Install the mLOM bracket.



Step 2 Install the half-height rear wall.

a) Orient the half-height rear wall as shown, making sure the folded metal tab is facing up.

b) Align the screw holes in the HH rear wall with the screw holes in the node sheet metal.
c) Holding the rear wall level, seat onto the node sheet metal, making sure that the screw holes line up.



Step 3 Using a #2 Phillips screwdriver, install the four screws the secure the mLOM bracket and the HH rear wall to the node sheet metal.

Caution Tighten screws to 4 lbs-in. Do not overtighten screws or you risk stripping them!

Figure 27: Installing Securing Screws, Facing Rear Riser Slots

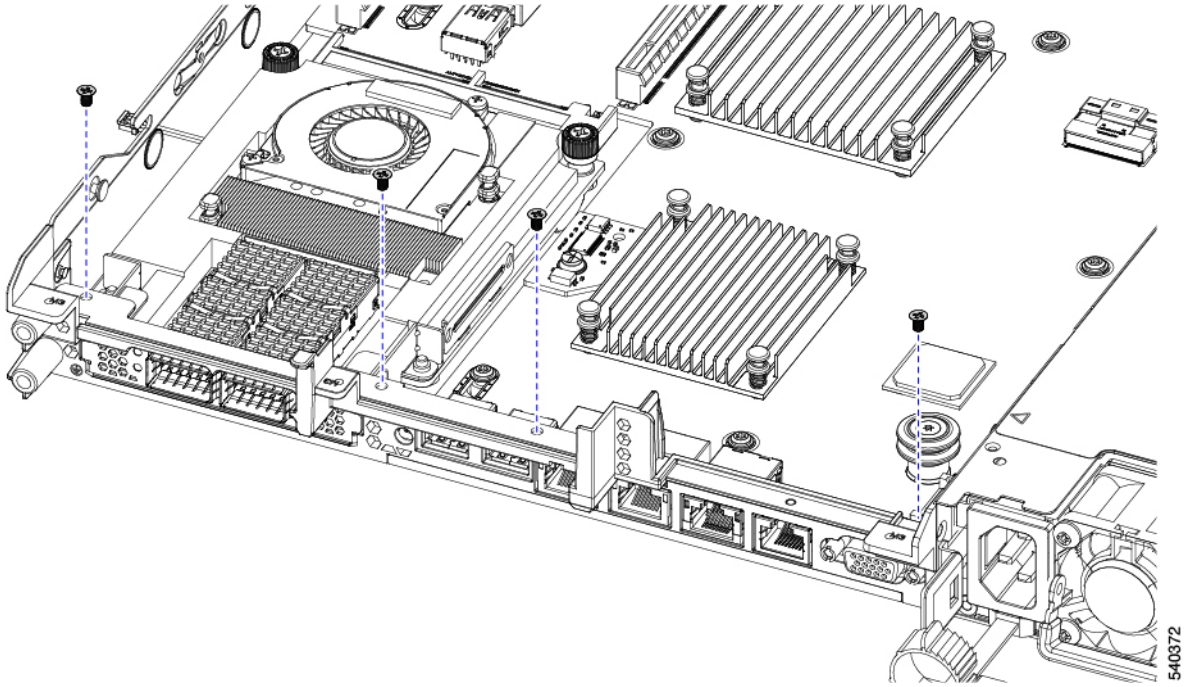
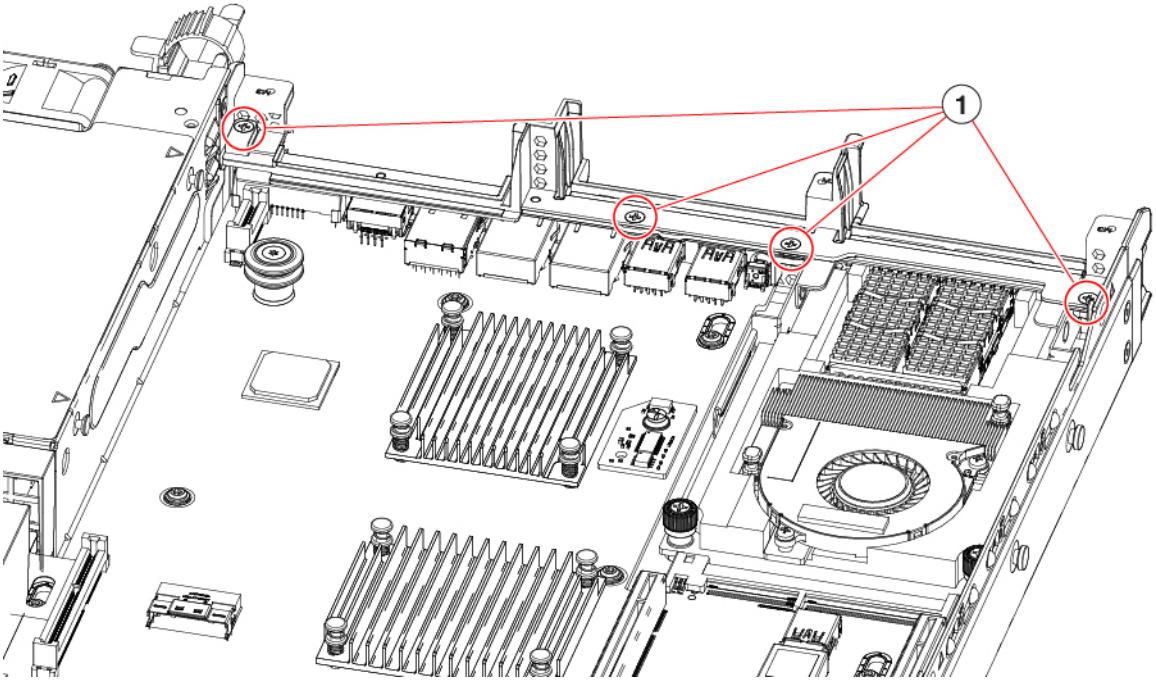


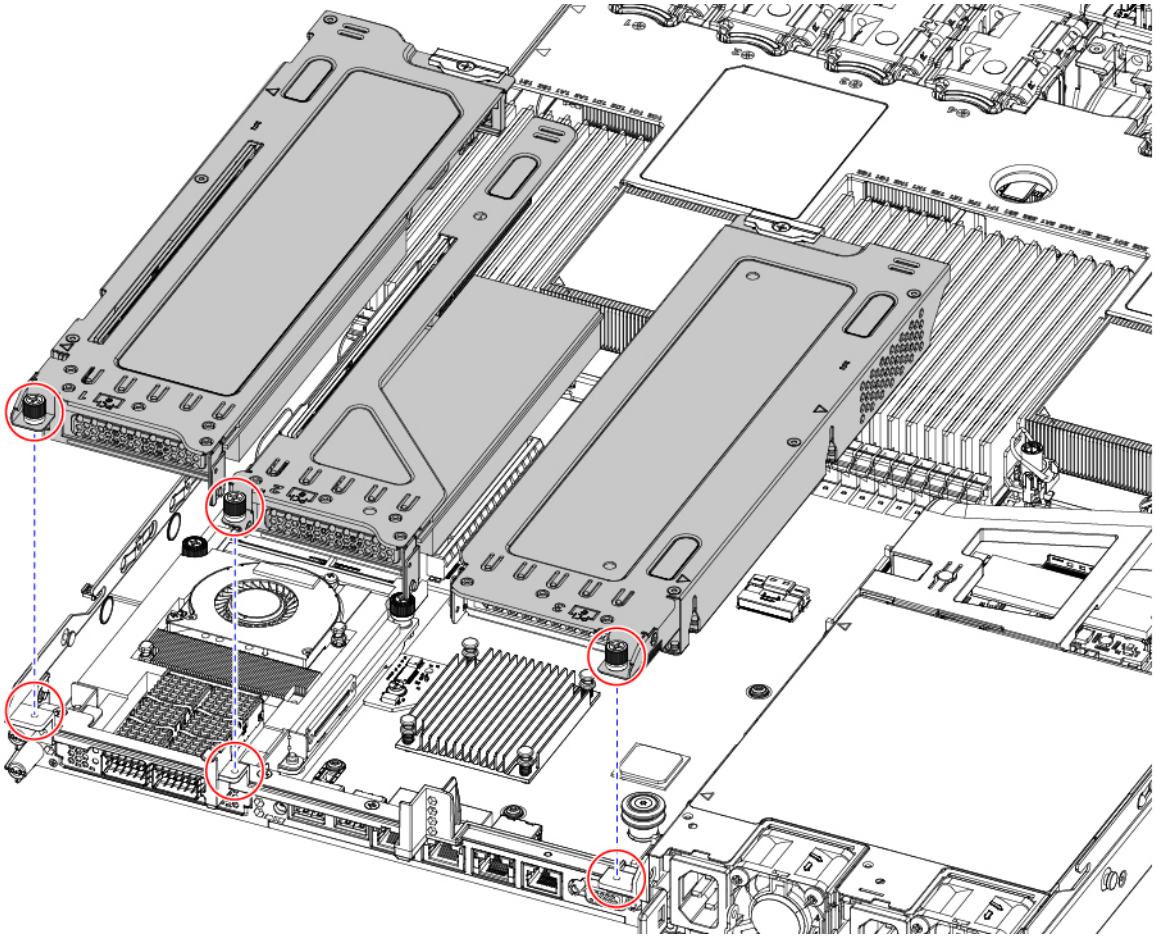
Figure 28: Installing Securing Screws, Alternative View



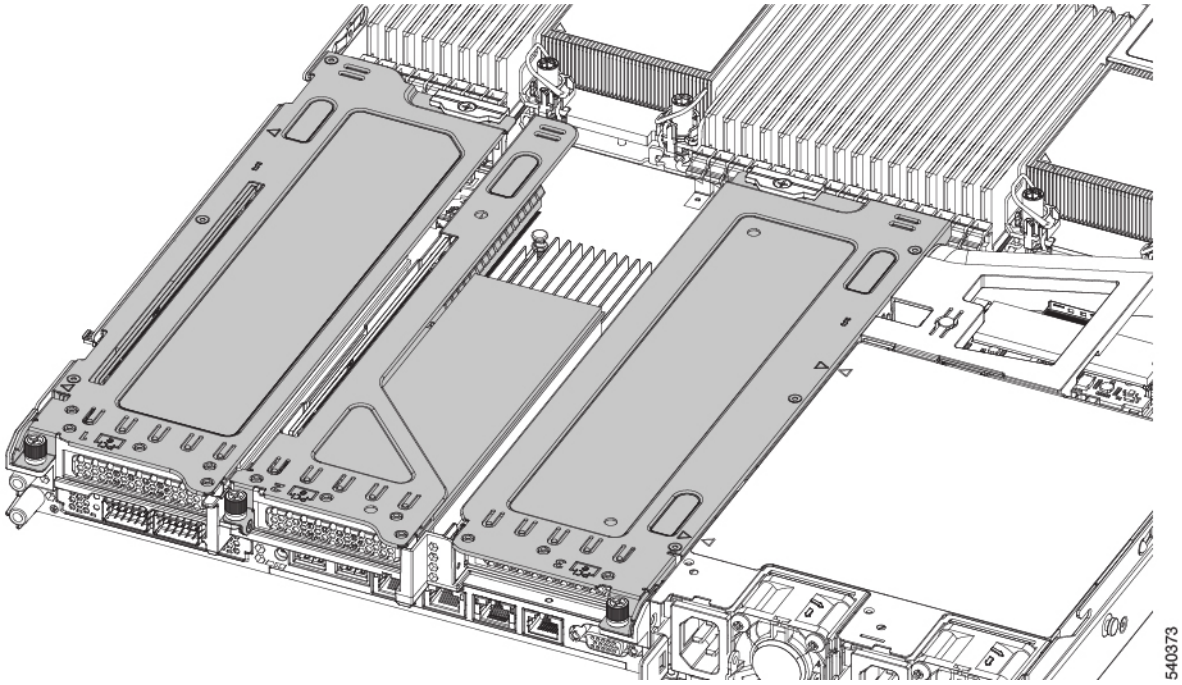
Step 4 Install the two full height riser cages.

a) Align riser cages 1, 2, and 3 over their PCIe slots, making sure that the captive thumbscrews are aligned with their screw holes.

b) Holding each riser cage level, lower it into its PCIe slot, then tighten the thumbscrew by using a #2 Phillips screwdriver or your fingers.



Step 5 Ensure the three riser cages are securely seated on the motherboard.



Step 6 Replace the node's top cover.

Replacing CPUs and Heatsinks

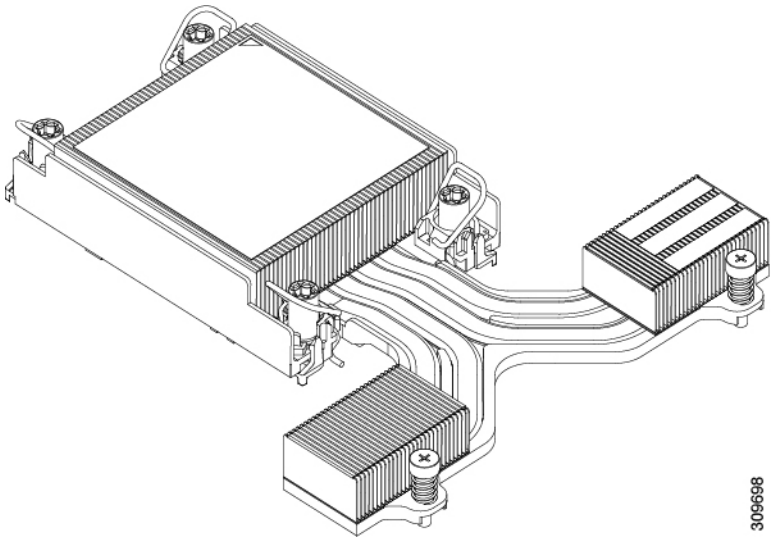
This section contains CPU configuration rules and the procedure for replacing CPUs and heatsinks:

CPU Configuration Rules

This server has two CPU sockets on the motherboard. Each CPU supports eight DIM channels (16 DIMM slots). See DIMM Slot Numbering, on page 74.

- The server can operate with one CPU, or two identical CPUs installed.
- The minimum configuration is that the node must have at least CPU 1 installed. Install CPU 1 first, and then CPU 2.
- The following restrictions apply when using a single-CPU configuration:
  - Any unused CPU socket must have the protective dust cover from the factory in place.
  - The maximum number of DIMMs is 16 (only CPU 1 channels A, B, C, D, E, F, G, and H).
  - PCIe riser 2 (slot 2) is unavailable.
  - Front-loading NVME drives are unavailable (they require PCIe riser 2).

- One type of CPU heatsink is available for this node, the low profile heatsink (UCSC-HSLP-M6). This heatsink has four T30 Torx screws on the main heatsink, and 2 Phillips-head screws on the extended heatsink.



Tools Required For CPU Replacement

You need the following tools and equipment for this procedure:

- T-30 Torx driver—Supplied with replacement CPU.
- #1 flat-head screwdriver—Supplied with replacement CPU.
- #2 Phillips screwdriver.
- CPU assembly tool—Supplied with replacement CPU. Orderable separately as Cisco PID UCS-CPUAT=.
- Heatsink cleaning kit—Supplied with replacement CPU. Orderable separately as Cisco PID UCSX-HSCK=.

  One cleaning kit can clean up to four CPUs.
- Thermal interface material (TIM)—Syringe supplied with replacement CPU. Use only if you are reusing your existing heatsink (new heatsinks have a pre-applied pad of TIM). Orderable separately as Cisco PID UCS-CPU-TIM=.

  One TIM kit covers one CPU.

See also Additional CPU-Related Parts to Order with RMA Replacement CPUs, on page 72.

Removing CPUs and Heat Sinks

Use the following procedure to remove an installed CPU and heatsink from the node. With this procedure, you will remove the CPU from the motherboard, disassemble individual components, then place the CPU and heatsink into the fixture that came with the CPU.

Step 1 Detach the CPU and heatsink (the CPU assembly) from the CPU socket.

a) Using a #2 Phillips screwdriver, loosen the two captive screws at the far end of the heatsink.

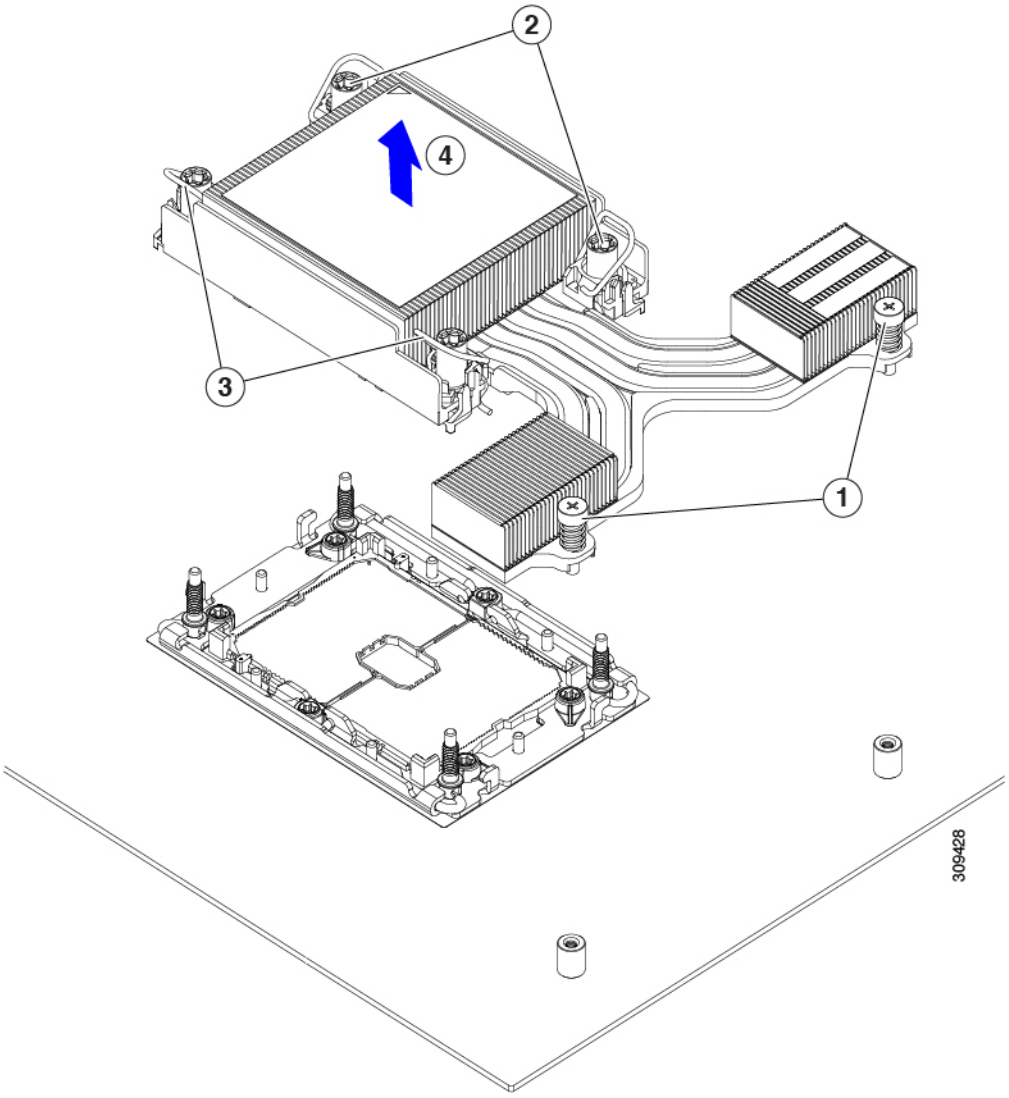
b) Using a T30 Torx driver, loosen all the securing nuts.

c) Push the rotating wires towards each other to move them to the unlocked position. The rotating wire locked and unlocked positions are labeled on the top of the heatsink.

Caution Make sure that the rotating wires are as far inward as possible. When fully unlocked, the bottom of the rotating wire disengages and allows the removal of the CPU assembly. If the rotating wires are not fully in the unlocked position, you can feel resistance when attempting to remove the CPU assembly.

d) Grasp the heatsink along the edge of the fins and lift the CPU assembly off of the motherboard.

Caution While lifting the CPU assembly, make sure not to bend the heatsink fins. Also, if you feel any resistance when lifting the CPU assembly, verify that the rotating wires are completely in the unlocked position.



Step 2 Put the CPU assembly on a rubberized mat or other ESD-safe work surface.

When placing the CPU on the work surface, the heatsink label should be facing up. Do not rotate the CPU assembly upside down.

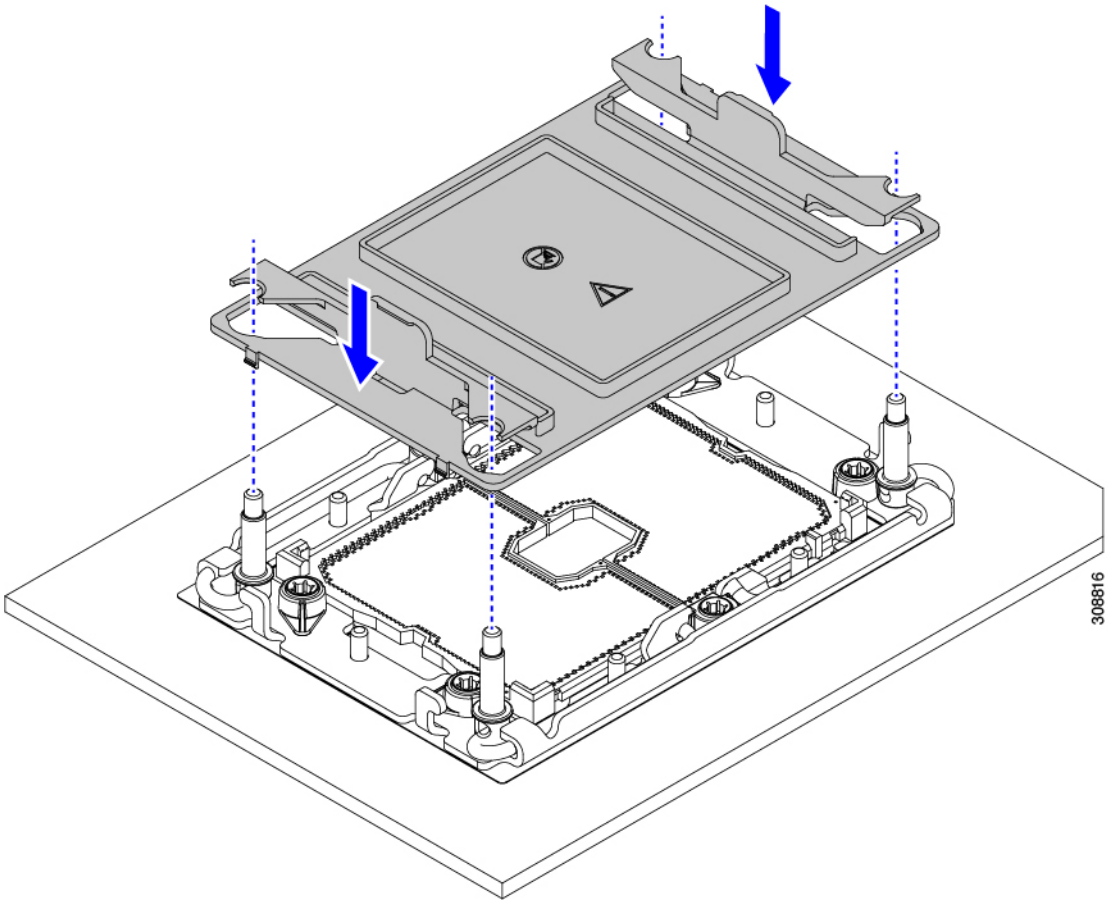
Ensure that the heatsink sits level on the work surface.

Step 3 Attach a CPU dust cover (UCS-CPU-M6-CVR=) to the CPU socket.

a) Align the posts on the CPU bolstering plate with the cutouts at the corners of the dust cover.

b) Lower the dust cover and simultaneously press down on the edges until it snaps into place over the CPU socket.

Caution Do not press down in the center of the dust cover!



Step 4 Detach the CPU from the CPU carrier.

a) Turn the CPU assembly upside down, so that the heatsink is pointing down.

This step enables access to the CPU securing clips.

b) Gently lift the TIM breaker (1 in the following illustration) in a 90-degree upward arc to partially disengage the CPU clips on this end of the CPU carrier.

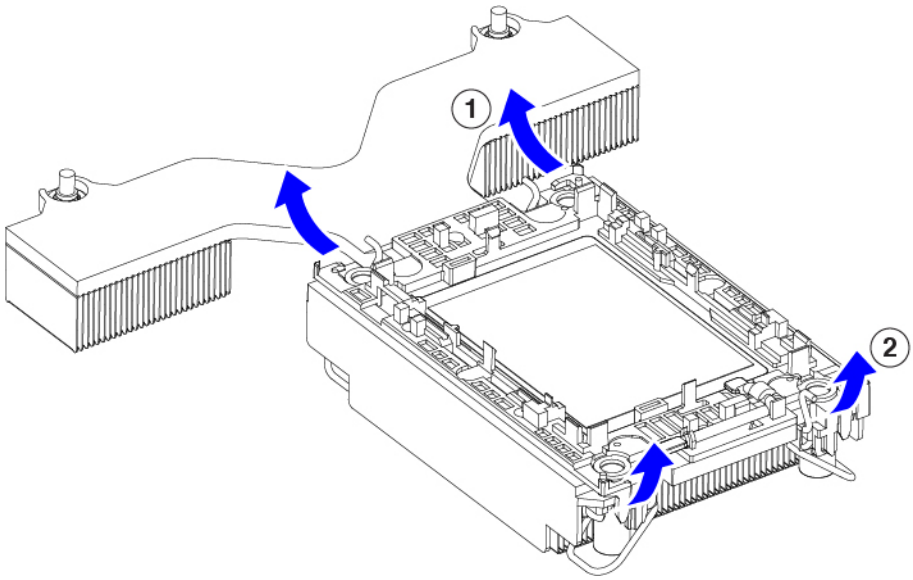
c) Lower the TIM breaker into the u-shaped securing clip to allow easier access to the CPU carrier.

Note Make sure that the TIM breaker is completely seated in the securing clip.

d) Gently pull up on the extended edge of the CPU carrier (1) so that you can disengage the second pair of CPU clips near both ends of the TIM breaker.

Caution Be careful when flexing the CPU carrier! If you apply too much force you can damage the CPU carrier. Flex the carrier only enough to release the CPU clips. Make sure to watch the clips while performing this step so that you can see when they disengage from the CPU carrier.

e) Gently pull up on the opposite edge of the CPU carrier (2) so that you can disengage the pair of CPU clips.



Step 5 When all the CPU clips are disengaged, grasp the carrier, and lift it and the CPU to detach them from the heatsink.

Note If the carrier and CPU do not lift off of the heatsink, attempt to disengage the CPU clips again.

Step 6 Use the provided cleaning kit (UCSX-HSCK) to remove all of the thermal interface barrier (thermal grease) from the CPU, CPU carrier, and heatsink.

Important Make sure to use only the Cisco-provided cleaning kit, and make sure that no thermal grease is left on any surfaces, corners, or crevices. The CPU, CPU carrier, and heatsink must be completely clean.

Step 7 Transfer the CPU and carrier to the fixture.

a) Flip the CPU and carrier right-side up.
b) Align the CPU and carrier with the fixture.
c) Lower the CPU and CPU carrier onto the fixture.

What to do next

Choose the appropriate option:

- If you will be installing a CPU, go to Installing the CPUs and Heatsinks, on page 70.
- If you will not be installing a CPU, verify that a CPU socket cover is installed. This option is valid only for CPU socket 2 because CPU socket 1 must always be populated in a runtime deployment.

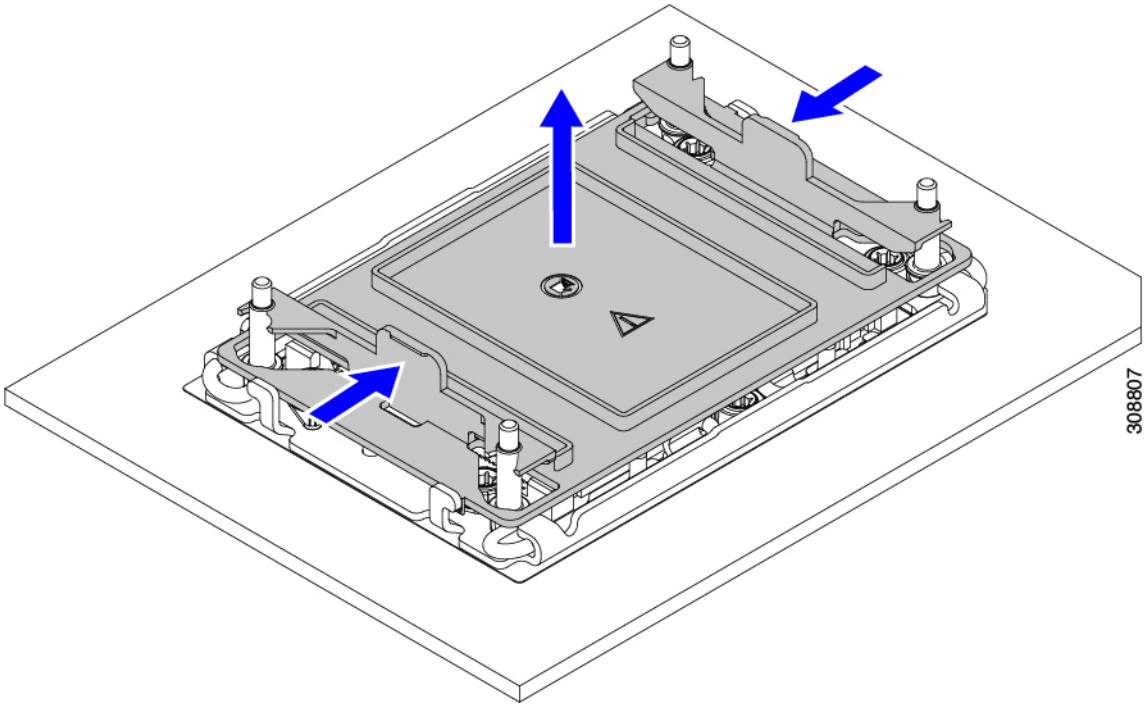
Installing the CPUs and Heatsinks

Use this procedure to install a CPU if you have removed one, or if you are installing a CPU in an empty CPU socket. To install the CPU, you will move the CPU to the fixture, then attach the CPU assembly to the CPU socket on the server mother board.

Step 1 Remove the CPU socket dust cover (UCS-CPU-M6-CVR=) on the server motherboard.

a) Push the two vertical tabs inward to disengage the dust cover.

b) While holding the tabs in, lift the dust cover up to remove it.



c) Store the dust cover for future use.

Caution Do not leave an empty CPU socket uncovered. If a CPU socket does not contain a CPU, you must install a CPU dust cover.

Step 2 Grasp the CPU fixture on the edges labeled PRESS, lift it out of the tray, and place the CPU assembly on an ESD-safe work surface.

Step 3 Apply new TIM.

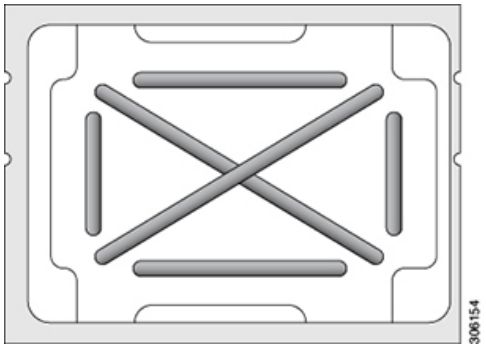
Note The heatsink must have new TIM on the heatsink-to-CPU surface to ensure proper cooling and performance.

- If you are installing a new heatsink, it is shipped with a pre-applied pad of TIM. Go to step 4.
- If you are reusing a heatsink, you must remove the old TIM from the heatsink and then apply new TIM to the CPU surface from the supplied syringe. Continue with step **a** below.

a) Apply the Bottle #1 cleaning solution that is included with the heatsink cleaning kit (UCSX-HSCK=), as well as the spare CPU package, to the old TIM on the heatsink and let it soak for a least 15 seconds.

b) Wipe all of the TIM off the heatsink using the soft cloth that is included with the heatsink cleaning kit. Be careful to avoid scratching the heatsink surface.
c) Completely clean the bottom surface of the heatsink using Bottle #2 to prepare the heatsink for installation.
d) Using the syringe of TIM provided with the new CPU (UCS-CPU-TIM=), apply 1.5 cubic centimeters (1.5 ml) of thermal interface material to the top of the CPU. Use the pattern shown in the following figure to ensure even coverage.

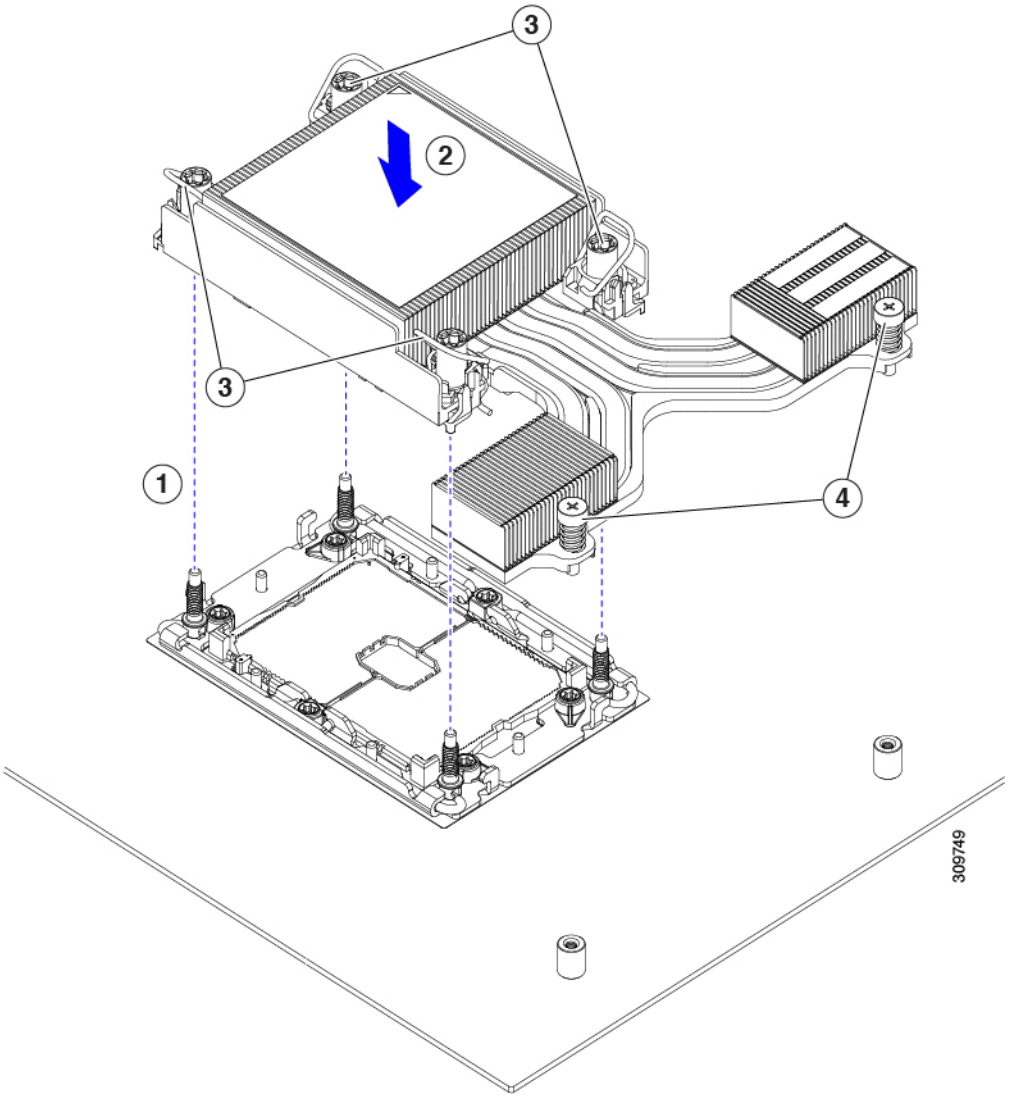
Figure 29: Thermal Interface Material Application Pattern



Caution Use only the correct heatsink for your CPU. CPU 1 uses heatsink UCSB-HS-M6-R and CPU 2 uses heatsink UCSB-HS-M6-F.

Step 4 Attach the heatsink to the socket.
a) Align the CPU and heatsink.
b) Lower the heatsink onto the CPU.
c) Close the rotating wires to lock the heatsink into place on the TIM grease.

Step 5 Install the CPU to the motherboard.
a) Push the rotating wires to the unlocked position so that they do not obstruct installation.
b) Holding the CPU by the fins, align it with the posts on the socket.
c) Lower the CPU onto the motherboard socket.
d) Set the T30 Torx driver to 12 in-lb of torque and tighten the 4 securing nuts to secure the CPU to the motherboard (3) first. Then, set the torque driver to 6 in-lb of torque and tighten the two Phillips head screws for the extended heatsink (4).



Additional CPU-Related Parts to Order with RMA Replacement CPUs

When a return material authorization (RMA) of the CPU is done on a Cisco UCS C-Series server, additional parts might not be included with the CPU spare. The TAC engineer might need to add the additional parts to the RMA to help ensure a successful replacement.

Note The following items apply to CPU *replacement* scenarios. If you are replacing a system chassis and *moving* existing CPUs to the new motherboard, you do not have to separate the heatsink from the CPU.

- Scenario 1—You are reusing the existing heatsinks:
  - Heatsink cleaning kit (HX-HSCK=)

One cleaning kit can clean up to four CPUs.

- Thermal interface material (TIM) kit for M6 servers (HX-CPU-TIM=)

  One TIM kit covers one CPU.

- Scenario 2—You are replacing the existing heatsinks:

Caution Use only the correct heatsink for your CPUs to ensure proper cooling. There are two different heatsinks: HX-HS-C220M5= for CPUs 150 W and less; HX-HS2-C220M5= for CPUs above 150 W.

  - Heatsink: HX-HS-C220M5= for CPUs 150 W and less; HX-HS2-C220M5= for CPUs above 150 W

    New heatsinks have a pre-applied pad of TIM.

  - Heatsink cleaning kit (HX-HSCK=)

    One cleaning kit can clean up to four CPUs.

- Scenario 3—You have a damaged CPU carrier (the plastic frame around the CPU):
  - CPU Carrier: HX-M5-CPU-CAR=
  - #1 flat-head screwdriver (for separating the CPU from the heatsink)
  - Heatsink cleaning kit (HX-HSCK=)

    One cleaning kit can clean up to four CPUs.

  - Thermal interface material (TIM) kit for M5 servers (HX-CPU-TIM=)

    One TIM kit covers one CPU.

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 TIM and the other to prepare the surface of the heatsink.

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

Replacing Memory DIMMs

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

Note DIMMs and their slots are keyed to insert only one way. Make sure to align the notch on the bottom of the DIMM with the key in the DIMM slot. If you are seating a DIMM in a slot and feel resistance, remove the DIMM and verify that its notch is properly aligned with the slot's key.

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

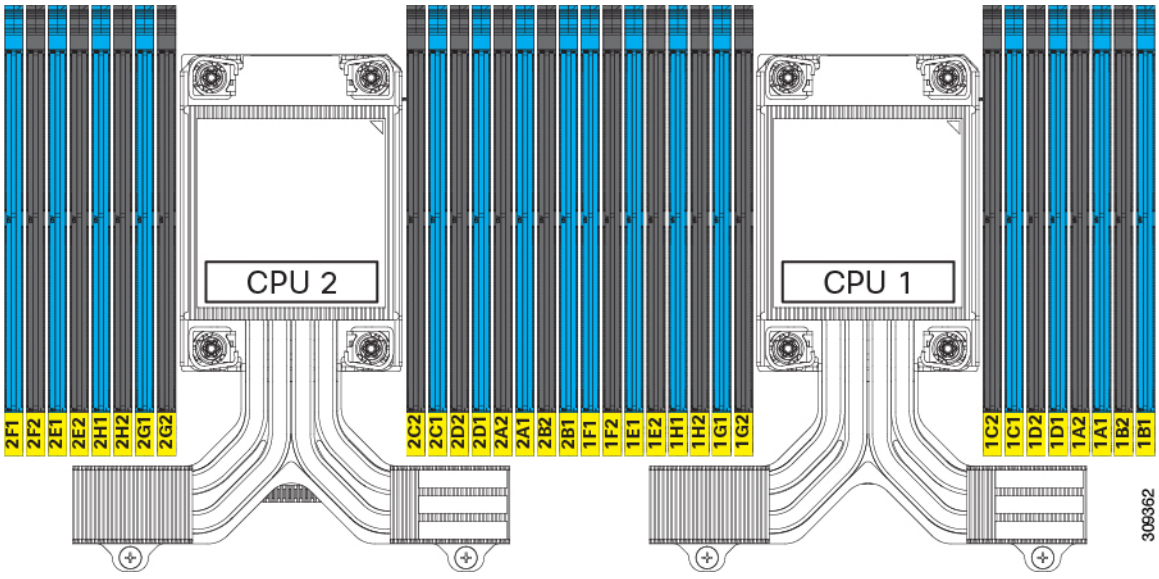
Note To ensure the best node performance, it is important that you are familiar with memory performance guidelines and population rules before you install or replace DIMMs.

DIMM Population Rules and Memory Performance Guidelines

The following sections provide partial information for memory usage. mixing, and population guidelines. For detailed information about memory usage and population, download the Cisco UCS C220/C240/B200 M6 Memory Guide.

DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the motherboard.



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs for maximum performance:

- The Cisco HX C220 M6 supports DIMMs (RDIMMs), load-reduced DIMMs (LR DIMMs) and Intel® Optane™ Persistent Memory Modules (PMEMs).

- Each CPU supports eight memory channels, A through H.
  - CPU 1 supports channels P1 A1, P1 A2, P1 B1, P1 B2, P1 C1, P1 C2, P1 D1, P1 D2, P1 E1, P1 E2, P1 F1, P1 F2, P1 G1, P1 G2, P1 H1, and P1 H2.
  - CPU 2 supports channels P2 A1, P2 A2, P2 B1, P2 B2, P2 C1, P2 C2, P2 D1, P2 D2, P2 E1, P2 E2, P2 F1, P2 F2, P2 G1, P2 G2, P2 H1, and P2 H2.
- When one DIMM is used, it must be populated in DIMM slot 1 (farthest away from the CPU) of a given channel.
- When single- or dual-rank DIMMs are populated in two DIMMs per channel (2DPC) configurations, always populate the higher number rank DIMM first (starting from the farthest slot). For a 2DPC example, first populate with dual-rank DIMMs in DIMM slot 1. Then populate single-rank DIMMs in DIMM 2 slot.
- Each channel has two DIMM sockets (for example, channel A = slots A1, A2).
- In a single-CPU configuration, populate the channels for CPU1 only (P1 A1 through P1 H2).
- For optimal performance, populate DIMMs in the order shown in the following table, depending on the number of CPUs and the number of DIMMs per CPU. If your server has two CPUs, balance DIMMs evenly across the two CPUs as shown in the table. DIMMs for CPU 1 and CPU 2 (when populated) must always be configured identically.

Note The section below lists recommended configurations. Using 5, 7, 9, 10, or 11 DIMMs per CPU is not recommended.

- Cisco memory from previous generation servers (DDR3 and DDR4) is not compatible with the server.
- Memory can be configured in any number of DIMMs as pairs, although for optimal performance, see the following document: https://www.cisco.com/c/dam/en/us/products/collateral/servers-unified-computing/ucs-c-series-rack-servers/c220-c240-b200-m6-memory-guide.pdf.
- DIMM mixing is supported for DIMMs, but not when Intel Optane Persistent Memory is installed.
  - LRDIMMs cannot be mixed with RDIMMs
  - RDIMMs can be mixed with RDIMMs, and LRDIMMs can be mixed with LRDIMMs, but mixing of non-3DS and 3DS LRDIMMs is not allowed in the same channel, across different channels, or across different sockets.
  - Allowed mixing must be in pairs of similar quantities (for example, 8x32GB and 8x64GB, 8x16GB and 8x64GB, 8x32GB and 8x64GB, or 8x16GB and 8x32GB). Mixing of 10x32GB and 6x64GB, for example, is not allowed.
- DIMMs are keyed. To properly install them, make sure that the notch on the bottom of the DIMM lines up with the key in slot.
- Populate all slots with a DIMM or DIMM blank. A DIMM slot cannot be empty.

Memory Population Order

The Cisco HX C220 M6 server has two memory options, DIMMs only or DIMMs plus Intel Optane PMem 200 series memory.

Memory slots are color-coded, blue and black. The color-coded channel population order is blue slots first, then black. DIMMs for CPU 1 and CPU 2 (when populated) must always be configured identically.

The following tables show the memory population order for each memory option.

Table 4: DIMMs Population Order

Number of DDR4 DIMMs per CPU (Recommended Configurations)	Populate CPU 1 Slot		Populate CPU2 Slots	
	P1 Blue #1 Slots	P1 Black #2 Slots	P2 Blue #1 Slots	P2 Black #2 Slots
1	(A1)	-	(A1)	
2	(A1, E1)	-	(A1, E1)	
4	(A1, C1); (E1, G1)	-	(A1, C1); (E1, G1)	
6	(A1, C1); (D1, E1): (G1, H1)	-	(A1, C1); (D1, E1): (G1, H1)	
8	(A1,C1); (D1, E1): (G1, H1); (B1, F1)	-	(A1,C1); (D1, E1): (G1, H1); (B1, F1)	
12	(A1,C1); (D1, E1): (G1, H1)	(A2, C2); (D2, E2); (G2, H2)	(A1,C1); (D1, E1): (G1, H1)	(A2, C2); (D2, E2); (G2, H2)
16	All populated (A1 through H1)	All populated (A2 through H2)	All populated (A1 through H1)	All populated (A2 through H2)

Table 5: DIMM Plus Intel Optane PMem 200 Series Memory Population Order

Total Number of DIMMs per CPU	DDR4 DIMM Slot	Intel Optane PMem 200 Series DIMM Slot
4+4 DIMM	A0, C0, E0, G0,	B0, D0, F0, H0
8+1 DIMMs	A0, B0, C0, D0, E0, F0, G0, H0	A1
8+4 DIMMs	A0, B0, C0, D0, E0, F0, G0, H0	A1, C1, E1, G1
8+8 DIMMs	A0, B0, C0, D0, E0, F0, G0, H0	A1, B1, C1, D1, E1, F1, G1, H1

Memory Mirroring

The CPUs in the node 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.

Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. The second, duplicate channel provides redundancy.

Replacing DIMMs

Identifying a Faulty DIMM

Each DIMM socket has a corresponding DIMM fault LED, directly in front of the DIMM socket. See Internal Diagnostic LEDs, on page 37 for the locations of these LEDs. When the node is in standby power mode, these LEDs light amber to indicate a faulty DIMM.

Step 1 Remove an existing DIMM:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40

d) Remove the air baffle that covers the front ends of the DIMM slots to provide clearance.

e) Locate the DIMM that you are removing, and then open the ejector levers at each end of its DIMM slot.

Step 2 Install a new DIMM:

Note Before installing DIMMs, see the memory population rules for this node: DIMM Population Rules and Memory Performance Guidelines, on page 74.

a) Align the new DIMM with the empty slot on the motherboard. Use the alignment feature in the DIMM slot 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.

c) Replace the top cover to the node.

d) Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Replacing Intel Optane DC Persistent Memory Modules

This topic contains information for replacing Intel Optane Data Center Persistent Memory modules (DCPMMs), including population rules. DCPMMs have the same form-factor as DDR4 DIMMs and they install to DIMM slots.

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

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

DCPMMs can be configured to operate in one of three modes:

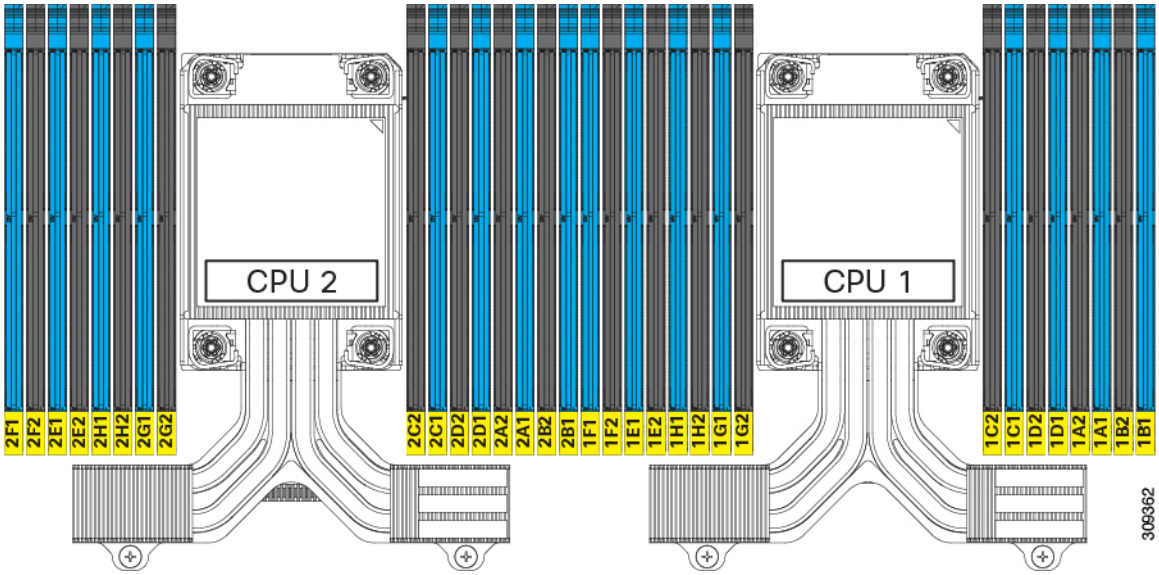
- Memory Mode (default): The module operates as 100% memory module. Data is volatile and DRAM acts as a cache for DCPMMs. This is the factory default setting.
- App Direct Mode: The module operates as a solid-state disk storage device. Data is saved and is non-volatile.
- Mixed Mode (25% Memory Mode + 75% App Direct): The module operates with 25% capacity used as volatile memory and 75% capacity used as non-volatile storage.

Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines

This topic describes the rules and guidelines for maximum memory performance when using Intel Optane DC persistent memory modules (DCPMMs) with DDR4 DRAM DIMMs.

DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the server motherboard.



Configuration Rules

Observe the following rules and guidelines:

- To use DCPMMs in this node, two CPUs must be installed.
- When using DCPMMs in a node:
  - The DDR4 DIMMs installed in the node must all be the same size.
  - The DCPMMs installed in the node must all be the same size and must have the same SKU.
- The DCPMMs run at 2666 MHz. If you have 2933 MHz RDIMMs or LRDIMMs in the node and you add DCPMMs, the main memory speed clocks down to 2666 MHz to match the speed of the DCPMMs.

- Each DCPMM draws 18 W sustained, with a 20 W peak.
- Intel Optane Persistent Memory supports the following memory modes:
  - App Direct Mode, in which the PMEM operates as a solid-state disk storage device. Data is saved and is non-volatile. Both PMEM and DIMM capacities count towards the CPU capacity limit
  - Memory Mode, in which the PMEM operates as a 100% memory module. Data is volatile and DRAM acts as a cache for PMEMs. Only the PMEM capacity counts towards the CPU capacity limit). This is the factory default mode

PMEM and DRAM Support

- Both DRAMs and PMEMs are supported in the Cisco HX C220 M6 rack node.
- Each CPU has 16 DIMM sockets and supports the following maximum memory capacities:
  - 4 TB using 16 x 256 GB DRAMs, or
  - 6 TB using 8 x 256 GB DRAMs and 8 x 512 GB Intel® Optane™ Persistent Memory Modules (PMEMs)
- If DRAMs/PMEMs are mixed, the following configuration the only one supported per CPU socket:
  - 4 DRAMs and 4 PMEMs
  - 8 DRAMs and 4 PMEMs
  - 8 DRAMs and 1 PMEM
  - 8 DRAMs and 8 PMEMs
- Supported capacities are:
  - DRAM: 32 GB, 64 GB, 128 GB, or 256 GB
  - PMEM: 128 GB, 256 GB, or 512 GB

Installing Intel Optane DC Persistent Memory Modules

Note DCPMM configuration is always applied to all DCPMMs in a region, including a replacement DCPMM. You cannot provision a specific replacement DCPMM on a preconfigured node.

Step 1 Remove an existing DCPMM:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.
d) Remove the air baffle that covers the front ends of the DIMM slots to provide clearance.

Caution If you are moving DCPMMs with active data (persistent memory) from one node to another as in an RMA situation, each DCPMM must be installed to the identical position in the new node. Note the positions of each DCPMM or temporarily label them when removing them from the old node.

e) Locate the DCPMM that you are removing, and then open the ejector levers at each end of its DIMM slot.

Step 2 Install a new DCPMM:

Note Before installing DCPMMs, see the population rules for this node: Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines, on page 78.

a) Align the new DCPMM with the empty slot on the motherboard. Use the alignment feature in the DIMM slot to correctly orient the DCPMM.
b) Push down evenly on the top corners of the DCPMM until it is fully seated and the ejector levers on both ends lock into place.
c) Reinstall the air baffle.
d) Replace the top cover to the node.
e) Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Step 3 Perform post-installation actions:

- If the existing configuration is in 100% Memory mode, and the new DCPMM is also in 100% Memory mode (the factory default), the only action is to ensure that all DCPMMs are at the latest, matching firmware level.
- If the existing configuration is fully or partly in App-Direct mode and new DCPMM is also in App-Direct mode, then ensure that all DCPMMs are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal.
- If the existing configuration and the new DCPMM are in different modes, then ensure that all DCPMMs are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal.

There are a number of tools for configuring goals, regions, and namespaces.

- To use the node's BIOS Setup Utility, see Server BIOS Setup Utility Menu for DCPMM, on page 80.
- To use Cisco IMC or Cisco UCS Manager, see the Cisco UCS: Configuring and Managing Intel Optane DC Persistent Memory Modules guide.

Server BIOS Setup Utility Menu for DCPMM

Caution Potential data loss: If you change the mode of a currently installed DCPMM from App Direct or Mixed Mode to Memory Mode, any data in persistent memory is deleted.

DCPMMs can be configured by using the server's BIOS Setup Utility, Cisco IMC, Cisco UCS Manager, or OS-related utilities.

- To use the BIOS Setup Utility, see the section below.

- To use Cisco IMC, see the configuration guides for Cisco IMC 4.0(4) or later: Cisco IMC CLI and GUI Configuration Guides
- To use Cisco UCS Manager, see the configuration guides for Cisco UCS Manager 4.0(4) or later: Cisco UCS Manager CLI and GUI Configuration Guides

The node BIOS Setup Utility includes menus for DCPMMs. They can be used to view or configure DCPMM regions, goals, and namespaces, and to update DCPMM firmware.

To open the BIOS Setup Utility, press **F2** when prompted during a system boot.

The DCPMM menu is on the Advanced tab of the utility:

`Advanced > Intel Optane DC Persistent Memory Configuration`

From this tab, you can access other menu items:

- `DIMMs`: Displays the installed DCPMMs. From this page, you can update DCPMM firmware and configure other DCPMM parameters.
  - `Monitor health`
  - `Update firmware`
  - `Configure security`

    You can enable security mode and set a password so that the DCPMM configuration is locked. When you set a password, it applies to all installed DCPMMs. Security mode is disabled by default.
  - `Configure data policy`
- `Regions`: Displays regions and their persistent memory types. When using App Direct mode with interleaving, the number of regions is equal to the number of CPU sockets in the node. When using App Direct mode without interleaving, the number of regions is equal to the number of DCPMMs in the node.

  From the Regions page, you can configure memory goals that tell the DCPMM how to allocate resources.
  - `Create goal config`
- `Namespaces`: Displays namespaces and allows you to create or delete them when persistent memory is used. Namespaces can also be created when creating goals. A namespace provisioning of persistent memory applies only to the selected region.

  Existing namespace attributes such as the size cannot be modified. You can only add or delete namespaces.
- `Total capacity`: Displays the total resource allocation across the node.

Updating the DCPMM Firmware Using the BIOS Setup Utility

You can update the DCPMM firmware from the BIOS Setup Utility if you know the path to the .bin files. The firmware update is applied to all installed DCPMMs.

1. Navigate to **`Advanced > Intel Optane DC Persistent Memory Configuration > DIMMs > Update firmware`**
2. Under **`File:`**, provide the file path to the .bin file.
3. Select **`Update`**.

Replacing a Mini-Storage Module

The mini-storage module plugs into a motherboard socket to provide additional internal storage. The module is available in two different versions:

- SD card carrier—provides two SD card sockets.
- M.2 SSD Carrier—provides two M.2 form-factor SSD sockets.

Note The Cisco IMC firmware does not include an out-of-band management interface for the M.2 drives installed in the M.2 version of this mini-storage module (HX-MSTOR-M2). The M.2 drives are not listed in Cisco IMC inventory, nor can they be managed by Cisco IMC. This is expected behavior.

Replacing a Mini-Storage Module Carrier

This topic describes how to remove and replace a mini-storage module carrier. The carrier has one media socket on its top and one socket on its underside. Use the following procedure for any type of mini-storage module carrier (SD card or M.2 SSD).

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

Step 2 Slide the node 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 node from the rack.

Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Remove a carrier from its socket:

a) Locate the mini-storage module carrier in its socket just in front of power supply 1.
b) At each end of the carrier, push outward on the clip that secures the carrier.
c) Lift both ends of the carrier to disengage it from the socket on the motherboard.
d) Set the carrier on an anti-static surface.

Step 5 Install a carrier to its socket:

a) Position the carrier over socket, with the carrier's connector facing down and at the same end as the motherboard socket. Two alignment pegs must match with two holes on the carrier.
b) Gently push down the socket end of the carrier so that the two pegs go through the two holes on the carrier.
c) Push down on the carrier so that the securing clips click over it at both ends.

Step 6 Replace the top cover to the node.

Step 7 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Replacing an SD Card in a Mini-Storage Carrier For SD

This topic describes how to remove and replace an SD card in a mini-storage carrier for SD (PID HX-MSTOR-SD). The carrier has one SD card slot on its top and one slot on its underside.

Population Rules For Mini-Storage SD Cards

- You can use one or two SD cards in the carrier.
- Dual SD cards can be configured in a RAID 1 array through the Cisco IMC interface.
- SD slot 1 is on the top side of the carrier; SD slot 2 is on the underside of the carrier (the same side as the carrier's motherboard connector).

Step 1 Power off the node and then remove the mini-storage module carrier from the node as described in Replacing a Mini-Storage Module Carrier, on page 82.

Step 2 Remove an SD card:

a) Push on the top of the SD card, and then release it to allow it to spring out from the socket.
b) Grasp and remove the SD card from the socket.

Step 3 Install a new SD card:

a) Insert the new SD card into the socket with its label side facing up.
b) Press on the top of the SD card until it clicks in the socket and stays in place.

Step 4 Install the mini-storage module carrier back into the node and then power it on as described in Replacing a Mini-Storage Module Carrier, on page 82.

Replacing an M.2 SSD in a Mini-Storage Carrier For M.2

This topic describes how to remove and replace an M.2 SATA or M.2 NVMe SSD in a mini-storage carrier for M.2 (HX-MSTOR-M2). The carrier has one M.2 SSD socket on its top and one socket on its underside.

Population Rules For Mini-Storage M.2 SSDs

- Both M.2 SSDs must be either SATA or NVMe; do not mix types in the carrier.
- You can use one or two M.2 SSDs in the carrier.
- M.2 socket 1 is on the top side of the carrier; M.2 socket 2 is on the underside of the carrier (the same side as the carrier's motherboard connector).

Step 1 Power off the node and then remove the mini-storage module carrier from the node as described in Replacing a Mini-Storage Module Carrier, on page 82.

Step 2 Remove an M.2 SSD:

a) Use a #1 Phillips-head screwdriver to remove the single screw that secures the M.2 SSD to the carrier.
b) Remove the M.2 SSD from its socket on the carrier.

Step 3 Install a new M.2 SSD:

a) Angle the M.2 SSD downward and insert the connector-end into the socket on the carrier. The M.2 SSD's label must face up.
b) Press the M.2 SSD flat against the carrier.
c) Install the single screw that secures the end of the M.2 SSD to the carrier.

Step 4 Install the mini-storage module carrier back into the node and then power it on as described in Replacing a Mini-Storage Module Carrier, on page 82.

Replacing Power Supplies

The node can have one or two Titanium 80PLUS rated power supplies. When two power supplies are installed they are redundant as 1+1 by default, but they also support cold redundancy mode. Cold redundancy (CR) suspends power delivery on one or more power supplies and forces the remainder of the load to be supplied by the active PSU(s). As a result, total power efficiency is improved by best utilizing the PSU efficiency when compared to load characteristics.

The node supports up to two of the following hot-swappable power supplies:

- 1050 W (AC), Cisco PID HX-PSU1-1050W
- 1050 W V2 (DC), Cisco PID HX-PSUV2-1050DC
- 1600 W (AC), Cisco PID HX-PSU1-1600W
- 2300 W (AC), Cisco PID HX-PSU-2300W

One power supply is mandatory, and one more can be added for 1 + 1 redundancy. You cannot mix AC and DC power supplies in the same node.

- See also Power Specifications, on page 137 for more information about the power supplies.
- See also Rear-Panel LEDs, on page 36 for information about the power supply LEDs.

This section includes procedures for replacing AC and DC power supply units.

See the following.

- Replacing AC Power Supplies, on page 84
- Replacing DC Power Supplies, on page 85
- Installing DC Power Supplies (First Time Installation), on page 87
- Grounding for DC Power Supplies, on page 88

Replacing AC Power Supplies

Note If you have ordered a node with power supply redundancy (two power supplies), you do not have to power off the node to replace a power supply because they are redundant as 1+1.

Note Do not mix power supply types or wattages in the node. Both power supplies must be identical.

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 node has only one power supply, shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.
- If your node has two power supplies, you do not have to shut down the node.

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

c) Grasp the power supply handle while pinching the release lever toward the handle.

d) Pull the power supply out of the bay.

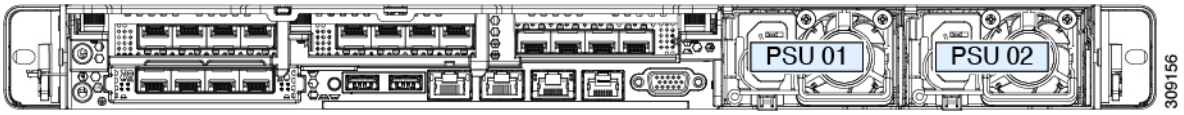
Step 2 Install a new power supply:

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.

d) Only if you shut down the node, press the Power button to boot the node to main power mode.



1	Power supply release lever	**2**	Power supply handle

Replacing DC Power Supplies

Note This procedure is for replacing DC power supplies in a node that already has DC power supplies installed. If you are installing DC power supplies to the node for the first time, see Installing DC Power Supplies (First Time Installation), on page 87.

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

Statement 1074

Note If you are replacing DC power supplies in a node with power supply redundancy (two power supplies), you do not have to power off the node to replace a power supply because they are redundant as 1+1.

Note Do not mix power supply types or wattages in the node. Both power supplies must be identical.

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

a) Perform one of the following actions:

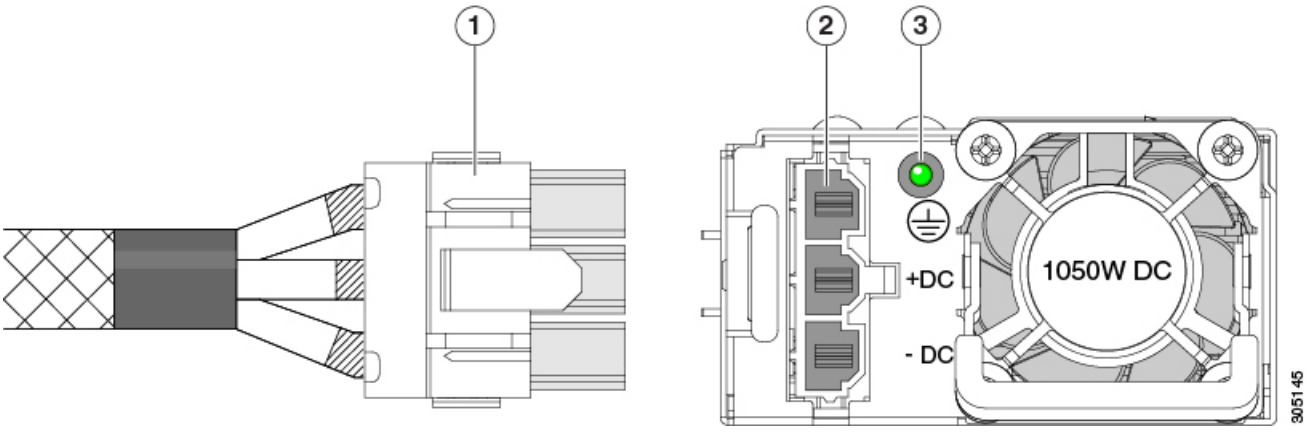
- If you are replacing a power supply in a node that has only one DC power supply, shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.
- If you are replacing a power supply in a node that has two DC power supplies, you do not have to shut down the node.

b) Remove the power cord from the power supply that you are replacing. Lift the connector securing clip slightly and then pull the connector from the socket on the power supply.
c) Grasp the power supply handle while pinching the release lever toward the handle.
d) Pull the power supply out of the bay.

Step 2 Install a new DC 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. Press the connector into the socket until the securing clip clicks into place.
d) Only if you shut down the node, press the Power button to boot the node to main power mode.

Figure 30: Replacing DC Power Supplies



1	Keyed cable connector (CAB-48DC-40A-8AWG)	**3**	PSU status LED
2	Keyed DC input socket	-	

Installing DC Power Supplies (First Time Installation)

Note This procedure is for installing DC power supplies to the node for the first time. If you are replacing DC power supplies in a node that already has DC power supplies installed, see Replacing DC Power Supplies, on page 85.

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

Statement 1074

Note Do not mix power supply types or wattages in the node. Both power supplies must be identical.

Caution As instructed in the first step of 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.

Note The required DC input cable is Cisco part CAB-48DC-40A-8AWG. This 3-meter cable has a 3-pin connector on one end that is keyed to the DC input socket on the power supply. The other end of the cable has no connector so that you can wire it to your facility's DC power.

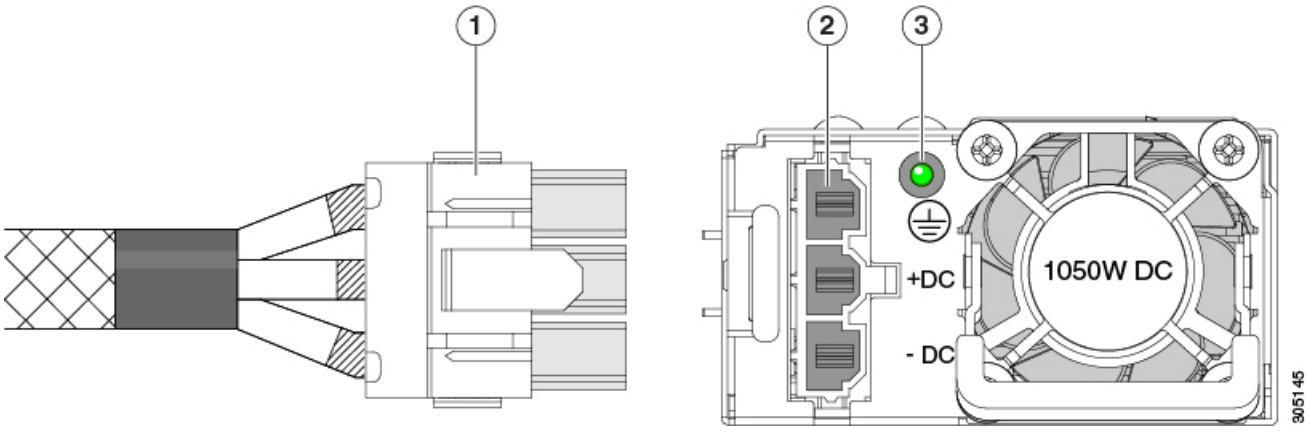
Step 2 Wire the non-terminated end of the cable to your facility's DC power input source.

Step 3 Connect the terminated end of the cable to the socket on the power supply. The connector is keyed so that the wires align for correct polarity and ground.

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

Step 5 Press the Power button to boot the node to main power mode.

Figure 31: Installing DC Power Supplies



1	Keyed cable connector (CAB-48DC-40A-8AWG)	**3**	PSU status LED
2	Keyed DC input socket	-	

Step 6 See Grounding for DC Power Supplies, on page 88 for information about additional chassis grounding.

Grounding for DC Power Supplies

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 the node chassis to the earth ground of the rack is available. Two screw holes for use with your dual-hole grounding lug and grounding wire are supplied on the chassis rear panel.

Note The grounding points on the chassis are sized for 10-32 screws. You must provide your own screws, grounding lug, and grounding wire. The grounding lug must be dual-hole lug that fits 10-32 screws. The grounding cable that you provide must be 14 AWG (2 mm), minimum 60° C wire, or as permitted by the local code.

Replacing a PCIe Card

Note If you are installing a Cisco HX Virtual Interface Card, there are prerequisite considerations. See Cisco Virtual Interface Card (VIC) Considerations, on page 92.

Note RAID controller cards install into a separate mRAID riser. See Replacing a SAS Storage Controller Card (RAID or HBA) in Riser 3, on page 110.

Step 1 Remove an existing PCIe card (or a blank filler panel) from the PCIe riser:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

d) Remove any cables from the ports of the PCIe card that you are replacing.

e) Use two hands to grasp the external riser handle and the blue area at the front of the riser.

f) Lift straight up to disengage the riser's connectors from the two sockets on the motherboard. Set the riser upside-down on an antistatic surface.

g) Open the hinged plastic retainer that secures the rear-panel tab of the card.

h) Pull evenly on both ends of the PCIe card to remove it from the socket on the PCIe riser.

If the riser has no card, remove the blanking panel from the rear opening of the riser.

Step 2 Install a new PCIe card:

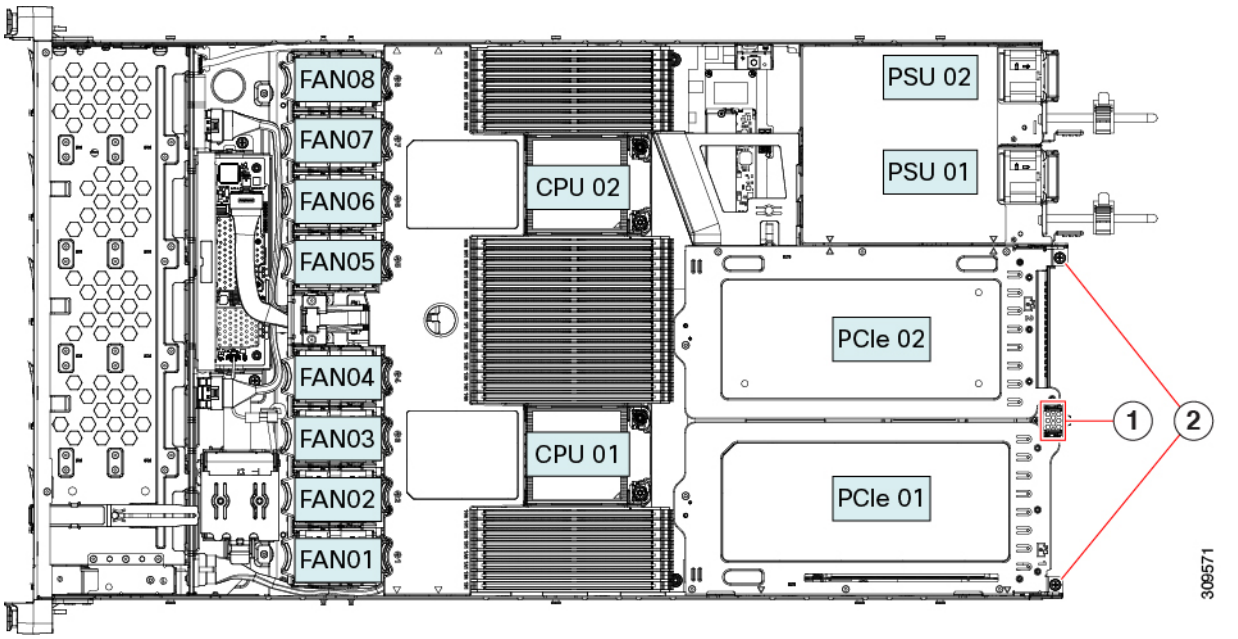
a) With the hinged tab retainer open, align the new PCIe card with the empty socket on the PCIe riser.

PCIe riser 1/slot 1 has a long-card guide at the front end of the riser. Use the slot in the long-card guide to help support a full-length card.

b) Push down evenly on both ends of the card until it is fully seated in the socket.

c) Ensure that the card's rear panel tab sits flat against the riser rear-panel opening and then close the hinged tab retainer over the card's rear-panel tab.
d) Position the PCIe riser over its two sockets on the motherboard and over the two chassis alignment channels.

Figure 32: PCIe Riser Alignment Features



1	Blue riser handle	**2**	Riser alignment features in chassis

e) Carefully push down on both ends of the PCIe riser to fully engage its two connectors with the two sockets on the motherboard.
f) Replace the top cover to the node.
g) Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

PCIe Slot Specifications

The node contains two PCIe slots on one riser assembly for horizontal installation of PCIe cards. Both slots support the NCSI protocol and 12V standby power.

The following tables describe the specifications for the slots.

Table 6: PCIe Riser 1/Slot 1

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support
1	Gen-3 x16	x24 connector	¾ length	Full-height	Yes
Micro SD card slot	One socket for Micro SD card				

Table 7: PCIe Riser 2/Slot 2

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support
2	Gen-3 x16	x24 connector	½ length	½ height	Yes
PCIe cable connector for front-panel NVMe SSDs	Gen-3 x8	Other end of cable connects to front drive backplane to support front-panel NVMe SSDs.			

Note Riser 2/Slot 2 is not available in single-CPU configurations.

Replacing a PCIe Card

Note If you are installing a Cisco HX Virtual Interface Card, there are prerequisite considerations. See Cisco Virtual Interface Card (VIC) Considerations, on page 92.

Note RAID controller cards install into a separate mRAID riser. See Replacing a SAS Storage Controller Card (RAID or HBA) in Riser 3, on page 110.

Step 1 Remove an existing PCIe card (or a blank filler panel) from the PCIe riser:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

d) Remove any cables from the ports of the PCIe card that you are replacing.

e) Use two hands to grasp the external riser handle and the blue area at the front of the riser.

f) Lift straight up to disengage the riser's connectors from the two sockets on the motherboard. Set the riser upside-down on an antistatic surface.

g) Open the hinged plastic retainer that secures the rear-panel tab of the card.

h) Pull evenly on both ends of the PCIe card to remove it from the socket on the PCIe riser.

If the riser has no card, remove the blanking panel from the rear opening of the riser.

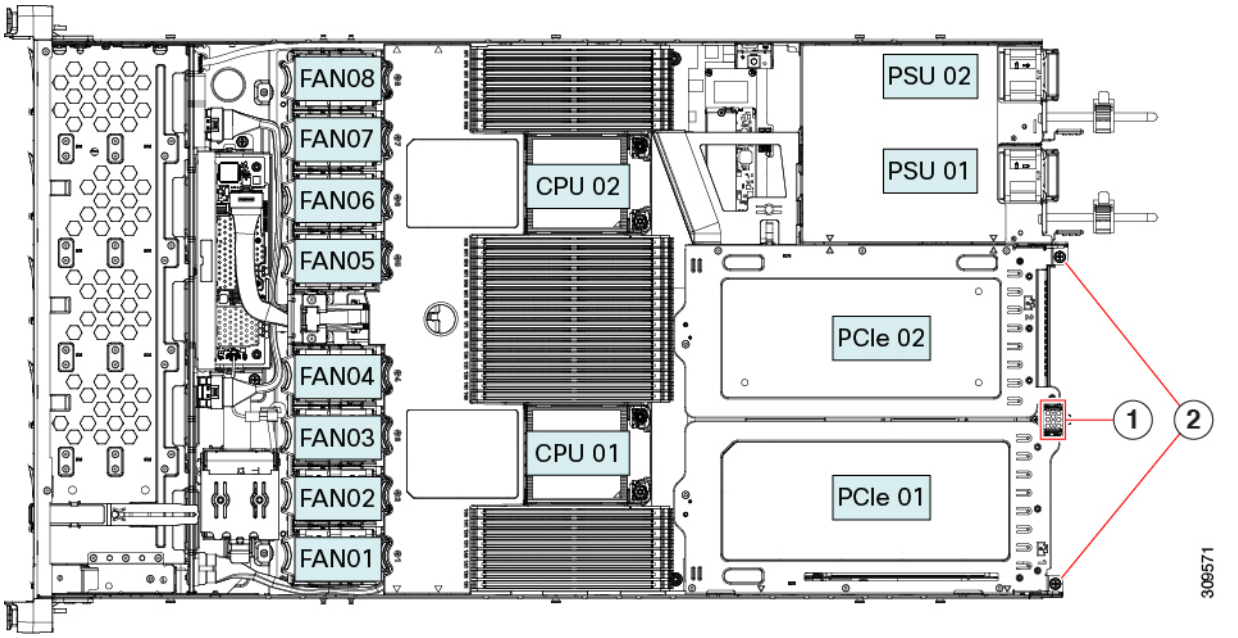
Step 2 Install a new PCIe card:

a) With the hinged tab retainer open, align the new PCIe card with the empty socket on the PCIe riser.

PCIe riser 1/slot 1 has a long-card guide at the front end of the riser. Use the slot in the long-card guide to help support a full-length card.

b) Push down evenly on both ends of the card until it is fully seated in the socket.
c) Ensure that the card's rear panel tab sits flat against the riser rear-panel opening and then close the hinged tab retainer over the card's rear-panel tab.
d) Position the PCIe riser over its two sockets on the motherboard and over the two chassis alignment channels.

Figure 33: PCIe Riser Alignment Features



1	Blue riser handle	**2**	Riser alignment features in chassis

e) Carefully push down on both ends of the PCIe riser to fully engage its two connectors with the two sockets on the motherboard.
f) Replace the top cover to the node.
g) Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Cisco Virtual Interface Card (VIC) Considerations

This section describes VIC card support and special considerations for this server.

Note If you use the *Cisco Card* NIC mode, you must also make a *VIC Slot* setting that matches where your VIC is installed. The options are Riser1, Riser2, and Flex-LOM. See NIC Mode and NIC Redundancy Settings, on page 28 for more information about NIC modes.

Table 8: VIC Support and Considerations in This Server

VIC	How Many Supported in Server	Slots That Support VICs	Primary Slot For *Cisco Card* NIC Mode	Minimum Cisco IMC Firmware
Cisco HX VIC 1385 HX-PCIE-C40Q-03	2 PCIe	PCIe 1 PCIe 2	PCIe 1	3.1(1)
Cisco HX VIC 1455 HX-PCIE-C25Q-04	2 PCIe	PCIe 1 PCIe 2	PCIe 1	4.0(1)
Cisco HX VIC 1495 HX-PCIE-C100-04	2 PCIe	PCIe 1 PCIe 2	PCIe 1	4.0(2)
Cisco HX VIC 1387 HX-MLOM-C40Q-03	1 mLOM	mLOM	mLOM	3.1(1)
Cisco HX VIC 1457 HX-MLOM-C25Q-04	1 mLOM	mLOM	mLOM	4.0(1)
Cisco HX VIC 1497 HX-MLOM-C100-04	1 mLOM	mLOM	mLOM	4.0(2)

Replacing an mLOM Card

The server supports a modular LOM (mLOM) card to provide additional rear-panel connectivity. The horizontal mLOM socket is on the motherboard, under a PCIe riser.

The mLOM socket provides a Gen-3 x16 PCIe lane. The socket remains powered when the server is in 12 V standby power mode, and it supports the network communications services interface (NCSI) protocol.

The mLOM replacement procedure differs slightly depending on whether your server has 2 full-height (FH) or 3 half-height (HH) riser cages. Use the following procedures to replace an mLOM:

- Removing an mLOM Card (2FH Riser Cages), on page 93
- Installing an mLOM Card (2FH Riser Cages), on page 97
- Removing an mLOM Card (3HH Riser Cages), on page 101
- Installing an mLOM Card (3HH Riser Cages), on page 104

Removing an mLOM Card (2FH Riser Cages)

Use the following task to remove an mLOM card from a node with 2 full height riser cages.

Before you begin

You will find it helpful to have a #2 Phillips screwdriver for this task.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

Step 2 Slide the node 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.

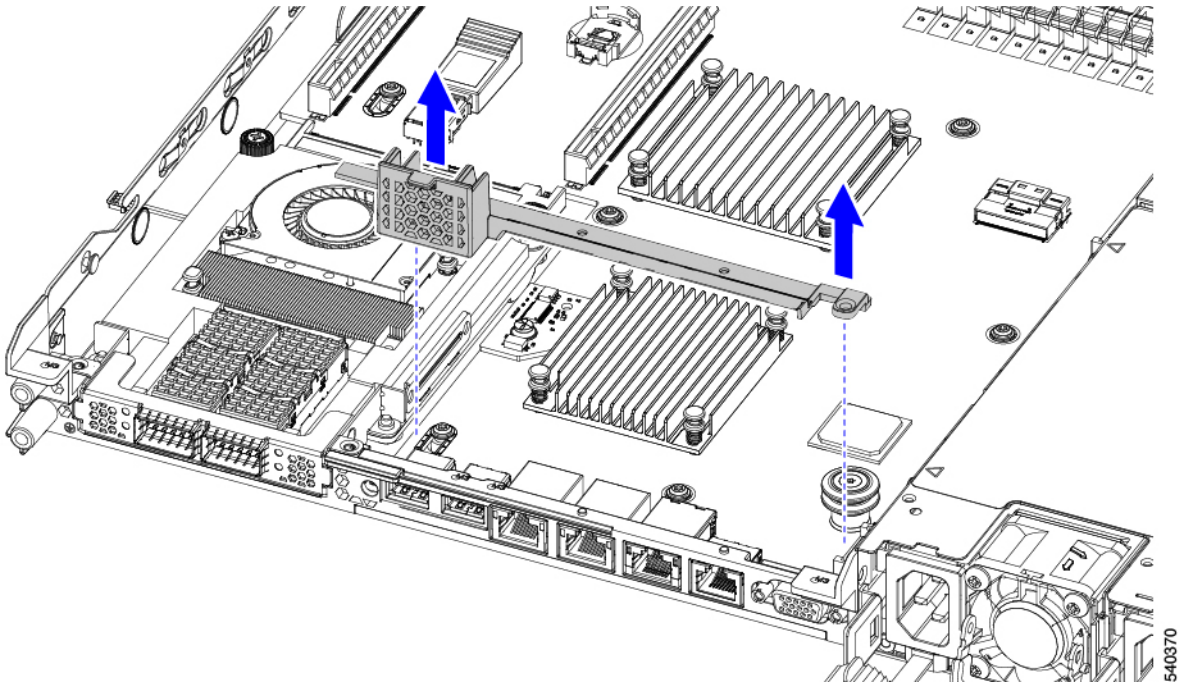
Caution If you cannot safely view and access the component, remove the node from the rack.

Step 3 If full height riser cages are present, remove them now.

See Removing Full Height Riser Cages, on page 57.

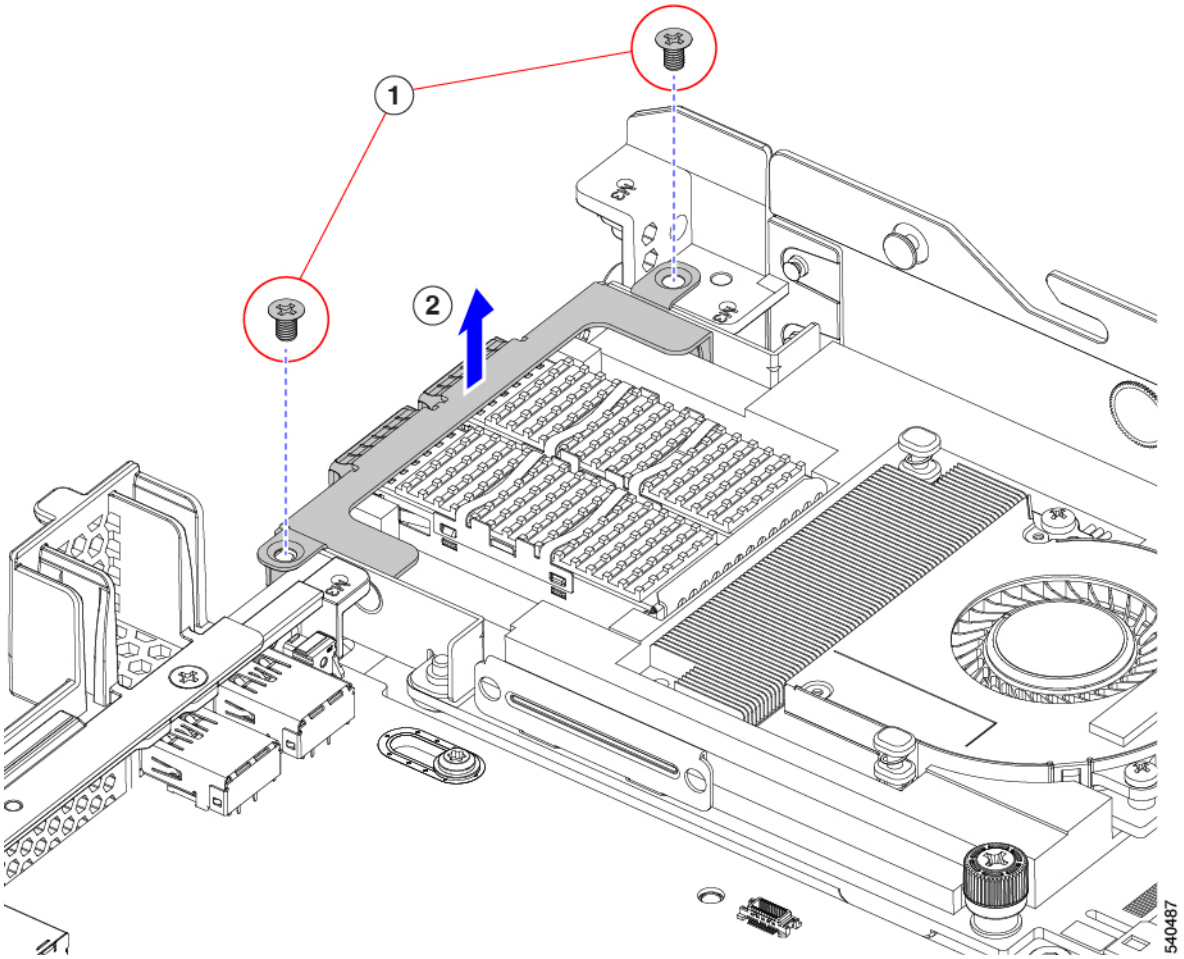
Step 4 If you have not already removed the riser cage rear wall, remove it now.

a) Using a #2 Phillips screwdriver, remove the two countersink screws.
b) Grasp each end of the full height rear wall and remove it.



Step 5 If you have not removed the existing mLOM bracket, remove it now.

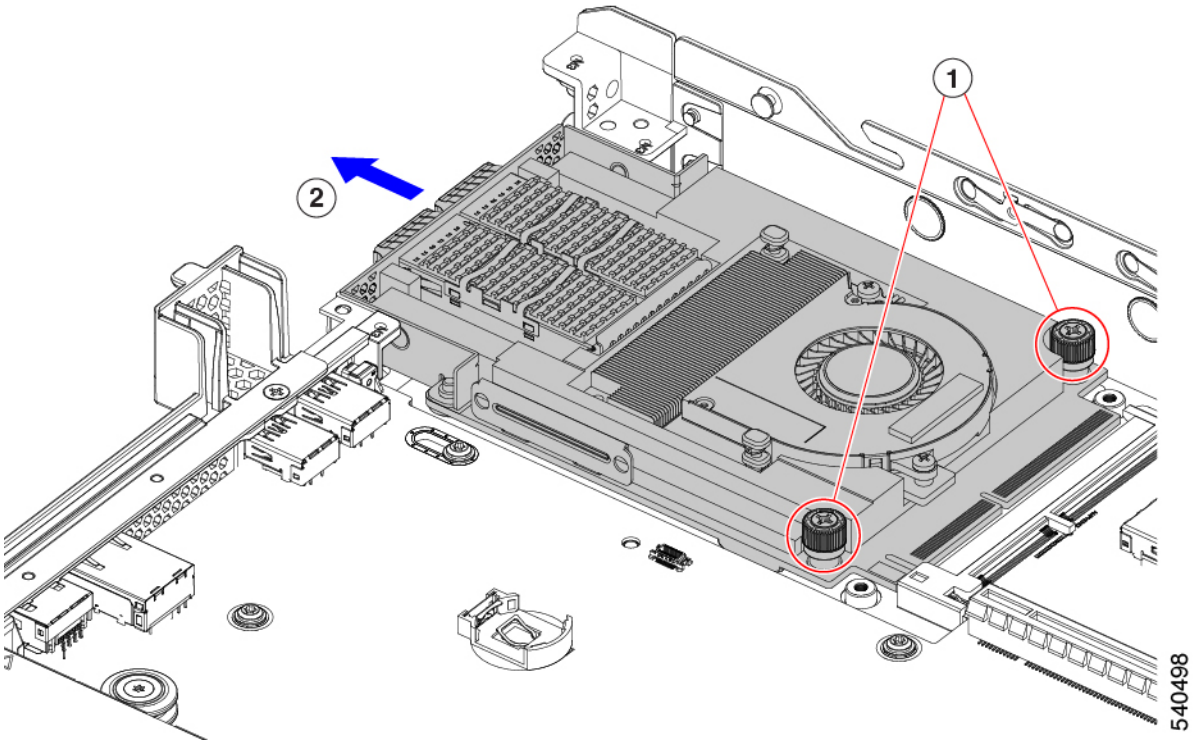
a) Using a #2 Phillips screwdriver, remove the two countersink screws that hold the mLOM bracket in place.
b) Lift the mLOM bracket straight up to remove it from the node.



Step 6 Remove the mLOM card.

a) Loosen the two captive thumbscrews that secure the mLOM card to the threaded standoff on the chassis floor.

b) Slide the mLOM card horizontally to disconnect it from the socket, then lift it out of the node.

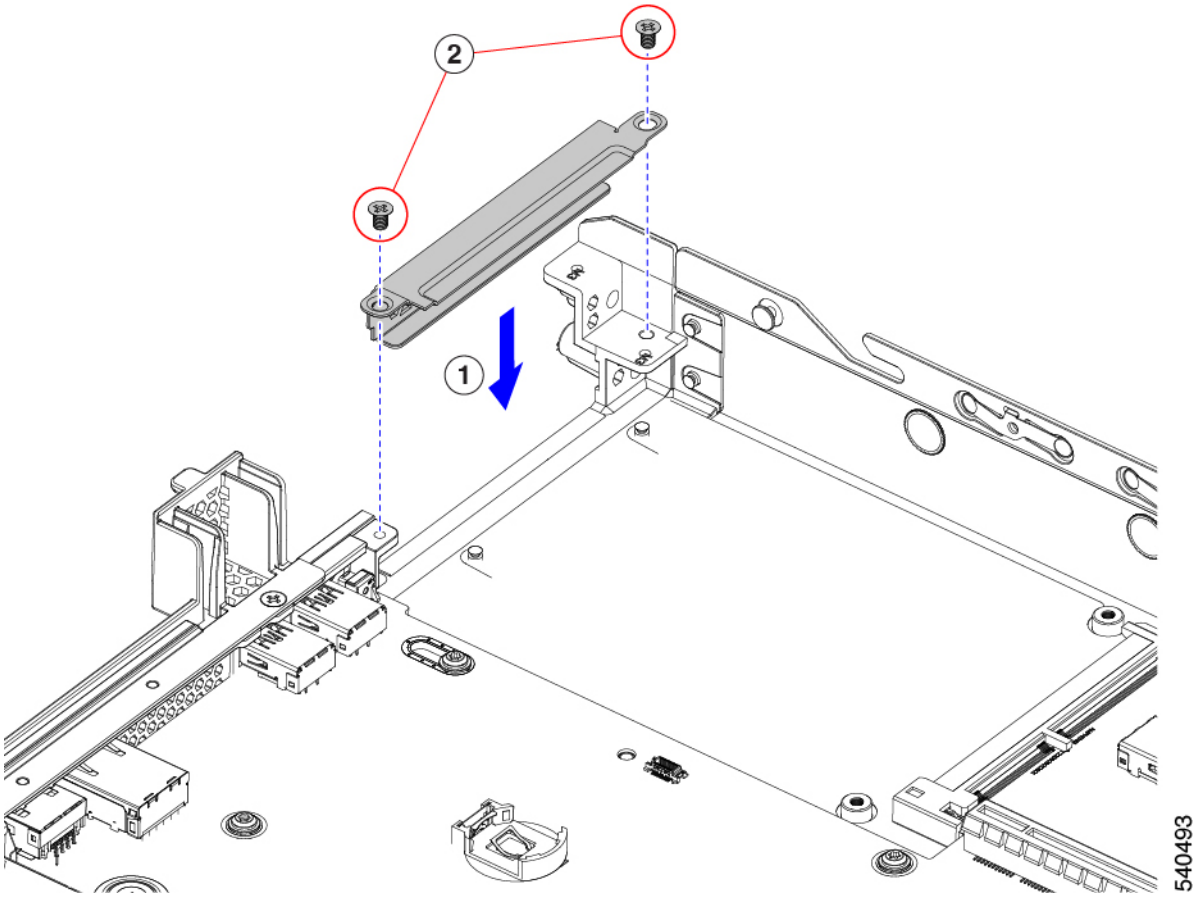


Step 7 If you are not installing an mLOM, install the filler panel in the mLOM slot as shown below. Otherwise, go to Installing an mLOM Card (2FH Riser Cages), on page 97.

a) Lower the filler panel onto the node, aligning the screwholes.

b) Using a #2 Phillips screwdriver, insert and tighten the screws.

Caution Tighten screws to 4 lbs-in. Do not overtighten screws or you risk stipping them!



Installing an mLOM Card (2FH Riser Cages)

Use the following task to install an mLOM card in a node with 2 full height riser cages.

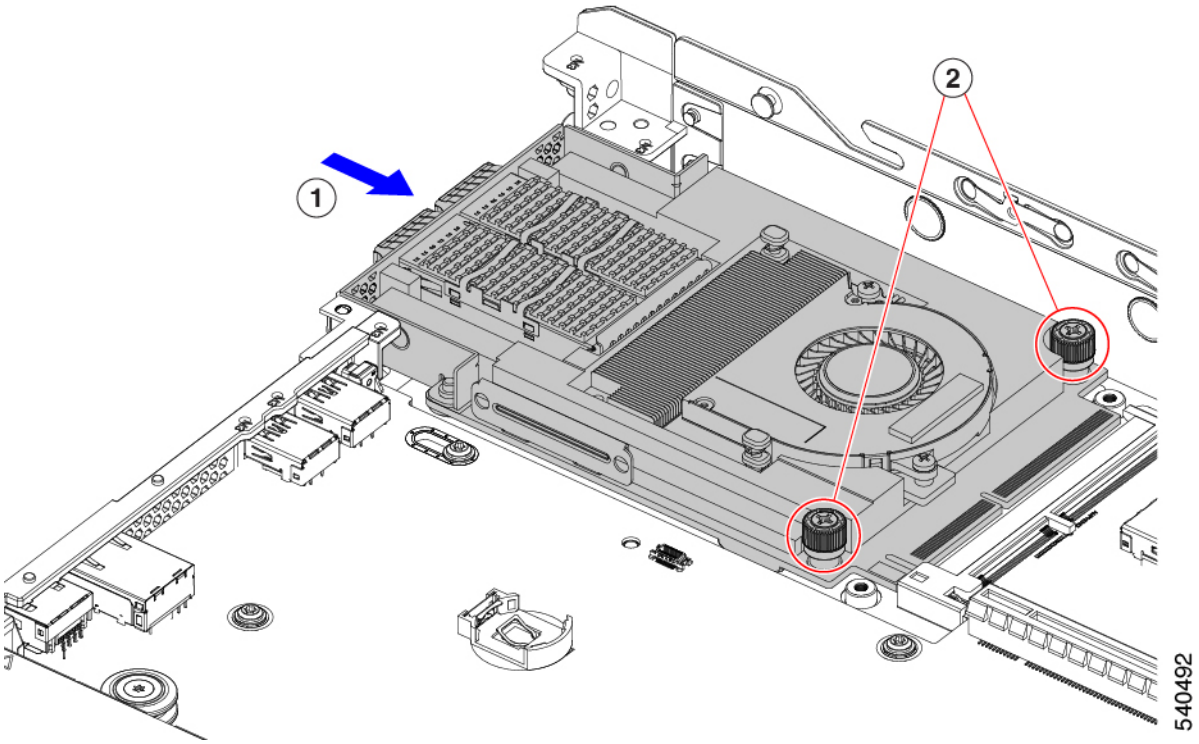
Before you begin

You will find it helpful to have a #2 Phillips screwdriver for this task.

Step 1 Install the mLOM card into the mLOM slot.

a) Holding the mLOM level, slide it into the slot until it seats into the PCI connector.

b) Using a #2 Phillips screwdriver, tighten the captive screws to secure the mLOM to the node.

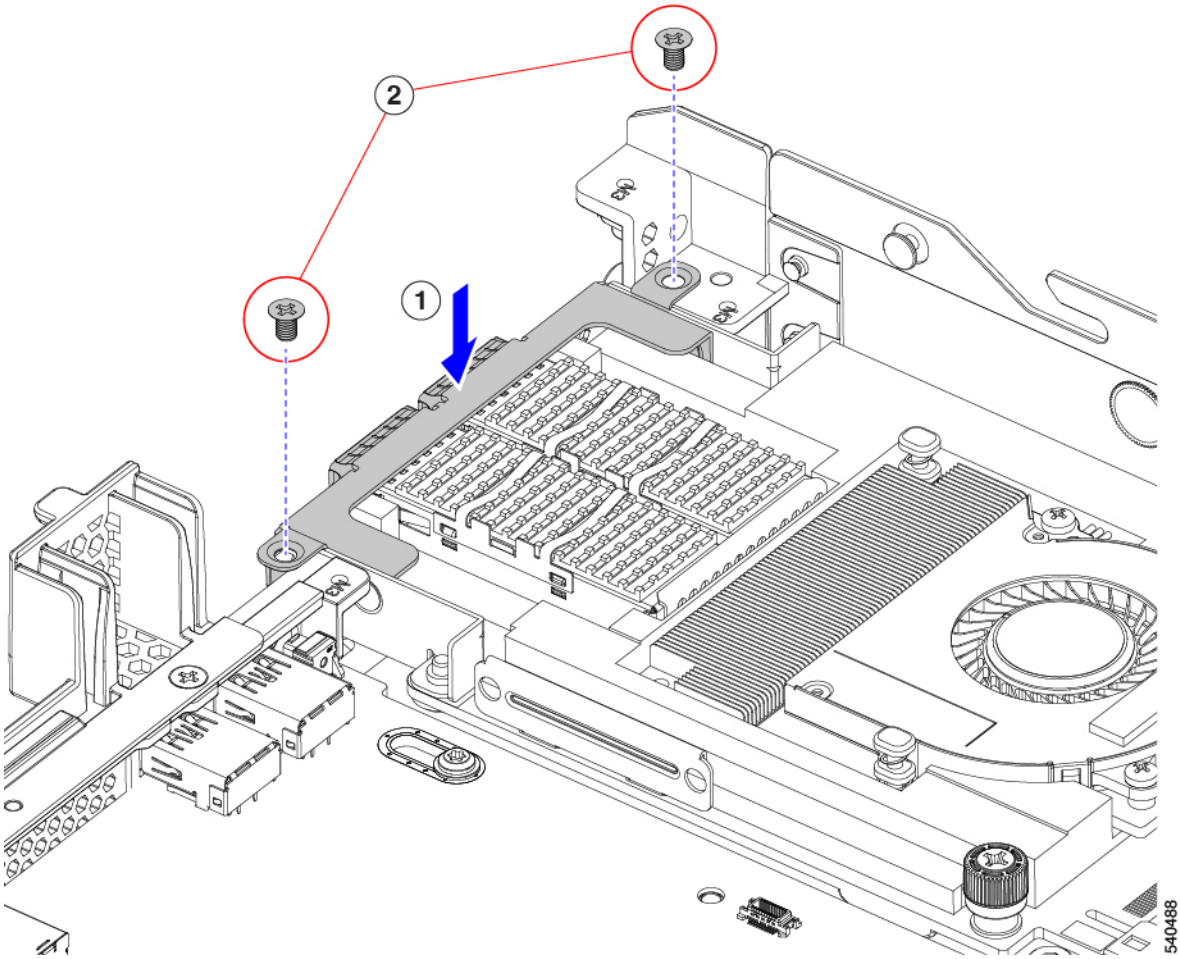


Step 2 Install the mLOM bracket.

a) Lower the mLOM bracket onto the mLOM, aligning the screwholes.

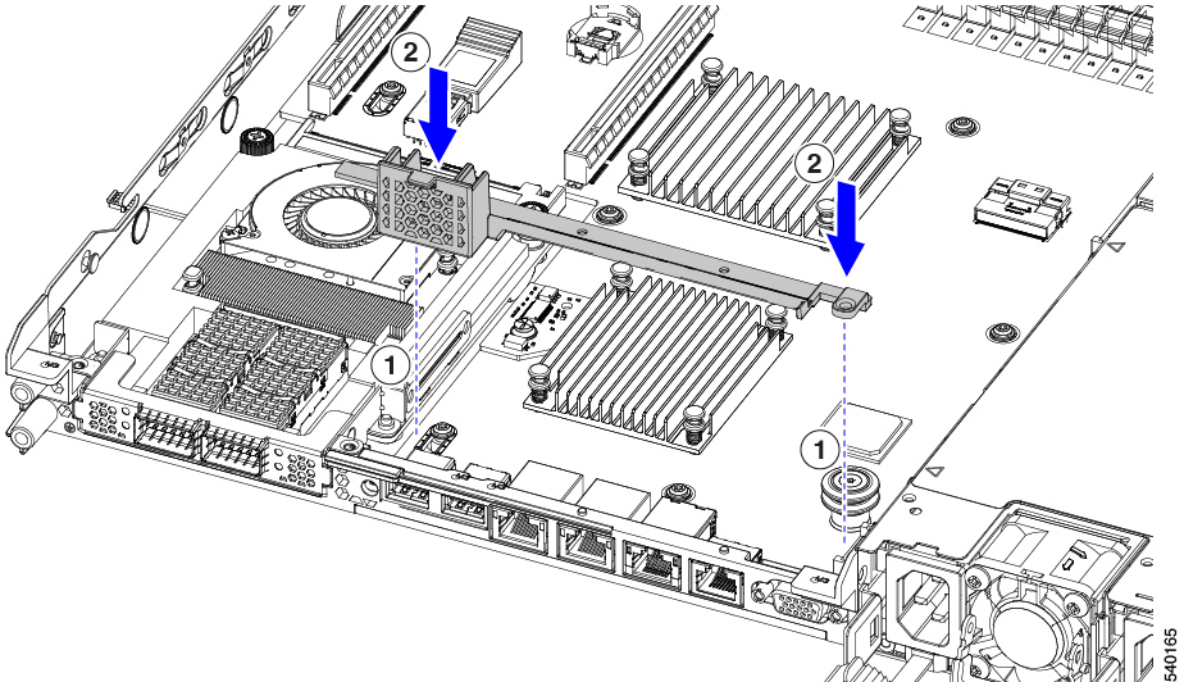
b) Using a #2 Phillips screwdriver, insert and tighten the screws.

Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.



Step 3 Install the full-height rear wall.

a) Orient the full-height rear wall as shown, making sure the folded metal tab is facing up.
b) Align the screw holes in the FH rear wall with the screw holes in the node sheet metal.
c) Holding the rear wall level, seat it onto the node sheet metal, making sure that the screw holes line up.



d) Using a #2 Phillips screwdriver, insert and tighten the countersink screws.

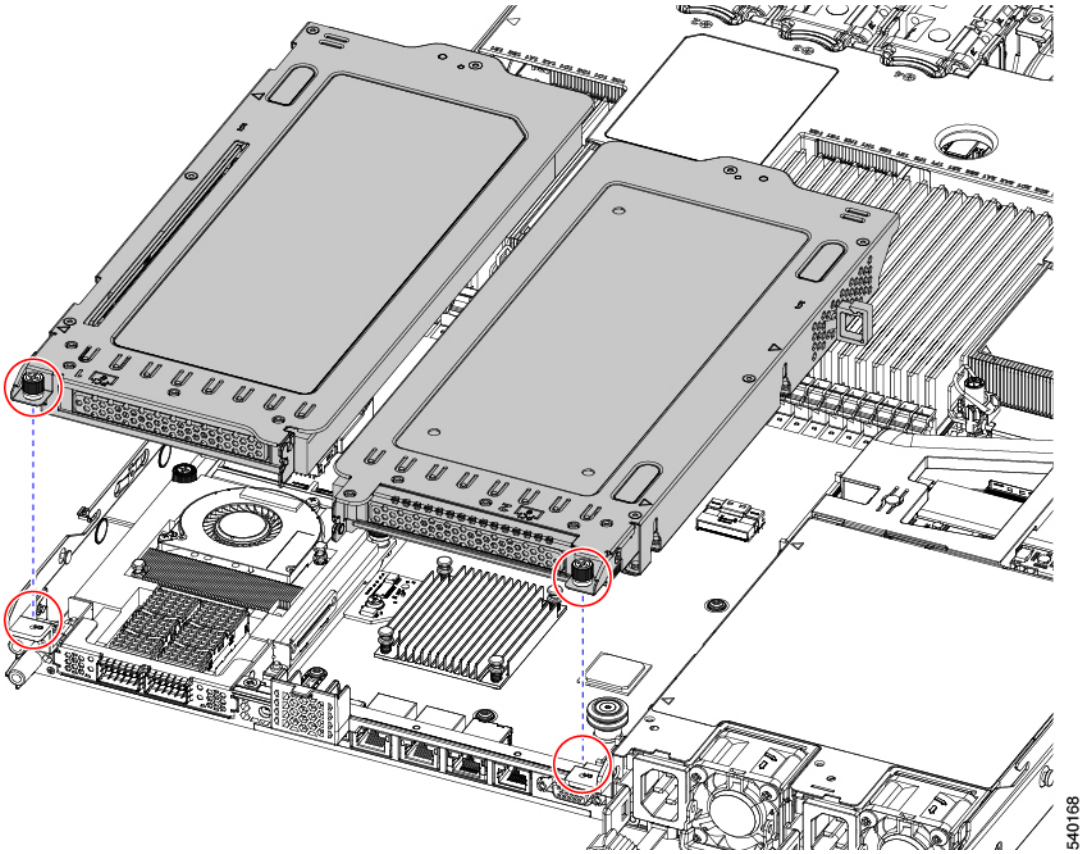
Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.

Step 4 Install the two full height riser cages.

a) Align riser cages 1 and 2 over their PCIe slots, making sure that the captive thumbscrews are aligned with their screw holes.

b) Holding each riser cage level, lower it into its PCIe slot, then tighten the thumbscrew by using a #2 Phillips screwdriver or your fingers.

Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.



Step 5 Reinstall the node.

a) Replace the node's top cover.
b) If needed, reinstall the node in the rack.
c) If needed, reconnect any cables.

Removing an mLOM Card (3HH Riser Cages)

Use the following task to install an mLOM card in a node with 3 half-height riser cages.

Before you begin

You will find it helpful to have a #2 Phillips screwdriver for this task.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

Step 2 Slide the node 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 node from the rack.

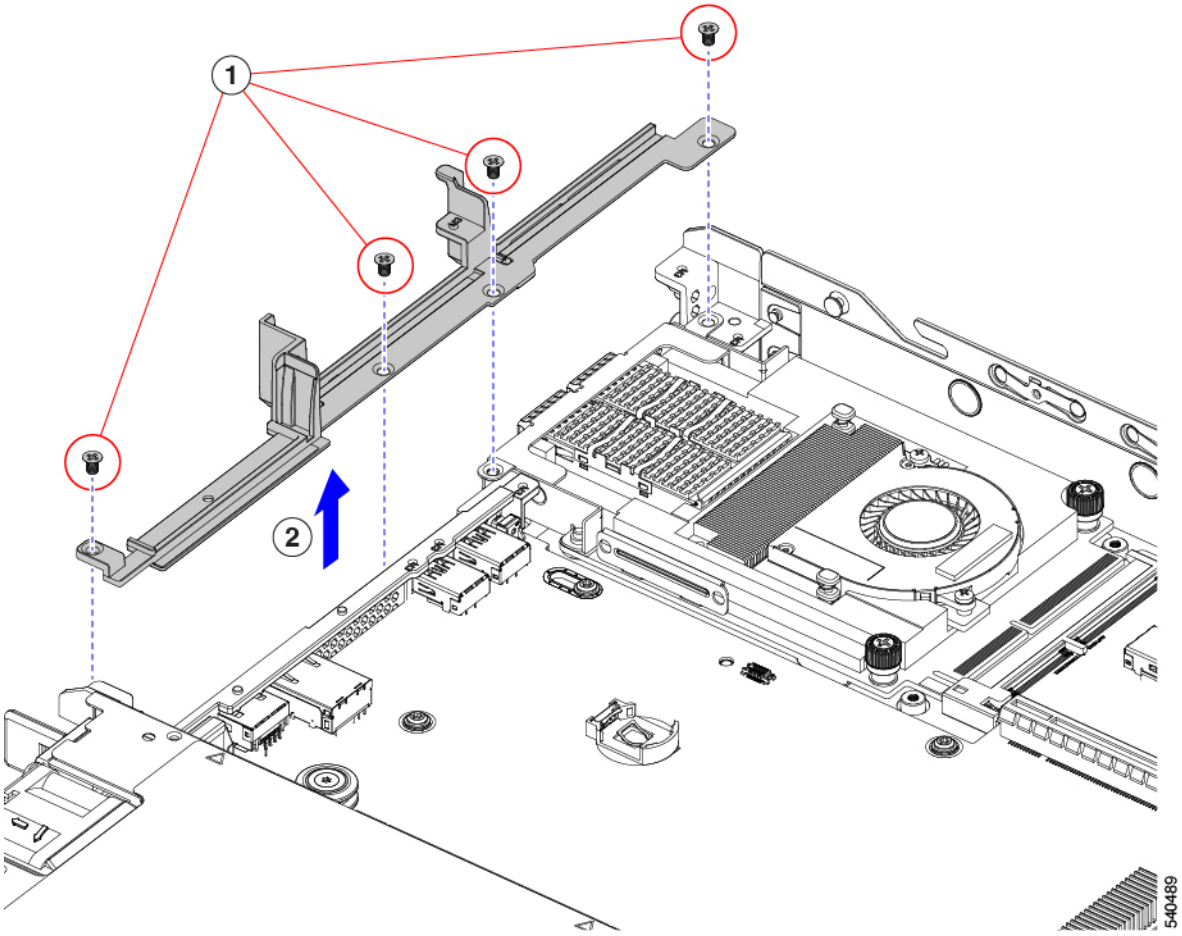
Step 3 If half-height riser cages are present, remove them now.

See Removing Half Height Riser Cages, on page 51.

Step 4 If you have not already removed the half-height rear wall, remove it now.

a) Using a #2 Phillips screwdriver, remove the four countersink screws.

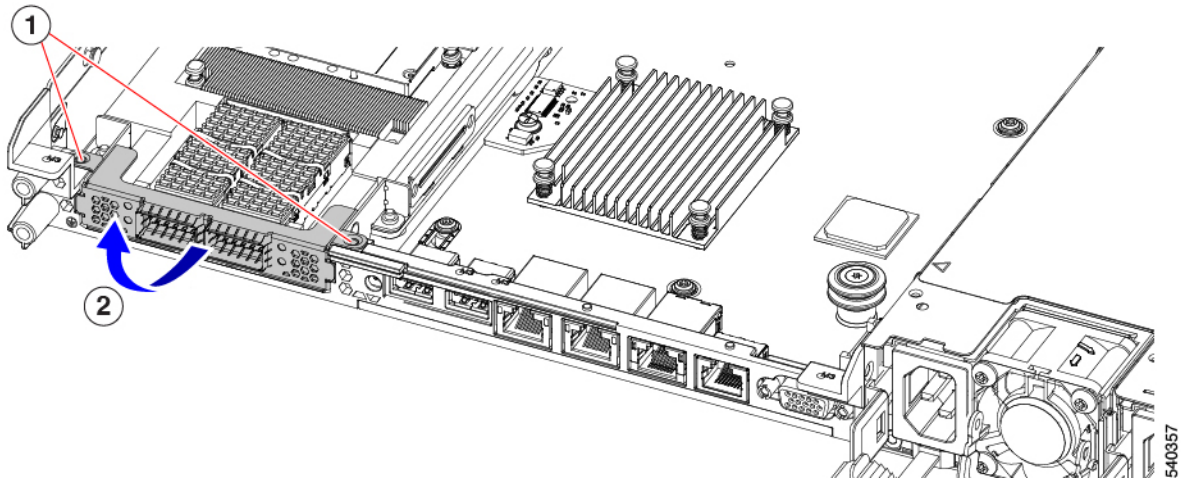
b) Grasp each end of the half-height rear wall and lift it off of the node.



Step 5 If you have not removed the existing mLOM bracket, remove it now.

a) Using a #2 Phillips screwdriver, remove the two countersink screws that hold the mLOM bracket in place.

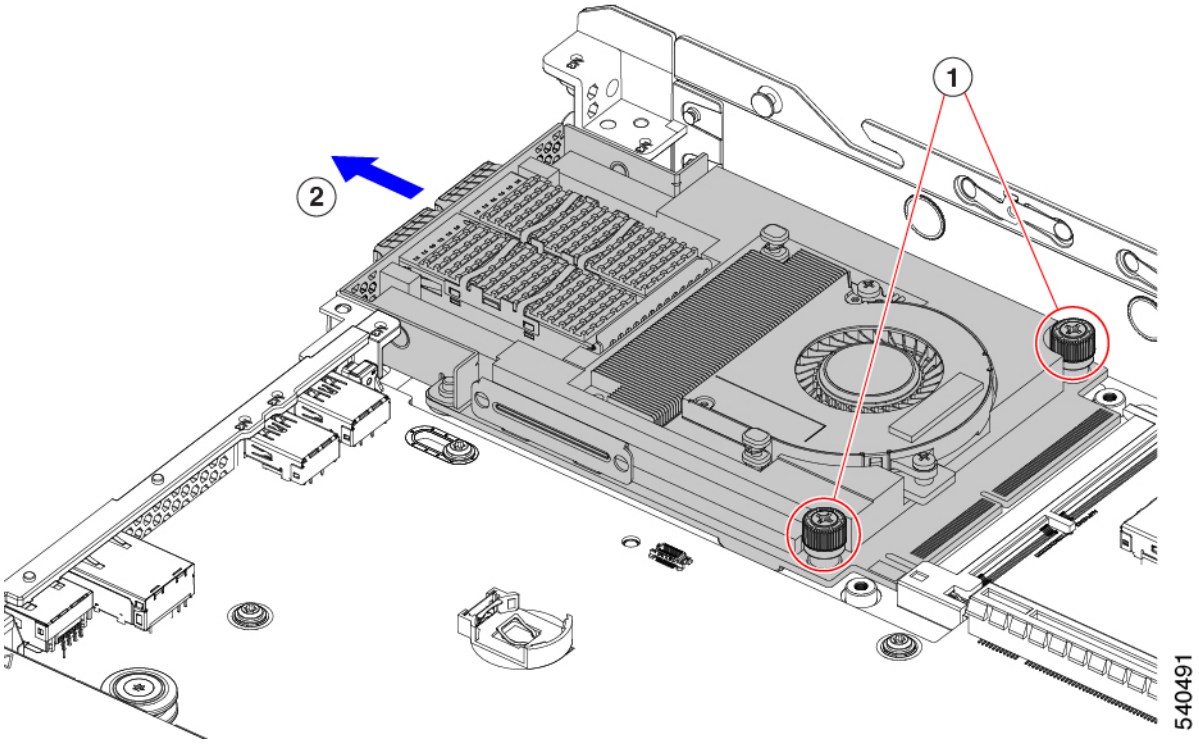
b) Lift the mLOM bracket to remove it from the node.



Step 6 Remove the mLOM card.

a) Loosen the two captive thumbscrews that secure the mLOM card to the threaded standoff on the chassis floor.

b) Slide the mLOM card horizontally to disconnect it from the socket, then lift it out of the node.

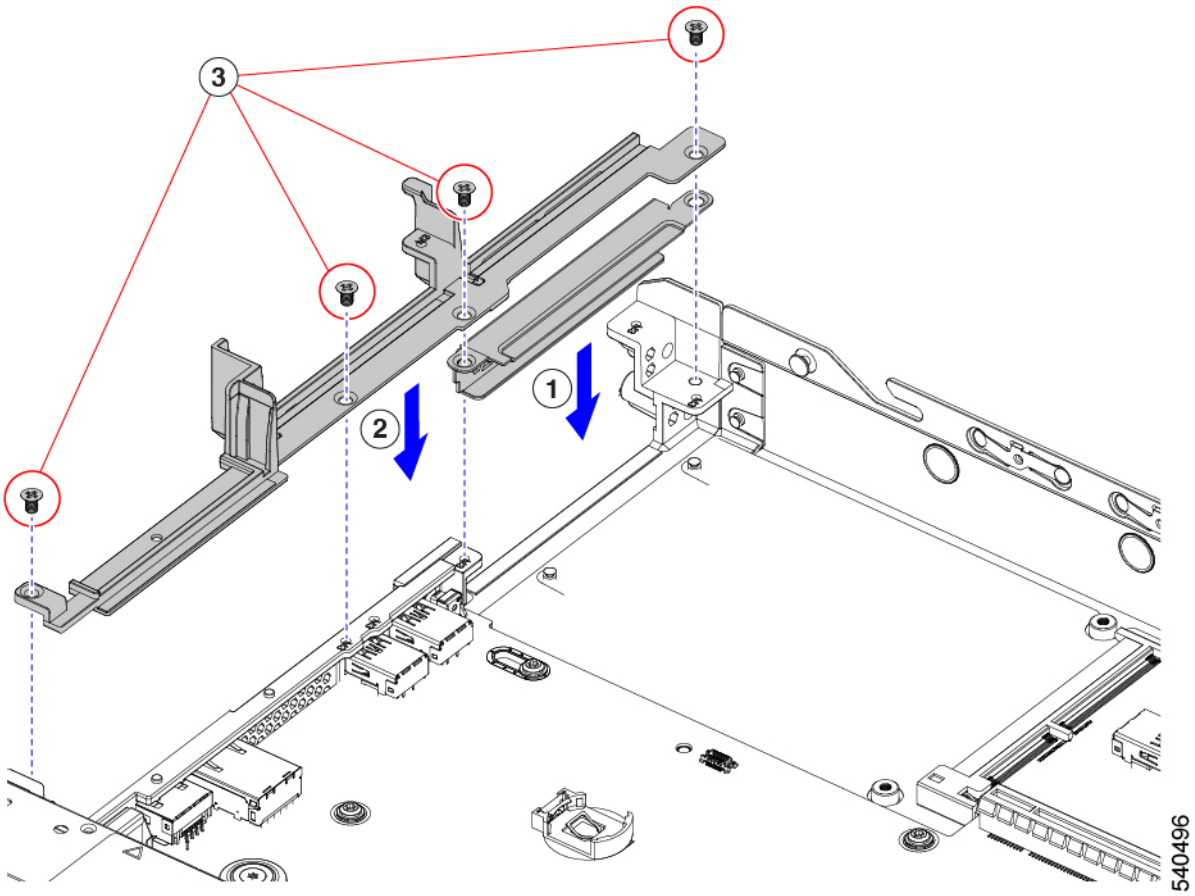


Step 7 If you are not installing an mLOM, install the filler panel in the mLOM slot as shown below. Otherwise, go to Installing an mLOM Card (3HH Riser Cages), on page 104.

a) Lower the filler panel onto the node, aligning the screwholes.
b) Lower the half-height rear wall onto the node, aligning the screwholes.
c) Using a #2 Phillips screwdriver, insert and tighten the four countersink screws.

Note Two screwholes overlap on the rear wall and the filler panel. When installing the screws, make sure that the screws sink through both parts and tightens into sheetmetal.

Caution Tighten screws to 4 lbs-in. Do not overtighten screws or you risk stripping them!



Installing an mLOM Card (3HH Riser Cages)

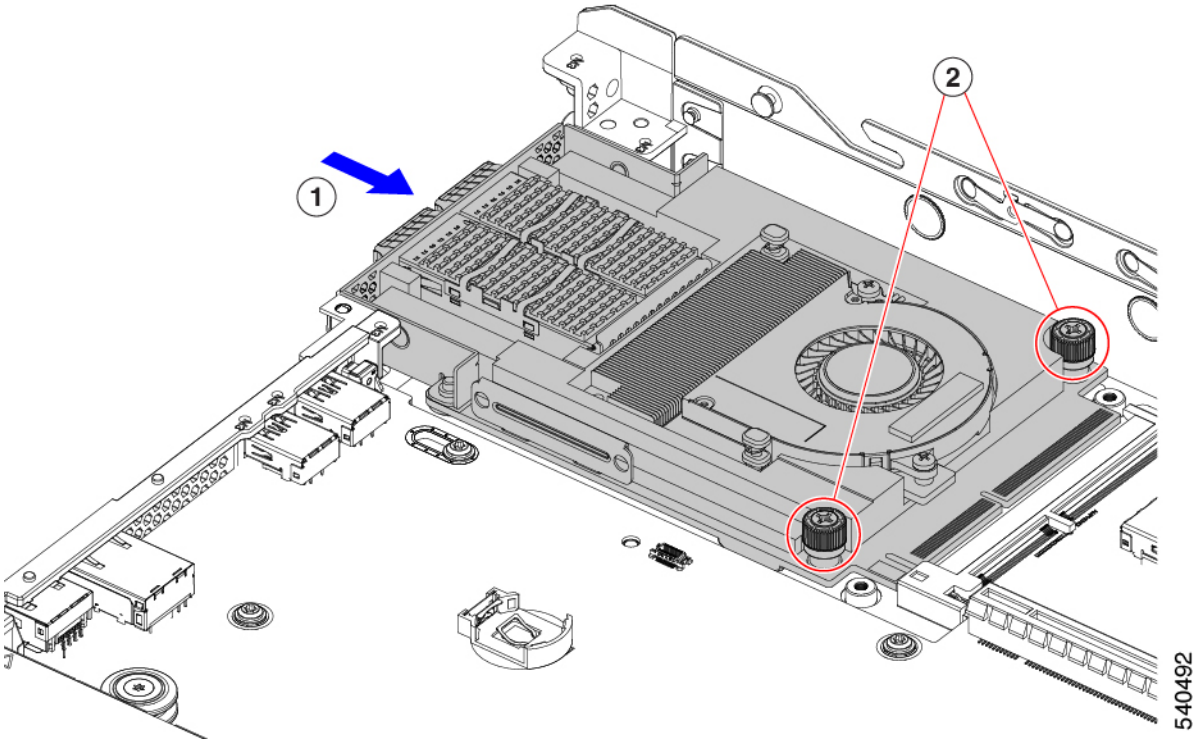
User this task to install and mLOM card in a node that has 3 half-height risers.

Before you begin

You will find it helpful to have a #2 Phillips screwdriver for this task.

Step 1 Install the mLOM card into the mLOM slot.

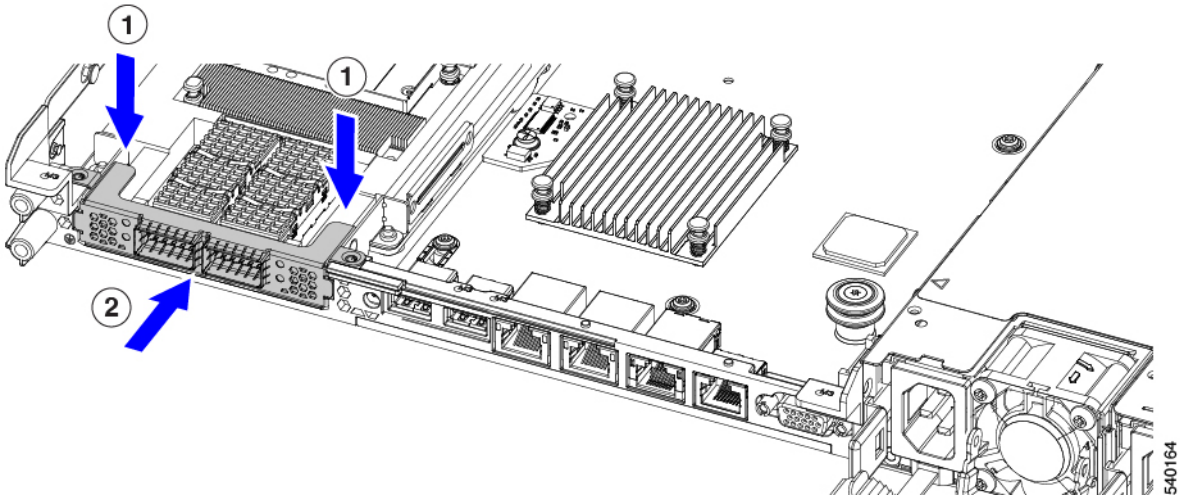
a) Holding the mLOM level, slide it into the slot until it seats into the PCI connector.
b) Using a #2 Phillips screwdriver, tighten the captive screws to secure the mLOM to the node.



Step 2 Install the mLOM bracket.

a) Lower the mLOM bracket onto the mLOM, aligning the screw holes.
b) Using a #2 Phillips screwdriver, insert and tighten the screws.

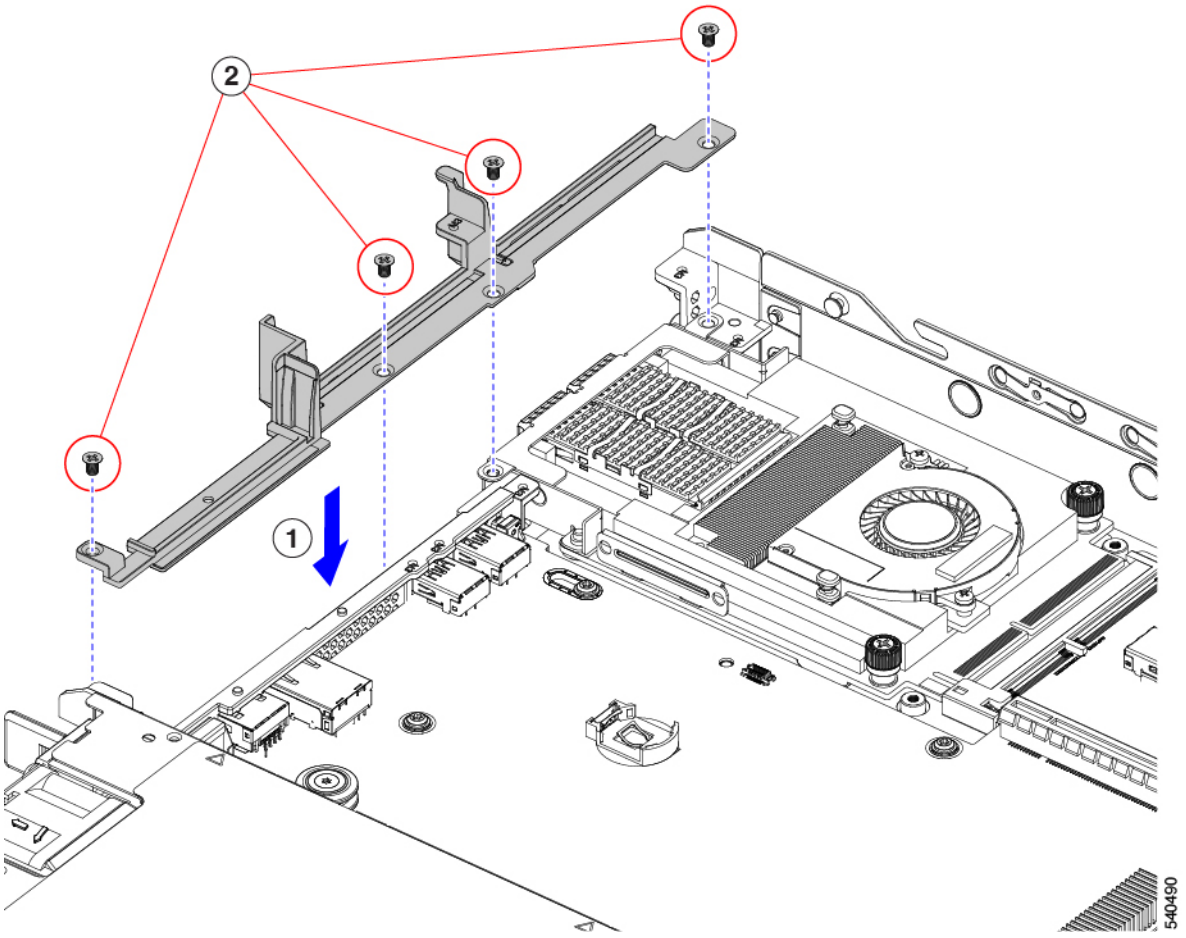
Caution Tighten the screws to 4 lbs-in of torque. Do not over tighten the screws or you risk stripping them.



Step 3 Install the half-height rear wall.

a) Orient the half-height rear wall as shown.
b) Align the screw holes in the FH rear wall with the screw holes in the node sheet metal.
c) Holding the rear wall level, seat it onto the node sheet metal, making sure that the screw holes line up.
d) Using a #2 Phillips screwdriver, insert and tighten the countersink screws.

Caution Tighten the screws to 4 lbs-in of torque. Do not over tighten the screws or you risk stripping them.

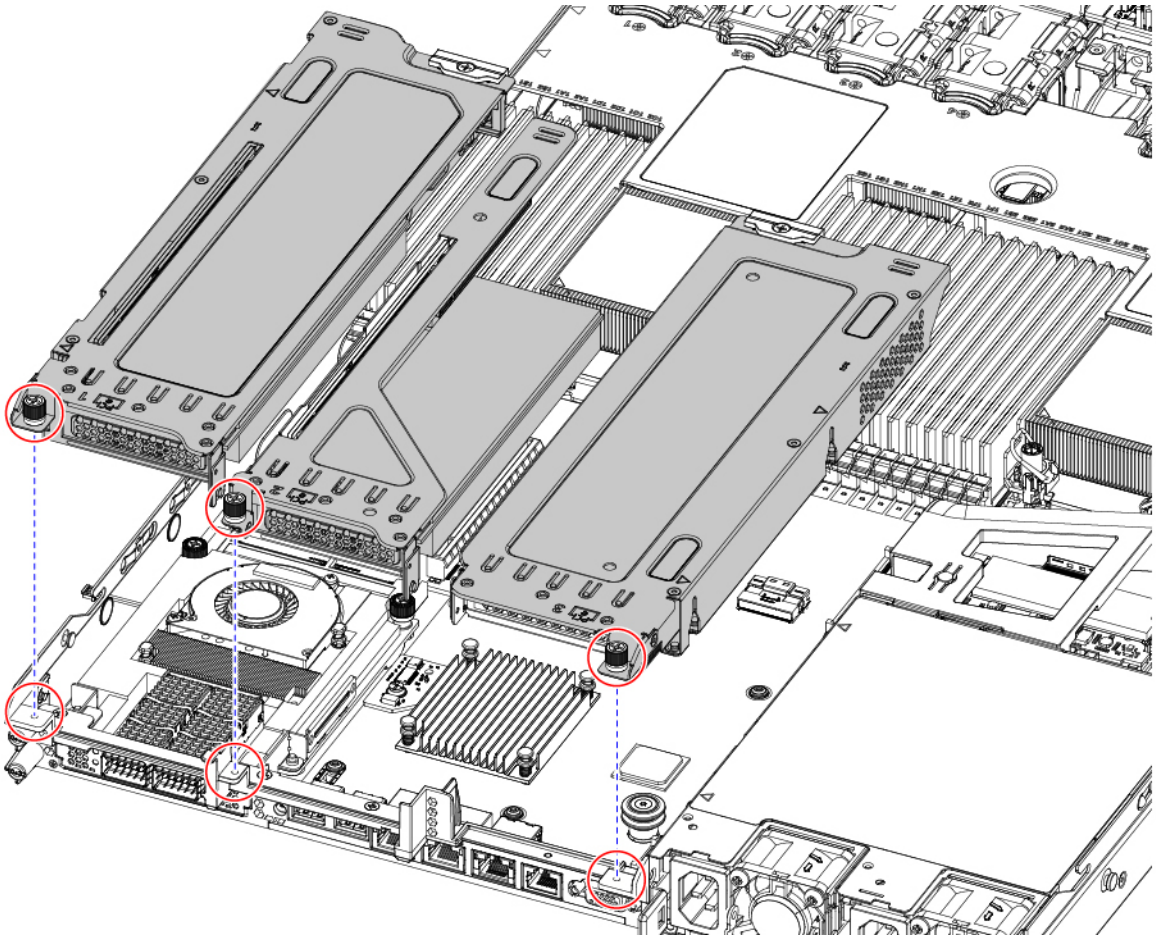


Step 4 Install the two full height riser cages.

a) Align riser cages 1 and 2 over their PCIe slots, making sure that the captive thumbscrews are aligned with their screw holes.

b) Holding each riser cage level, lower it into its PCIe slot, then tighten the thumbscrew by using a #2 Phillips screwdriver or your fingers.

Caution Tighten the screws to 4 lbs-in of torque. Do not overtighten the screws or you risk stripping them.



Step 5 Reinstall the node.

a) Replace the node' top cover.
b) If needed, reinstall the node in the rack.
c) If needed, reconnect any cables.

Replacing an mRAID Riser (Riser 3)

The node has a dedicated internal riser that is used for either a Cisco modular storage controller card (RAID or HBA) or the SATA interposer card for embedded software RAID. This riser plugs into a dedicated motherboard socket and provides a horizontal socket for the installed card.

This riser can be ordered as the following options:

- HX-XRAIDR-220M5—Replacement unit for this mRAID riser.
- HX-MRAID1GB-KIT—Kit for first-time addition of this riser (includes RAID controller, SuperCap, and SuperCap cable).

See also Replacing a SAS Storage Controller Card (RAID or HBA) in Riser 3, on page 110.

See also Replacing the Supercap (RAID Backup), on page 116.

- HX-SATA-KIT-M5—Kit for first-time addition of this riser (includes SATA interposer for embedded software RAID and SATA cables).

  See also Replacing a SATA Interposer Card , on page 120.

- The NVMe-optimized, SFF 10-drive version, HX-220-M5SN, supports NVMe drives only and so does not use SAS or SATA RAID. This version of the node comes with an NVMe-switch card factory-installed in the internal mRAID riser to support NVMe drives in front-loading bays 3 - 10. The NVMe switch card is not orderable separately.

Step 1 Prepare the node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 2 Remove the existing mRAID riser:

a) Using both hands, grasp the external blue handle on the rear of the riser and the blue finger-grip on the front end of the riser.

b) Lift the riser straight up to disengage it from the motherboard socket.

c) Set the riser upside down on an antistatic surface.

d) Remove any card from the riser. Open the blue card-ejector lever that is on the edge of the card and then pull the card straight out from its socket on the riser.

Step 3 Install a new mRAID riser:

a) Install your card into the new riser. Close the card-ejector lever on the card to lock it into the riser.

b) Connect cables to the installed card.

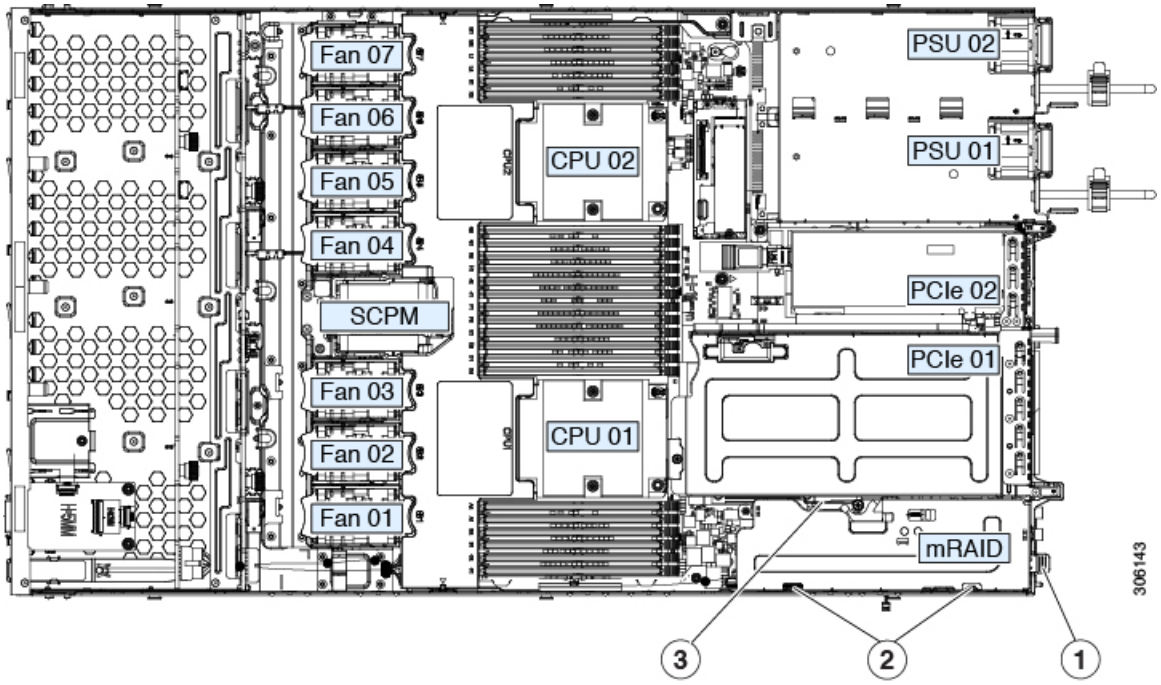
c) Align the riser with the socket on the motherboard. At the same time, align the two slots on the back side of the bracket with the two pegs on the inner chassis wall.

d) Push down gently to engage the riser with the motherboard socket. The metal riser bracket must also engage the two pegs that secure it to the chassis wall.

Step 4 Replace the top cover to the node.

Step 5 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Figure 34: mRAID Riser (Internal Riser 3) Location



1	External blue handle	**3**	Card-ejector lever
2	Two pegs on inner chassis wall	-	

Replacing a SAS Storage Controller Card (RAID or HBA) in Riser 3

For hardware-based storage control, the node can use a Cisco modular 12G SAS RAID controller or Cisco 12 G SAS HBA that plugs into a horizontal socket on a dedicated mRAID riser (internal riser 3).

- The Cisco 12G SAS RAID controller (HX-RAID-220M6) supports up to 10 SAS HDD or SAS/SATA SSD drives operating at 3 Gbs, 6 Gbs, and 12 Gbs.

  It includes a SuperCap module (HX-SCAP-M6) for write cache backup, a 4 GB flash-back write cache (FBWC), and supports RAID 0, 1, 5, 6, 10, 50, 60, JBOD mode, and SRAID0. The RAID controller plugs directly into a dedicated slot.

  For all self-encrypting drives (SED), standalone Management (CIMC/UCSM) is supported for configuring and managing local keys. SED drives are managed with local key management only.

- The Cisco 12G SAS HBA (HX-SAS-220M6) supports up to 10 SAS HDD or SAS/ SATA SSD drives operating at 3 Gbs, 6 Gbs, and 12 Gbs. It supports JBOD or pass-through mode (not RAID) and plugs directly into a dedicated slot.

Storage Controller Card Firmware Compatibility

Firmware on the storage controller (RAID or HBA) must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the node. If not compatible, upgrade or downgrade the storage controller firmware using the Cisco 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 node components to compatible levels: HUU Guides.

Note **For servers running in standalone mode only:** After you replace controller hardware, you must run the Cisco Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the node SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

Replacing a SAS Storage Controller Card (RAID or HBA)

Step 1 Prepare the node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 2 Remove the mRAID riser (riser 3) from the node:

a) Using both hands, grasp the external blue handle on the rear of the riser and the blue finger-grip on the front end of the riser.

b) Lift the riser straight up to disengage it from the motherboard socket.

c) Set the riser upside down on an antistatic surface.

Step 3 Remove any existing card from the riser:

a) Disconnect cables from the existing card.

b) Open the blue card-ejector lever on the back side of the card to eject it from the socket on the riser.

c) Pull the card from the riser and set it aside.

Step 4 Install a new storage controller card to the riser:

a) With the riser upside down, set the card on the riser.

b) Push on both corners of the card to seat its connector in the riser socket.

c) Close the card-ejector lever on the card to lock it into the riser.

d) Connect cables to the installed card.

Step 5 Return the riser to the node:

a) Align the connector on the riser with the socket on the motherboard. At the same time, align the two slots on the back side of the bracket with the two pegs on the inner chassis wall.

b) Push down gently to engage the riser connector with the motherboard socket. The metal riser bracket must also engage the two pegs that secure it to the chassis wall.

Step 6 Replace the top cover to the node.

Step 7 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Step 8 If your node is running in standalone mode, use the Cisco UCS Host Upgrade Utility to update the controller firmware and program the correct suboem-id for the controller.

Replacing a Boot-Optimized M.2 RAID Controller Module

The Cisco Boot-Optimized M.2 RAID Controller module connects to the mini-storage module socket on the motherboard. It includes slots for two SATA M.2 drives, plus an integrated 6-Gbps SATA RAID controller that can control the SATA M.2 drives in a RAID 1 array. The Cisco Boot-Optimized M.2 RAID Controller module (HX-HWRAID) plugs into a connector on the motherboard and holds up to 2 M.2 SATA drives.

The node supports the following SATA M.2 drives are:

- 240 GB M.2 SATA SSD (HX-M2-240GB)
- 960 GB M.2 SATA SSD (HX-M2-960GB)

Cisco Boot-Optimized M.2 RAID Controller Considerations

Review the following considerations:

Note The Cisco Boot-Optimized M.2 RAID Controller is not supported when the node is used as a compute-only node in Cisco HyperFlex configurations.

- The minimum version of Cisco IMC and Cisco UCS Manager that support this controller is 4.0(4) and later.
- This controller supports RAID 1 (single volume) and JBOD mode.

Note Do not use the node's embedded SW MegaRAID controller to configure RAID settings when using this controller module. Instead, you can use the following interfaces:

- Cisco IMC 4.2(1) and later
- BIOS HII utility, BIOS 4.2(1) and later
- Cisco UCS Manager 4.2(1) and later (UCS Manager-integrated servers)

The name of the controller in the software is MSTOR-RAID.

- The controller supports only 240 GB and 960 GB M.2 SSDs. The M.2 SATA SSDs must be identical. You cannot mix M.2 drives with different capacities. For example, one 240 GB M.2 and one 960 GB M.2 is an unsupported configuration.
- The Boot-Optimized RAID controller supports VMWare, Windows, and Linux Operating Systems only.
- A SATA M.2 drive in slot 1 (the top) is the first SATA device; a SATA M.2 drive in slot 2 (the underside) is the second SATA device.
  - The name of the controller in the software is MSTOR-RAID.
  - A drive in Slot 1 is mapped as drive 253; a drive in slot 2 is mapped as drive 254.
- It is recommended that M.2 SATA SSDs be used as boot-only devices.
- When using RAID, we recommend that both SATA M.2 drives are the same capacity. If different capacities are used, the smaller capacity of the two drives is used to create a volume and the rest of the drive space is unusable.

  JBOD mode supports mixed capacity SATA M.2 drives.
- Hot-plug replacement is *not* supported. The node must be powered off.
- Monitoring of the controller and installed SATA M.2 drives can be done using Cisco IMC and Cisco UCS Manager. They can also be monitored using other utilities such as UEFI HII, PMCLI, XMLAPI, and Redfish.
- CIMC/UCSM is supported for configuring of volumes and monitoring of the controller and installed SATA M.2 drives.
- Updating firmware of the controller and the individual drives:
  - For standalone servers, use the Cisco Host Upgrade Utility (HUU). Refer to the HUU Documentation.
  - For servers integrated with Cisco UCS Manager, refer to the Cisco UCS Manager Firmware Management Guide.
- The SATA M.2 drives can boot in UEFI mode only. Legacy boot mode is not supported.
- If you replace a single SATA M.2 drive that was part of a RAID volume, rebuild of the volume is auto-initiated after the user accepts the prompt to import the configuration. If you replace both drives of a volume, you must create a RAID volume and manually reinstall any OS.
- We recommend that you erase drive contents before creating volumes on used drives from another node. The configuration utility in the node BIOS includes a SATA secure-erase function.
- The node BIOS includes a configuration utility specific to this controller that you can use to create and delete RAID volumes, view controller properties, and erase the physical drive contents. Access the utility by pressing **F2** when prompted during node boot. Then navigate to **Advanced > Cisco Boot Optimized M.2 RAID Controller**.
- The boot-optimized RAID controller is not supported when the node is used as a compute node in HyperFlex configurations.

Replacing a Cisco Boot-Optimized M.2 RAID Controller

This topic describes how to remove and replace a Cisco Boot-Optimized M.2 RAID Controller. The controller board has one M.2 socket on its top (Slot 1) and one M.2 socket on its underside (Slot 2).

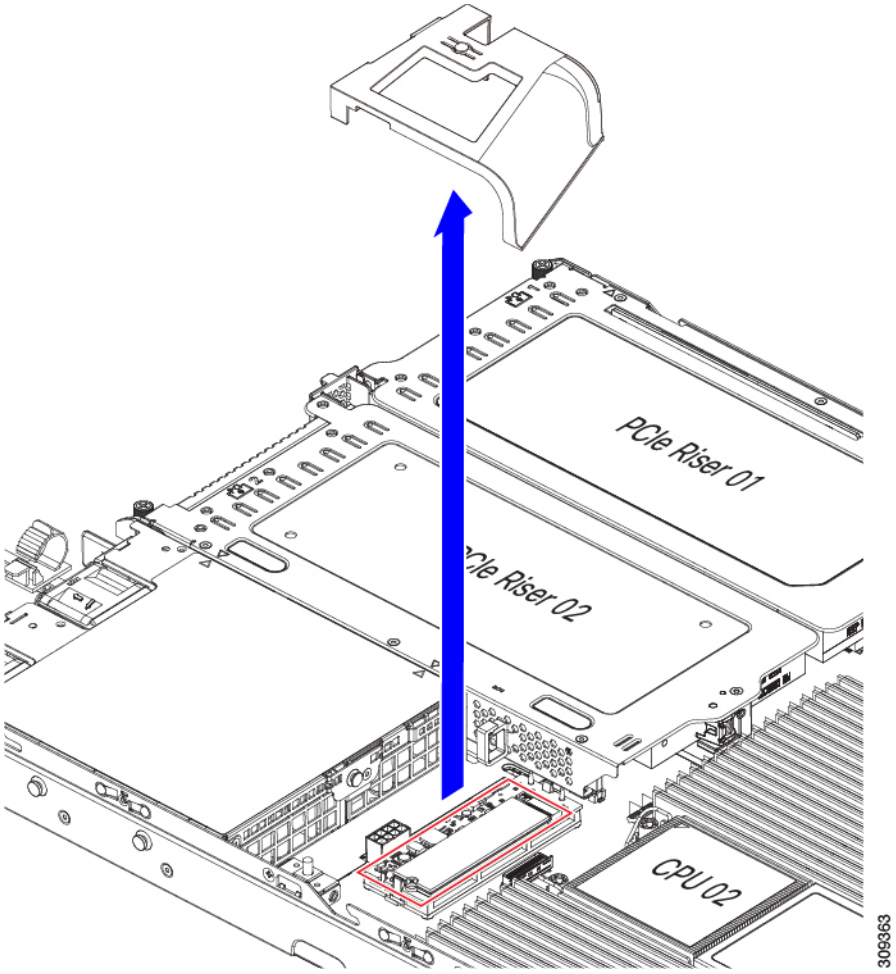
Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

Step 2 Slide the node 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 node from the rack.

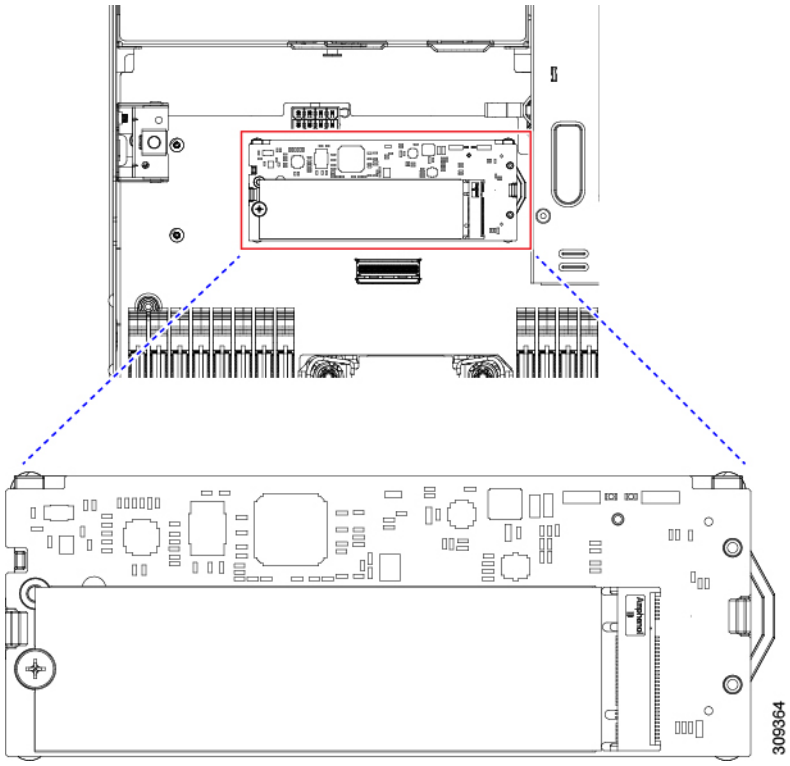
Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Grasp and remove the air baffle located between CPU 2 and PCIe Riser 3.



Step 5 Remove a controller from its motherboard socket:

a) Locate the controller in its socket just behind CPU 2.



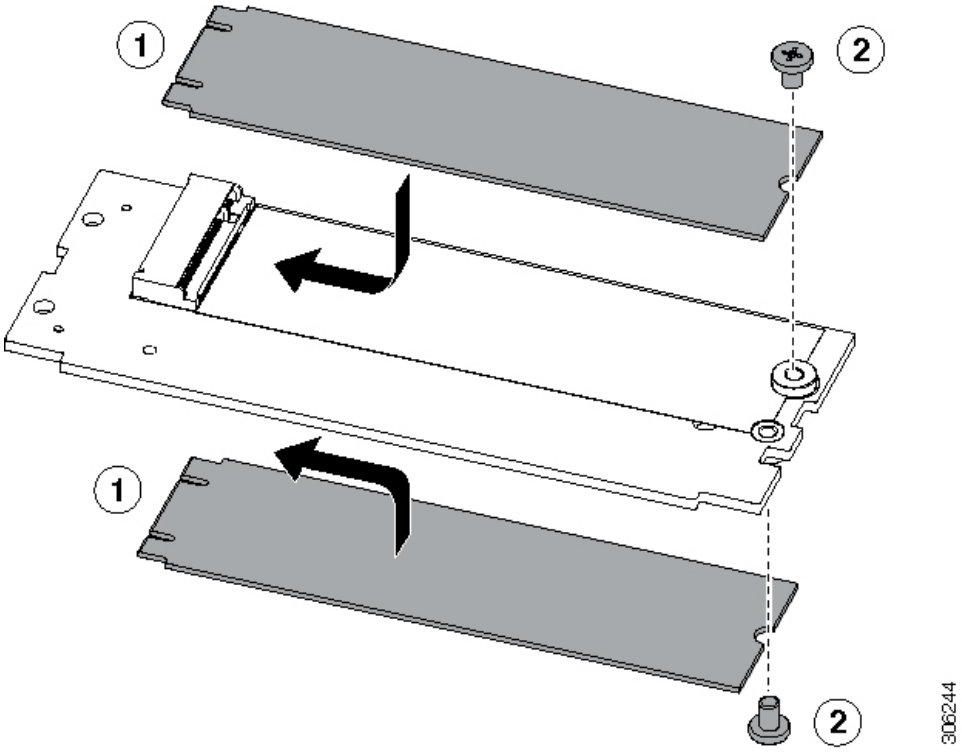
b) At each end of the controller board, push outward on the clip that secures the carrier.
c) Lift both ends of the controller to disengage it from the socket on the motherboard.
d) Set the carrier on an anti-static surface.

Step 6 If you are transferring SATA M.2 drives from the old controller to the replacement controller, do that before installing the replacement controller:

Note Any previously configured volume and data on the drives are preserved when the M.2 drives are transferred to the new controller. The system will boot the existing OS that is installed on the drives.

a) Use a #1 Phillips-head screwdriver to remove the single screw that secures the M.2 drive to the carrier.
b) Lift the M.2 drive from its socket on the carrier.
c) Position the replacement M.2 drive over the socket on the controller board.
d) Angle the M.2 drive downward and insert the connector-end into the socket on the carrier. The M.2 drive's label must face up.
e) Press the M.2 drive flat against the carrier.
f) Install the single screw that secures the end of the M.2 SSD to the carrier.
g) Turn the controller over and install the second M.2 drive.

Figure 35: Cisco Boot-Optimized M.2 RAID Controller, Showing M.2 Drive Installation



Step 7 Install the controller to its socket on the motherboard:

a) Position the controller over socket, with the controller's connector facing down and at the same end as the motherboard socket. Two alignment pegs must match with two holes on the controller.

b) Gently push down the socket end of the controller so that the two pegs go through the two holes on the controller.

c) Push down on the controller so that the securing clips click over it at both ends.

Step 8 Replace the top cover to the node.

Step 9 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Replacing the Supercap (RAID Backup)

This node supports installation of one Supercap unit (HX-SCAP-M6). The unit mounts to a bracket that is in the middle of the row of cooling fan modules.

Step 1 Prepare the node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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.

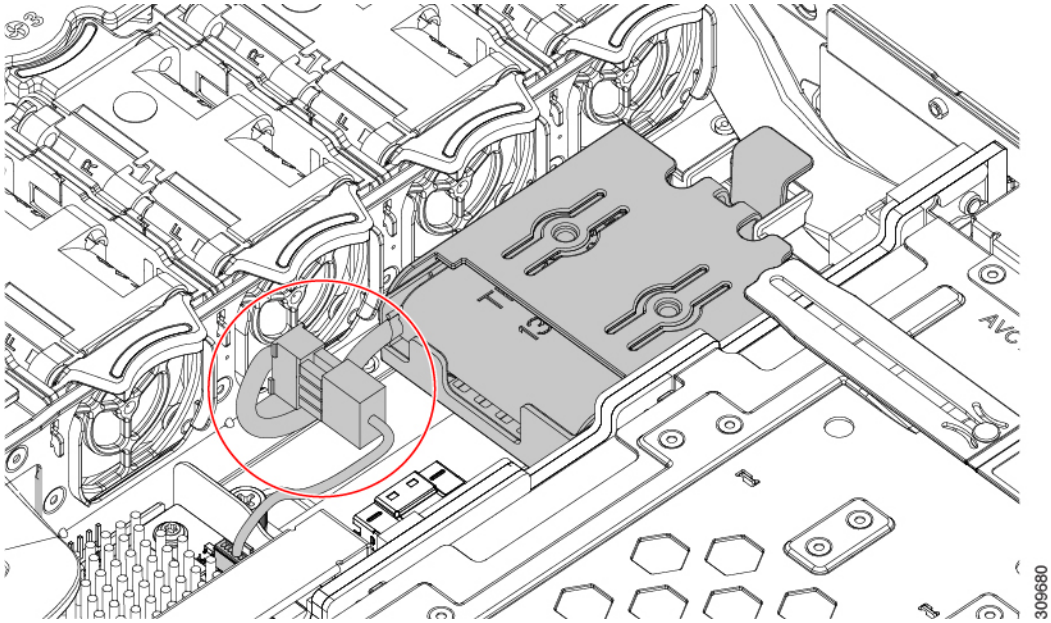
Caution If you cannot safely view and access the component, remove the node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

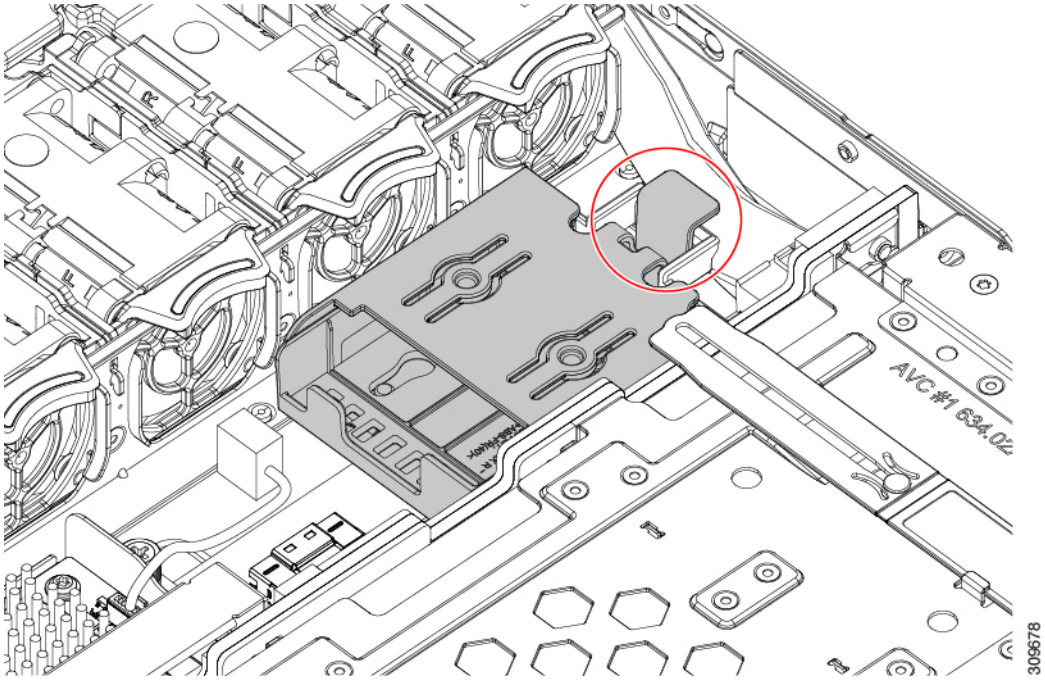
Step 2 Remove an existing Supercap:

a) Locate the Supercap modules near the RAID card by the front-loading drives.

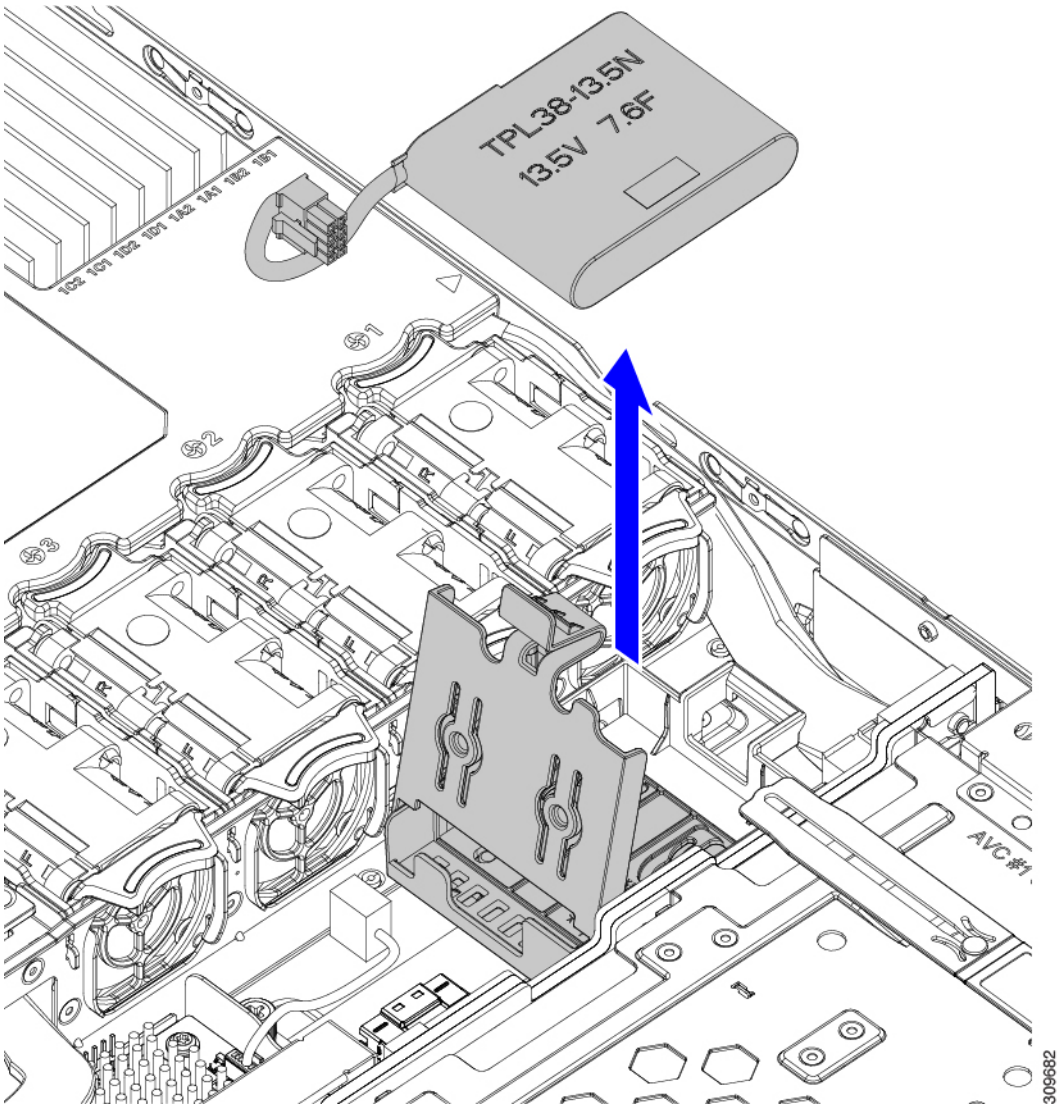
b) Disconnect the Supercap cable connector from the RAID cable connector.



c) Push aside the securing tab and open the hinged door that secures the Supercap to its bracket.



d) Lift the Supercap free of the bracket and set it aside.

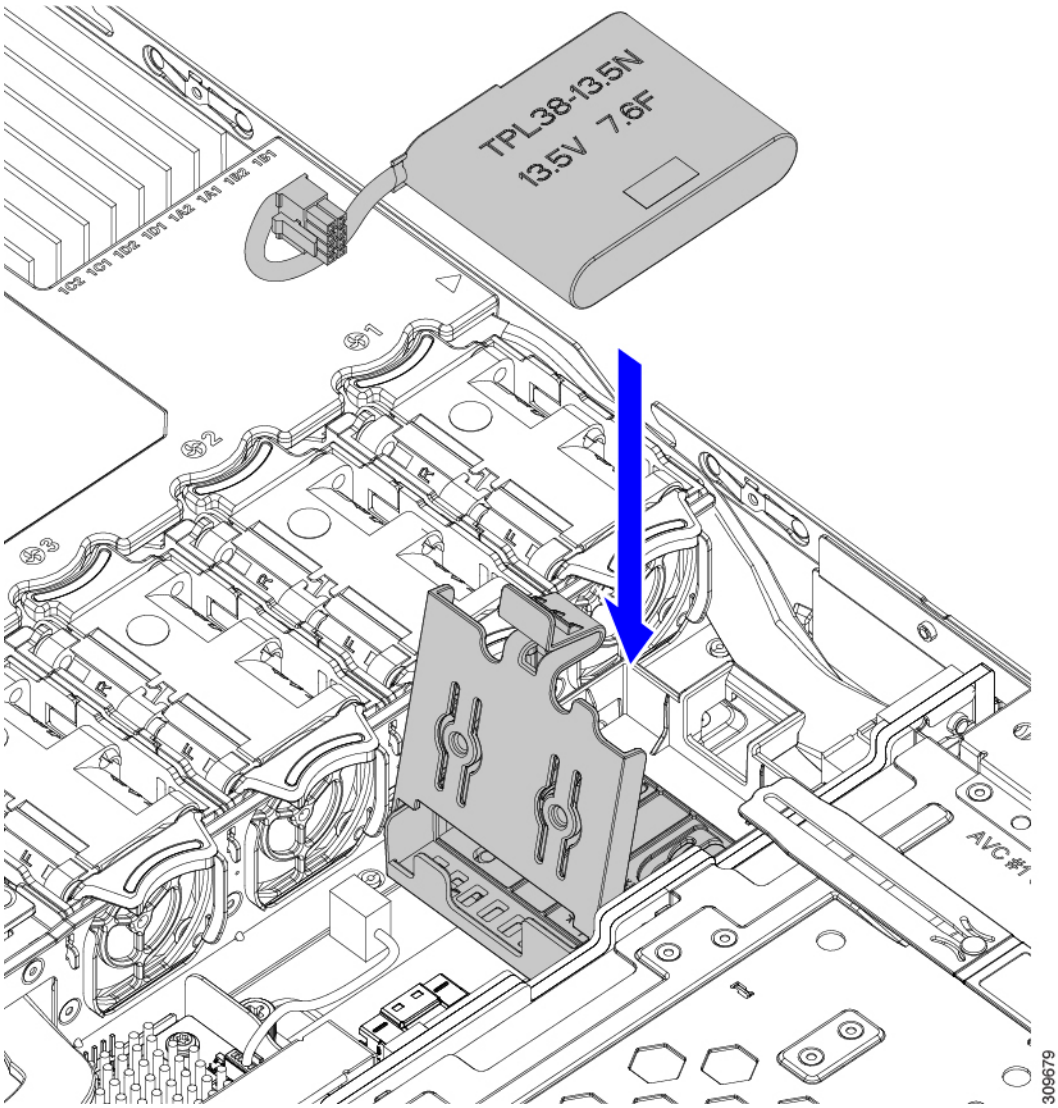


Step 3 Install a new Supercap:

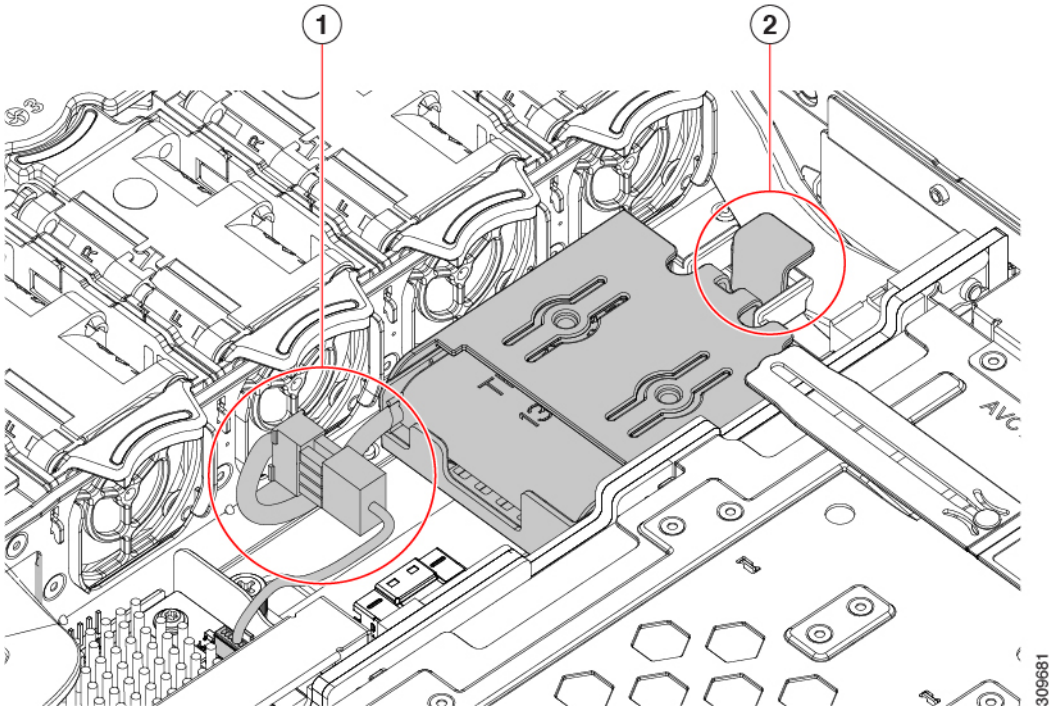
a) Orient the Supercap so that its cable connector is facing the RAID cable connector.

b) Make sure that the RAID cable will not obstruct installation, then insert the new Supercap into the mounting bracket.

Note You must feed the Supercap cable and connector through the open space in the tray so that the Supercap cable can connect to the RAID cable.



c) Connect the Supercap cable from the RAID controller card to the connector on the new Supercap cable.
d) Close the hinged plastic bracket over the Supercap. Push down until the securing tab clicks.



Step 4 Replace the top cover to the node.

Step 5 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Replacing a SATA Interposer Card

For software-based storage control that uses the node's embedded SATA controller, the node requires a SATA interposer card that plugs into a horizontal socket on a dedicated mRAID riser.

The SATA Interposer card (HX-SATAIN-220M6) supports Advanced Host Control Interface (AHCI) by default. AHCI supports SATA-only drives. A maximum of 8 SATA drives is supported with AHCI, and this configuration requires a SATA interposer card, which plugs directly into the drive backplane. The SATA Interposer supports drives in slots 1-4 and 6-9.

Step 1 Prepare the node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 2 Remove the mRAID riser from the node:

a) Using both hands, grasp the external blue handle on the rear of the riser and the blue finger-grip on the front end of the riser.
b) Lift the riser straight up to disengage it from the motherboard socket.
c) Set the riser upside down on an antistatic surface.

Step 3 Remove any existing card from the riser:

a) Disconnect cables from the existing card.
b) Open the blue card-ejector lever on the back side of the card to eject it from the socket on the riser.
c) Pull the card from the riser and set it aside.

Step 4 Install a new card to the riser:

a) With the riser upside down, set the card on the riser.
b) Push on both corners of the card to seat its connector in the riser socket.
c) Close the card-ejector lever on the card to lock it into the riser.

Step 5 Return the riser to the node:

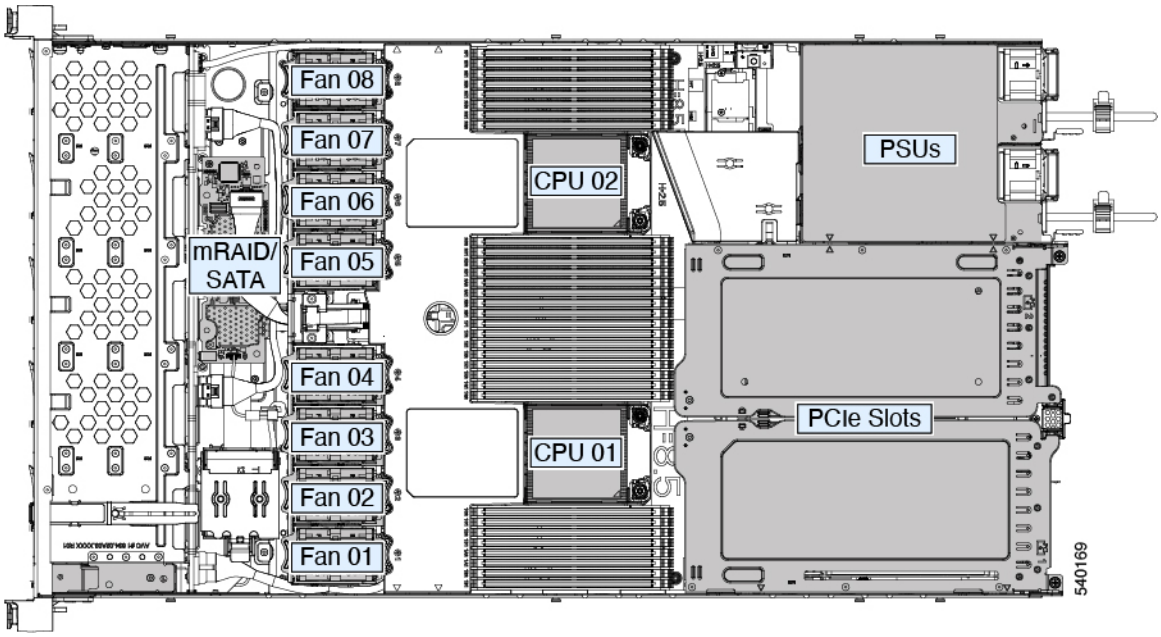
a) Align the connector on the riser with the socket on the motherboard. At the same time, align the two slots on the back side of the bracket with the two pegs on the inner chassis wall.
b) Push down gently to engage the riser connector with the motherboard socket. The metal riser bracket must also engage the two pegs that secure it to the chassis wall.

Step 6 Reconnect the cables to their connectors on the new card.

Step 7 Replace the top cover to the node.

Step 8 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Figure 36: mRAID Riser Location



1	External blue handle	**3**	Card-ejector lever

2	Two pegs on inner chassis wall	-	

Replacing a Chassis Intrusion Switch

The chassis intrusion switch in an optional security feature that logs an event in the system event log (SEL) whenever the cover is removed from the chassis.

Step 1 Prepare the node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 2 Remove an existing intrusion switch:

a) Disconnect the intrusion switch cable from the socket on the motherboard.

b) Use a #1 Phillips-head screwdriver to loosen and remove the single screw that holds the switch mechanism to the chassis wall.

c) Slide the switch mechanism straight up to disengage it from the clips on the chassis.

Step 3 Install a new intrusion switch:

a) Slide the switch mechanism down into the clips on the chassis wall so that the screwhole lines up.

b) Use a #1 Phillips-head screwdriver to install the single screw that secures the switch mechanism to the chassis wall.

c) Connect the switch cable to the socket on the motherboard.

Step 4 Replace the cover to the node.

Step 5 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Installing a Trusted Platform Module (TPM)

A Trusted Platform Module (TPM) is a computer chip (microcontroller) that can securely store artifacts used to authenticate the platform (node). These artifacts can include passwords, certificates, or encryption keys. A TPM can also be used to store platform measurements that help ensure that the platform remains trustworthy. Authentication (ensuring that the platform can prove that it is what it claims to be) and attestation (a process helping to prove that a platform is trustworthy and has not been breached) are necessary steps to ensure safer computing in all environments.

The trusted platform module (TPM) plugs into a motherboard socket and is then permanently secured with a one-way screw.

TPM Considerations

- This node supports either TPM version 1.2 or TPM version 2.0 (HX-TPM-002C) as defined by the Trusted Computing Group (TCG). The TPM is also SPI-based.
- Field replacement of a TPM is not supported; you can install a TPM after-factory only if the node does not already have a TPM installed.
- If there is an existing TPM 1.2 installed in the node, you cannot upgrade to TPM 2.0. If there is no existing TPM in the node, you can install TPM 2.0.
- If a node with a TPM is returned, the replacement node must be ordered with a new TPM.
- If the TPM 2.0 becomes unresponsive, reboot the node.

Installing and Enabling a TPM

Note Field replacement of a TPM is not supported; you can install a TPM after-factory only if the node does not already have a TPM installed.

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

1. Installing the TPM Hardware
2. Enabling the TPM in the BIOS
3. Enabling the Intel TXT Feature in the BIOS

Installing TPM Hardware

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 node for component installation:

a) Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

b) Slide the node 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 node from the rack.

c) Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 2 Check if there is a card installed in PCIe riser 2:

- If no card is installed in PCIe riser 2, you can access the TPM socket. Go to the next step.

- If a card is installed in PCIe riser 2, remove the PCIe riser assembly from the chassis to provide clearance before continuing with the next step. See Replacing a PCIe Card, on page 89 for instructions on removing the PCIe riser.

Step 3 Install a TPM:

a) Locate the TPM socket on the motherboard, as shown below.
b) Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole 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.
e) If you removed the PCIe riser assembly to provide clearance, return it to the node now.

Step 4 Replace the cover to the node.

Step 5 Replace the node in the rack, replace cables, and then fully power on the node by pressing the Power button.

Step 6 Continue with Enabling the TPM in the BIOS, on page 124.

Enabling the TPM in the BIOS

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

Note You must set a BIOS Administrator password before performing this procedure. To set this password, press the **F2** key when prompted during system boot to enter the BIOS Setup utility. Then navigate to **Security > Set Administrator Password** and enter the new password twice as prompted.

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 node.

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, on page 124.

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 node. 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 node 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

d) Do one of the following:

- 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.

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

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

g) 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.

Removing the Trusted Platform Module (TPM)

The TPM module is attached to the printed circuit board assembly (PCBA). You must disconnect the TPM module from the PCBA before recycling the PCBA. The TPM module is secured to a threaded standoff by a tamper resistant screw. If you do not have the correct tool for the screw, you can use a pair of pliers to remove the screw.

Before you begin

Note **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics for proper disposal to comply with local eco design and e-waste regulations.

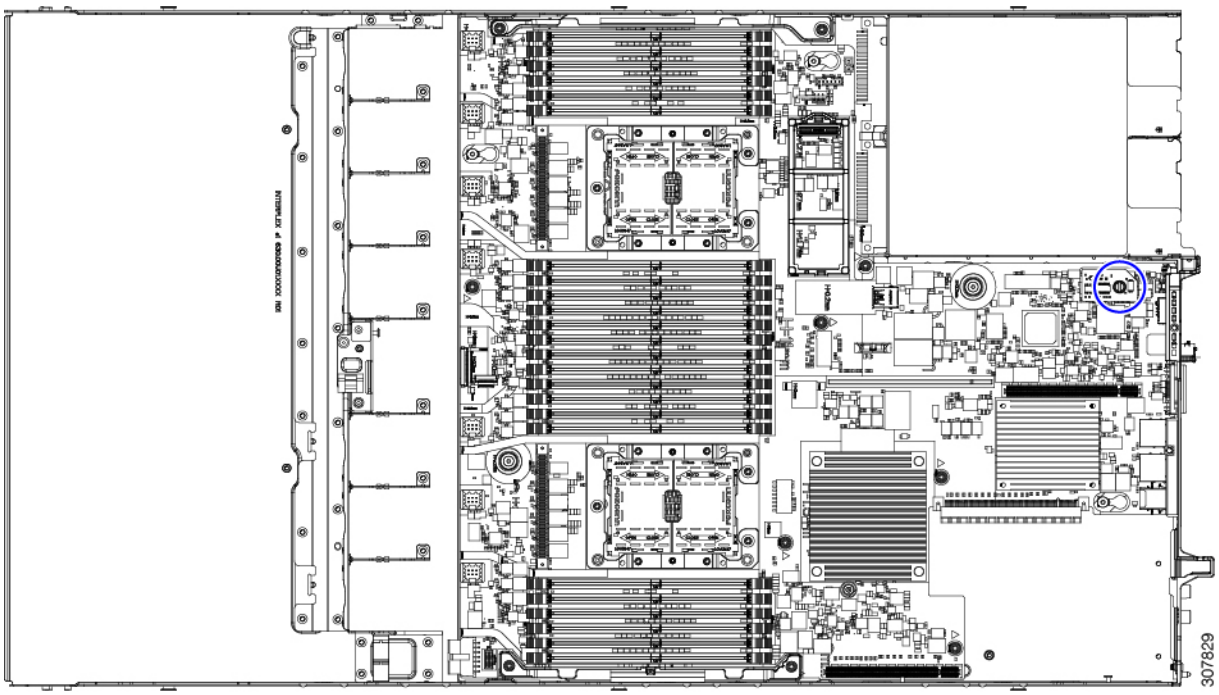
To remove the TPM, the following requirements must be met for the node:

- It must be disconnected from facility power.
- It must be removed from the equipment rack.
- The top cover must be removed. If the top cover is not removed, see Removing Top Cover, on page 40.

Step 1 Locate the TPM module.

The following illustration shows the location of the TPM module's screw.

Figure 37: Screw Location for Removing the TPM Module



Step 2 Using the pliers, grip the head of the screw and turn it counter clockwise until the screw releases.

Step 3 Remove the TPM module and dispose of it properly.

What to do next

Remove the PCBA. See Recycling the PCB Assembly (PCBA), on page 126.

Recycling the PCB Assembly (PCBA)

The PCBA is secured to the node's sheet metal through the following:

- 13 M3.5x0.6mm Torx screws.
- 2 M3.5x0.6mm Torx thumb screws.

You must disconnect the PCBA from the tray before recycling the PCBA.

Before you begin

Note **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics for proper disposal to comply with local eco design and e-waste regulations.

To remove the printed circuit board assembly (PCBA), the following requirements must be met:

- The node must be disconnected from facility power.
- The node must be removed from the equipment rack.
- The node's top cover must be removed. See Removing Top Cover, on page 40.

Gather the following tools before you start this procedure:

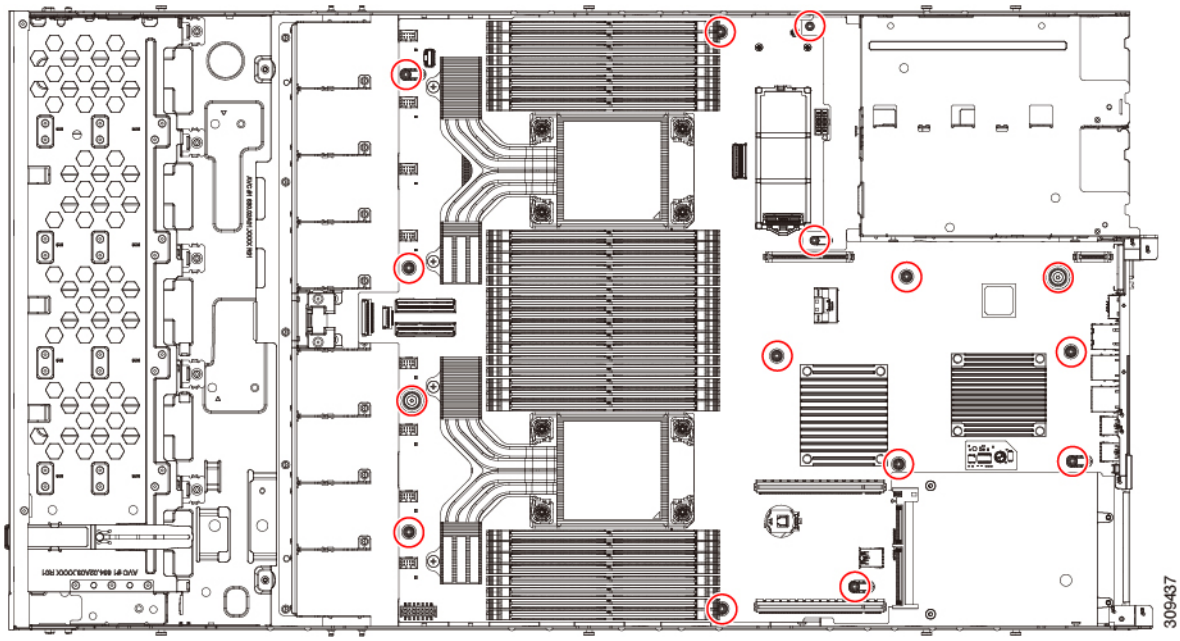
- Pliers
- T10 Torx screwdriver

Step 1 If you have not removed the TPM module, do so now.

Step 2 When the TPM module is detached, locate the PCBA's screws.

The following figure shows the location of the screws.

Figure 38: Screw Locations for Removing the PCBA



Step 3 Using a T10 Torx driver, remove all of the indicated screws.

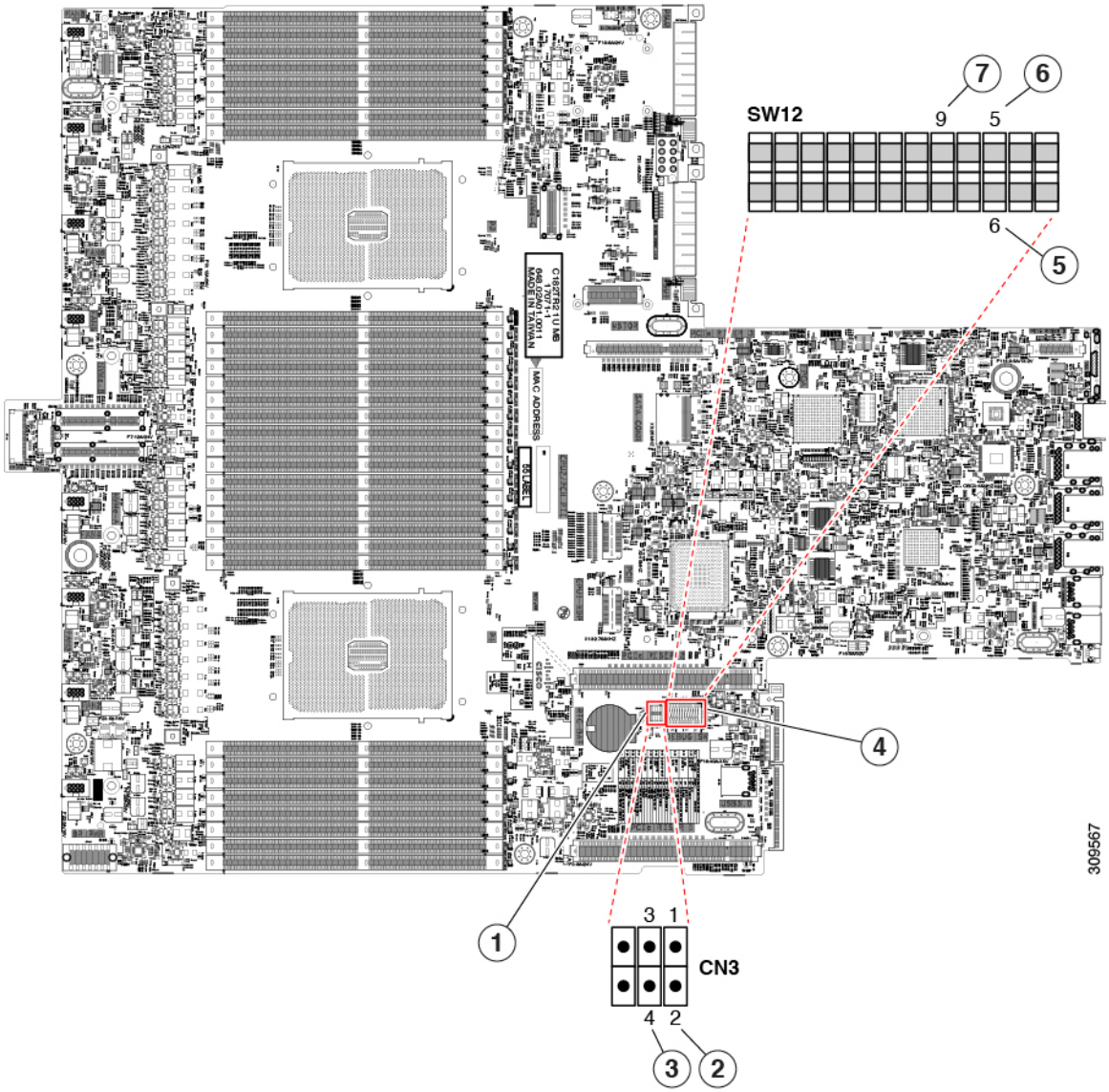
Step 4 Remove the PCBA and dispose of it properly.

Service Headers and Jumpers

This server includes two blocks of headers (J38, J39) that you can jumper for certain service and debug functions.

This section contains the following topics:

Figure 39: Location of Service Header Blocks SW12 and CN3



1	Location of header block CN3	**5**	BIOS Recovery Switch (SW12 Switch 5)
2	Boot Alternate Cisco IMC Header: CN3 pins 1 - 2	**6**	Clear BIOS Password Switch (SW12 Switch 6)
3	System Secure Firmware Erase Header: CN3 pins 3 - 4	**7**	Clear CMOS Switch (SW1q2 Switch 9)
4	Location of SW 12 DIP switches	-	

Using the Clear CMOS Switch (SW12, Switch 9)

You can use this switch to clear the node's CMOS settings in the case of a system hang. For example, if the node hangs because of incorrect settings and does not boot, use this switch to invalidate the settings and reboot with defaults.

You will find it helpful to refer to the location of the CN3 header. See Service Headers and Jumpers, on page 128.

Caution Clearing the CMOS removes any customized settings and might result in data loss. Make a note of any necessary customized settings in the BIOS before you use this clear CMOS procedure.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39.

Step 2 Slide the node 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 node from the rack.

Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Using your finger, gently push the SW12 switch 9 to the side marked ON.

Step 5 Reinstall the top cover and reconnect AC power cords to the node. The node powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 6 Return the node to main power mode by pressing the Power button on the front panel. The node is in main power mode when the Power LED is green.

Note You must allow the entire node to reboot to main power mode to complete the reset. The state of the switch cannot be determined without the host CPU running.

Step 7 Press the Power button to shut down the node to standby power mode, and then remove AC power cords from the node to remove all power.

Step 8 Remove the top cover from the node.

Step 9 Using your finger, gently push switch 9 to its original position (OFF).

Note If you do not reset the switch to its original position (OFF), the CMOS settings are reset to the defaults every time you power-cycle the node.

Step 10 Replace the top cover, replace the node in the rack, replace power cords and any other cables, and then power on the node by pressing the Power button.

Using the BIOS Recovery Header (SW12, Switch 5)

Depending on which stage the BIOS becomes corrupted, you might see different behavior.

- If the BIOS BootBlock is corrupted, you might see the system get stuck on the following message:

  ```
  Initializing and configuring memory/hardware
  ```

- If it is a non-BootBlock corruption, a message similar to the following is displayed:

```
****BIOS FLASH IMAGE CORRUPTED****
Flash a valid BIOS capsule file using Cisco IMC WebGUI or CLI interface.
IF Cisco IMC INTERFACE IS NOT AVAILABLE, FOLLOW THE STEPS MENTIONED BELOW.
1. Connect the USB stick with bios.cap file in root folder.
2. Reset the host.
IF THESE STEPS DO NOT RECOVER THE BIOS
1. Power off the system.
2. Mount recovery jumper.
3. Connect the USB stick with bios.cap file in root folder.
4. Power on the system.
Wait for a few seconds if already plugged in the USB stick.
REFER TO SYSTEM MANUAL FOR ANY ISSUES.
```

Note As indicated by the message shown above, there are two procedures for recovering the BIOS. Try procedure 1 first. If that procedure does not recover the BIOS, use procedure 2.

Using the Clear BIOS Password Switch (SW12, Switch 6)

You can use this switch to clear the BIOS password.

You will find it helpful to refer to the location of the CN3 header. See Service Headers and Jumpers, on page 128.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39. Disconnect power cords from all power supplies.

Step 2 Slide the node 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 node from the rack.

Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Using your finger, gently slide the SW12 switch 6 to the ON position.

Step 5 Reinstall the top cover and reconnect AC power cords to the node. The node powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 6 Return the node to main power mode by pressing the Power button on the front panel. The node is in main power mode when the Power LED is green.

Note You must allow the entire node to reboot to main power mode to complete the reset. The state of the switch cannot be determined without the host CPU running.

Step 7 Press the Power button to shut down the node to standby power mode, and then remove AC power cords from the node to remove all power.

Step 8 Remove the top cover from the node.

Step 9 Reset the switch to its original position (OFF).

Note If you do not remove the switch to its original position (OFF), the BIOS password is cleared every time you power-cycle the node.

Step 10 Replace the top cover, replace the node in the rack, replace power cords and any other cables, and then power on the node by pressing the Power button.

Using the Boot Alternate Cisco IMC Image Header (CN3, Pins 1-2)

You can use this Cisco IMC debug header to force the system to boot from an alternate Cisco IMC image.

You will find it helpful to refer to the location of the CN3 header. See Service Headers and Jumpers, on page 128.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39. Disconnect power cords from all power supplies.

Step 2 Slide the node 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 node from the rack.

Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Install a two-pin jumper across CN3 pins 1 and 2.

Step 5 Reinstall the top cover and reconnect AC power cords to the node. The node powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 6 Return the node to main power mode by pressing the Power button on the front panel. The node is in main power mode when the Power LED is green.

Note When you next log in to Cisco IMC, you see a message similar to the following:

```
'Boot from alternate image' debug functionality is enabled.
CIMC will boot from alternate image on next reboot or input power cycle.
```

Note If you do not remove the jumper, the node will boot from an alternate Cisco IMC image every time that you power cycle the node or reboot Cisco IMC.

Step 7 To remove the jumper, press the Power button to shut down the node to standby power mode, and then remove AC power cords from the node to remove all power.

Step 8 Remove the top cover from the node.

Step 9 Remove the jumper that you installed.

Step 10 Replace the top cover, replace the node in the rack, replace power cords and any other cables, and then power on the node by pressing the Power button.

Using the System Firmware Secure Erase Header (CN3, Pins 3-4)

You can use this header to securely erase system firmware from the node.

You will find it helpful to refer to the location of the CN3 header. See Service Headers and Jumpers, on page 128.

Step 1 Shut down and remove power from the node as described in Shutting Down and Removing Power From the Node, on page 39. Disconnect power cords from all power supplies.

Step 2 Slide the node 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 node from the rack.

Step 3 Remove the top cover from the node as described in Removing Top Cover, on page 40.

Step 4 Install a two-pin jumper across CN3 pins 3 and 4.

Step 5 Reinstall the top cover and reconnect AC power cords to the node. The node powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 6 Return the node to main power mode by pressing the Power button on the front panel. The node is in main power mode when the Power LED is green.

Note You must allow the entire node to reboot to main power mode to complete the reset. The state of the jumper cannot be determined without the host CPU running.

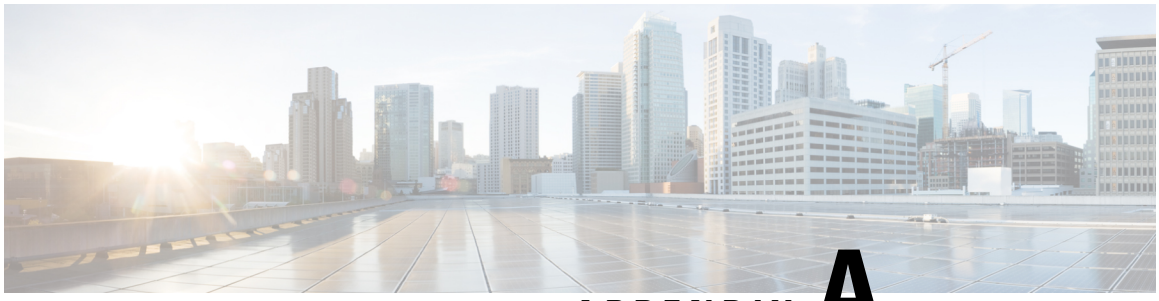
Step 7 Press the Power button to shut down the node to standby power mode, and then remove AC power cords from the node to remove all power.

Step 8 Remove the top cover from the node.

Step 9 Remove the jumper that you installed.

Note If you do not remove the jumper, the password is cleared every time you power-cycle the node.

Step 10 Replace the top cover, replace the node in the rack, replace power cords and any other cables, and then power on the node by pressing the Power button.



APPENDIX A

Node Specifications

Server Specifications

This appendix lists the physical, environmental, and power specifications for the node.

Physical Specifications

The following table lists the physical specifications for the node.

Table 9: Physical Specifications

Description	Specification
Height	1.7 in. (43.2 mm)
Width	16.9 in. (429.0 mm)
Depth (length)	Server only: 30 in. (762 mm) Server with slide rail: 31.5 in (800.1 mm)
Weight	• Maximum, fully configured with rail kit: 42.432 lb (19.25 kg) • Maximum, not configured, no rail kit: 22.32 lb (10.13 kg)

Environmental Specifications

As a Class A2 product, the node has the following environmental specifications.

Table 10: Environmental Specifications

Description	Specification
Temperature, Operating	Dry bulb temperature of 10°C to 35°C (50°F to 95°F) Maximum temperature change of 20°C (36°F) per hour (a temperature change within a specified period of time and not a rate of change) Humidity condition: Uncontrolled, not to exceed 50% RH starting condition Derate the maximum temperature by 1°C (33.8°F) per every 305 meters of altitude above 900m
Temperature, Extended Operating	5°C to 40°C (41°F to 104°F) with no direct sunlight Humidity condition: Uncontrolled, not to exceed 50% RH starting condition Derate the maximum temperature by 1°C (33.8°F) per every 305 meters of altitude above 900m
Temperature, non-operating (when the node is stored or transported)	Dry bulb temperature of 40 °C to 65 °C (-40°F to 149 °F)
Humidity (RH), operating	10% to 90% and 28°C (82.4°F) maximum dew-point temperature, non-condensing environment Minimum to be higher (more moisture) of -12 ˚C (10.4 ˚F) dew point or 8% relative humidity Maximum to be 24 ˚C (75.2 ˚F) dew point or 90% relative humidity
Humidity (RH), non-operating (when the node is stored or transported)	5% to 93% relative humidity, non-condensing, with a maximum wet bulb temperature of 28 °C across the 20 °C to 40 °C dry bulb range.
Altitude, operating	A maximum elevation of 3050 meters (10,006 feet)
Altitude, non-operating (when the node is stored or transported)	An elevation of 0 to 12,000 meters (39,370 feet)
Maximum Operating Duration	Unlimited
Sound power level Measure A-weighted per ISO7779 LwAd (Bels) Operation at 73°F (23°C)	5.5
Sound pressure level Measure A-weighted per ISO7779 LpAm (dBA) Operation at 73°F (23°C)	40

Power Specifications

Note Do not mix power supply types or wattages in the node. Both power supplies must be identical.

You can get more specific power information for your exact node configuration by using the Cisco UCS Power Calculator:

http://ucspowercalc.cisco.com

The power specifications for the supported power supply options are listed in the following sections.

1050 W AC Power Supply

Note For the 80PLUS platinum certification documented in the following table, you can find test results at https://www.clearesult.com/80plus/.

Parameter	Specification			
Input Connector	IEC320 C14			
Input Voltage Range (V rms)	100 to 240			
Maximum Allowable Input Voltage Range (V rms)	90 to 264			
Frequency Range (Hz)	50 to 60			
Maximum Allowable Frequency Range (Hz)	47 to 63			
Maximum Rated Output (W) Limited to 800W when operating at low-line input voltage, 100-127 V	800		1050	
Maximum Rated Standby Output (W)	36			
Nominal Input Voltage (V rms)	100	120	208	230
Nominal Input Current (A rms)	9.2	7.6	5.8	5.2
Maximum Input at Nominal Input Voltage (W)	889	889	1167	1154
Maximum Input at Nominal Input Voltage (VA)	916	916	1203	1190
Maximum Rated Efficiency (%) Minimum rating required to achieve 80PLUS platinum certification.	90	90	90	91

Parameter	Specification			
Maximum Rated Power Factor Minimum rating required to achieve 80PLUS platinum certification.	0.97	0.97	0.97	0.97
Maximum Inrush Current (peak A)	15			
Maximum Inrush Current (ms)	0.2			
Maximum Ride-Through Time Time output voltage remains within regulation limits at 100% load, during input voltage dropout	12			

1050 W V2 DC Power Supply

Note For the 80PLUS platinum certification documented in the following table, you can find test results at https://www.clearesult.com/80plus/.

Parameter	Specification
Input Connector	Molex 42820
Input Voltage Range (V rms)	-48
Maximum Allowable Input Voltage Range (V rms)	-40 to -72
Frequency Range (Hz)	NA
Maximum Allowable Frequency Range (Hz)	NA
Maximum Rated Output (W)	1050
Maximum Rated Standby Output (W)	36
Nominal Input Voltage (V rms)	-48
Nominal Input Current (A rms)	24
Maximum Input at Nominal Input Voltage (W)	1154
Maximum Input at Nominal Input Voltage (VA)	1154
Maximum Rated Efficiency (%) Minimum rating required to achieve 80PLUS platinum certification.	91
Maximum Rated Power Factor Minimum rating required to achieve 80PLUS platinum certification.	NA

Parameter	Specification
Maximum Inrush Current (peak A)	15
Maximum Inrush Current (ms)	0.2
Maximum Ride-Through Time This is the time output voltage remains within regulation limits at 100% load, during input voltage dropout	5

1600 W AC Power Supply

Note For the 80PLUS platinum certification documented in the following table, you can find test results at https://www.clearesult.com/80plus/.

Parameter	Specification			
Input Connector	IEC320 C14			
Input Voltage Range (V rms)	200 to 240			
Maximum Allowable Input Voltage Range (V rms)	180 to 264			
Frequency Range (Hz)	50 to 60			
Maximum Allowable Frequency Range (Hz)	47 to 63			
Maximum Rated Output (W) Limited to 800W when operating at low-line input voltage, 100-127 V	1600			
Maximum Rated Standby Output (W)	36			
Nominal Input Voltage (V rms)	100	120	208	230
Nominal Input Current (A rms)	NA	NA	8.8	7.9
Maximum Input at Nominal Input Voltage (W)	NA	NA	1778	1758
Maximum Input at Nominal Input Voltage (VA)	NA	NA	1833	1813
Maximum Rated Efficiency (%) Minimum rating required to achieve 80PLUS platinum certification.	NA	NA	90	91
Maximum Rated Power Factor Minimum rating required to achieve 80PLUS platinum certification.	NA	NA	0.97	0.97

Parameter	Specification
Maximum Inrush Current (peak A)	30
Maximum Inrush Current (ms)	0.2
Maximum Ride-Through Time The time that the output voltage remains within regulation limits at 100% load, during input voltage dropout	12

2300 W AC Power Supply

Note For the 80PLUS platinum certification documented in the following table, you can find test results at https://www.clearesult.com/80plus/.

Parameter	Specification			
Input Connector	IEC320 C20			
Input Voltage Range (V rms)	100 to 240			
Maximum Allowable Input Voltage Range (V rms)	90 to 264			
Frequency Range (Hz)	50 to 60			
Maximum Allowable Frequency Range (Hz)	47 to 63			
Maximum Rated Output (W) Limited to 800W when operating at low-line input voltage, 100-127 V	2300			
Maximum Rated Standby Output (W)	36			
Nominal Input Voltage (V rms)	100	120	208	230
Nominal Input Current (A rms)	13	11	12	10.8
Maximum Input at Nominal Input Voltage (W)	1338	1330	2490	2480
Maximum Input at Nominal Input Voltage (VA)	1351	1343	2515	2505
Maximum Rated Efficiency (%) Minimum rating required to achieve 80PLUS platinum certification.	92	92	93	93
Maximum Rated Power Factor Minimum rating required to achieve 80PLUS platinum certification.	0.99	0.99	0.97	0.97

Parameter	Specification
Maximum Inrush Current (peak A)	30
Maximum Inrush Current (ms)	0.2
Maximum Ride-Through Time Time output voltage remains within regulation limits at 100% load, during input voltage dropout	12

Power Cord Specifications

Each power supply in the node has a power cord. Standard power cords or jumper power cords are available for connection to the node. The shorter jumper power cords, for use in racks, are available as an optional alternative to the standard power cords.

Note Only the approved power cords or jumper power cords listed below are supported.

The following tables show the supported power cords supported for less than 2300-Watt node PSUs, and more than 2300-Watt node PSUs.

Table 11: Supported Power Cords for Less than 2300 W Server PSUs

Description	Length (Feet)	Length (Meters)
CAB-48DC-40A-8AWG DC power cord, -48 VDC, 40 A, 8 AWG Three-socket Mini-Fit connector to three-wire	11.7	3.5
CAB-C13-C14-AC AC power cord, 10 A; C13 to C14, recessed receptacle	9.8	3.0
CAB-250V-10A-AR AC power cord, 250 V, 10 A Argentina	8.2	2.5
CAB-C13-C14-2M-JP AC Power Cord, C13 to C14 Japan PSE Mark	6.6	2.0
CAB-9K10A-EU AC Power Cord, 250 V, 10 A; CEE 7/7 Plug Europe	8.2	2.5

CAB-250V-10A-IS AC Power Cord, SFS, 250 V, 10 A Israel	8.2	2.5
CAB-250V-10A-CN AC power cord, 250 V, 10 A PR China	8.2	2.5
CAB-ACTW AC power cord, 250 V, 10 A, C13 EL302 Taiwan	7.5	2.3
CAB-C13-CBN AC cabinet jumper power cord, 250, 10 A, C13 to C14	2.2	0.68
CAB-C13-C14-2M AC cabinet jumper power cord, 250 V, 10 A, C13 to C14	6.6	2.0
CAB-9K10A-AU AC power cord, 250 V, 10 A, 3112 plug, Australia	8.2	2.5
CAB-N5K6A-NA AC power cord, 200/240 V, 6 A, North America	8.2	2.5
CAB-250V-10A-ID AC power Cord, 250 V, 10 A, India	8.2	2.5
CAB-9K10A-SW AC power cord, 250 V, 10 A, MP232 plug Switzerland	8.2	2.5
CAB-250V-10A-BR AC power Cord, 250 V, 10 A Brazil	8.2	2.5

CAB-9K10A-UK AC power cord, 250 V, 10 A (13 A fuse), BS1363 plug United Kingdom	8.2	2.5
CAB-9K12A-NA AC power cord, 125 V, 13 A, NEMA 5-15 plug North America	8.2	2.5
CAB-AC-L620-C13 AC power cord, NEMA L6-20 to C13 connectors	6.6	2.0
CAB-9K10A-IT AC power cord, 250 V, 10 A, CEI 23-16/VII plug Italy	8.2	2.5
CAB-C13-C14-3M-IN AC power cord jumper, C13 to C14 connector India	9.8	3.0
CAB-C13-C14-IN AC power cord jumper, C13 to C14 connector India	4.6	1.4
CAB-9K10A-KOR Power Cord, 125 V AC, 13 A, KSC8305 plug Korea	6	1.8
CAB-JPN-3PIN 90-125 V AC, 12 A, NEMA 5-15 plug Japan		2.4
R2XX-DMYMPWRCORD No power cord; PID option for ordering node with no power cord	NA	NA

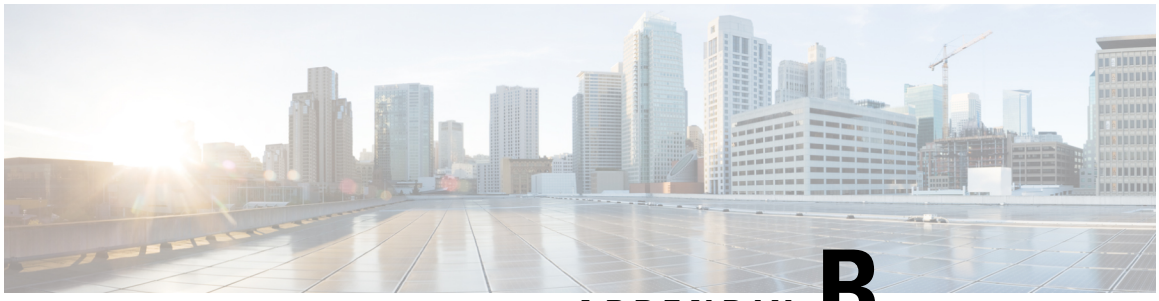
Table 12: Supported Power Cords for More than 2300 W Server PSUs

Description	Length (Feet)	Length (Meters)
CAB-C19-CBN Cabinet Jumper Power Cord, 250 VAC, 16A, C20 to C19 connector		

CAB-S132-C19-ISRL S132 to IEC320 C19 connector Israel	14	
CAB-IR2073-C19-AR IRSM 2073 to IEC320 C19 connector Argentina	14	
CAB-BS1363-C19-UK BS-1363 to IEC 320 C19 connector UK	14	
CAB-SABS-C19-IND SABS 164-1 to IEC 320 C19 connector India		
CAB-C2316-C19-IT CEI 23-16 to IEC 320 C19 Italy	14	
CAB-L520P-C19-US NEMA L5-20 to IEC 320 C19 US	6	
CAB-US515P-C19-US NEMA 5-15 to IEC 320 C19 US	13	
CAB-US520-C19-US NEMA 5-20 to IEC 320 C19 US	14	
CAB-US620P-C19-US NEMA 6-20 to IEC-C19 US	13	
CAB-C19-C20-IND Power Cord C19 to C20 connector India		

UCSB-CABL-C19-BRZ AC power cord NBR 14136 to C19 connector Brazil	14	
CAB-9K16A-BRZ AC Power Cord, 250 V, 16 A, Source Plug EL224 to C19 connector Brazil		
CAB-ACS-16 AC Power Cord, 16A Switzerland		
CAB-AC-16A-AUS AC Power Cord, 250 V, 16 A, C19 connector Australia		
CAB-C19-C20-3M-JP AC Power Cord C19 to C20 connector, Japan PSE mark Japan	10	3
CAB-AC-C19-TW AC Power Cord, 250 V, 16 A, C19 connectors Taiwan		
CAB-AC-C6K-TWLK AC Power Cord, 250 V, 16 A, twist lock NEMA L6-20 plug US		
CAB-AC-2500W-EU AC Power Cord, 250 V, 16 A Europe		
CAB-AC-2500W-INT AC Power Cord, 250 V, 16A International		
CAB-9K16A-KOR AC Power Cord, 250 V, 16 A, Source Plug Korea		

CAB-AC-2500W-ISRL AC Power Cord, 250 V, 16 A Israel		
CAB-AC16A-CH AC Power Cord, 16 A China		
R2XX-DMYMPWRCORD No power cord; PID option for ordering node with no power cord	NA	NA



APPENDIX B

Storage Controller Considerations

This appendix provides storage controller (HBA) information.

Supported Storage Controller and Cables

This node supports a single, PCIe-style, SAS RAID or HBA controller that plugs into a dedicated internal riser.

Note Do not mix controller types in the node.

Note NVMe PCIe SSDs cannot be controlled by a SAS/SATA RAID controller.

This node supports the RAID and HBA controller options and cable requirements shown in the following table.

Storage Adapter (PID)	Product Name	Supported node	Maximum Number of Drives Supported	Supported RAID Type	Cache Size (GB)
HX-RAID-M6T	Cisco 12G SAS RAID Controller with 4GB FBWC (16 Drives)	HX-C220-M6S	10 10 2.5-inch SFF front-loading drives Slots 1-10	RAID	4
HX-SAS-M6T	Cisco 12G SAS HBA (16 Drives)	HX-C220-M6S	10 10 2.5-inch SFF front-loading drives Slots 1-10	SAS HBA	NA
HX-9500-8E	Cisco 9500-8e 12G SAS HBA for external JBOD attach	All models of HX C220 M6 and HX Cs240 M6 node	NA	SAS HBA	NA

Storage Controller Card Firmware Compatibility

Firmware on the storage controller HBA must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the node. If not compatible, upgrade or downgrade the storage controller firmware 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 node components to compatible levels: HUU Guides.

RAID Backup (Supercap)

This supports installation of one Supercap unit (UCS-SCAP-M6). The unit mounts to a bracket in-line with the fan modules.

The optional SCPM provides approximately three years of backup for the disk write-back cache DRAM in the case of a sudden power loss.

For Supercap unit replacement instructions, see Replacing the Supercap (RAID Backup), on page 116.

Write-Cache Policy for Cisco 12G SAS Modular RAID Controller

For this node, the default write-cache policy for the Cisco Modular RAID controller is *Write Through* (irrespective of the presence of a charged SuperCap or “good BBU”). This utilizes the optimal performance characteristics of the controller.

The write policy can be set to *Write Back*, if preferred. You can set the write policy using the following methods:

- For standalone servers, use the Cisco IMC interface to set Virtual Drive Properties > Write Policy. See the "Managing Storage Adapters" section in your Cisco IMC Configuration Guide.

  Cisco IMC GUI and CLI Configuration Guides

- For Cisco UCS-integrated servers, use the Cisco UCS Manager interface to set the write-cache policy as part of virtual drive configuration in your storage profile.

  Cisco UCS Manager Configuration Guides

- Use the LSI Option ROM Configuration Utility.

Mixing Drive Types in RAID Groups

For the best performance follow these guidelines:

- Use either all SAS or all SATA drives in a RAID group.
- Use the same capacity for each drive in the RAID group.
- Never mix HDDs and SSDs in the same RAID group.

RAID Controller Migration

This supports SAS/SATA hardware RAID (controller card) and embedded software SATA RAID. You cannot use hardware RAID and software RAID at the same time. See the table below for which data migrations are allowed and a summary of migration steps.

Starting RAID Controller	Migrate to Hardware RAID Allowed?	Migrate to Software RAID Allowed?
None (no drives). Embedded RAID is disabled in the BIOS.	Allowed 1. Install RAID card. 2. Install SAS cables.	Allowed 1. Install SATA interposer card. 2. Install SATA cables. 3. Enable embedded RAID in BIOS.

Embedded software RAID. Embedded RAID is enabled in the BIOS.	**Caution** Data migration from software RAID to hardware RAID is *not* supported and could result in data loss. Allowed only before there is data on the drives; data migration is not supported. **1.** Disable embedded RAID in the BIOS. **2.** Install RAID card. **3.** Install SAS cables.	-
Hardware RAID. Embedded RAID is disabled in the BIOS.	-	Not allowed.

Storage Controller and Backplane Connectors

This section describes cabling connections for the storage controllers and the backplane. The SAS/SATA cables are factory-installed and are used for all supported internal controllers in the SFF 10-drive version of the node.

This section also contains diagrams that show the cable-to-drive mapping.

Note The SFF 10-drive version with NVMe drives only, and so does not use SAS or SATA RAID. This version of the comes with an NVMe-switch card factory-installed in the internal mRAID riser and a PCIe cable connected to PCIe riser 2. The NVMe switch card is not orderable separately.

Embedded RAID

This SW RAID option can control up to 8 SATA drives in the SFF 10-drive version.

This embedded RAID option requires that you have a SATA interposer card installed in internal mRAID riser 3. Use the SAS/SATA cables that came with the .

1. Connect SAS/SATA cable A1 from the A1 interposer connector to the A1 backplane connector.
2. Connect SAS/SATA cable A2 from the A2 interposer connector to the A2 backplane connector.

Note See the following figures that illustrate cable connections and which drives are controlled by each cable. In the SFF 10-drive version, drives 5 and 10 cannot be controlled by the embedded SATA RAID controller.

Cisco 12G Modular SAS RAID Controller or HBA

This HW RAID option can control up to 10 SAS/SATA drives in the SFF 10-drive version.

This option requires that you have a SAS RAID or HBA card installed in internal mRAID riser 3. Use the SAS/SATA cables that came with the .

1. Connect SAS/SATA cable A1 from the A1 card connector to the A1 backplane connector.
2. Connect SAS/SATA cable A2 from the A2 card connector to the A2 backplane connector.
3. For SFF-10-drive servers only: Connect SAS/SATA cable B2 from the B2 card connector to the B2 backplane connector.

Note See the following figures that illustrate cable connections and which drives are controlled by each cable.

For More RAID Utility Information

The Broadcom utilities have help documentation for more information about using the utilities.

- For basic information about RAID and for using the utilities for the RAID controller cards that are supported in Cisco servers, see the Cisco Servers RAID Guide.
- For hardware SAS MegaRAID configuration—Broadcom 12Gb/s MegaRAID SAS Software User Guide, Version 2.8
- For embedded software MegaRAID and the utility that is accessed via the BIOS (refer to Chapter 4)—Broadcom Embedded MegaRAID Software User Guide, March 2018.