Cisco HX220c M4 HyperFlex Node (Hybrid and All-Flash Models) Installation Guide

Updated January 30, 2018
Includes information for Hybrid, All-Flash, and SED versions

Cisco Systems, Inc.
www.cisco.com

Cisco has more than 200 offices worldwide.
Addresses, phone numbers, and fax numbers
are listed on the Cisco website at
www.cisco.com/go/offices.

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment causes interference to radio or television reception, which can be determined by turning the equipment off and on, users are encouraged to try to correct the interference by using one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications to this product not authorized by Cisco could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

CCDE, CCENT, CCSI, Cisco Eos, Cisco Explorer, Cisco HealthPresence, Cisco IronPort, the Cisco logo, Cisco Nurse Connect, Cisco Pulse, Cisco SensorBase, Cisco StackPower, Cisco StadiumVision, Cisco TelePresence, Cisco TrustSec, Cisco Unified Computing System, Cisco WebEx, DCE, Flip Channels, Flip for Good, Flip Mino, Flipshare (Design), Flip Ultra, Flip Video, Flip Video (Design), Instant Broadband, and Welcome to the Human Network are trademarks; Changing the Way We Work, Live, Play, and Learn, Cisco Capital, Cisco Capital (Design), Cisco:Financed (Stylized), Cisco Store, Flip Gift Card, and One Million Acts of Green are service marks; and Access Registrar, Aironet, AllTouch, AsyncOS, Bringing the Meeting To You, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, CCVP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Lumin, Cisco Nexus, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Collaboration Without Limitation, Continuum, EtherFast, EtherSwitch, Event Center, Explorer, Follow Me Browsing, GainMaker, iLYNX, IOS, iPhone, IronPort, the IronPort logo, Laser Link, LightStream, Linksys, MeetingPlace, MeetingPlace Chime Sound, MGX, Networkers, Networking Academy, PCNow, PIX, PowerKEY, PowerPanels, PowerTV, PowerTV (Design), PowerVu, Prisma, ProConnect, ROSA, SenderBase, SMARTnet, Spectrum Expert, StackWise, WebEx, and the WebEx logo are registered trademarks of Cisco and/or its affiliates in the United States and certain other countries.

Cisco and the Cisco Logo are trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and other countries. A listing of Cisco's trademarks can be found at www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1005R)

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

Cisco HX220c M4 HyperFlex Node (Hybrid and All-Flash Models) Installation Guide
© 2017 Cisco Systems, Inc. All rights reserved.

C O N T E N T S

Cisco HX220c M4 HyperFlex Node Installation Guide

Overview

This chapter provides an overview of the Cisco HX220c M4 HyperFlex Node features:

- Cisco HyperFlex Systems Related Documentation, page 1-1
- External Features Overview, page 1-1
- Replaceable Component Locations, page 1-4
- Summary of Node Features, page 1-5
- Cisco HX220c All-Flash HyperFlex Nodes Overview, page 1-6

Cisco HyperFlex Systems Related Documentation

Links for related Cisco HyperFlex Systems documentation such as the Getting Started Guide, Administration Guide, and Release Notes are listed in the Documentation Roadmap.

External Features Overview

The figures in this chapter show an overview of external node features.

- The front-panel features are shown in Figure 1-1.
- The rear panel features are shown in Figure 1-2.

Figure 1-1   *Front Panel Features*

1	Drive bays 3–8: • HX220c: HDD persistent data drives • HX220c All-Flash: SSD persistent data drives See Replacing Drives, page 3-16 for information about supported drives.	8	Node status LED
2	Drive bay 1: housekeeping SSD for SDS logs	9	Fan status LED
3	Drive bay 2: SSD caching drive The supported SSD differs between the HX220c and HX220c All-Flash nodes. See Replacing Drives, page 3-16.	10	Temperature status LED
4	Pull-out asset tag	11	Power supply status LED
5	Operations panel buttons and LEDs	12	Network link activity LED
6	Power button/power status LED	13	KVM connector (used with KVM cable that provides two USB 2.0, one VGA, and one serial connector)
7	Unit identification button/LED		

Figure 1-2   *Rear Panel Features*
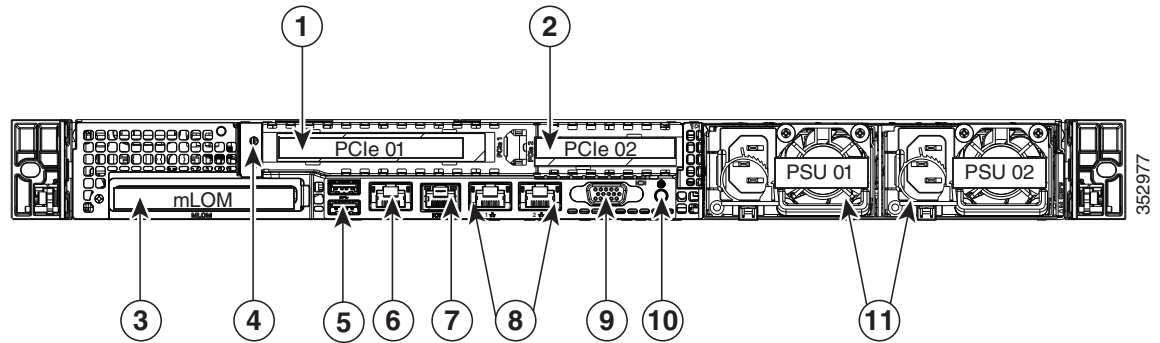
1	PCIe riser 1/slot 1	**7**	Serial port (RJ-45 connector)
2	PCIe riser 2/slot 2	**8**	Dual 1-Gb Ethernet ports (LAN1 and LAN2)
3	Modular LAN-on-motherboard (mLOM) card slot for Cisco VIC 1227	**9**	VGA video port (DB-15)
4	Grounding-lug hole (for DC power supplies)	**10**	Rear unit identification button/LED
5	USB 3.0 ports (two)	**11**	Power supplies (up to two, redundant as 1+1)
6	1-Gb Ethernet dedicated management port		

Replaceable Component Locations

This section shows the locations of the field-replaceable components. The view in Figure 1-3 is from the top down with the top cover and air baffle removed.

Figure 1-3   Replaceable Component Locations

1	Drive bays 3–8: • HX220c: HDD persistent data drives • HX220c All-Flash: SSD persistent data drives See Replacing Drives, page 3-16 for information about supported drives.	9	Power supplies (up to two, hot-swappable when redundant as 1+1)
2	Drive bay 2: SSD caching drive The supported caching SSD differs between the HX220c and HX220c All-Flash nodes. See Replacing Drives, page 3-16.	10	Trusted platform module (TPM) socket on motherboard (not visible in this view)
3	Drive bay 1: housekeeping SSD for SDS logs	11	PCIe riser 2 (half-height PCIe slot 2)
4	Cooling fan modules (six)	12	PCIe riser 1 (full-height PCIe slot 1)
5	DIMM sockets on motherboard (24)	13	Modular LOM (mLOM) connector on chassis floor for Cisco VIC 1227
6	CPUs and heatsinks (two)	14	Cisco modular HBA PCIe riser (dedicated riser with horizontal socket)
7	SD card bays on motherboard (two)	15	Cisco modular HBA card
8	Internal USB 3.0 port on motherboard	16	RTC battery on motherboard

Summary of Node Features

.

Table 1-1   Cisco HX220c M4 HyperFlex Node Features

Feature	Description
Chassis	One rack-unit (1RU) chassis.
Processors	Two Intel Xeon E5-2600 v3 or v4 Series processors.
Memory	24 DDR4 DIMM[1] sockets on the motherboard (12 each CPU).
Multi-bit error protection	Multi-bit error protection is supported.
Baseboard management	BMC, running Cisco Integrated Management Controller (Cisco IMC) firmware. Depending on your Cisco IMC settings, Cisco IMC can be accessed through the 1-Gb dedicated management port, the 1-Gb Ethernet LOM ports, or a Cisco virtual interface card.
Network and management I/O	Supported connectors: • One 1-Gb Ethernet dedicated management port • Two 1-Gb BASE-T Ethernet LAN ports • One RS-232 serial port (RJ-45 connector) • One 15-pin VGA[2] connector • Two USB[3] 3.0 connectors • One front-panel KVM connector that is used with the KVM cable, which provides two USB 2.0, one VGA, and one serial (DB-9) connector.
Modular LOM	Dedicated socket that can be used to add an mLOM card for additional rear-panel connectivity.
WoL	1-Gb BASE-T Ethernet LAN ports support the wake-on-LAN (WoL) standard.
Power	Two AC power supplies: 770 W AC each. Redundant as 1+1. See Power Specifications, page A-3.
ACPI	The advanced configuration and power interface (ACPI) 4.0 standard is supported.
Cooling	Six hot-swappable fan modules for front-to-rear cooling.
PCIe I/O	Two horizontal PCIe[4] expansion slots (single riser assembly).
InfiniBand	The bus slots in this node support the InfiniBand architecture.
Storage	Drives are installed into front-panel drive bays: • One housekeeping SSD for SDS logs in bay 1. • One solid state drive (SSD) caching drive in bay 2. • Persistent data drives: – HX220c: Up to six HDD persistent data drives in bays 3–8. – HX220c All-Flash: Up to six SSD persistent data drives in bays 3–8. See Cisco HX220c All-Flash HyperFlex Nodes Overview, page 1-6 for more information.
Internal USB	One internal USB 3.0 port on the motherboard that you can use with a USB thumb drive for additional storage.

Table 1-1   Cisco HX220c M4 HyperFlex Node Features (continued)

Feature	Description (continued)
SD cards	Two internal bays on the motherboard.
Disk Management	The node has a dedicated internal riser for a PCIe-style Cisco modular HBA card.
	For a list of controller options and required cabling, see Supported HBAs and Required Cables, page C-2.
Native Video	VGA video resolution up to 1920 x 1200, 16 bpp at 60 Hz, and up to 256 MB of video memory.

1. DIMM = dual inline memory module

2. VGA = video graphics array

3. USB = universal serial bus

4. PCIe = peripheral component interconnect express

Cisco HX220c All-Flash HyperFlex Nodes Overview

The HX220c All-Flash HyperFlex node contains all SSDs, rather than the hybrid mix of SSDs and HDDs that is used in the HX220c HyperFlex node. Enterprise value SSDs are used for the persistent data drives. Enterprise high-endurance SSDs are used for the caching drives.

Note the following considerations and restrictions:

- The minimum Cisco HyperFlex software required is Release 2.0 or later.

- HX220c All-Flash HyperFlex nodes are ordered as specific All-Flash PIDs; All-Flash configurations are supported only on those PIDs.

- Conversion from hybrid HX220c configuration to HX220c All-Flash configuration is not supported.

- Mixing hybrid HX220c HyperFlex nodes with HX220c All-Flash HyperFlex nodes within the same HyperFlex cluster is not supported.

See HX220c Drive Configuration Comparison, page 3-17 for specifics about drive PIDs supported in the node types.

Installing the Node

This chapter describes how to install the node, and it includes the following sections:

- Unpacking and Inspecting the Node, page 2-2
- Preparing for Node Installation, page 2-3
- Installing the Node In a Rack, page 2-5
- Initial Node Setup, page 2-9

Note Before you install, operate, or service a node, 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

Unpacking and Inspecting the Node

⚠️

Caution   When handling internal node components, wear an ESD strap and handle modules by the carrier edges only.

🔍

Tip   Keep the shipping container in case the node requires shipping in the future.

✎

Note   The chassis is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, contact your customer service representative immediately.

Step 1   Remove the node from its cardboard container and save all packaging material.

Step 2   Compare the shipment to the equipment list provided by your customer service representative. Verify that you have all items.

Step 3   Check for damage and report any discrepancies or damage to your customer service representative. Have the following information ready:

- Invoice number of shipper (see the packing slip)
- Model and serial number of the damaged unit
- Description of damage
- Effect of damage on the installation

Preparing for Node Installation

This section provides information about preparing for node installation, and it includes the following topics:

Installation Guidelines

Warning   **To prevent the node from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of: 40° C (104° 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

Caution   To ensure proper airflow it is necessary to rack the nodes 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 nodes, which could result in overheating, higher fan speeds, and higher power consumption. We recommend that you mount your nodes on rail kits when you are installing them into the rack because these rails provide the minimal spacing required between the nodes. No additional spacing between the nodes is required when you mount the units using rail kits.

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

- Ensure that there is adequate space around the node to allow for servicing 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, page A-2.

- Ensure that the cabinet or rack meets the requirements listed in the "Rack Requirements" section on page 2-4.
- Ensure that the site power meets the power requirements listed in the Power Specifications, page A-3. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

Rack Requirements

This section provides the requirements for the standard open racks.

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 supplied slide rails.
- The minimum vertical rack space per node must be one RU, equal to 1.75 in. (44.45 mm).

Equipment Requirements

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

Supported Slide Rail Kits

This node supports two rail kit options:

- Cisco part UCSC-RAILB-M4= (ball-bearing rail kit).
- Cisco part UCSC-RAILF-M4= (friction rail kit).

Slide Rail Adjustment Range 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 contains the following sections:

Installing the Slide Rails

This section describes how to install the node in a rack using the rack kits that are 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 node 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 (see Figure 2-1).

b.   Set the keyed slots over the pegs, and then slide the rail toward the front to lock it in place on the pegs. The front slot has a metal clip that locks over the front peg.

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

Figure 2-1   Attaching Inner Rail to Side of Node

1	Front of node	2	Locking clip on inner rail
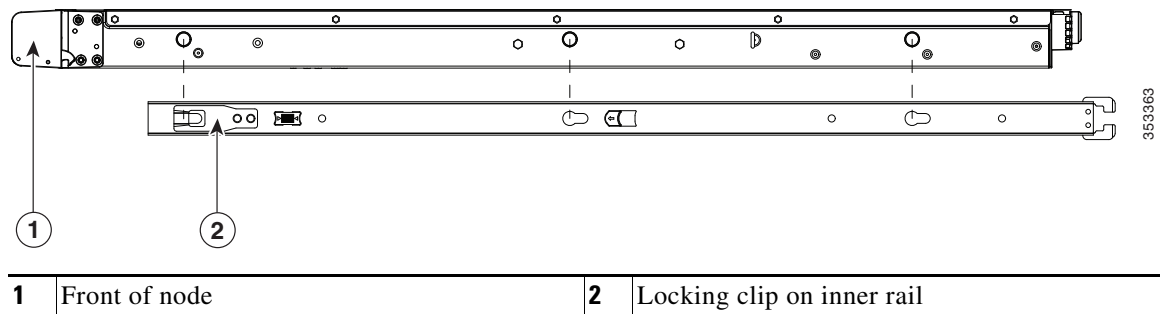
Step 2 Open the front securing plate on both slide-rail assemblies. The front end of the slide-rail assembly has a spring-loaded securing plate that must be open before you can insert the mounting pegs into the rack-post holes (see Figure 2-2).

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

Figure 2-2   Front Securing Mechanism, Inside of Front End
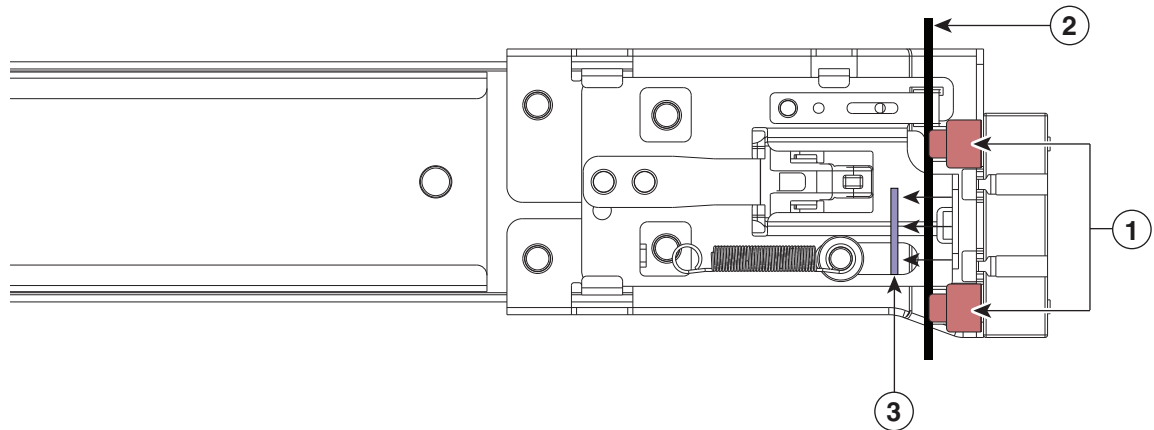
| 1 | Front mounting pegs | 3 | Securing plate shown pulled back to open position |
| 2 | Rack post | | |

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 (see Figure 2-2).

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 with each other 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 67 pounds (59 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 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 stops.

c. Slide the 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 2-3   Inner Rail Release Clip
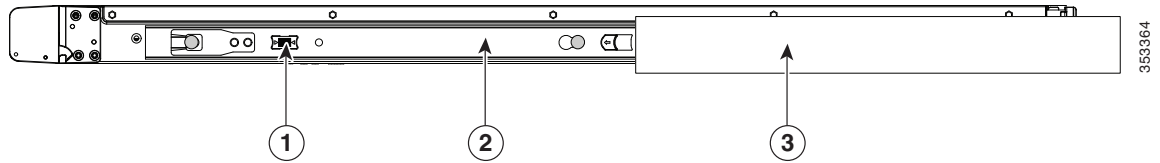
1	Inner rail release clip	**3**	Outer rail attached to rack post
2	Inner rail attached to node and inserted into outer rail		

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 nodes installed.

With the node fully pushed into the slide rails, open a hinged slam latch lever on the front of the node and insert the 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.

Installing the Cable Management Arm (Optional)

✎
Note The CMA is reversible left to right. To reverse the CMA, see Reversing the Cable Management Arm (Optional), page 2-9 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 (see Figure 2-4). Slide the tab over the end of the rail until it clicks and locks.

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 (see Figure 2-4). 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 (see Figure 2-4).

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 (see Figure 2-4). 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.

Figure 2-4   Attaching the Cable Management Arm to the Rear of the Slide Rails
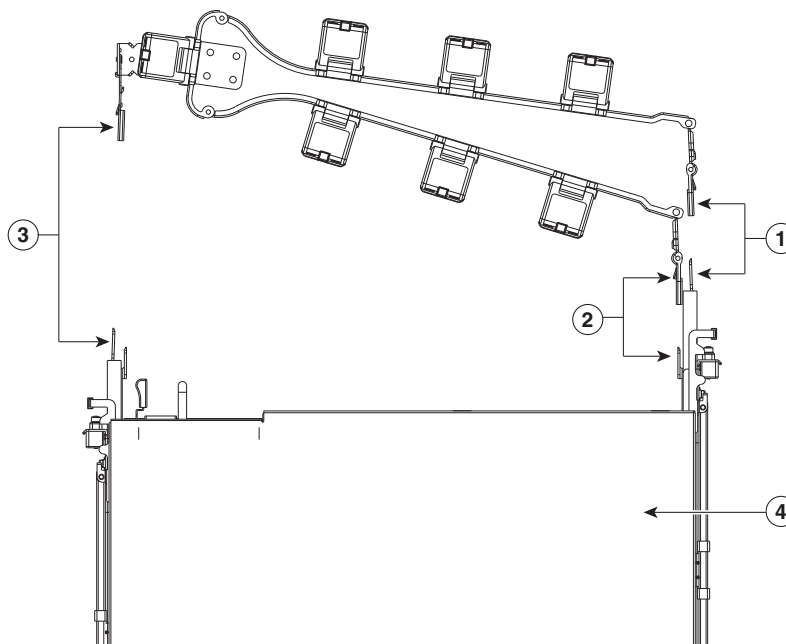
1	CMA tab on arm farthest from node and end of stationary outer slide rail	3	CMA tab on width-adjustment slider and end of stationary outer slide rail
2	CMA tab on arm closest to the node and end of inner slide rail attached to node	4	Rear of node

Reversing the Cable Management Arm (Optional)

Step 1   Rotate the entire CMA assembly 180 degrees. The plastic cable guides must remain pointing upward.

Step 2   Flip the tabs at the end of each CMA arm 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 2-5   Reversing the CMA
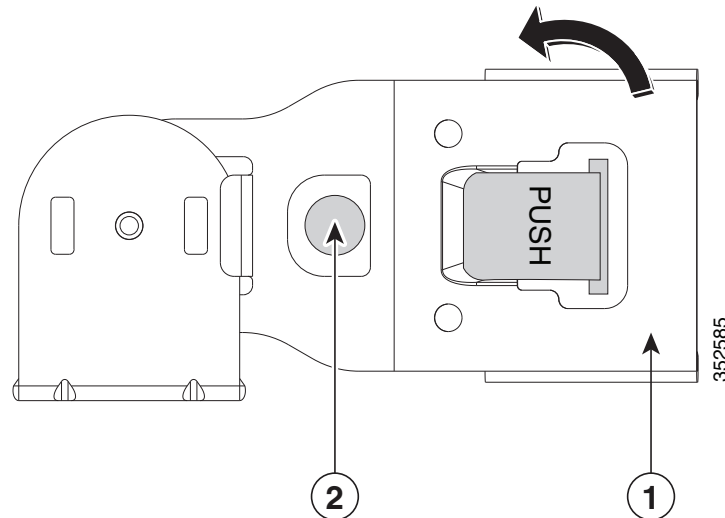
1	CMA tab on end of width-adjustment slider	**2**	Metal button for rotating

Initial Node Setup

Refer to the following documentation:

- For instructions on physically installing the nodes in racks, see Installing the Node In a Rack, page 2-5

- For installation instructions on configuring system fabric interconnects and connecting the HX Series HyperFlex nodes to the fabrics, refer to the Cisco HyperFlex Systems Getting Started Guide.

- For instructions on adding the HX220c node as a compute-only node, see the "Adding a Compute Node" section in the Cisco HyperFlex Systems Getting Started Guide.

- For instructions on starting the node in standalone mode for troubleshooting purposes only, see Setting Up the Node in Standalone Mode, page 3-65.

Maintaining the Node

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

- Status LEDs and Buttons, page 3-1
- Preparing for Component Installation, page 3-7
- Installing or Replacing Node Components, page 3-14
- Service DIP Switches, page 3-58
- Setting Up the Node in Standalone Mode, page 3-65

Status LEDs and Buttons

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

- Front Panel LEDs, page 3-2
- Rear Panel LEDs and Buttons, page 3-4
- Internal Diagnostic LEDs, page 3-6

Front Panel LEDs

Figure 3-1 shows the front panel LEDs. Table 3-1 defines the LED states.

Figure 3-1   ***Front Panel LEDs***
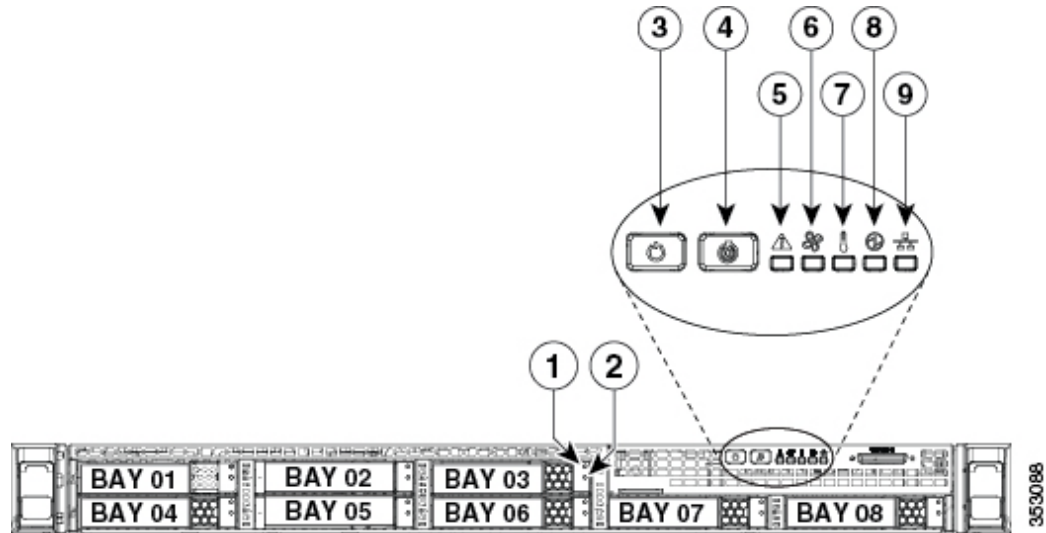
1	Drive fault LED	6	Fan status LED
2	Drive activity LED	7	Temperature status LED
3	Power button/power status LED	8	Power supply status LED
4	Identification button/LED	9	Network link activity LED
5	Node status LED		

Table 3-1   ***Front Panel LEDs, Definitions of States***

	LED Name	State
1	SAS/SATA drive fault	• Off—The hard drive is operating properly. • Amber—Drive fault detected. • Amber, blinking—The device is rebuilding. • Amber, blinking with one-second interval—Drive locate function activated.
2	SAS/SATA drive activity	• Off—There is no hard drive in the hard drive tray (no access, no fault). • Green—The hard drive is ready. • Green, blinking—The hard drive is reading or writing data.
3	Power button/LED	• Off—There is no AC power to the node. • Amber—The node is in standby power mode. Power is supplied only to the Cisco IMC and some motherboard functions. • Green—The node is in main power mode. Power is supplied to all node components.
4	Unit identification	• Off—The unit identification function is not in use. • Blue—The unit identification function is activated.

Table 3-1   *Front Panel LEDs, Definitions of States (continued)*

	LED Name	State

5	Node status	• Green—The node is running in normal operating condition.
		
		• Green, blinking—The node is performing node initialization and memory check.
		
		• Amber, steady—The node is in a degraded operational state. For example:
		  – Power supply redundancy is lost.
		  – CPUs are mismatched.
		  – At least one CPU is faulty.
		  – At least one DIMM is faulty.
		  – At least one drive in a RAID configuration failed.
		
		• Amber, blinking—The node is in a critical fault state. For example:
		  – Boot failed.
		  – Fatal CPU and/or bus error is detected.
		  – node is in an over-temperature condition.

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

Rear Panel LEDs and Buttons

Figure 3-2 shows the rear panel LEDs and buttons. Table 3-2 defines the LED states.

Figure 3-2   Rear Panel LEDs and Buttons
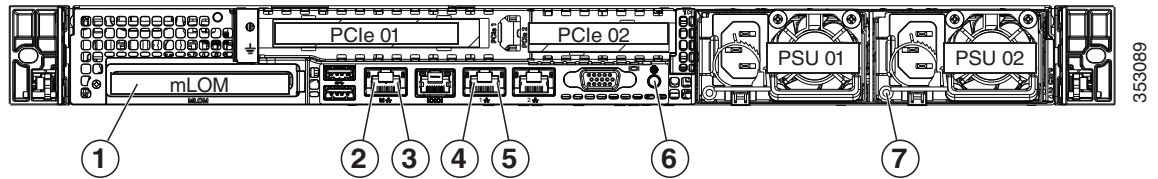
1	mLOM card LED (Cisco VIC 1227) (not shown, see Table 3-2)	5	1-Gb Ethernet link status LED
2	1-Gb Ethernet dedicated management link status LED	6	Rear unit identification button/LED
3	1-Gb Ethernet dedicated management link speed LED	7	Power supply status LED
4	1-Gb Ethernet link speed LED		

Table 3-2   Rear Panel LEDs, Definitions of States

	LED Name	State
1	mLOM Cisco VIC 1227 10-Gb SFP+ (single status LED)	• Off—No link is present. • Green, steady—Link is active. • Green, blinking—Traffic is present on the active link.
2	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.
3	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.
4	1-Gb Ethernet link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
5	1-Gb Ethernet link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.

Table 3-2   Rear Panel LEDs, Definitions of States (continued)

	LED Name	State
6	Rear unit identification	• Off—The unit identification LED is not in use.
		• Blue—The unit identification LED is activated.
7	Power supply status	• 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).

Internal Diagnostic LEDs

The node has internal fault LEDs for CPUs, DIMMs, fan modules, SD cards, the RTC battery, and the mLOM card. These LEDs are available only when the node is in standby power mode. An LED lights amber to indicate a faulty component.

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

Figure 3-3   Internal Diagnostic LED Locations
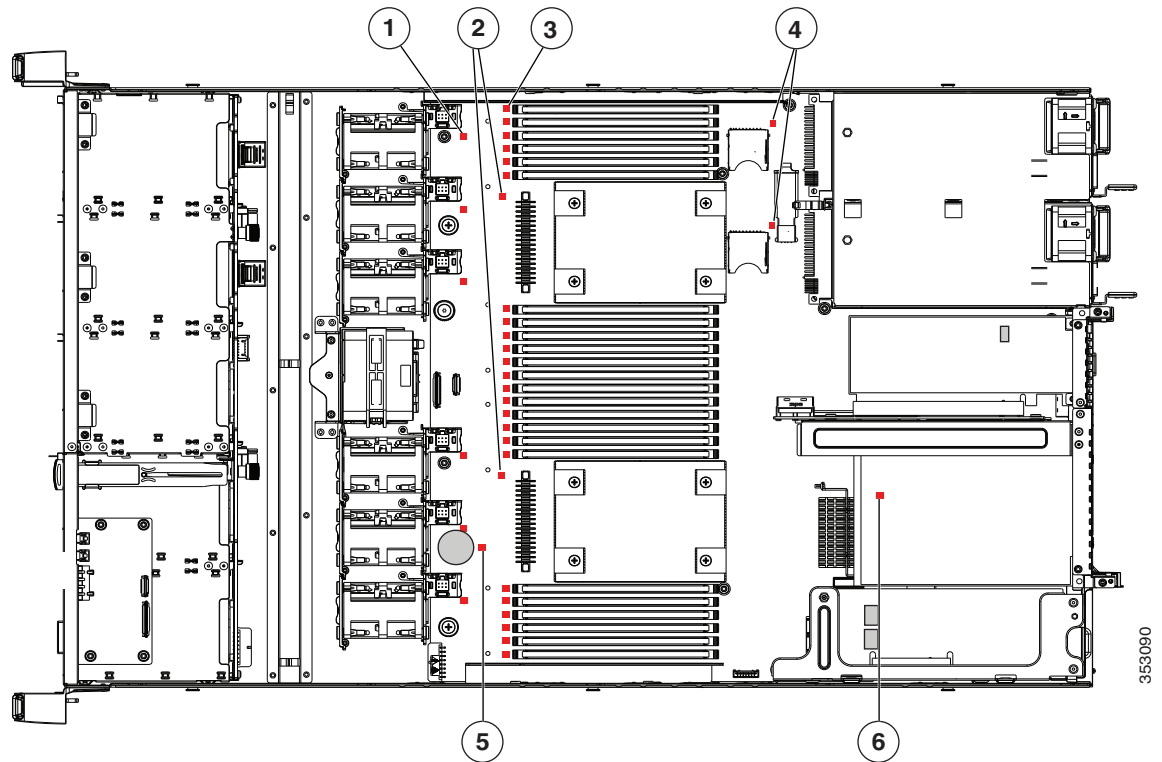
1	Fan module fault LEDs (one next to each fan connector on the motherboard)	4	SD card fault LEDs (one next to each bay)
2	CPU fault LEDs (one in front of each CPU)	5	RTC battery fault LED
3	DIMM fault LEDs (one in front of each DIMM socket on the motherboard)	6	mLOM card fault LED (on motherboard next to mLOM socket)

Table 3-3   Internal Diagnostic LEDs, Definition of States

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

Preparing for Component Installation

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

Required Equipment

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

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

Shutting Down the Node

The node can run in 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 the cooling fans and it is safe to power off the node from this mode.

⚠️

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

This section contains the following procedures, which are referenced from component replacement procedures. Alternate shutdown procedures are included.

فالله

Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode

Some procedures directly place the node into Cisco HX Maintenance mode. This procedure migrates all VMs to other nodes before the node is shut down and decommissioned from Cisco UCS Manager.

Step 1 Put the node in Cisco HX Maintenance mode by using the vSphere interface:

- **Using the vSphere web client:**

    a. Log in to the vSphere web client.

    b. Go to **Home > Hosts and Clusters.**

    c. Expand the **Datacenter** that contains the **HX Cluster**.

    d. Expand the **HX Cluster** and select the node.

    e. Right-click the node and select **Cisco HX Maintenance Mode > Enter HX Maintenance Mode**.

- **Using the command line interface:**

    a. Log in to the storage controller cluster command line as a user with root privileges.

    b. Move the node into HX Maintenance Mode.

    1. Identify the node ID and IP address:

    # `stcli node list --summary`

    2. Enter the node into HX Maintenance Mode.

    # `stcli node maintenanceMode (--id ID | --ip IP Address) --mode enter`

    (see also **stcli node maintenanceMode --help**)

    c. Log into the ESXi command line of this node as a user with root privileges.

    d. Verify that the node has entered HX Maintenance Mode:

    # `esxcli system maintenanceMode get`

Step 2 Shut down the node using UCS Manager as described in Shutting Down the Node, page 3-7.

Shutting Down the Node with the Node Power Button

✎

Note This method is not recommended for a HyperFlex node, but the operation of the physical power button is explained here in case an emergency shutdown is required.

Step 1 Check the color of the Power Status LED (see the "Front Panel LEDs" section on page 3-2).

- Green—The node is in main power mode and must be shut down before it can be safely powered off. Go to Step 2.

- Amber—The node is already in standby mode and can be safely powered off.

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

⚠

Caution To avoid data loss or damage to your operating node, 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 Status LED.

- Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.

Decommissioning the Node Using Cisco UCS Manager

Before replacing an internal component of a node, you must decommission the node to remove it from the Cisco UCS configuration. When you use this procedure to shut down an HX node, Cisco UCS Manager triggers the OS into a graceful shutdown sequence.

Step 1 In the Navigation pane, click **Equipment**.

Step 2 Expand **Equipment > Rack Mounts > Servers**.

Step 3 Choose the node that you want to decommission.

Step 4 In the **Work** pane, click the **General** tab.

Step 5 In the **Actions** area, click **Server Maintenance**.

Step 6 In the Maintenance dialog box, click **Decommission**, then click **OK**.

The node is removed from the Cisco UCS configuration.

Post-Maintenance Procedures

This section contains the following procedures, which are referenced from component replacement procedures:

- Recommissioning the Node Using Cisco UCS Manager, page 3-11
- Associating a Service Profile With an HX Node, page 3-11
- Exiting HX Maintenance Mode, page 3-12

Recommissioning the Node Using Cisco UCS Manager

After replacing an internal component of a node, you must recommission the node to add it back into the Cisco UCS configuration.

Step 1   In the **Navigation** pane, click **Equipment**.

Step 2   Under **Equipment,** click the **Rack Mounts** node.

Step 3   In the **Work** pane, click the **Decommissioned** tab.

Step 4   On the row for each rack-mount server that you want to recommission, do the following:

    a.   In the **Recommission** column, check the check box.

    b.   Click **Save Changes**.

Step 5   If a confirmation dialog box displays, click **Yes**.

Step 6   (Optional) Monitor the progress of the server recommission and discovery on the **FSM** tab for the server.

Associating a Service Profile With an HX Node

Use this procedure to associate an HX node to its service profile after recommissioning.

Step 1   In the **Navigation** pane, click **Servers**.

Step 2   Expand **Servers > Service Profiles**.

Step 3   Expand the node for the organization that contains the service profile that you want to associate with the HX node.

Step 4   Right-click the service profile that you want to associate with the HX node and then select **Associate Service Profile**.

Step 5   In the Associate Service Profile dialog box, select the **Server** option.

Step 6   Navigate through the navigation tree and select the HX node to which you are assigning the service profile.

Step 7   Click **OK**.

Exiting HX Maintenance Mode

Use this procedure to exit HX Maintenance Mode after performing a service procedure.

Step 1 Exit the node from Cisco HX Maintenance mode by using the vSphere interface:

- **Using the vSphere web client:**

a. Log in to the vSphere web client.

b. Go to **Home > Hosts and Clusters.**

c. Expand the **Datacenter** that contains the **HX Cluster**.

d. Expand the **HX Cluster** and select the node.

e. Right-click the node and select **Cisco HX Maintenance Mode > Exit HX Maintenance Mode**.

- **Using the command line:**

a. Log in to the storage controller cluster command line as a user with root privileges.

b. Exit the node out of HX Maintenance Mode.

   1. Identify the node ID and IP address:

   `# stcli node list --summary`

   2. Exit the node out of HX Maintenance Mode

   `# stcli node maintenanceMode (--id ID | --ip IP Address) --mode exit`

   (see also **stcli node maintenanceMode --help**)

c. Log into ESXi command line of this node as a user with root privileges.

d. Verify that the node has exited HX Maintenance Mode:

   `# esxcli system maintenanceMode get`

Removing and Replacing the Node Top Cover

Step 1   Remove the top cover (see Figure 3-4).

    a.   If the cover latch is locked, use a screwdriver to turn the lock 90-degrees counterclockwise to unlock it. See Figure 3-4.

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

    c.   Lift the top cover straight up from the node and set it aside.

Step 2   Replace the top cover:

✎

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

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

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

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

Figure 3-4   Removing the Top Cover
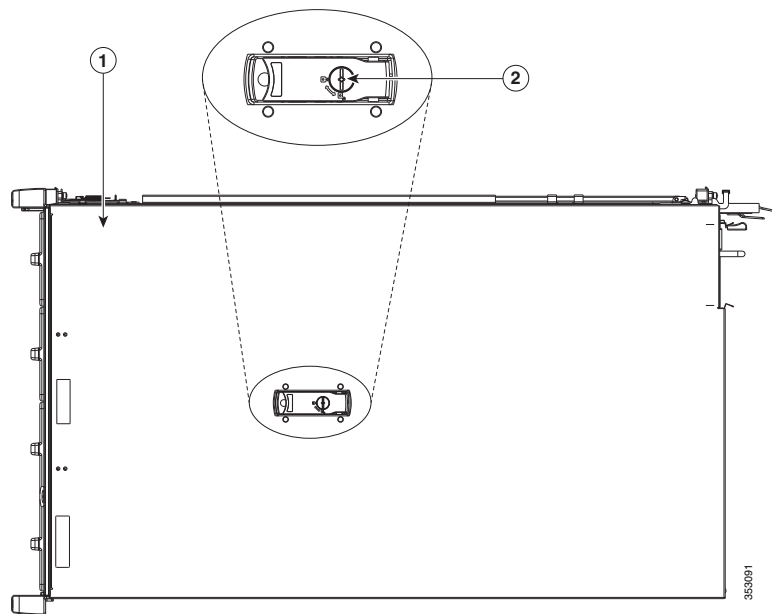
1	Top cover	2	Locking cover latch

Installing or Replacing Node 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 node unless all cards, faceplates, front covers, and rear covers are in place.**
Statement 1029

Caution   When handling node components, wear an ESD strap to avoid damage.

Tip   You can press the unit identification button on the front panel or rear panel to turn on a flashing unit identification LED on the front and rear panels of the 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. See the "Status LEDs and Buttons" section on page 3-1 for locations of these LEDs.

This section describes how to install and replace node components, and it includes the following topics:

- Replaceable Component Locations, page 3-15
- Replacing Drives, page 3-16
- Replacing Fan Modules, page 3-22
- Replacing the Motherboard RTC Battery, page 3-24
- Replacing DIMMs, page 3-26
- Replacing CPUs and Heatsinks, page 3-31
- Replacing an Internal SD Card, page 3-37
- Enabling or Disabling the Internal USB Port, page 3-38
- Replacing a Cisco Modular HBA Riser (Internal Riser 3), page 3-39
- Replacing a Cisco Modular HBA Card, page 3-41
- Replacing a PCIe Riser Assembly, page 3-43
- Replacing a PCIe Riser Assembly, page 3-43
- Replacing a PCIe Card, page 3-45
- Installing and Enabling a Trusted Platform Module, page 3-49
- Replacing an mLOM Card (Cisco VIC 1227), page 3-53
- Replacing Power Supplies, page 3-56

Replaceable Component Locations

This section shows the locations of the field-replaceable components. The view in Figure 3-5 is from the top down with the top cover and air baffle removed.

Figure 3-5   *Replaceable Component Locations*

1	Drive bays 3–8: • HX220c: HDD persistent data drives • HX220c All-Flash: SSD persistent data drives See Replacing Drives, page 3-16 for information about supported drives.	9	Power supplies (up to two, hot-swappable when redundant as 1+1)
2	Drive bay 2: SSD caching drive The supported caching SSD differs between the HX220c and HX220c All-Flash nodes. See Replacing Drives, page 3-16.	10	Trusted platform module (TPM) socket on motherboard (not visible in this view)
3	Drive bay 1: housekeeping SSD for SDS logs	11	PCIe riser 2 (half-height PCIe slot 2)
4	Cooling fan modules (six)	12	PCIe riser 1 (full-height PCIe slot 1)
5	DIMM sockets on motherboard (24)	13	Modular LOM (mLOM) connector on chassis floor for Cisco VIC 1227
6	CPUs and heatsinks (two)	14	Cisco modular HBA PCIe riser (dedicated riser with horizontal socket)
7	SD card bays on motherboard (two)	15	Cisco modular HBA card
8	Internal USB 3.0 port on motherboard	16	RTC battery on motherboard

Replacing Drives

This section includes the following information:

Drive Population Guidelines

The drive bay numbering is shown in Figure 3-6.

Figure 3-6   *Drive Bay Numbering*
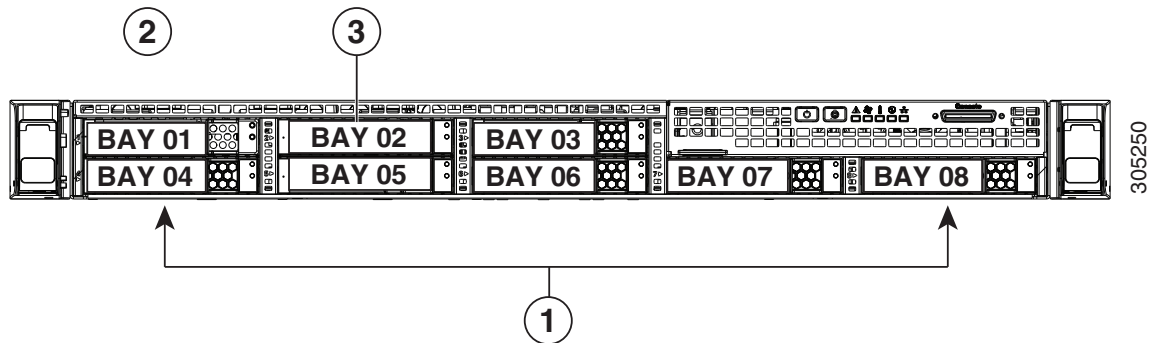
1	Bays 3 - 8: HDD data drives	**3**	Bay 2: SSD cache drive
2	Bay 1: housekeeping SSD for SDS logs		

Observe these drive population guidelines:

- Populate the housekeeping SSD for SDS logs only in bay 1.
- Populate the SSD caching drive only in bay 2. See Table 3-4 for the supported caching SSDs, which differ between supported drive configurations.
- Populate persistent data drives only in bays 3 - 8.
    - HX220c: HDD persistent data drives
    - HX220c All-Flash: SSD persistent data drives

  See Table 3-4 for the supported persistent drives, which differ between supported drive configurations.

- When populating persistent data drives, add drives in the lowest numbered bays first.
- Keep an empty drive blanking tray in any unused bays to ensure optimal airflow and cooling.
- See HX220c Drive Configuration Comparison, page 3-17 for comparison of supported drive configurations.

HX220c Drive Configuration Comparison

Table 3-4   *Supported Drive Configurations*

Component	HX220c Hybrid Drives	HX220c All-Flash Drives	HX220c SED Hybrid Drives	HX220c SED All-Flash Drives
Persistent data drives **Front bays 3 - 8**	HDD: • UCS-HD12TB10K12G	SSDs: • UCS-SD960GBKS4-EV	HDD (SED): • UCS-HD12G10K9	SSD (SED): • UCS-SD800GBEK9
Housekeeping SSD for SDS logs **Front bay 1**	SSD: • UCS-SD120GBKS4-EV	SSD: • UCS-SD120GBKS4-EV	SSD: • UCS-SD120GBKS4-EV	SSD: • UCS-SD120GBKS4-EV
Caching SSD **Front bay 2**	SSD: • UCS-SD480G12S3-EP	SSD: • UCS-SD480G12S3-EP	SSD (SED): • UCS-SD800GBEK9	SSD: (SED) • UCS-SD800GBEK9

Note the following considerations and restrictions for All-Flash HyperFlex nodes:

- The minimum Cisco HyperFlex software required is Release 2.0 or later.
- HX220c All-Flash HyperFlex nodes are ordered as specific All-Flash PIDs; All-Flash configurations are supported only on those PIDs.
- Conversion from hybrid HX220c configuration to HX220c All-Flash configuration is not supported.
- Mixing hybrid HX220c HyperFlex nodes with HX220c All-Flash HyperFlex nodes within the same HyperFlex cluster is not supported.

Note the following considerations and restrictions for SED HyperFlex nodes:

- The minimum Cisco HyperFlex software required for SED configurations is Release 2.1(1a) or later.
- Mixing HX220c *hybrid* SED HyperFlex nodes with HX220c *All-Flash* SED HyperFlex nodes within the same HyperFlex cluster is not supported.

Drive Replacement Overview

The three types of drives in the node require different replacement procedures.

Table 3-5   Drive Replacement Overview

Persistent data drives Front bays 3 - 8	Hot-swap replacement is supported. See Replacing Persistent Data Drives (Bays 3 – 8), page 3-19. **NOTE:** Hot-swap replacement includes hot-removal, so you can remove the drive while it is still operating.
Housekeeping SSD for SDS logs Front bay 1	Node must be put into Cisco HX Maintenance Mode before replacing the housekeeping SSD. Replacement requires additional technical assistance and cannot be completed by the customer. See Replacing the Housekeeping SSD for SDS Logs (Bay 1), page 3-20.
SSD caching drive Front bay 2	Hot-swap replacement is supported. See Replacing the SSD Caching Drive (Bay 2), page 3-21. **NOTE:** Hot-swap replacement for SAS/SATA drives includes hot-removal, so you can remove the drive while it is still operating. **NOTE:** If an NVMe SSD is used as the caching drive, additional steps are required, as described in the procedure.

Replacing Persistent Data Drives (Bays 3 – 8)

The persistent data drives must be installed only in drive bays 3 - 8.

See HX220c Drive Configuration Comparison, page 3-17 for supported drives.

Note Hot-swap replacement includes hot-removal, so you can remove the drive while it is still operating.

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. See Figure 3-7.

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

c. If you are replacing an existing drive, remove the four drive-tray screws that secure the drive to the tray and then lift the drive out of the tray.

Step 2 Install a new drive:

a. Place a new drive in the empty drive tray and 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 3-7   Replacing Drives
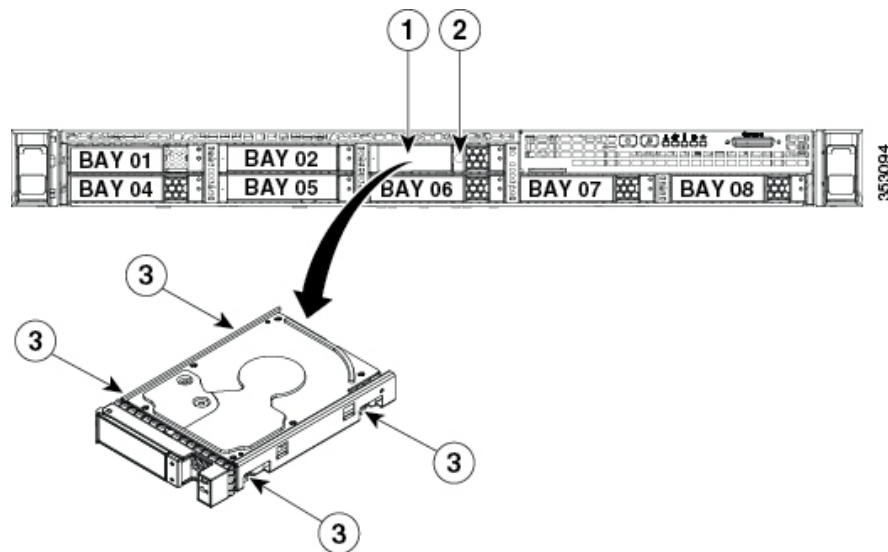
1	Ejector lever	**3**	Drive tray securing screws (4)
2	Release button		–

Replacing the Housekeeping SSD for SDS Logs (Bay 1)

Note   This procedure requires assistance from technical support for additional software update steps after the hardware is replaced. It cannot be completed without technical support assistance.

Caution   Put the HX node in Cisco HX Maintenance mode before replacing the housekeeping SSD, as described in the procedure. Hot swapping the housekeeping/logs SSD while the HX node is running causes the HX node to fail.

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   Remove the drive that you are replacing:

   a. Press the release button on the face of the drive tray. See Figure 3-7.

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

   c. If you are replacing an existing drive, remove the four drive-tray screws that secure the drive to the tray and then lift the drive out of the tray.

Step 6   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.

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

Step 8   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 9   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 10   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Note   After you replace the SSD hardware, you must contact technical support for additional software update steps.

Replacing the SSD Caching Drive (Bay 2)

The SSD caching drive must be installed in drive bay 2.

Note the following considerations and restrictions for NVMe SSDs When Used As the Caching SSD:

- NVMe SSDs are supported in HX220c and All-Flash nodes.
- NVMe SSDs are not supported in Hybrid nodes.
- NVMe SSDs are supported only in the Caching SSD position, in drive bay 2.
- NVMe SSDs are not supported for persistent storage or as the Housekeeping drive.
- The locator (beacon) LED cannot be turned on or off on NVMe SSDs.

Note   Always replace the drive with the same type and size as the original drive.

Note   Upgrading or downgrading the Caching drive in an existing HyperFlex cluster is not supported. If the Caching drive must be upgraded or downgraded, then a full redeployment of the HyperFlex cluster is required.

Note   When using a SAS drive, hot-swap replacement includes hot-removal, so you can remove a SAS drive while it is still operating. NVMe drives cannot be hot-swapped.

Step 1   **Only if the caching drive is an NVMe SSD**, enter the ESXi host into HX Maintenance Mode. Otherwise, skip to step 2.

Step 2   Remove the SSD caching drive:

   a. Press the release button on the face of the drive tray (see Figure 3-7).

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

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

Step 3   Install a new SSD caching drive:

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

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

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

Step 4   **Only if the caching drive is an NVMe SSD**:

   a. reboot the ESXi host. This enables ESXi to discover the NVMe SSD.

   b. Exit the ESXi host from HX Maintenance Mode.

Replacing Fan Modules

The six fan modules in the node are numbered as follows when you are facing the front of the node (also see Figure 3-9).

Figure 3-8   *Fan Module Numbering*

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

Tip   Each fan module has a fault LED next to the fan connector on the motherboard that lights amber if the fan module fails. Standby power is required to operate these LEDs.

Caution   You do not have to shut down or power off 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 a fan module that you are replacing (see Figure 3-9):

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 as described in Removing and Replacing the Node Top Cover, page 3-13.

c.   Grasp the fan module at its front and on the green connector. Lift straight up to disengage its connector from the motherboard and free it from the two alignment pegs.

Step 2   Install a new fan module:

a.   Set the new fan module in place, aligning its two openings with the two alignment pegs on the motherboard. See Figure 3-9.

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

c.   Replace the top cover.

d.   Replace the node in the rack.

Figure 3-9   Top View of Fan Module
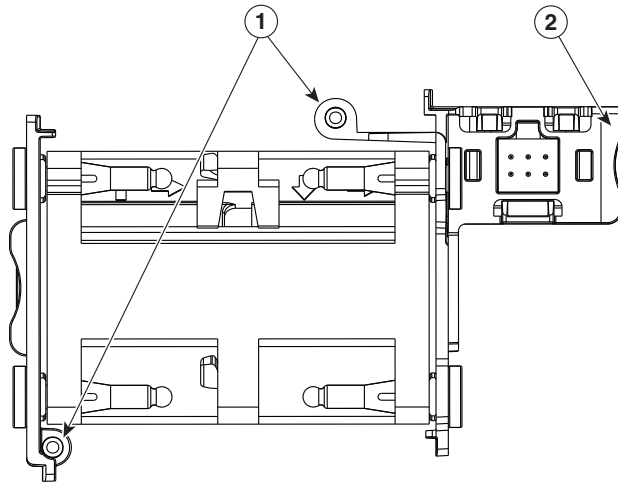
1	Openings in fan module for motherboard alignment pegs	**2**	Fan connector to motherboard

Replacing the Motherboard RTC Battery

⚠

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

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

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

⚠

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Locate the RTC battery. See Figure 3-10.

Step 8   Gently remove the battery from the holder on the motherboard.

Step 9   Insert the battery into its holder and press down until it clicks in place.

✎

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

Step 10   Replace the top cover.

Step 11   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 12   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 13   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 14   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-10   Motherboard RTC Battery Location
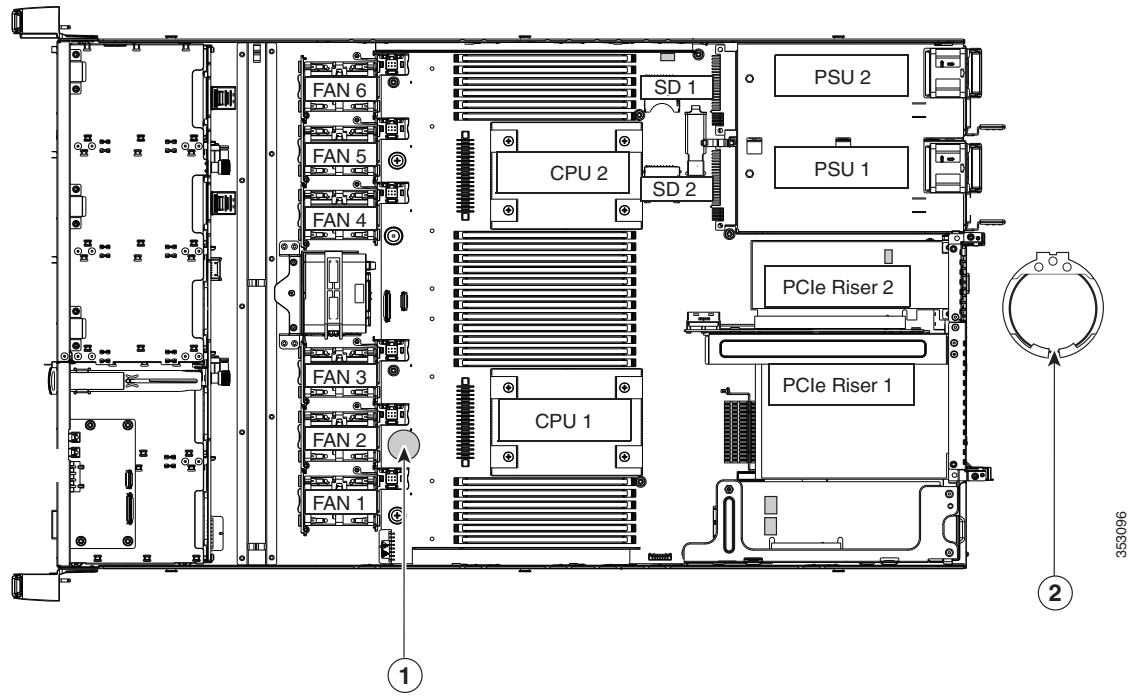
1	RTC battery holder on motherboard	**2**	Prying point on battery in holder

Replacing DIMMs

This section includes the following topics:

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

⚠️
Caution Cisco does not support third-party DIMMs. Using non-Cisco DIMMs in the node might result in node 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.

Memory Performance Guidelines and Population Rules

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

DIMM Slot Numbering

Figure 3-11 shows the numbering of the DIMM slots.

Figure 3-11   *DIMM Slots and CPUs*
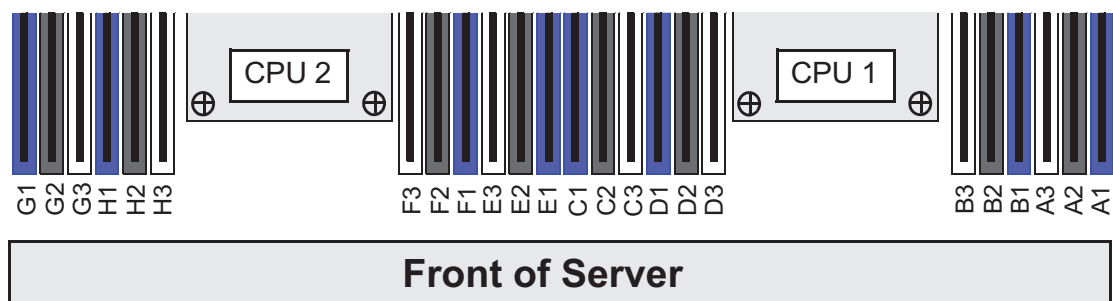
DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- Each CPU supports four memory channels.

    - CPU1 supports channels A, B, C, and D.

    - CPU2 supports channels E, F, G, and H.

- Each channel has three DIMM sockets (for example, channel A = slots A1, A2, and A3).

    - A channel can operate with one, two, or three DIMMs installed.

    - If a channel has only one DIMM, populate slot 1 first (the blue slot).

- When both CPUs are installed, populate the DIMM sockets of each CPU identically.

    - Fill blue #1 slots in the channels first: A1, E1, B1, F1, C1, G1, D1, H1

    - Fill black #2 slots in the channels second: A2, E2, B2, F2, C2, G2, D2, H2

    - Fill white #3 slots in the channels third: A3, E3, B3, F3, C3, G3, D3, H3

- Any DIMM installed in a DIMM socket for which the CPU is absent is not recognized. In a single-CPU configuration, populate the channels for CPU1 only (A, B, C, D).

- Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. When memory mirroring is enabled, DIMMs must be installed in sets of 4, 6, or 8 as described in Memory Mirroring and RAS, page 3-28.

- Observe the DIMM mixing rules shown in Table 3-6.

Table 3-6   DIMM Mixing Rules for HX220c M4 Nodes

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

Memory Mirroring and RAS

The Intel E5-2600 CPUs within the 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. Furthermore, if memory mirroring is used, DRAM size is reduced by 50 percent for reasons of reliability.

Lockstep Channel Mode

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

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

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

DIMM Replacement Procedure

This section includes the following topics:

- Identifying a Faulty DIMM, page 3-29
- Replacing DIMMs, page 3-29

Identifying a Faulty DIMM

Each DIMM socket has a corresponding DIMM fault LED, directly in front of the DIMM socket. See Figure 3-3 for the locations of these LEDs. The LEDs light amber to indicate a faulty DIMM. To operate these LEDs from the supercap power source, remove AC power cords and then press the **unit identification** button. See also Internal Diagnostic LEDs, page 3-6.

Replacing DIMMs

Step 1 Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2 Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3 Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4 Disconnect all power cables from the power supplies.

Step 5 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 6 Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7 Identify the faulty DIMM by observing the DIMM slot fault LEDs on the motherboard.

Step 8 Open the ejector levers at both ends of the DIMM slot, and then lift the DIMM out of the slot.

Step 9 Install a new DIMM:

✎
Note   Before installing DIMMs, see the population guidelines: Memory Performance Guidelines and Population Rules, page 3-26.

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

f. 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.

g. Replace the top cover.

Step 10 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 11 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 12 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 13 After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Replacing CPUs and Heatsinks

This section contains the following topics:

✎

Note   You can use Xeon v3- and v4-based nodes in the same cluster. Do not mix Xeon v3 and v4 CPUs within the same node.

Special Information For *Upgrades* to Intel Xeon v4 CPUs

⚠

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

The minimum software and firmware versions required for the node to support Intel v4 CPUs are as follows:

Table 3-7   Minimum Requirements For Intel Xeon v4 CPUs

Software or Firmware	Minimum Version
Node Cisco IMC	2.0(10)
Node BIOS	2.0(10)
Cisco UCS Manager (UCSM-managed system only)	3.1(1)

Do one of the following actions:

- If your node's firmware and/or Cisco UCS Manager software are already at the required levels shown in Table 3-7, you can replace the CPU hardware by using the procedure in CPU Replacement Procedure, page 3-32.
- If your node's firmware and/or Cisco UCS Manager software is earlier than the required levels, use the instructions in Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-31 to upgrade your software in the correct order. After you upgrade the software, you will be redirected to this section to replace the CPU hardware.

CPU Configuration Rules

This node has two CPU sockets. Each CPU supports four DIMM channels (12 DIMM slots). See Figure 3-11.

- The minimum configuration is that the node must have at two CPUs installed.
- Do not mix Xeon v3 and v4 CPUs within the same node.

CPU Replacement Procedure

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

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

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Remove the plastic air baffle that sits over the CPUs.

Step 8   Remove the heatsink that you are replacing. Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heatsink and then lift it off of the CPU.

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

Step 9   Open the CPU retaining mechanism:

   a.   Unclip the first retaining latch labeled with the ⊏⌒ icon, and then unclip the second retaining latch labeled with the ⌂ icon. See Figure 3-12.

   b.   Open the hinged CPU cover plate.

Figure 3-12   **CPU Socket**
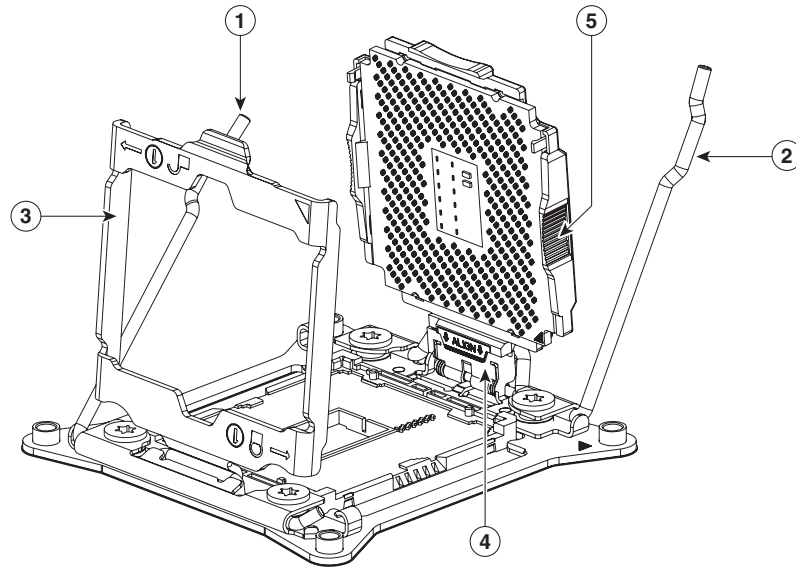
1	CPU retaining latch	**4**	Hinged CPU seat
2	CPU retaining latch	**5**	Finger grips on plastic CPU frame
3	Hinged CPU cover plate		

Step 10   Remove any existing CPU:

   a.   With the latches and hinged CPU cover plate open, swing up the CPU in its hinged seat to the open position, as shown in Figure 3-12.

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

   c.   Set the CPU aside on an anti-static surface.

Step 11   Install a new CPU:

   a.   Grasp the new CPU by the finger grips on its plastic frame and align the tab on the frame that is labeled "ALIGN" with the SLS mechanism, as shown in Figure 3-13.

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

   The line below the word "ALIGN" should be level with the edge of the seat, as shown in Figure 3-13.

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

   d.   Close the hinged CPU cover plate.

   e.   Clip down the CPU retaining latch with the   icon, and then clip down the CPU retaining latch with the   icon. See Figure 3-12.

Figure 3-13   *CPU and Socket Alignment Features*
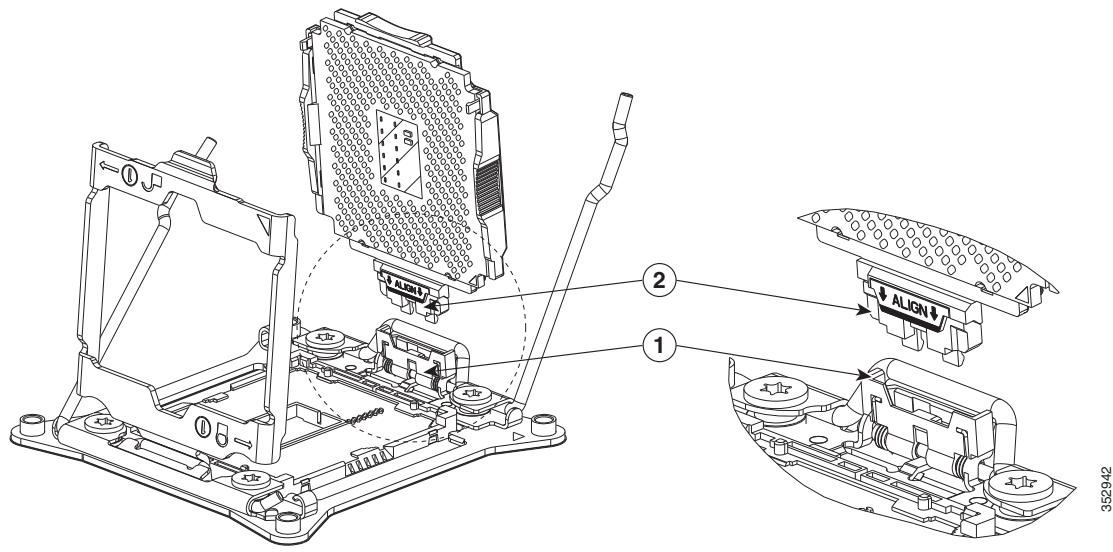
| 1 | SLS mechanism on socket | 2 | Tab on CPU frame (labeled ALIGN) |

Step 12   Install a heat sink:

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

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

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

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

    c. Using the syringe of thermal grease provided with the CPU (UCS-CPU-GREASE3=), apply 2 cubic
centimeters of thermal grease to the top of the CPU. Use the pattern shown in Figure 3-14 to ensure
even coverage.

Figure 3-14   *Thermal Grease Application Pattern*
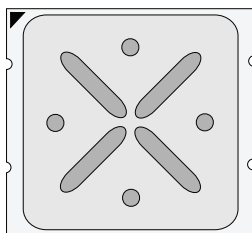
    d. Align the four heatsink captive screws with the motherboard standoffs, and then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.

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

**Step 13** Replace the air baffle.

Step 14 Replace the top cover.

Step 15 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 16 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 17 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 18 After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Special Instructions for *Upgrades* to Intel Xeon v4 Series

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

Use the following procedure to upgrade the node and CPUs.

Step 1 Upgrade the Cisco UCS Manager software to the minimum version for your node (or later). See Table 3-7.

Use the procedures in the appropriate Cisco UCS Manager upgrade guide (depending on your current software version): Cisco UCS Manager Upgrade Guides.

Step 2 Use Cisco UCS Manager to upgrade and activate the node Cisco IMC to the minimum version for your node (or later). See Table 3-7.

Use the procedures in the GUI or CLI Cisco UCS Manager Firmware Management Guide for your release.

Step 3 Use Cisco UCS Manager to upgrade and activate the node BIOS to the minimum version for your node (or later). See Table 3-7.

Use the procedures in the Cisco UCS Manager GUI or CLI Cisco UCS Manager Firmware Management Guide for your release.

Step 4 Replace the CPUs with the Intel Xeon v4 Series CPUs.

Use the CPU replacement procedures in CPU Replacement Procedure, page 3-32.

Additional CPU-Related Parts to Order with RMA Replacement Motherboards

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

- Scenario 1—You are reusing the existing heatsinks:

    - Heat sink cleaning kit (UCSX-HSCK=)

    - Thermal grease kit for C240 M4 (UCS-CPU-GREASE3=)

- Scenario 2—You are replacing the existing heatsinks:

    - Heat sink (UCSC-HS-C220M4=)

    - Heat sink cleaning kit (UCSX-HSCK=)

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

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

Replacing an Internal SD Card

The node has two internal SD card bays on the motherboard.

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

Step 1 Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2 Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3 Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4 Disconnect all power cables from the power supplies.

Step 5 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 6 Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7 Locate the SD card that you are replacing on the motherboard (see Figure 3-15).

Step 8 Push on the top of the SD card, and then release it to allow it to spring up in the slot.

Step 9 Remove the SD card from the slot.

Step 10 Insert the SD card into the slot with the label side facing up.

Step 11 Press on the top of the card until it clicks in the slot and stays in place.

Step 12 Replace the top cover.

Step 13 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 14 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 15 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 16 After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-15   SD Card Bays and USB Port Locations on the Motherboard
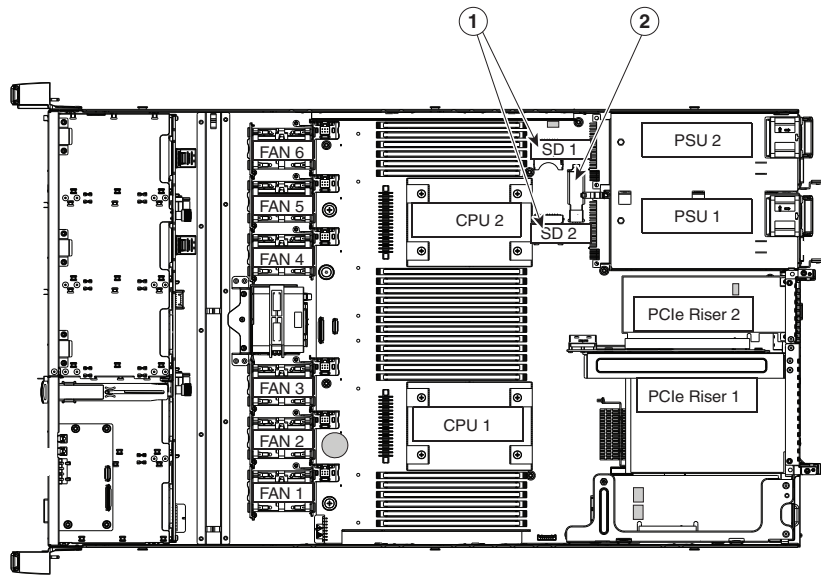
1	SD card bays SD1 and SD2	**2**	USB 3.0 port

Enabling or Disabling the Internal USB Port

⚠

Caution   We do not recommend that you hot-swap the internal USB drive while the node is powered on.

The factory default is for all USB ports on the node to be enabled. However, the internal USB port can be enabled or disabled in the node BIOS. See Figure 3-15 for the location of the USB port on the motherboard.

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

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

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

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

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

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

Replacing a Cisco Modular HBA Riser (Internal Riser 3)

The node has a dedicated internal riser 3 that is used only for the Cisco modular HBA card. This riser plugs into a dedicated motherboard socket and provides a horizontal socket for the HBA.

Step 1 Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2 Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3 Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4 Disconnect all power cables from the power supplies.

Step 5 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 6 Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7 Remove the existing riser (see Figure 3-16):

a. If the existing riser has a card in it, disconnect the SAS cable from the card.

b. Lift the riser straight up to disengage the riser from the motherboard socket. The riser bracket must also lift off of two pegs that hold it to the inner chassis wall.

c. Set the riser upside down.

d. Remove the card from the riser. Loosen the single thumbscrew that secures the card to the riser bracket and then pull the card straight out from its socket on the riser (see Figure 3-17).

Step 8 Install a new riser:

a. Install your HBA card into the new riser. See Replacing a Cisco Modular HBA Card, page 3-41.

b. 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.

c. 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.

d. Reconnect the SAS cable to its connector on the HBA card.

Step 9 Replace the top cover.

Step 10 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 11 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 12 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 13   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-16   Cisco Modular HBA Riser (Internal Riser 3) Location
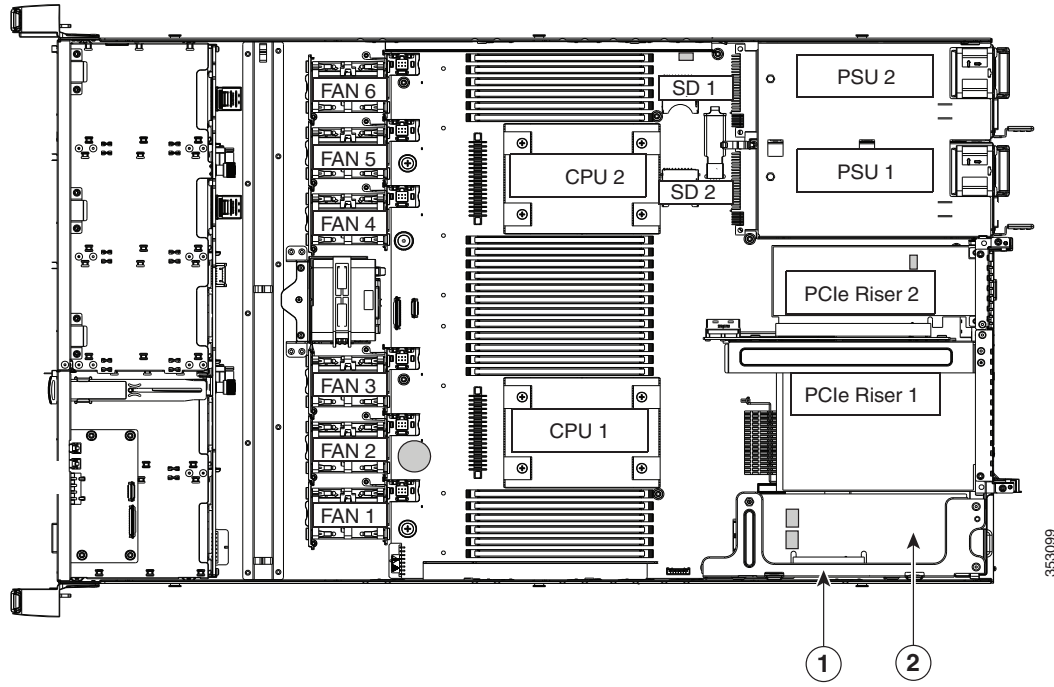
1	Cisco modular HBA riser assembly (top of bracket)	**2**	Cisco modular HBA card in riser

Replacing a Cisco Modular HBA Card

The node can use a Cisco modular HBA card that plugs into a horizontal socket on a dedicated internal riser 3.

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

⚠

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Remove the riser from the node (see Figure 3-16):

   a.   Disconnect the SAS cable from the existing HBA card.

   b.   Lift the riser straight up to disengage the riser from the motherboard socket. The riser bracket must also lift off of two pegs that hold it to the inner chassis wall.

   c.   Set the riser upside down.

Step 8   Remove the card from the riser:

   a.   Loosen the single thumbscrew that secures the card to the metal riser bracket (see Figure 3-17).

   b.   Pull the card straight out from its socket on the riser and the guide channel on the riser bracket.

Step 9   Install the HBA card into the riser:

⚠

Caution   Be careful when inserting the card to the riser so that you do not scrape electronic components on the underside of the card on features of the riser. The threaded standoff on the riser that is for the thumbscrew on the card might snag and damage the card components (see item 4 in Figure 3-17).

   a.   With the riser upside down, set the card on the riser. Align the right end of the card with the alignment channel on the riser; align the connector on the card edge with the socket on the riser (see Figure 3-17).

   b.   Being careful to avoid scraping the underside of the card on the threaded standoff on the riser, push on both corners of the card to seat its connector in the riser socket.

   c.   Tighten the single thumbscrew that secures the card to the riser bracket.

Step 10   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 11 Reconnect the SAS cable to its connector on the HBA card.

Step 12 Replace the top cover.

Step 13 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 14 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 15 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 16 After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-17   Cisco Modular HBA Card in Riser
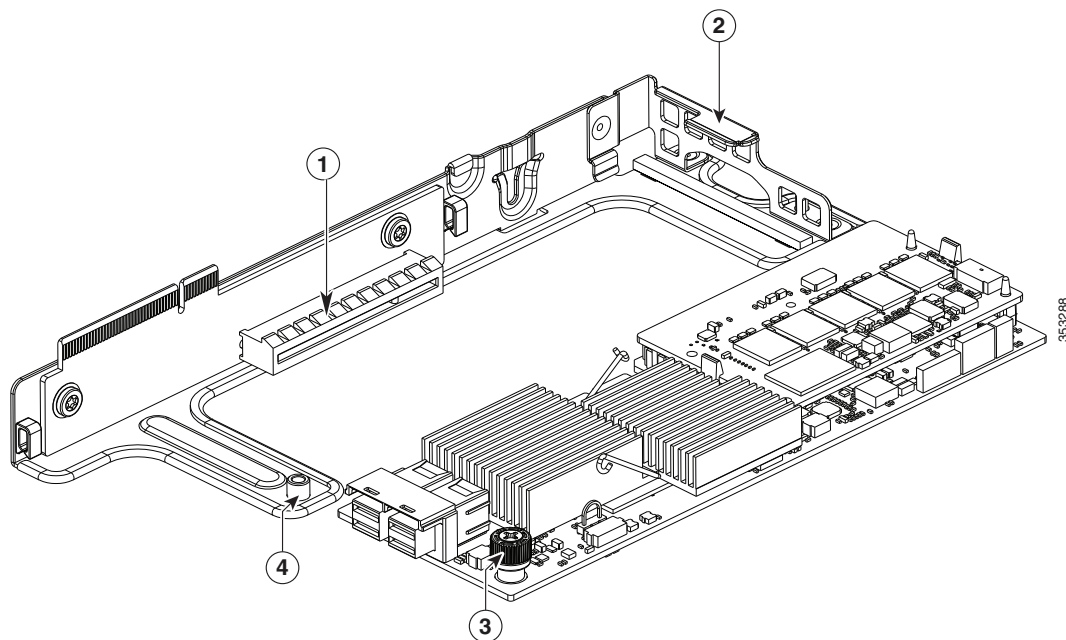
1	Card socket on upside down riser	3	Thumbscrew on card
2	Guide channel on riser	4	Threaded standoff on riser
			CAUTION: Do not scrape the underside of the card on this threaded standoff.

Replacing a PCIe Riser Assembly

The node contains two PCIe risers that are attached to a single riser assembly. Riser 1 provides PCIe slot 1 and riser 2 provides PCIe slot 2, as shown in Figure 3-18. See Table 3-8 for a description of the PCIe slots on each riser.

Figure 3-18   Rear Panel, Showing PCIe Slots
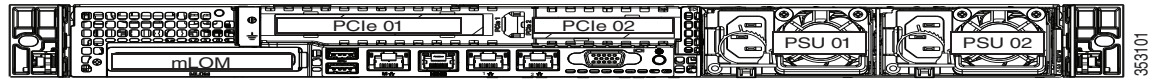
To install or replace a PCIe riser, follow these steps:

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Use two hands to grasp the metal bracket of the riser assembly and lift straight up to disengage its connectors from the two sockets on the motherboard.

Step 8   If the riser has any cards installed, remove them from the riser.

Step 9   Install a new PCIe riser assembly:

　　a.   If you removed any cards from the old riser assembly, install the cards to the new riser assembly (see Replacing a PCIe Card, page 3-45).

　　b.   Position the riser assembly over its two sockets on the motherboard and over the chassis alignment channels (see Figure 3-19):

　　c.   Carefully push down on both ends of the riser assembly to fully engage its connectors with the two sockets on the motherboard.

Step 10   Replace the top cover.

Step 11   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 12   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 13   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 14   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-19   PCIe Riser Assembly Location and Alignment Channels


1	PCIe riser assembly bracket	**3**	Chassis alignment channels
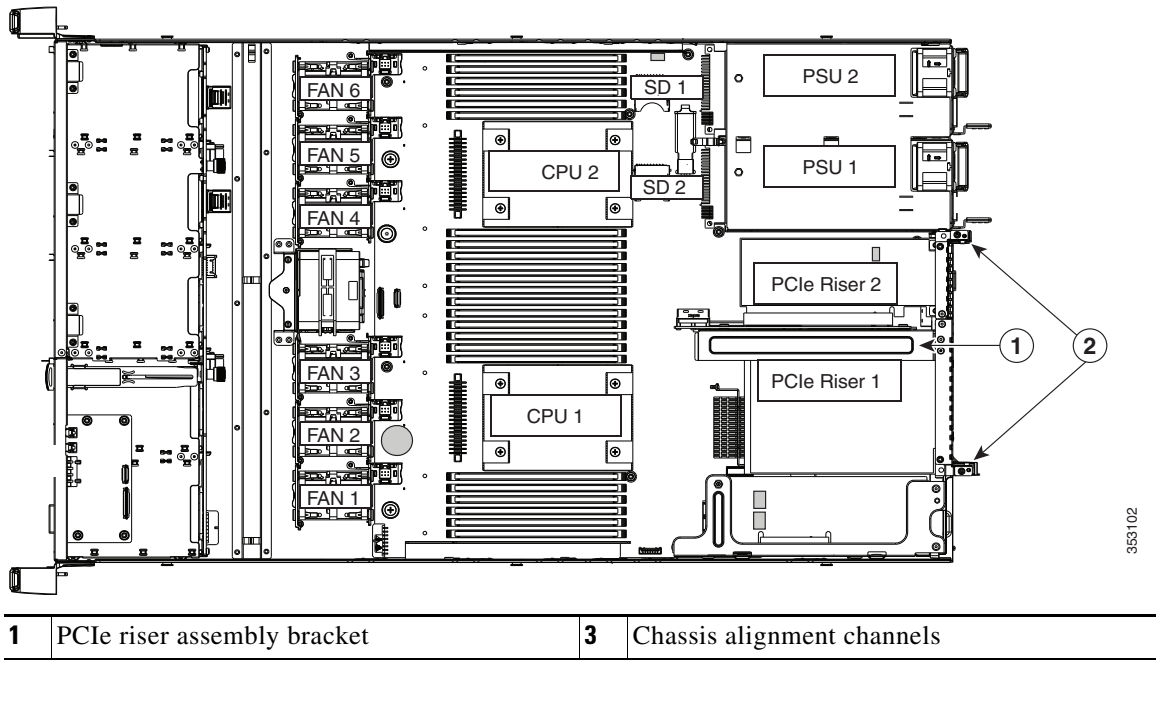
Replacing a PCIe Card

⚠

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

This section includes the following topics:

PCIe Slots

The node contains two toolless PCIe risers for horizontal installation of PCIe cards. See Figure 3-20 and Table 3-8 for a description of the PCIe slots on these risers.

Both slots support the network communications services interface (NCSI) protocol and standby power.

Figure 3-20   Rear Panel, Showing PCIe Slots
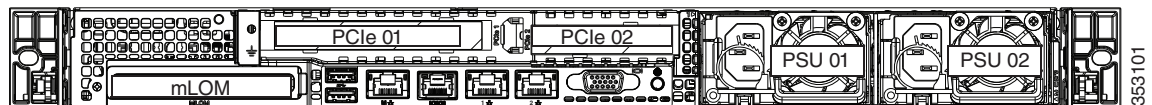
Table 3-8   PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Card Length[1]	Card Height [2]	NCSI Support
1 (on riser 1)	Gen-3 x16	x24 connector	3/4 length	Full-height	Yes
2 (on riser 2)	Gen-3 x16	x24 connector	1/2 length	1/2 height	Yes

1. This is the supported length because of internal clearance.
2. This is the size of the rear panel opening.

Replacing a PCIe Card

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

Step 1 Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2 Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3 Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4 Disconnect all power cables from the power supplies.

Step 5 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 6 Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7 Remove a PCIe card:

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

   b. Use two hands to grasp the metal bracket of the riser assembly and lift straight up to disengage its connectors from the two sockets on the motherboard.

   c. Open the hinged plastic retainer that secures the rear-panel tab of the card (see Figure 3-21).

   d. 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 8 Install a new PCIe card:

   a. Open the hinged plastic retainer

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

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

   d. 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 (see Figure 3-21).

   e. Position the PCIe riser over its two sockets on the motherboard and over the chassis alignment channels (see Figure 3-19).

   f. Carefully push down on both ends of the PCIe riser to fully engage its connector with the sockets on the motherboard.

Step 9 Replace the top cover.

Step 10 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 11 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Figure 3-21   *PCIe Riser Assembly*
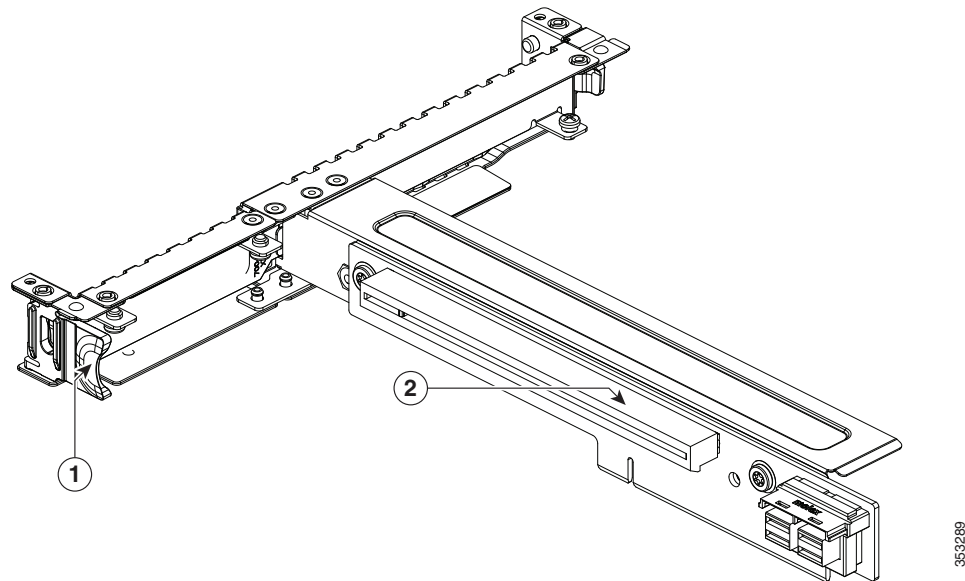
1	Hinged rear-panel tab retainer	**2**	Card socket on riser

Installing Multiple PCIe Cards and Resolving Limited Resources

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

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

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

- Resolving Insufficient Memory Space to Execute Option ROMs, page 3-47
- Resolving Insufficient 16-Bit I/O Space, page 3-48

Resolving Insufficient Memory Space to Execute Option ROMs

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

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

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

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

- **Guidelines for RAID controller booting**

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

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

- **Guidelines for onboard NIC PXE booting**

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

Resolving Insufficient 16-Bit I/O Space

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

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

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

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

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

Installing and Enabling a Trusted Platform Module

The trusted platform module (TPM) is a small circuit board that attaches to a motherboard socket. The socket location is on the motherboard between the power supplies and PCIe riser 2 (see Figure 3-22).

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

1. Installing the TPM Hardware, page 3-49
2. Enabling TPM Support in the BIOS, page 3-50
3. Enabling the Intel TXT Feature in the BIOS, page 3-51

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

Installing the TPM Hardware

Step 1 Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2 Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3 Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4 Disconnect all power cables from the power supplies.

Step 5 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 6 Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7 Check if there is a card installed in PCIe riser 2. See Figure 3-22.

- If no card is installed in PCIe riser 2, you can access the TPM socket. Go to Step 8.
- If a card is installed in PCIe riser 2, remove the PCIe riser assembly from the chassis. See Replacing a PCIe Riser Assembly, page 3-43 for details.

Step 8 Install a TPM (see Figure 3-22):

  a. Locate the TPM socket on the motherboard, as shown in Figure 3-22.

  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 adjacent to the TPM socket.

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

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

Step 9   If you removed the PCIe riser assembly, return it to the node now. See Replacing a PCIe Riser Assembly, page 3-43 for details.

Step 10   Replace the top cover.

Step 11   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 12   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 13   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 14   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Step 15   Continue with Enabling TPM Support in the BIOS, page 3-50.

Figure 3-22   TPM Socket Location on Motherboard
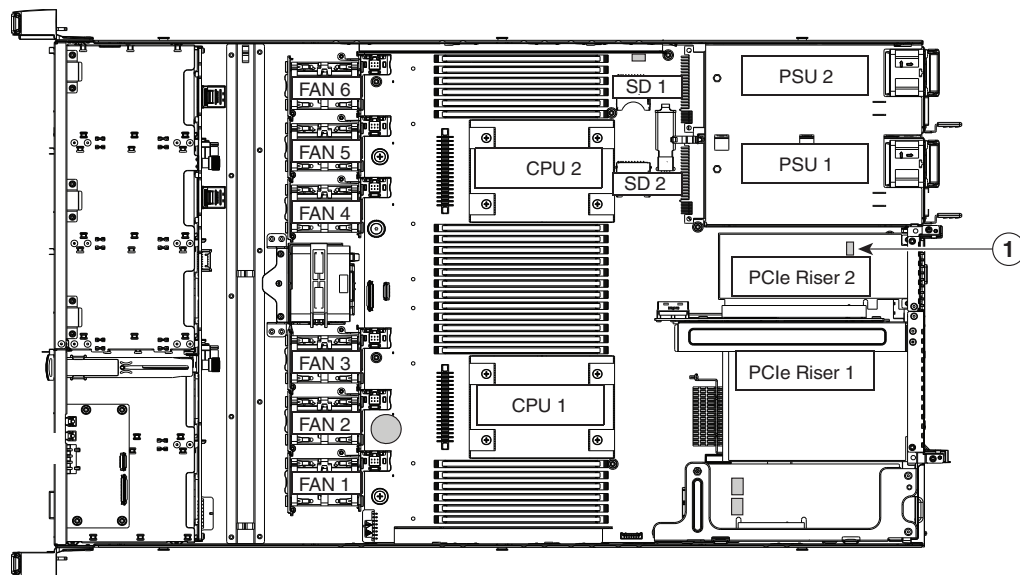
1	TPM socket and screw hole on motherboard		

Enabling TPM Support in the BIOS

Note   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

Intel Trusted Execution Technology (TXT) provides greater protection for information that is used and stored on the 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 node. 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

     •   If VT-d Support and VT Support are already enabled, skip to Step 4.

     •   If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.

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

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

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

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

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

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

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

Replacing an mLOM Card (Cisco VIC 1227)

The node can use a modular LOM (mLOM) card to provide additional rear-panel connectivity. The mLOM card socket remains powered when the node is in 12 V standby power mode and it supports the network communications services interface (NCSI) protocol.

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

    c.   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.

    d.   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 5   See the location of the mLOM socket in Figure 3-23. You might have to remove PCIe riser 1 and the Cisco modular HBA riser to provide clearance.

    • If there is no card in PCIe riser 1 or the HBA card riser, you can access the mLOM socket. Continue with Step 6.

    • If there is a card in PCIe riser 1 or the HBA card riser, remove those risers to provide clearance. See Replacing a PCIe Riser Assembly, page 3-43 and Replacing a Cisco Modular HBA Card, page 3-41 for instructions.

Step 6   Loosen the single thumbscrew that secures the mLOM card to the chassis floor and then slide the mLOM card horizontally to disengage its connector from the motherboard socket.

Step 7   Install a new mLOM card:

    a.   Set the mLOM card on the chassis floor so that its connector is aligned with the motherboard socket and its thumbscrew is aligned with the standoff on the chassis floor.

    b.   Push the card's connector into the motherboard socket horizontally.

    c.   Tighten the thumbscrew to secure the card to the chassis floor.

Step 8   If you removed PCIe riser 1 or the HBA card riser, return them to the node. See Replacing a PCIe Riser Assembly, page 3-43 or Replacing a Cisco Modular HBA Card, page 3-41 for instructions.

Step 9   Replace the top cover.

Step 10   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 11   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 12   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 13   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-23   *mLOM Card Socket Location*
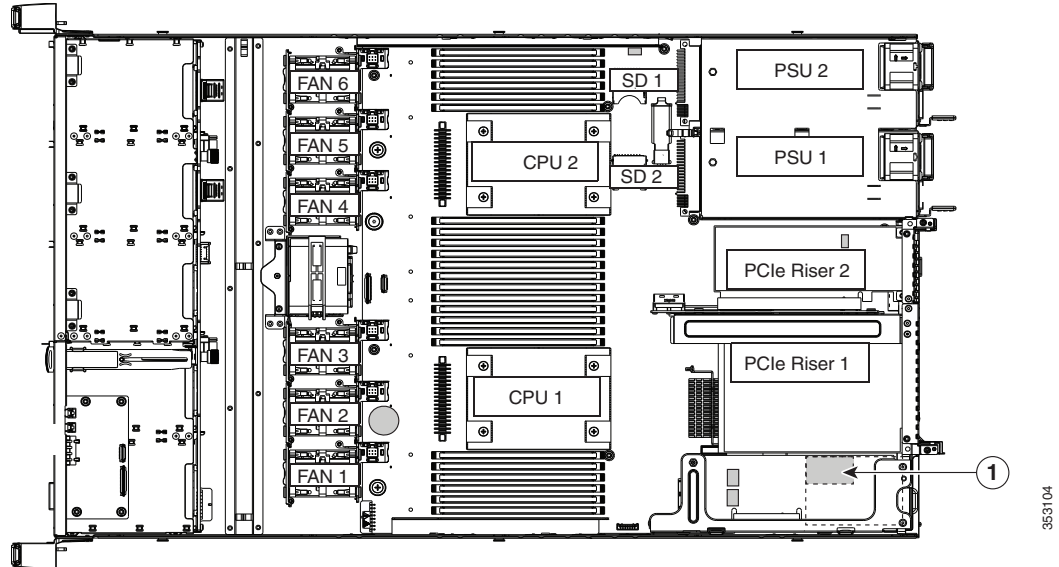
1	mLOM card socket location on motherboard for Cisco VIC 1227 (under a PCIe riser 1 card and the RAID controller card)		

Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-9 describes the requirements for the supported Cisco UCS virtual interface cards (VICs).

Table 3-9   *Cisco UCS HX220c M4 Requirements for Virtual Interface Cards*

Virtual Interface Card (VIC)	Number of This VIC Supported in node	Slots That Support VICs	Primary Slot For Cisco UCS Manager Integration	Primary Slot For Cisco Card NIC Mode	Minimum Cisco IMC Firmware	Minimum VIC Firmware
Cisco UCS VIC 1227 UCSC-MLOM-CSC-02	1 mLOM	mLOM	mLOM	mLOM	2.0(3)	4.0(0)

Note   The Cisco UCS VIC 1227 (UCSC-MLOM-CSC-02) is not compatible to use in *Cisco Card* NIC mode with a certain Cisco SFP+ module. Do not use a Cisco SFP+ module part number 37-0961-01 that has a serial number in the range MOC1238*xxxx* to MOC1309*xxxx*. If you use the Cisco UCS VIC 1227 in Cisco Card NIC mode, use a different part number Cisco SFP+ module, or you can use this part number 37-0961-01 if the serial number is *not* included in the range above. See the data sheet for this adapter for other supported SFP+ modules: Cisco UCS VIC 1227 Data Sheet

Replacing Power Supplies

When two power supplies are installed they are redundant as 1+1.

- Replacing an AC Power Supply, page 3-56
- See Power Specifications, page A-3 for more information about the power supplies.
- See Rear Panel LEDs and Buttons, page 3-4 for information about the power supply LEDs.

Note   You do not have to power off the node to replace power supplies because they are redundant as 1+1.

Replacing an AC Power Supply

Step 1   Perform one of the following actions:

- If your node has two power supplies, you do not have to shut down the node. Continue with step 2.
- If your node has only one power supply:

a.   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

b.   Shut down the node as described in Shutting Down the Node, page 3-7.

c.   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

Step 2   Remove the power cord from the power supply that you are replacing.

Step 3   Grasp the power supply handle while pinching the release lever toward the handle.

Step 4   Pull the power supply out of the bay.

Step 5   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.

Step 6   Only if you shut down the node, perform these steps:

a.   Press the **Power** button to return the node to main power mode.

b.   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

c.   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

d.   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Figure 3-24   Removing and Replacing Power Supplies
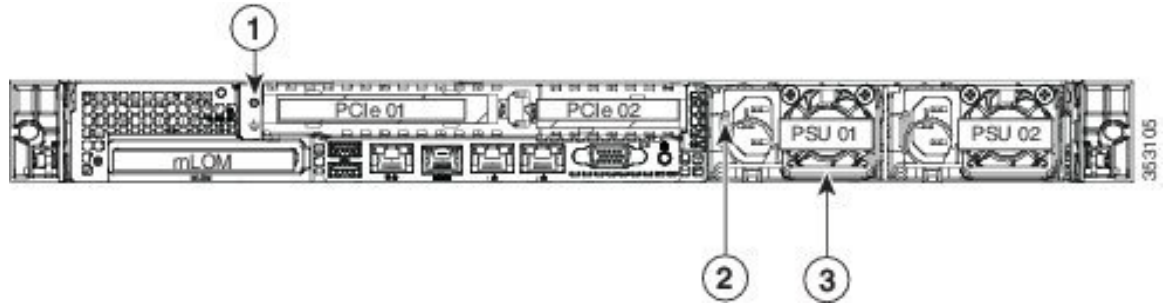
1	Screw hole for grounding lug	**3**	Power supply handle
2	Power supply release lever		

Service DIP Switches

This section includes the following topics:

DIP Switch Location on the Motherboard

See Figure 3-25. The position of the block of DIP switches (SW6) is shown in red. In the magnified view, all switches are shown in the default position.

- BIOS recovery—Switch 1
- Clear password—Switch 2
- Not used—Switch 3
- Clear CMOS—Switch 4

Figure 3-25   Service DIP Switches (SW6)
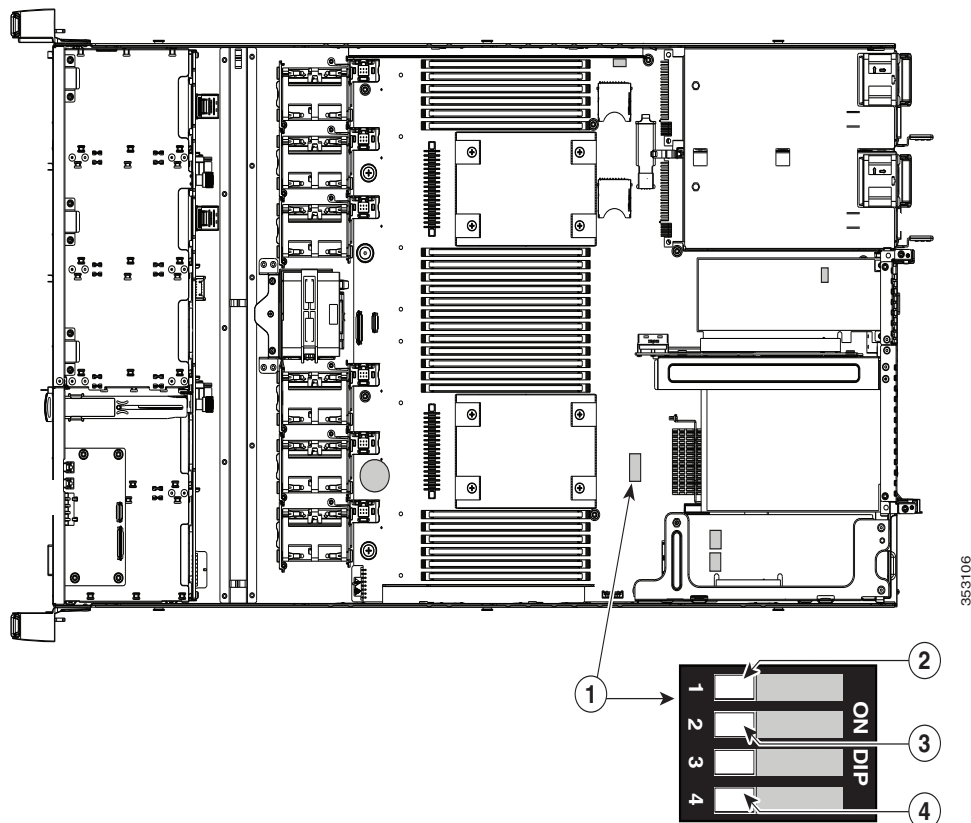
1	DIP switch block SW6	3	Clear password switch 2
2	BIOS recovery switch 1	4	Clear CMOS switch 4

Using the BIOS Recovery DIP Switch

✎
Note   The following procedures use a recovery.cap recovery file. In Cisco IMC releases 3.0(1) and later, this recovery file has been renamed bios.cap.

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

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

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

- If it is a non-BootBlock corruption, the following message 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 recovery.cap (or 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 recovery.cap (or 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.

Procedure 1: Reboot with recovery.cap (or bios.cap) File

Step 1   Download the BIOS update package and extract it to a temporary location.

Step 2   Copy the contents of the extracted recovery folder to the root directory of a USB thumb drive. The recovery folder contains the recovery.cap (or bios.cap) file that is required in this procedure.

✎
Note   The recovery.cap (or bios.cap) file must be in the root directory of the USB drive. Do not rename this file. The USB drive must be formatted with either FAT16 or FAT32 file systems.

Step 3   Insert the USB thumb drive into a USB port on the node.

Step 4   Reboot the node.

Step 5   Return the node to main power mode by pressing the **Power** button on the front panel.

The node boots with the updated BIOS boot block. When the BIOS detects a valid recovery.cap (or bios.cap) file on the USB thumb drive, it displays this message:

```
Found a valid recovery file...Transferring to Cisco IMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

Step 6   Wait for node to complete the BIOS update, and then remove the USB thumb drive from the node.

✎

Note   During the BIOS update, Cisco IMC shuts down the node and the screen goes blank for about 10 minutes. Do not unplug the power cords during this update. Cisco IMC powers on the node after the update is complete.

Procedure 2: Use BIOS Recovery DIP switch and recovery.cap (or bios.cap) File

See Figure 3-25 for the location of the SW8 block of DIP switches.

Step 1   Download the BIOS update package and extract it to a temporary location.

Step 2   Copy the contents of the extracted recovery folder to the root directory of a USB thumb drive. The recovery folder contains the recovery.cap (or bios.cap) file that is required in this procedure.

✎

Note   The recovery.cap (or bios.cap) file must be in the root directory of the USB drive. Do not rename this file. The USB drive must be formatted with either FAT16 or FAT32 file systems.

Step 3   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 4   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 5   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

⚠

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

Step 6   Disconnect all power cables from the power supplies.

Step 7   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 8   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 9   Slide the BIOS recovery DIP switch from position 1 to the closed position (see Figure 3-25).

Step 10   Reconnect AC power cords to the node. The node powers up to standby power mode.

Step 11   Insert the USB thumb drive that you prepared in Step 2 into a USB port on the node.

Step 12   Return the node to main power mode by pressing the **Power** button on the front panel.

The node boots with the updated BIOS boot block. When the BIOS detects a valid recovery file on the USB thumb drive, it displays this message:

```
Found a valid recovery file...Transferring to Cisco IMC
System would flash the BIOS image now...
System would restart with recovered image after a few seconds...
```

Step 13   Wait for node to complete the BIOS update, and then remove the USB thumb drive from the system.

Note   During the BIOS update, Cisco IMC shuts down the node and the screen goes blank for about 10 minutes. Do not unplug the power cords during this update. Cisco IMC powers on the node after the update is complete.

Step 14   After the node has fully booted, power off the node again and disconnect all power cords.

Step 15   Slide the BIOS recovery DIP switch from the closed position back to the default position 1 (see Figure 3-25).

Note   If you do not move the jumper, after recovery completion you see the prompt, "Please remove the recovery jumper."

Step 16   Replace the top cover to the node.

Step 17   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 18   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 19   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 20   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Using the Clear Password DIP Switch

See Figure 3-25 for the location of this DIP switch. You can use this switch to clear the administrator password.

Step 1   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Slide the clear password DIP switch from position 2 to the closed position (see Figure 3-25).

Step 8   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 9   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, not just the service processor, to reboot to main power mode to complete the reset. The state of the jumper cannot be determined without the host CPU running.

Step 10   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 11   Remove the top cover from the node.

Step 12   Slide the clear CMOS DIP switch from the closed position back to default position 2 (see Figure 3-25).

> **Note**   If you do not move the jumper, the CMOS settings are reset to the default every time that you power-cycle the node.

Step 13   Replace the top cover to the node.

Step 14   Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 15   Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 16   Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 17   After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Using the Clear CMOS DIP Switch

See Figure 3-25 for the location of this DIP switch. You can use this switch to clear the node's CMOS settings in the case of a node hang. For example, if the node hangs because of incorrect settings and does not boot, use this jumper to invalidate the settings and reboot with defaults.

⚠
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   Put the node in Cisco HX Maintenance mode as described in Shutting Down the Node Through vSphere With Cisco HX Maintenance Mode, page 3-9.

Step 2   Shut down the node as described in Shutting Down the Node, page 3-7.

Step 3   Decommission the node as described in Decommissioning the Node Using Cisco UCS Manager, page 3-10.

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

Step 4   Disconnect all power cables from the power supplies.

Step 5   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 6   Remove the top cover as described in Removing and Replacing the Node Top Cover, page 3-13.

Step 7   Slide the clear CMOS DIP switch from position 4 to the closed position (see Figure 3-25).

Step 8   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 9   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, not just the service processor, to reboot to main power mode to complete the reset. The state of the jumper cannot be determined without the host CPU running.

Step 10   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 11   Remove the top cover from the node.

Step 12   Slide the clear CMOS DIP switch from the closed position back to default position 4 (see Figure 3-25).

✎
Note   If you do not move the jumper, the CMOS settings are reset to the default every time that you power-cycle the node.

Step 13   Replace the top cover to the node.

Step 14 Replace the node in the rack, replace power cables, and then power on the node by pressing the **Power** button.

Step 15 Recommission the node as described in Recommissioning the Node Using Cisco UCS Manager, page 3-11.

Step 16 Associate the node to its service profile as described in Associating a Service Profile With an HX Node, page 3-11.

Step 17 After ESXi reboot, exit HX Maintenance mode as described in Exiting HX Maintenance Mode, page 3-12.

Setting Up the Node in Standalone Mode

Note   The HX Series node is always managed in UCS Manager-controlled mode. This section is included only for cases in which a node might need to be put into standalone mode for troubleshooting purposes. Do not use this setup for normal operation of the HX Series node.

Connecting and Powering On the Node (Standalone Mode)

The node is shipped with these default settings:

- The NIC mode is Shared LOM EXT.

  Shared LOM EXT mode enables the 1-Gb Ethernet ports and the ports on any installed Cisco virtual interface card (VIC) to access 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 Step 1 of the following procedure.

- The NIC redundancy is active-active. All Ethernet ports are utilized simultaneously.

- DHCP is enabled.

- IPv4 is enabled.

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

- Local setup—Use this procedure if you want to connect a keyboard and monitor to the node for setup. This procedure can use a KVM cable (Cisco PID N20-BKVM) or the ports on the rear of the node. See Local Connection Procedure, page 3-65.

- Remote setup—Use this procedure if you want to perform setup through your dedicated management LAN. See Remote Connection Procedure, page 3-66.

Note   To configure the node remotely, you must have a DHCP server on the same network as the node. Your DHCP server must be preconfigured with the range of MAC addresses for this node. The MAC address is printed on a label that is on the pull-out asset tag on the front panel (see Figure 1-1). This 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.

Local Connection Procedure

Step 1   Attach a power cord to each power supply in your node, and then attach each power cord to a grounded AC power outlet. See Power Specifications, page A-3 for power specifications.

Wait for approximately two minutes to let the node boot in standby power during the first bootup.

You can verify node power status by looking at the node Power Status LED on the front panel (see External Features Overview, page 1-1). The node is in standby power mode when the LED is amber.

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

- Connect a USB keyboard and VGA monitor to the corresponding connectors on the rear panel (see External Features Overview, page 1-1).

- Connect an optional KVM cable (Cisco PID N20-BKVM) to the KVM connector on the front panel (see External Features Overview, page 1-1 for the connector location). Connect your USB keyboard and VGA monitor to the KVM cable.

Step 3   Open the Cisco IMC Configuration Utility:

    a.   Press and hold the front panel power button for four seconds to boot the node.

    b.   During bootup, press **F8** when prompted to open the Cisco IMC Configuration Utility.

        This utility has two windows that you can switch between by pressing F1 or F2.

Step 4   Continue with Cisco IMC Configuration Utility Setup, page 3-67.

Remote Connection Procedure

Step 1   Attach a power cord to each power supply in your node, and then attach each power cord to a grounded AC power outlet. See Power Specifications, page A-3 for power specifications.

Wait for approximately two minutes to let the node boot in standby power during the first bootup.

You can verify node power status by looking at the node Power Status LED on the front panel (see External Features Overview, page 1-1). The node 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 (see External Features Overview, page 1-1).

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

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

    Note   The default user name for the node is *admin*. The default password is *password*.

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

Step 6   From the Cisco IMC Summary page, click **Power Cycle**. The node 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.

This utility has two windows that you can switch between by pressing F1 or F2.

Step 9   Continue with Cisco IMC Configuration Utility Setup, page 3-67.

Cisco IMC Configuration Utility Setup

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

Step 1 Set NIC mode and NIC redundancy:

a. Set the NIC mode to choose which ports to use to access Cisco IMC for node management (see Figure 1-2 for identification of the ports):

- 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.

  In this mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the node determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager node 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 Ethernet ports are used to access Cisco IMC. You must select a NIC redundancy and IP setting.

- Dedicated—The dedicated management port is used to access Cisco IMC. You must select a NIC redundancy and IP setting.

- Cisco Card—The ports on an installed Cisco UCS virtual interface card (VIC) are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.

  See also the required VIC Slot setting below.

- VIC Slot—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, slot 1 is used.

  – If you select Riser2, slot 2 is used.

  – If you select Flex-LOM, you must use an mLOM-style VIC in the mLOM slot.

b. Use this utility to change 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.

  – Active-active—All Ethernet ports are utilized simultaneously. The Shared LOM EXT mode can have only this NIC redundancy setting. Shared LOM and Cisco Card modes can have both Active-standby and Active-active settings.

Step 2 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.
- The prefix/subnet.

    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 3   (Optional) Use this utility to make VLAN settings.

Step 4   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 5   (Optional) Set a hostname for the node.

Step 6   (Optional) Enable dynamic DNS and set a dynamic DNS (DDNS) domain.

Step 7   (Optional) If you check the Factory Default check box, the node reverts to the factory defaults.

Step 8   (Optional) Set a default user password.

Step 9   (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 10   (Optional) Reset port profiles and the port name.

Step 11   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 12   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.

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

To manage the node in standalone mode, 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. The links to these documents are in the C-Series documentation roadmap:

http://www.cisco.com/go/unifiedcomputing/c-series-doc

Node Specifications

This appendix lists the technical specifications for the node and includes the following sections:

- Physical Specifications, page A-1
- Environmental Specifications, page A-2
- Power Specifications, page A-3

Physical Specifications

Table A-1 lists the physical specifications for the node.

Table A-1   Physical Specifications

Description	Specification
Height	1.7 in. (4.3 cm)
Width	16.9 in. (42.9 cm)
Depth (length)	29.8 in. (75.8 cm)
Maximum weight (fully loaded chassis)	37.9 lb. (17.2 Kg)

Environmental Specifications

Table A-2 lists the environmental specifications for the node.

Table A-2   Environmental Specifications

Description	Specification
Temperature, operating	41 to 95°F (5 to 35°C) Derate the maximum temperature by 1°C per every 305 meters of altitude above sea level.
Temperature, non-operating (when the node is stored or transported)	–40 to 149°F (–40 to 65°C)
Humidity (RH), operating	10 to 90%
Humidity, non-operating	5 to 93%
Altitude, operating	0 to 10,000 feet
Altitude, non-operating (when the node is stored or transported)	0 to 40,000 feet
Sound power level Measure A-weighted per ISO7779 LwAd (Bels) Operation at 73°F (23°C)	5.4
Sound pressure level Measure A-weighted per ISO7779 LpAm (dBA) Operation at 73°F (23°C)	37

Power Specifications

The power specifications for the power supply option is listed in the following sections:

- 770 W AC Power Supply, page A-3

You can get more specific power information for your exact node configuration by using the Cisco UCS Power Calculator:

http://ucspowercalc.cisco.com

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

770 W AC Power Supply

Table A-3 lists the specifications for each 770 W AC power supply
(Cisco part number UCSC-PSU1-770W).

Table A-3   Power Supply Specifications

Description	Specification
AC input voltage	Nominal range: 100–120 VAC, 200–240 VAC (Range: 90–132 VAC, 180–264 VAC)
AC input frequency	Nominal range: 50 to 60Hz (Range: 47–63 Hz)
Maximum AC input current	9.5 A at 100 VAC 4.5 A at 208 VAC
Maximum input volt-amperes	950 VA at 100 VAC
Maximum output power per PSU	770 W
Maximum inrush current	15 A (sub-cycle duration)
Maximum hold-up time	12 ms at 770 W
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP2
Input connector	IEC320 C14

Power Specifications

Power Cord Specifications

This appendix provides supported power cable specifications.

Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to the node. The 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 provided with the node are supported.

Table B-1 lists the power cords for the node power supplies.

Table B-1 Supported Power Cords for the Node

Description	Length	
	Feet	**Meters**
CAB-250V-10A-AR Power Cord, 250 VAC 10 A IRAM 2073 Plug Argentina	8.2	2.5
CAB-9K10A-AU 250 VAC 10 A 3112 Plug, Australia	8.2	2.5
CAB-250V-10A-CN Power Cord, 250 VAC 10 A GB 2009 Plug China	8.2	2.5
CAB-ACTW AC power cord, 250 V, 10 A, C13 plug Taiwan	7.5	2.3
CAB-9K10A-EU Power Cord, 250 VAC 10 A M 2511 Plug Europe	8.2	2.5

Table B-1   ***Supported Power Cords for the Node (continued)***

Description	Length	
	Feet	**Meters**
CAB-250V-10A-ID Power Cord, 250 VAC 16A EL-208 Plug South Africa, United Arab Emirates, India	8.2	2.5
CAB-250V-10A-IS Power Cord, 250 VAC 10 A SI32 Plug Israel	8.2	2.5
CAB-9K10A-IT Power Cord, 250 VAC 10 A CEI 23-16 Plug Italy	8.2	2.5
CAB-9K10A-SW Power Cord, 250 VAC 10 A MP232 Plug Switzerland	8.2	2.5
CAB-9K10A-UK Power Cord, 250 VAC 10 A BS1363 Plug (13 A fuse) United Kingdom	8.2	2.5
CAB-AC-250V/13A Power Cord, 250 VAC 13 A IEC60320 Plug North America	6.6	2.0
CAB-N5K6A-NA Power Cord, 250 VAC 13 A NEMA 6-15 Plug, North America	8.2	2.5
CAB-9K12A-NA Power cord, 125 VAC, 13 A, NEMA 5-15 Plug North America	8.2	2.5
CAB-C13-CBN Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	2.2	0.68
CAB-C13-C14-2M Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	6.6	2.0
CAB-C13-C14-AC Cabinet Jumper Power Cord, 250 VAC 10 A, C13-C14 Connectors	9.8	3.0

HBA Card Considerations

This appendix contains the following sections:

Supported HBAs and Required Cables

This node supports the HBA options and cable requirements shown in Table C-1.

Table C-1   Cisco HX220c M4 RAID Options

Controller	Style	Node Version/ Maximum Drives Controlled	SCPM	RAID Levels	Required Cables
Cisco UCS 12G SAS Modular HBA	PCIe	8 internal drives	No	Non-RAID	(UCS-220CBLMR8=)

HBA Card Firmware Compatibility

Firmware on the 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 HBA firmware accordingly.

Use the procedures in the GUI or CLI Cisco UCS Manager Firmware Management Guide for your release.
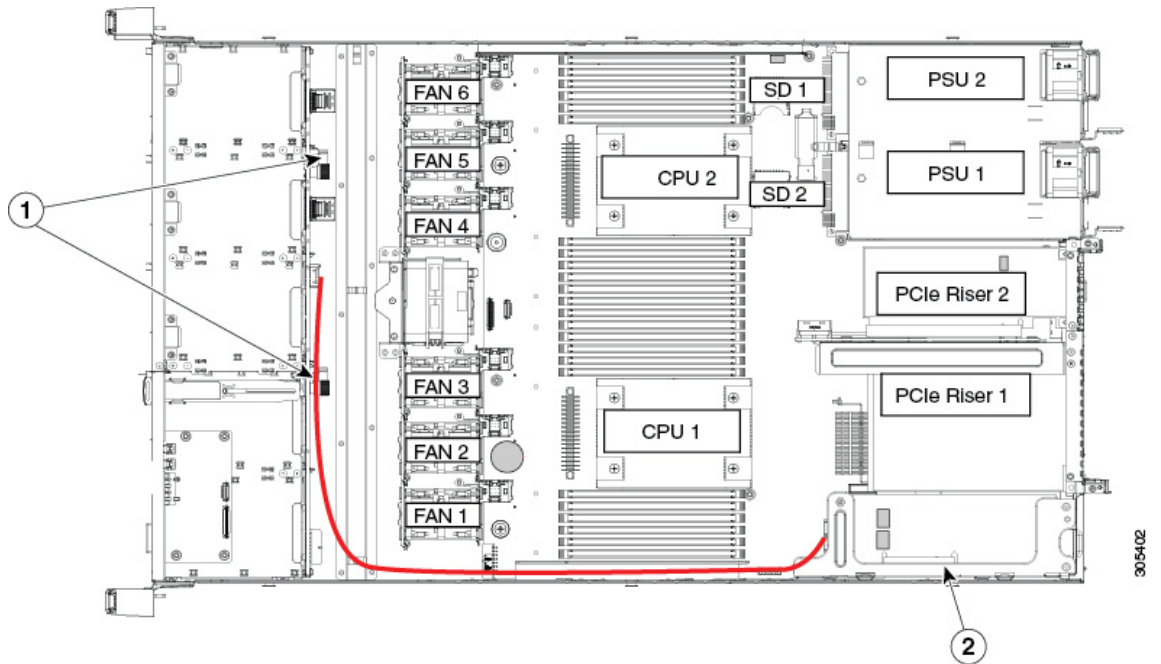
HBA Cabling

This section includes the following topics:

Cable Routing

The RAID controller connectors in this node are shown in Figure C-1.

The red line shows the recommended cable routing path from the Cisco modular HBA card to the drive backplane. Cable guides on the chassis wall help route the cables.

Figure C-1   RAID Controller Connectors

1	SAS/SATA connectors on the drive backplane	2	Cisco modular HBA riser (dedicated internal riser)

Cisco HX220c M4 Node Cabling

Cisco UCS 12G Modular HBA cabling

This non-RAID option can control up to eight SAS/SATA drives.

The required UCS-220CBLMR8= cable kit has one Y-cable with a mini-SAS HD double connector on one end and two mini-SAS HD single connectors on the other end.

Step 1   Connect the mini-SAS double connector to the modular HBA card.

Step 2   Connect single connector PORT A to the PORT A connector on the backplane.

Step 3   Connect single connector PORT B to the PORT B connector on the backplane.