Cisco UCS C480 ML M5 Server Installation and Service Guide

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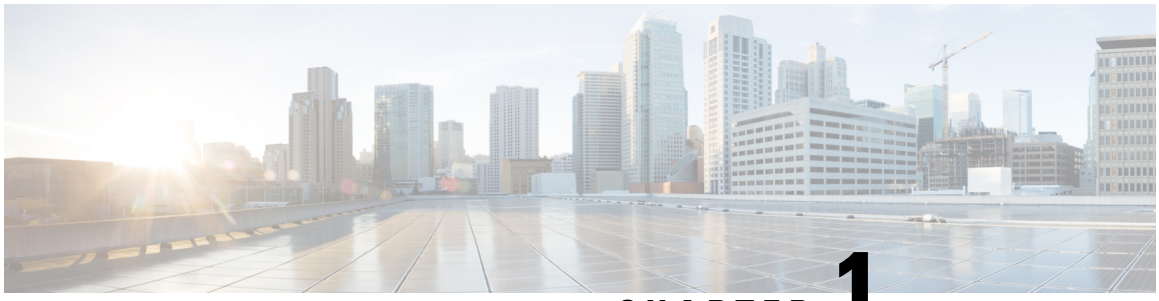


CHAPTER 1

Overview

- Overview, on page 1
- External Features, on page 1
- Serviceable Component Locations, on page 4
- Summary of Server Features, on page 8

Overview

This chapter provides a summary overview of the Cisco UCS C480 ML M5 server.

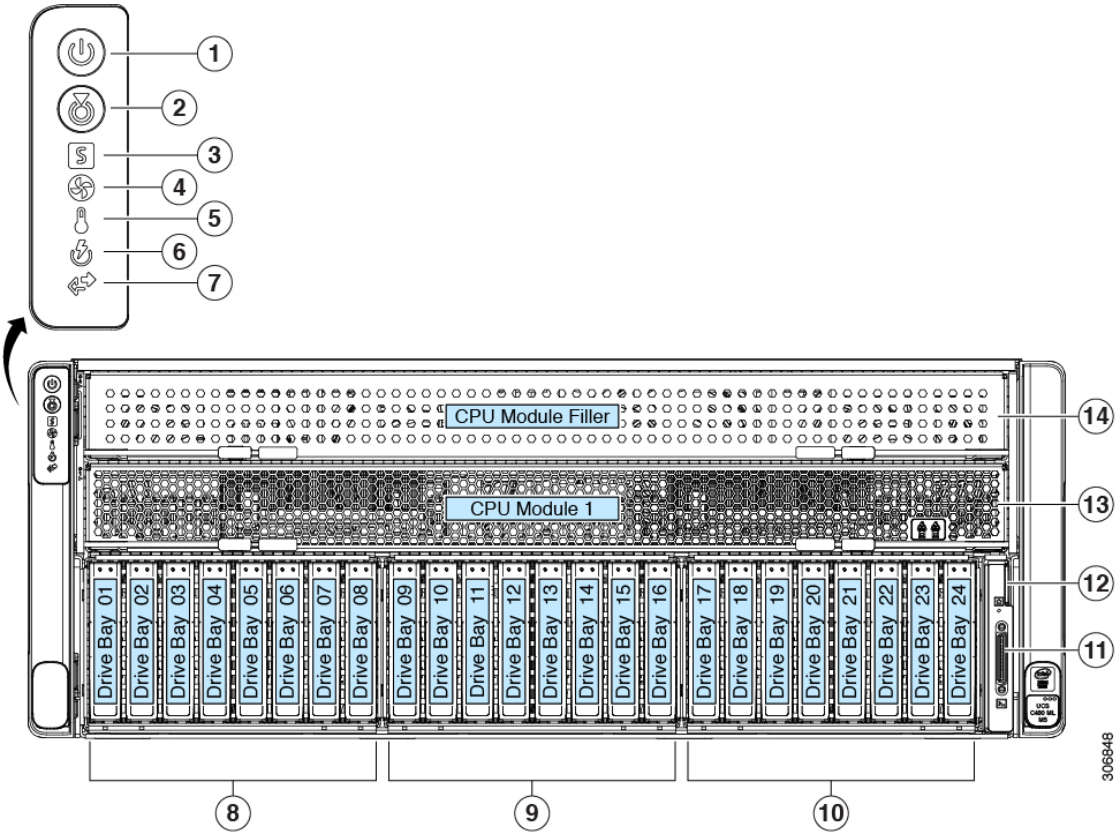
External Features

This topic shows the external features of the server.

Cisco UCS C480 ML M5 Server Front Panel Features

For definitions of LED states, see Front-Panel LEDs, on page 30.

Figure 1: Cisco UCS C480 ML M5 Server Front Panel



1	Power button/LED	**8**	Left bay module (drive bays 1 - 8) • All 8 bays supports SAS/SATA drives. • Bays 1, 2, 7, 8 also support NVMe drives.
2	Identification button/LED	**9**	Center bay module (drive bays 9 - 16) • All 8 bays supports SAS/SATA drives. • Bay 9 also supports NVMe drives.

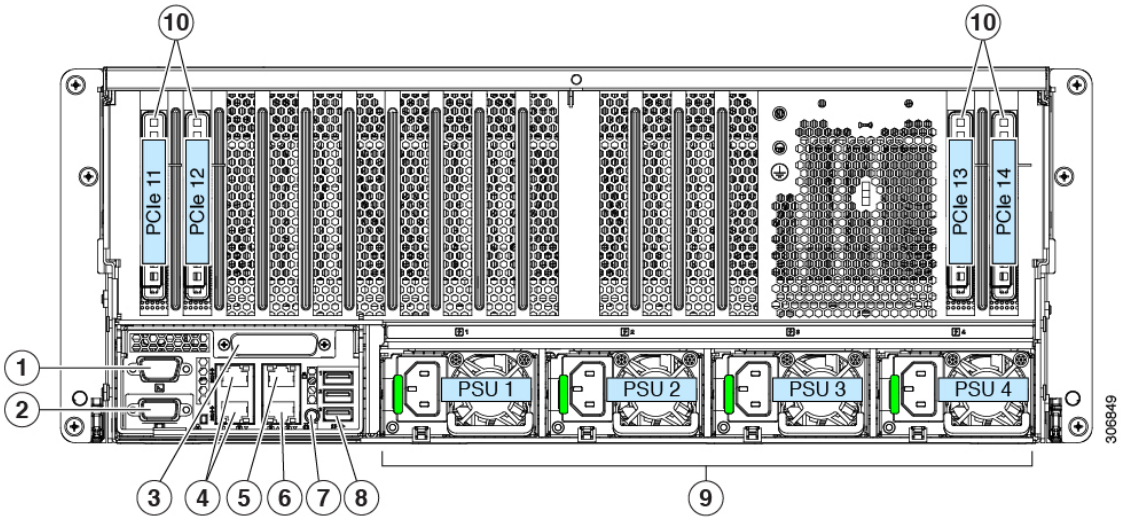
3	System status LED	**10**	Right bay module, supports either:
			• Optional DVD drive module
			• Drive bays 17 - 24 (shown)
			  • All 8 bays supports SAS/SATA drives.
			  • Bay 17 also supports NVMe drives.

4	Fan status LED	**11**	KVM console connector (used with a KVM cable that provides two USB, one VGA, and one serial connector)
5	Temperature status LED	**12**	Pull-out asset tag
6	Power supply status LED	**13**	CPU module bay 1 The system must have one CPU module in lower bay 1 to boot.
7	Network link activity LED	**14**	CPU module bay 2 (blank with filler module) There must be a blank filler module in upper bay 2 or the system will not boot.

Cisco UCS C480 ML M5 Server Rear Panel Features

For definitions of LED states, see Rear-Panel LEDs, on page 33.

Figure 2: Cisco UCS C480 ML M5 Server Rear Panel



1	Serial port COM 1 (DB-9 connector)	**7**	Rear identification button/LED

2	VGA video port (DB-15 connector)	**8**	USB 3.0 ports (three)
3	Not used at this time	**9**	Power supplies 1 – 4 (hot-swappable, redundant as 3+1) See Power Specifications, on page 112 for specifications and supported options.
4	1-Gb/10-Gb Ethernet ports (LAN1 upper, LAN2 lower) The dual LAN ports can suport 1 Gbps and 10 Gbps, depending on the link-partner capability.	**10**	PCIe slots 11 – 14 See PCIe Slot Specifications and Restrictions, on page 67 for slot specifications.
5	10/100/1000 Ethernet dedicated management port (Base-T)	-	
6	Not used at this time	-	

Serviceable Component Locations

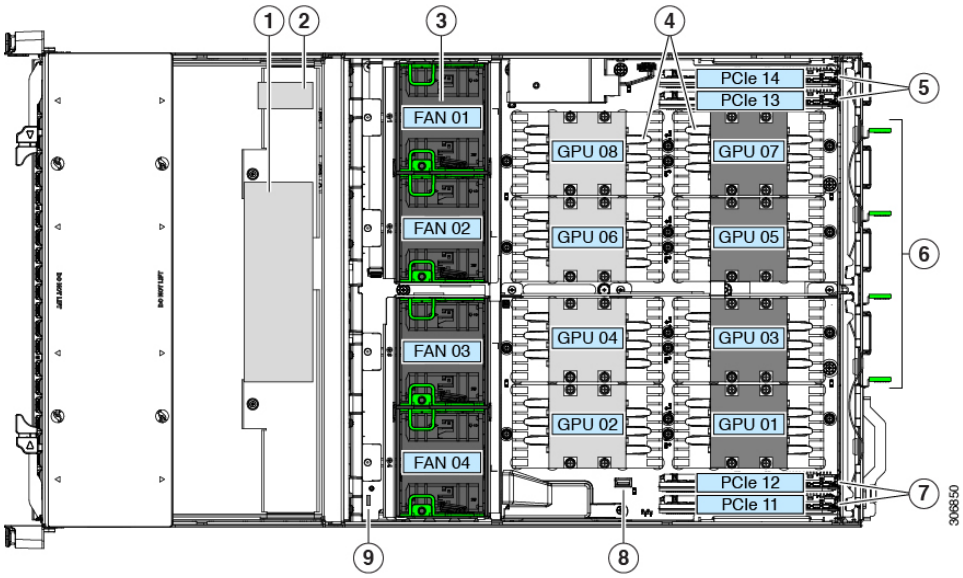
This topic shows the locations of the field-replaceable components and service-related items.

The Technical Specifications Sheet for this server, which includes supported component part numbers, are at Cisco UCS Servers Technical Specifications Sheets (scroll down to *Technical Specifications*).

- Serviceable Components Inside the Main Chassis, on page 5
- Serviceable Components Inside a CPU Module, on page 7
- Serviceable Components Inside an I/O Module, on page 8

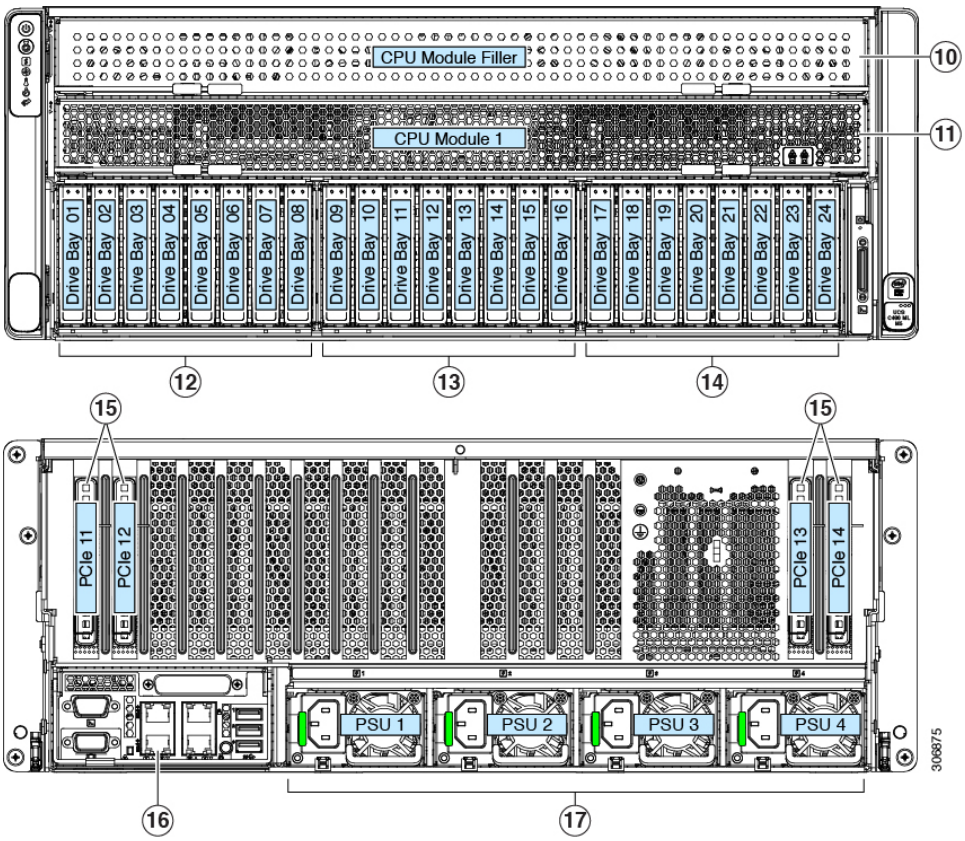
Serviceable Components Inside the Main Chassis

Figure 3: Serviceable Component Locations Inside the Main Chassis (Top View)



1	RAID controller card for front-loading SAS/SATA drives. (not visible in this view; position is near chassis floor under the CPU module)	**6**	Power supplies 1 – 4 (hot-swappable, redundant as 3+1)
2	Supercap (RAID backup) for front RAID controller (not visible in this view; mounting bracket position is on chassis wall under the CPU module)	**7**	PCIe slots 11 and 12 (Gen-3 x16) Slots 11 and 12 support standby power. Slot 11 is the primary slot for a Cisco UCS VIC card, slot 12 is the secondary slot.
3	Fan modules (four modules with two fans each; hot-swappable)	**8**	Internal, vertical USB 2.0 socket on motherboard
4	NVIDIA V100 SXM2 GPUs and heatsinks (eight) **Note** The GPUs are not customer-serviceable. Contact Cisco Support if you need service for the GPUs or their heatsinks.	**9**	Trusted platform module socket (TPM) on motherboard
5	PCIe slots 13 and 14 (Gen-3 x16) See PCIe Slot Specifications and Restrictions, on page 67 for slot specifications.	-	

Figure 4: Serviceable Component Locations Inside the Main Chassis (Front and Rear Views)



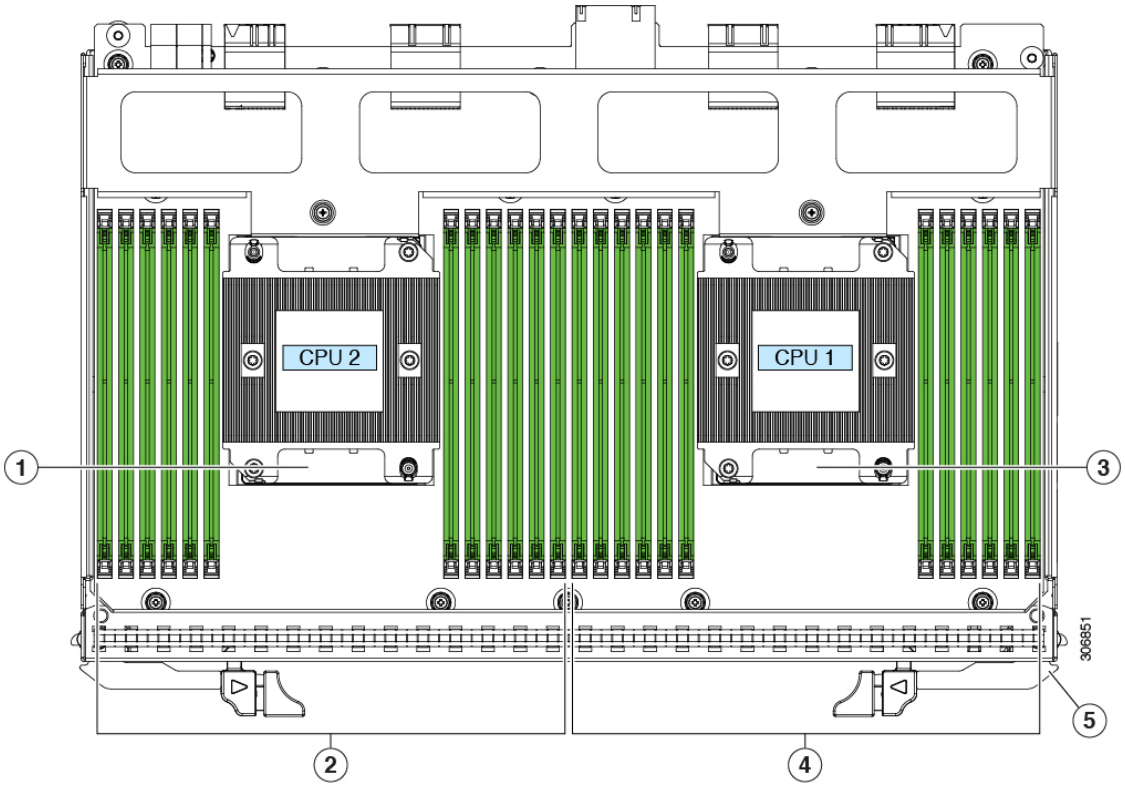
10	CPU module bay 2 (blank with filler module)
	There must be a blank filler module in upper bay 2 or the system will not boot.
		14	Right bay module, supports either:
			• Optional DVD drive module
			• Drive bays 17 - 24 (shown)
			  • All 8 bays supports SAS/SATA drives.
			  • Bay 17 also supports NVMe drives.

11	CPU module bay 1 The system must have one CPU module in lower bay 1 to boot.	**15**	PCIe slots 11 through 14, rear panel openings
12	Left bay module (drive bays 1 - 8) • All 8 bays supports SAS/SATA drives. • Bays 1, 2, 7, 8 also support NVMe drives.	**16**	I/O module **Note** The I/O module is not field replaceable, nor can you move an I/O module from one chassis to another. This module contains a security chip that requires it to stay with the PCIe module in the same chassis, as shipped from the factory.

13	Center bay module (drive bays 9 - 16) • All 8 bays supports SAS/SATA drives. • Bay 9 also supports NVMe drives.	**17**	Power supplies 1 – 4 (hot-swappable, redundant as 3+1) All power supplies in the system must be identical (no mixing).

Serviceable Components Inside a CPU Module

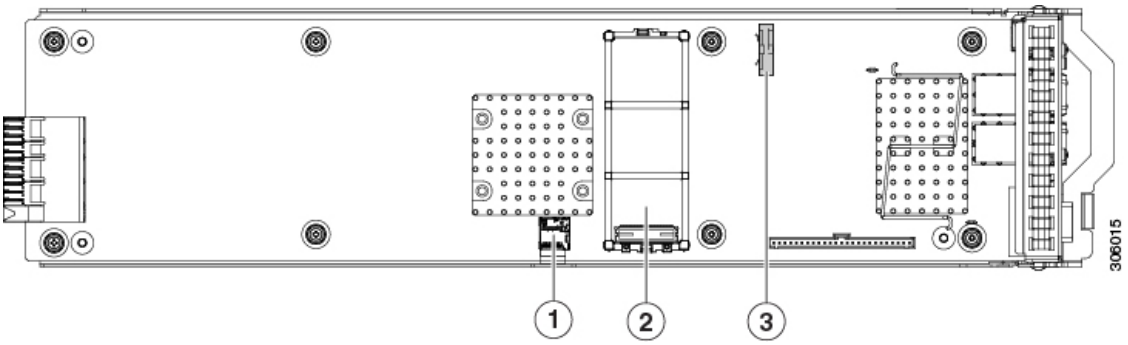
Figure 5: Serviceable Component Locations Inside a CPU Module



1	CPU 2	**4**	DIMM sockets controlled by CPU 1 (channels A, B, C, D, E, F.)
2	DIMM sockets controlled by CPU 2 (channels G, H, J, K, L, M.) See DIMM Population Rules and Memory Performance Guidelines, on page 86 for DIMM slot numbering.	**5**	Release levers for module (two each module)
3	CPU 1	-	

Serviceable Components Inside an I/O Module

Figure 6: Serviceable Component Locations Inside an I/O Module



1	Micro SD card socket	**3**	RTC battery vertical socket
2	Mini storage module connector Supports either an SD card carrier with two SD card slots or an M.2 SSD carrier with two SATA M.2 SSD slots.	-	

Summary of Server Features

The following table lists a summary of server features.

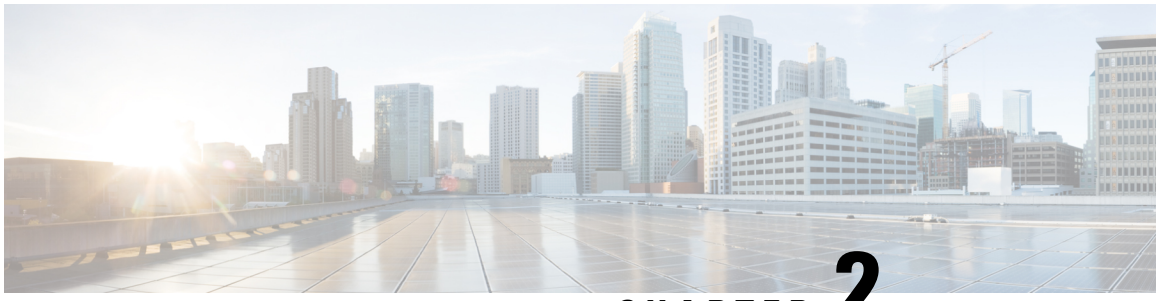
Feature	Description
Chassis	Four rack-unit (4RU) chassis
Central Processor	The server supports one removable CPU module with two CPUs from the Intel Xeon Processor Scalable Family. This includes CPUs from the following series: • Intel Xeon Silver 4XXX Processors • Intel Xeon Gold 5XXX Processors • Intel Xeon Gold 6XXX Processors • Intel Xeon Platinum 8XXX Processors
Memory	Each of the CPUs support up to 12 DIMMs for a total of 24 DIMMs.
Multi-bit error protection	Multi-bit error protection is supported

Feature	Description
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/10-Gb Ethernet LAN ports, or a Cisco virtual interface card.
Network and management I/O	The network and management I/O ports for this server are on a removeable I/O module: • One 10/100/1000 Ethernet dedicated management port (RJ-45 connector) • One 10/100/1000 Ethernet private inter-chassis port (RJ-45 connector) • Two 1-Gb/10-Gb BASE-T Ethernet LAN ports (RJ-45 connectors) • One RS-232 serial port (DB-9 connector) • One VGA video connector port (DB-15 connector) • Three USB 3.0 ports Front panel: • One front-panel keyboard/video/mouse (KVM) connector that is used with the KVM cable, which provides two USB 2.0, one VGA, and one DB-9 serial connector.
Power	Four power supplies, redundant as 3+1: • AC power supplies 1600 W AC each Do not mix power supply types or wattages in the server.
ACPI	The advanced configuration and power interface (ACPI) 4.0 standard is supported.
Cooling	Four hot-swappable fan modules with two fans in each for front-to-rear cooling.
PCIe I/O	Four vertical PCIe expansion slots on the chassis motherboard. See PCIe Slot Specifications and Restrictions, on page 67 for specifications of the slots.
InfiniBand	The PCIe bus slots in this server support the InfiniBand architecture.

Feature	Description
Storage, front-panel	The server can hold up to 24 front-loading, 2.5-inch drives. Front drive bays are divided across 3 removable drive bay modules. Each drive bay module has 8 drive bays for a total of 24 front-loading drive bays. • All 24 front drive bays support SAS/SATA drives. • NVMe drives are supported in these six bays: 1, 2, 7, 8, 9, 17.

Storage, internal	The server has these internal storage options:
	• One USB 2.0 port on the chassis motherboard.
	• Mini-storage module socket on the I/O module board, optionally with either:
	  • SD card carrier. Supports up to two SD cards.
	  • M.2 SSD carrier. Supports two SATA M.2 SSDs.
	• One micro-SD card socket on the I/O module board.

Other removable media	A DVD drive module option is available in place of the right drive bay module.
Storage management	Front-loading storage: the server has a dedicated internal socket near the chassis front for a single storage controller card (RAID). This controller card can control up to 24 front-loading drives. For a detailed list of storage controller options, see Supported Storage Controllers and Cables, on page 117.
RAID supercap backup	There is a bracket on the chassis wall for a supercap unit that backs up a front RAID controller for front-loading drives.
Integrated video	Integrated VGA video.



CHAPTER 2

Installing the Server

- Preparing for Installation, on page 11
- Installing the Server in a Rack, on page 14
- Initial Server Setup, on page 20
- NIC Mode and NIC Redundancy Settings, on page 25
- Accessing the System BIOS, on page 26
- Updating the BIOS and Cisco IMC Firmware, on page 27

Preparing for Installation

Installation Warnings and Guidelines

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

Warning

IMPORTANT SAFETY INSTRUCTIONS

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

Statement 1071

Warning

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

Statement 1047

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

Statement 1019

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

Statement 1005

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

Statement 1074

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

Statement 1017

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Statement 1024

Warning **For Nordic countries (Norway, Finland, Sweden and Denmark) this system must be installed in a Restricted Access Location, where the voltage of the main ground connection of all equipment is the same (equipotential earth) and the system is connected to a grounded electrical outlet.**

Statement 328

Warning **High leakage current – earth connection essential before connection to system power supply.**

Statement 342

Warning **This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Statement 366

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

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

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

- Plan your site configuration and prepare the site before installing the server. See the Cisco UCS Site Preparation Guide for the recommended site planning tasks.
- Ensure that there is adequate space around the server to allow for accessing the server and for adequate airflow. The airflow in this server is from front to back.
- Ensure that the air-conditioning meets the thermal requirements listed in the Environmental Specifications, on page 111.
- Ensure that the cabinet or rack meets the requirements listed in the Rack Requirements, on page 13.
- Ensure that the site power meets the power requirements listed in the Power Specifications, on page 112. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

Rack Requirements

The rack must be of the following type:

- A standard 19-in. (48.3-cm) wide, four-post EIA rack, with mounting posts that conform to English universal hole spacing, per section 1 of ANSI/EIA-310-D-1992.
- The rack-post holes can be square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), #12-24 UNC, or #10-32 UNC when you use the Cisco-supplied slide rails.
- The minimum vertical rack space per server must be four rack units (RUs), equal to 7.0 in. (177.8 mm).

Supported Cisco Slide Rail Kits

The server supports the following rail kit options:

- Cisco part UCSC-RAIL-4U-M5= (ball-bearing slide rail kit)
- Cisco part UCSC-CMA-4U-M5= (cable management arm)

Rack Installation Tools Required

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

Slide Rail and Cable Management Arm Dimensions

The slide rails for this server 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 server to the rear of the CMA is 5.4 inches (137.4 mm).
- The total length of the server including the CMA is 35.2 inches (894 mm).

Installing the Server in a Rack

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

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

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

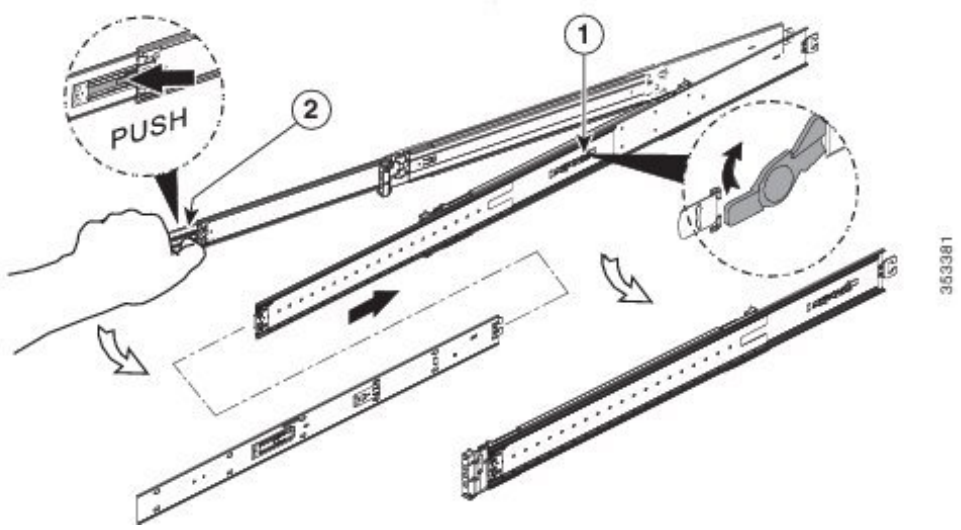
If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Statement 1006

Step 1 Remove the inner rail from the slide rail assembly:

a) Slide out the intermediate and inner slide rails until they click and lock in the fully open position.
b) Hold down the inner rail release clip and at the same time, pull the inner rail free from the assembly.
c) Push down the rail release latch while you collapse the intermediate rail back into the rail assembly.

Figure 7: Removing the Inner Rail From the Assembly



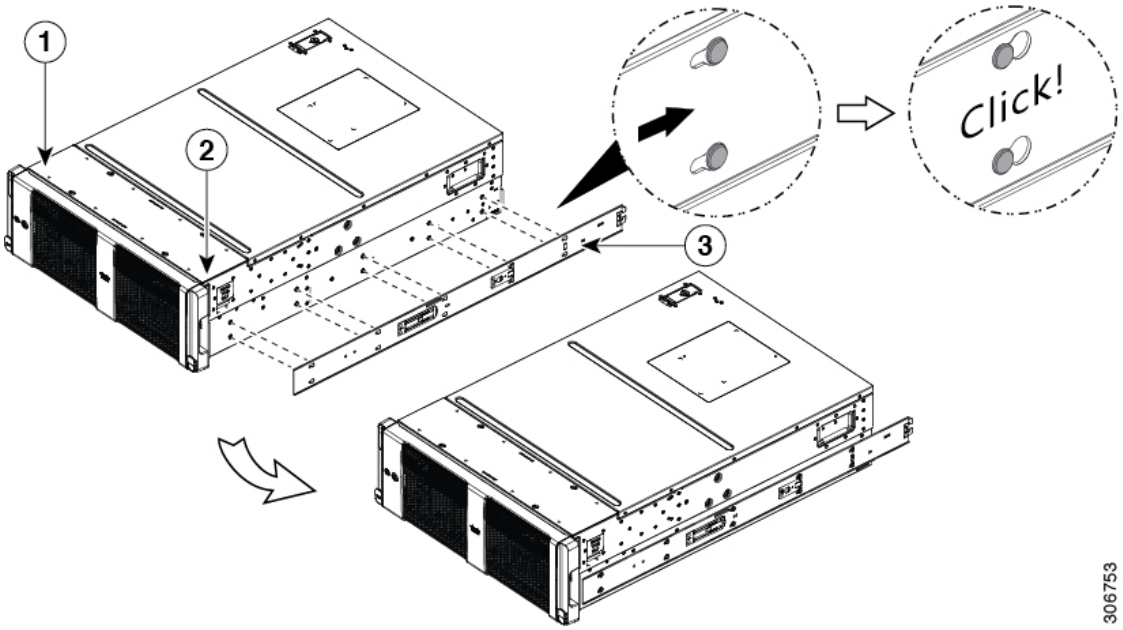
1	Rail release latch	**2**	Inner rail release clip

Step 2 Attach the inner rails to the sides of the server:

Note The inner rails are not identical: there is a left rail and a right rail (as viewed from the chassis front). The inner rails are marked with “L” for left or “R” for right.

a) Align the left inner rail marked “L” with the left side of the chassis (as viewed from the front). Align the 10 keyed slots in the rail with the 10 pegs on the side of the chassis.
b) Set the keyed slots over the pegs, and then slide the rail toward the front to lock it in place on the pegs.
c) Install the right inner rail marked “R” to the right side of the chassis (as viewed from the front).

Figure 8: Attaching the Inner Rail to the Side of the Server



1	Left side of chassis	**3**	Right-side inner rail marked "R"
2	Right side of chassis	-	

Step 3 Install the slide rail assemblies into the rack:

Note The slide rail assemblies are not identical; there is a left rail and a right rail (as viewed from the rack front). The assemblies are marked with “L” for left or “R” for right.

a) Align the front end of the left-side slide-rail assembly (marked “L”) with the left-front rack-post (as you face the front of the rack).

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.

The bottom of the slide rail assembly lines up with the intended bottom of the rack unit.

b) Push the front mounting pegs into the rack-post holes until you hear them click and lock.

c) Adjust the slide-rail length until it reaches the rear rack post perfectly level.

Note Ensure that the rail is perfectly level and that the same height rack-post holes are used in the front and rear posts.

d) Hold open the rear-peg spring latch, then push the rear mounting pegs into the rear rack-post-holes

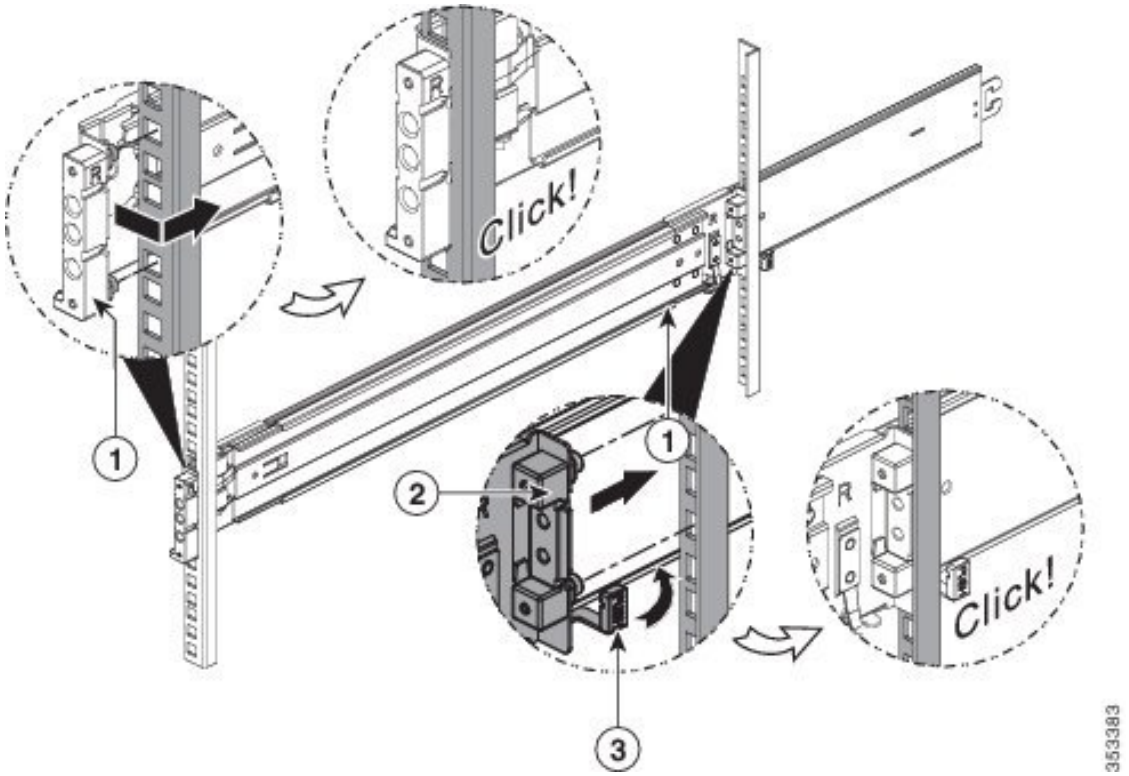
The rear mounting pegs enter the rear rack-post holes from the *inside* of the rack post.

e) Release the rear-peg spring latch to lock the rear pegs in place.

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

Caution Ensure that all pegs are fully inserted into the rack post holes before installing the server to the rack.

Figure 9: Attaching the Rail Assembly to the Rack Post



1	Front mounting pegs, entering rack-post holes from the outside front	**3**	Rear peg spring-latch
2	Rear mounting pegs, entering rack-post holes from inside rear	-	

Step 4 Pull the inner slide rails on each assembly out toward the rack front until they hit the internal stops and lock in place.

Step 5 Insert the server into the slide rails:

Caution This server can weigh up to 146 pounds (66.2 kilograms) when fully loaded with components. We recommend that you use a minimum of two people or a mechanical lift when lifting the server. Attempting this procedure alone could result in personal injury or equipment damage.

Note The rack rail channels are fragile to side loads. Install the chassis gently to avoid damaging the rails.

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

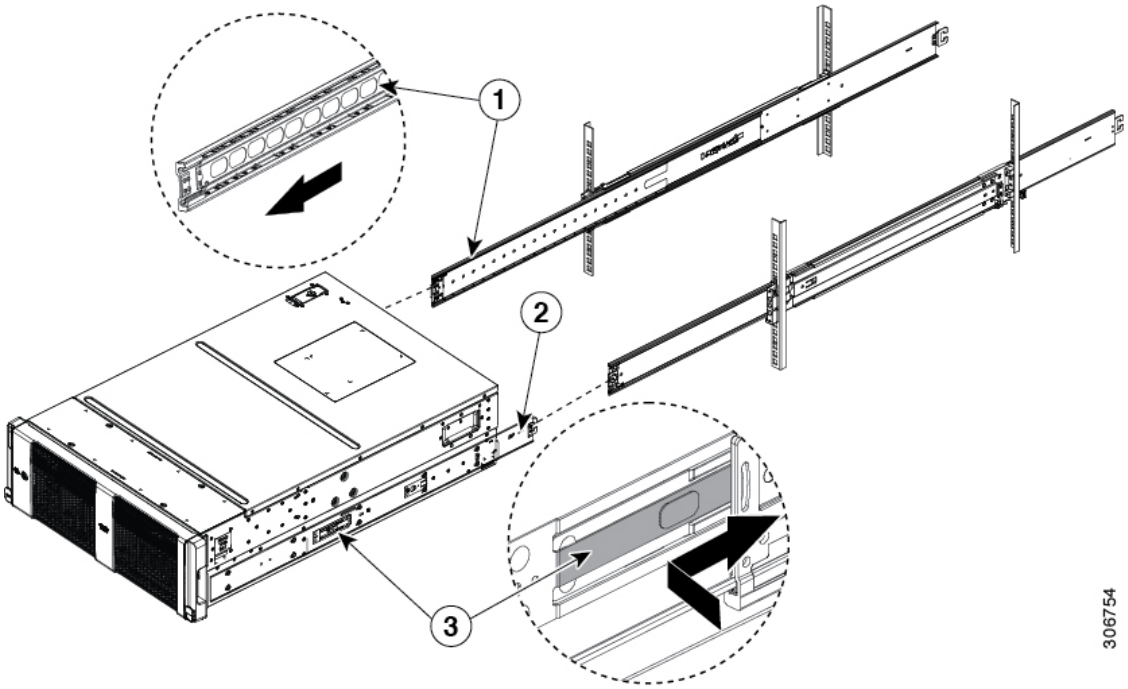
Caution Ensure that the inner rails on the chassis are parallel with the intermediate rails on the rack. This could require adjusting the mechanical lift position up-down and left-to-right. Consider using shims if your lift does not support these motions. The ends of the inner rail must align up-down and side-to-side with the ends of the intermediate rails.

b) Very slowly push the chassis toward the rack. Ensure that the rail ends mesh to each other and are fully engaged at the top and bottom of the rail channels.

c) Slowly push the inner rails into the slide rails on the rack until they stop at the internal stops.
d) Press the release clip on each inner rail inward, and then continue pushing the server into the rack until its front slam-latches engage with the rack posts.

Caution Ensure that both inner rail release clips are pushed in before pushing the server into the rack. Push the server into the rails slowly to avoid damaging the rails. Let go of the release clip buttons as the server begins to push in.

Figure 10: Inner-Rail Release Clip



1	Intermediate rail extended from outer rail	**3**	Inner rail release clip
2	Inner rail attached to server	-	

Step 6 (Optional) Secure the server in the rack more permanently by using the two screws that are provided with the slide rails. Always perform this step if you plan to move the rack with servers installed.

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

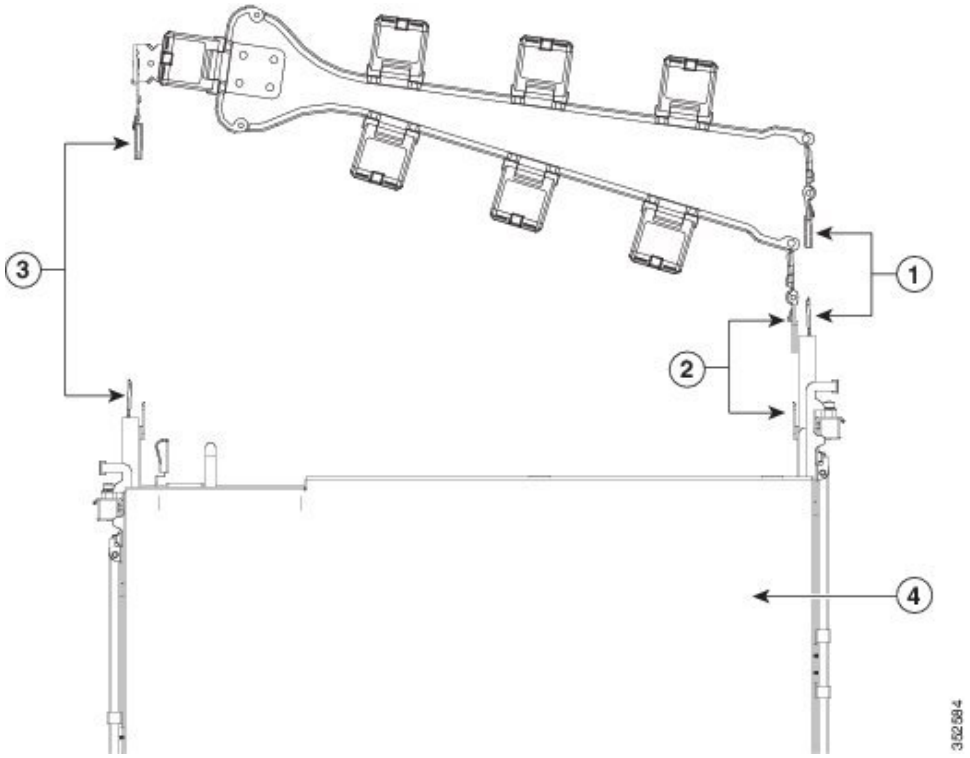
Caution Depressing the release clips on the inner rails allows the chassis to slide all the way out of the intermediate rails and could result in injury or equipment damage. When you pull the chassis outward from the rack, it stops at internal locking stops. Do not depress the inner-rail release clips unless you intend to slide the chassis back into the rack or to fully remove the chassis from the rack. It is recommended that when you test pulling the chassis out from the rack for the first time that you place the mechanical lift under the chassis to avoid an accidental drop.

Installing the Cable Management Arm (Optional)

Note The cable management arm (CMA) is reversible left-to-right. To reverse the CMA, see Reversing the Cable Management Arm (Optional), on page 20 before installation.

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

Figure 11: Attaching the CMA to the Rear Ends of the Slide Rails



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

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

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

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

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

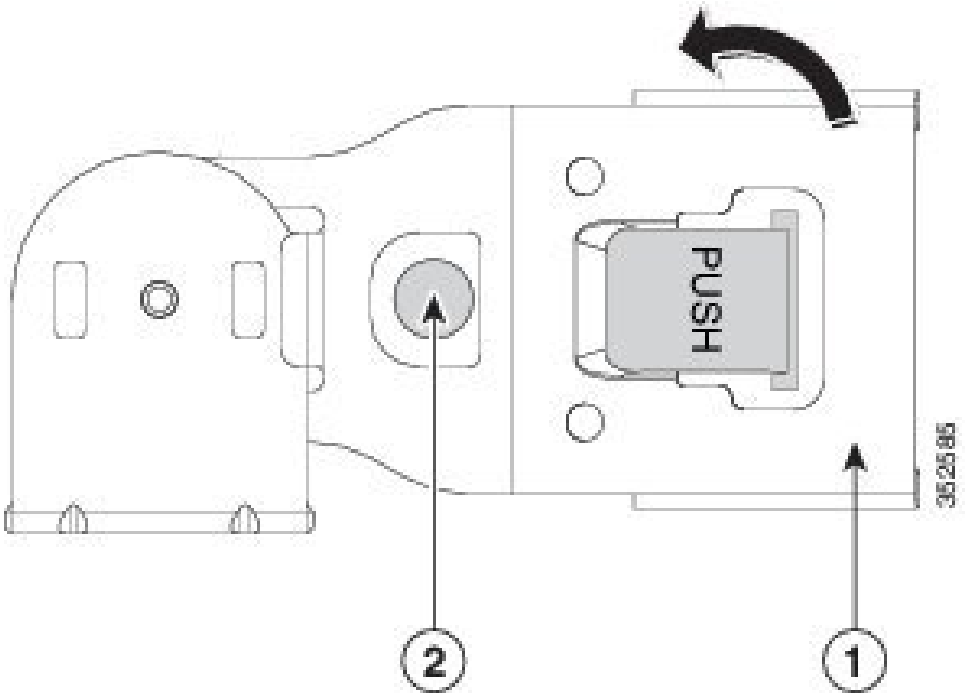
Reversing the Cable Management Arm (Optional)

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

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

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 server.

Figure 12: Reversing the CMA



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

Initial Server Setup

Note This section describes how to power on the server, assign an IP address, and connect to server management when using the server in standalone mode. To use the server in Cisco UCS Manager integration, specific cabling and settings are required. See Installation For Cisco UCS Manager Integration, on page 129.

Server Default Settings

The server is shipped with these default settings:

- The NIC mode is *Shared LOM EXT*.

  Shared LOM EXT mode enables the 1-Gb/10-Gb Ethernet ports *and* the ports on any installed Cisco virtual interface card (VIC) to access the Cisco Integrated Management Interface (Cisco IMC). If you want to use the 10/100/1000 dedicated management port to access Cisco IMC, you can connect to the server and change the NIC mode as described in Setting Up the System With the Cisco IMC Configuration Utility, on page 23.

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

Connection Methods

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

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

Note To configure the system remotely, you must have a DHCP server on the same network as the system. Your DHCP server must be preconfigured with the range of MAC addresses for this server node. This server 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.

Connecting to the Server Locally For Setup

This procedure requires the following equipment:

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

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

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

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

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

Step 3 Open the Cisco IMC Configuration Utility:

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

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

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

The following are the requirements for Strong Password:

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

Step 4 Continue with Setting Up the System With the Cisco IMC Configuration Utility, on page 23.

Connecting to the Server Remotely For Setup

This procedure requires the following equipment:

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

Before you begin

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

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

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

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

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

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

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

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

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

Step 7 Select the KVM console window.

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

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

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

The following are the requirements for Strong Password:

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

Step 9 Continue with Setting Up the System With the Cisco IMC Configuration Utility, on page 23.

Setting Up the System With the Cisco IMC Configuration Utility

Before you begin

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

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

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

  In this NIC mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the system determines that the Cisco card connection is not getting its IP address from a Cisco UCS Manager system because

the server is in standalone mode, further DHCP requests from the Cisco card are disabled. Use the Cisco Card NIC mode if you want to connect to Cisco IMC through a Cisco card in standalone mode.

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

  See also the required VIC Slot setting below.

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

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

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

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

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

- The Cisco IMC IP address.

  For IPv6, valid values are 1 - 127.
- The gateway.

  For IPv6, if you do not know the gateway, you can set it as none by entering :: (two colons).
- The preferred DNS server address.

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

Step 4 (Optional) Make VLAN settings.

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

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

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

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

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

Step 9 (Optional) Set a default user password.

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

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

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

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

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

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

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

What to do next

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

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

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

NIC Mode and NIC Redundancy Settings

Table 1: Valid NIC Redundancy Settings For Each NIC Mode

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

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

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

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

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

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

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

  See also the required VIC Slot setting below.

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

- *None*—The Ethernet ports operate independently and do not fail over if there is a problem. This setting can be used only with the Dedicated NIC mode.

- *Active-standby*—If an active Ethernet port fails, traffic fails over to a standby port. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.

- *Active-active* (default)—All Ethernet ports are utilized simultaneously. The Shared LOM EXT mode must use only this NIC redundancy setting. Shared LOM and Cisco Card modes can each use either Active-standby or Active-active settings.

Accessing the System BIOS

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

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

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

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

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

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

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

Updating the BIOS and Cisco IMC Firmware

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

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

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

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

  See the *Cisco Host Upgrade Utility Quick Reference Guide* for your firmware release at the documentation roadmap link below.

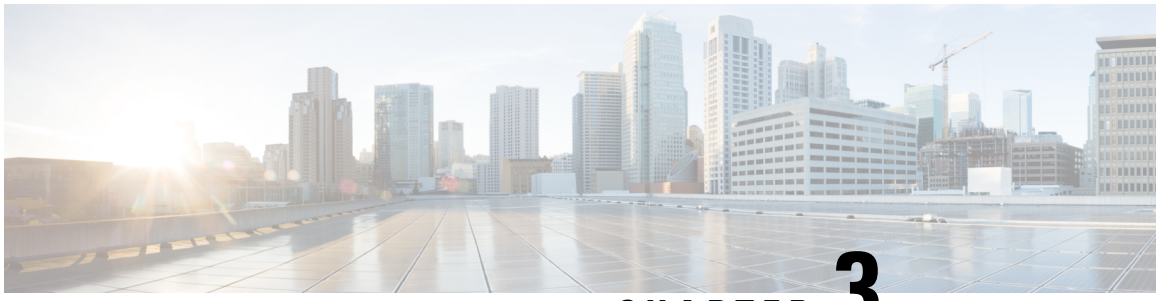
- You can upgrade the Cisco IMC and BIOS firmware by using the Cisco IMC GUI interface.

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

- You can upgrade the Cisco IMC and BIOS firmware by using the Cisco IMC CLI interface.

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

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



CHAPTER 3

Maintaining the Server

- Status LEDs and Buttons, on page 29
- Preparing For Component Installation, on page 35
- Serviceable Component Locations, on page 39
- Replacing Components Inside the Main Chassis, on page 43
- Replacing Components Inside a CPU Module, on page 72
- Replacing Components Inside an I/O Module, on page 94
- Service DIP Switches, on page 101

Status LEDs and Buttons

This section contains information for interpreting LED states.

Front-Panel LEDs

Figure 13: Front Panel LEDs

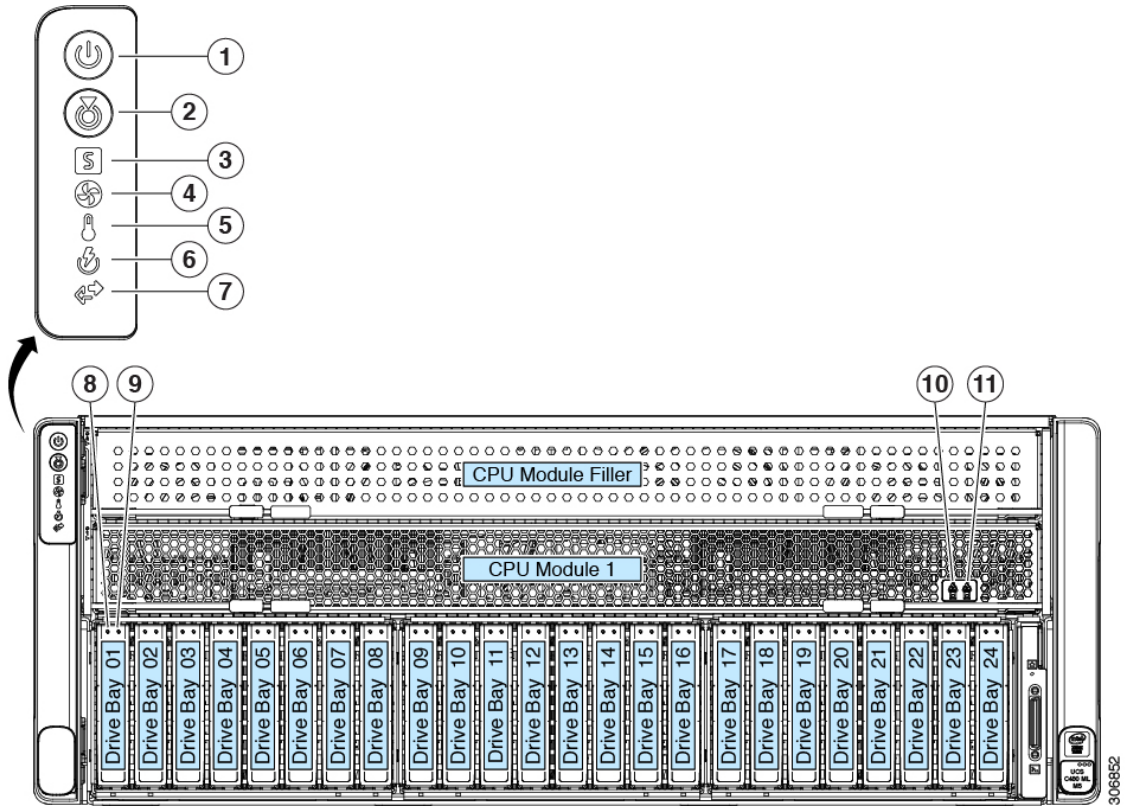


Table 2: Front Panel LEDs, Definition of States

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

3	System health	• Green—The server is running in normal operating condition.
		• Amber, steady—The server is in a degraded operational state (minor fault). For example:
		  • Power supply redundancy is lost.
		  • CPUs are mismatched.
		  • At least one CPU is faulty.
		  • At least one DIMM is faulty.
		  • At least one drive in a RAID configuration failed.
		• Amber, blinking—The server is in a critical fault state. For example:
		  • Boot failure
		  • Fatal processor and/or bus error detected
		  • Over-temperature condition

4	Power supply status	• Green—All power supplies are operating normally. • Amber, steady—One or more power supplies are in a degraded operational state. • Amber, blinking—One or more power supplies are in a critical fault state.
5	Fan status	• Green—All fan modules are operating properly. • Amber, steady—Fan modules are in a degraded state. One fan module has a fault. • Amber, blinking—Two or more fan modules have faults.
6	Network link activity	• Off—The Ethernet LOM port link is idle. • Green—One or more Ethernet LOM ports are link-active, but there is no activity. • Green, blinking—One or more Ethernet LOM ports are link-active, with activity.

7	Temperature status	• Green—The server is operating at normal temperature. No error conditions detected. • Amber, steady—One or more temperature sensors exceeded a warning threshold. • Amber, blinking—One or more temperature sensors exceeded a critical non-recoverable threshold.
8 **SAS**	SAS/SATA drive fault **Note** NVMe solid state drive (SSD) drive tray LEDs have different behavior than SAS/SATA drive trays.	• 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 in the software.
9 **SAS**	SAS/SATA drive activity LED	• 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.
8 **NVMe**	NVMe SSD drive fault **Note** NVMe solid state drive (SSD) drive-tray LEDs have different behavior than SAS/SATA drive trays.	• Off—The drive is not in use and can be safely removed. • Green—The drive is in use and functioning properly. • Green, blinking—the driver is initializing following insertion or the driver is unloading following an eject command. • Amber—The drive has failed or the NVMe drive is in a drive bay that does not support NVMe. • Amber, blinking—A drive Locate command has been issued in the software.
9 **NVMe**	NVMe SSD activity	• Off—No drive activity. • Green, blinking—There is drive activity.
10	CPU module power status	• Green—The CPU module is correctly seated and receiving power. • Off—There is no power to the CPU module or it is incorrectly seated.

11	CPU module fault	• Off—There is no fault with the CPUs or DIMMs on the CPU module board. • Amber—There is a fault with a CPU or DIMM on the CPU module board, such as an over-temperature condition.
-	DVD drive activity (optional DVD module not shown)	• Off—The drive is idle. • Green, steady—The drive is spinning up a disk. • Green, blinking—The drive is accessing data.

Rear-Panel LEDs

Figure 14: Rear Panel LEDs

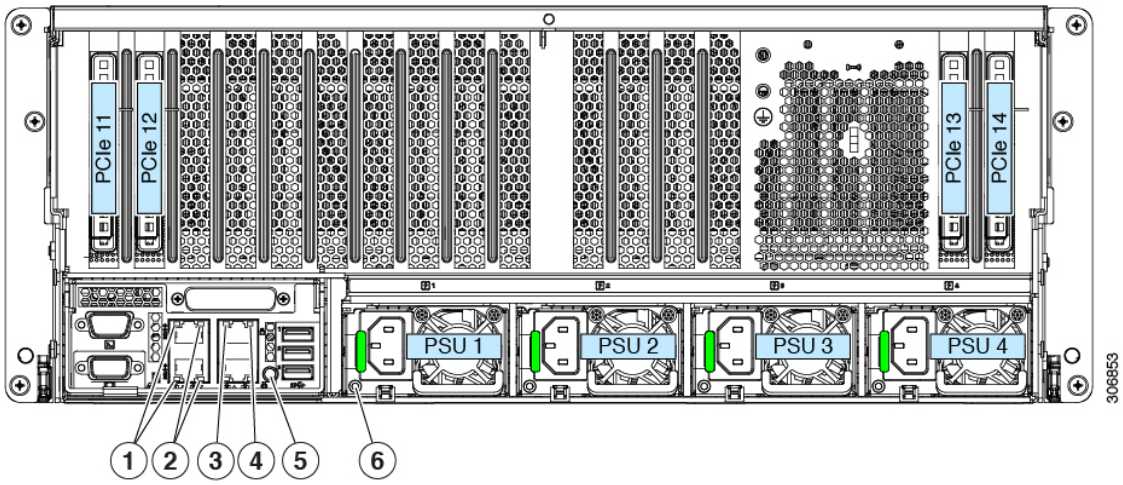


Table 3: Rear Panel LEDs, Definition of States

	LED Name	States
1	1-Gb/10-Gb Ethernet link speed (on both LAN1 and LAN2) These ports auto-negotiate link speed based on the link-partner capability.	• Off—Link speed is 100 Mbps. • Amber—Link speed is 1 Gbps. • Green—Link speed is 10 Gbps.
2	1-Gb/10-Gb Ethernet link status (on both LAN1 and LAN2)	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.

3	1-Gb Ethernet dedicated management link speed	• Off—Link speed is 10 Mbps. • Amber—Link speed is 100 Mbps. • Green—Link speed is 1 Gbps.
4	1-Gb Ethernet dedicated management link status	• Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
5	Rear unit identification	• Off—The unit identification function is not in use. • Blue, blinking—The unit identification function is activated.
6	Power supply status (one LED each power supply unit)	**AC power supplies:** • Off—No AC input (12 V main power off, 12 V standby power off). • Green, blinking—12 V main power off; 12 V standby power on. • Green, solid—12 V main power on; 12 V standby power on. • Amber, blinking—Warning threshold detected but 12 V main power on. • Amber, solid—Critical error detected; 12 V main power off (for example, over-current, over-voltage, or over-temperature failure).

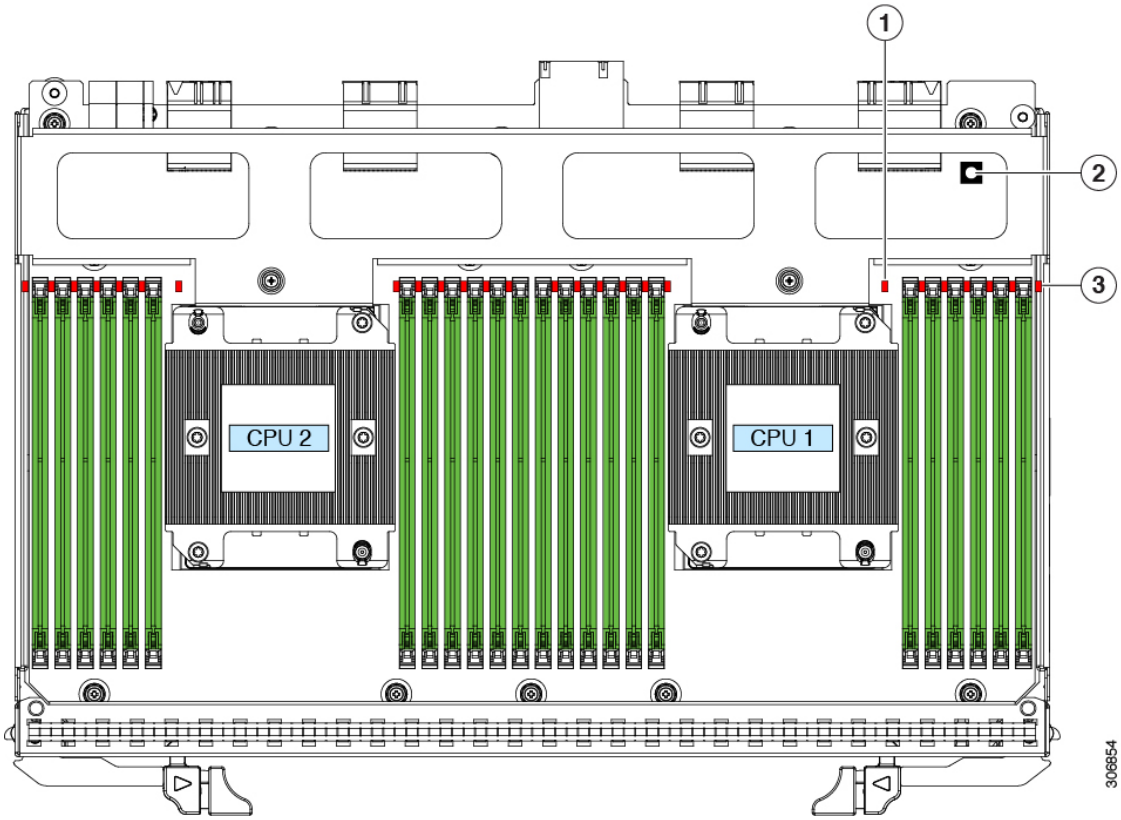
Internal Diagnostic LEDs

The system has the following internal fault LEDs to help with identifying a failing component:

- Each chassis fan module has a fault LED on top of the module. These fan LEDs operate only when the system is in standby power mode.
- The CPU module has internal fault LEDs for CPUs and DIMMs on the CPU module board. POST and runtime error detection routines are stored in on-board registers. The contents of the registers are preserved for a limited time by a supercap voltage source.

  To operate the LEDs, press switch SW1 on the board after the CPU module is removed from the chassis.

Figure 15: Internal Diagnostic LED Locations



1	CPU fault LEDs (one behind each CPU socket on the board). • Amber—CPU has a fault. • Off—CPU is OK.	**3**	DIMM fault LEDs (one next to each DIMM socket on the board) • Amber—DIMM has a fault. • Off—DIMM is OK.
2	Switch SW1 SW1 is labeled, " PRESS HERE TO SEE FAULTS".	-	

Preparing For Component Installation

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

Required Equipment For Service Procedures

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

- T-30 Torx driver (supplied with replacement CPUs for heatsink removal)

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

Shutting Down and Removing Power From the Server

The server can run in either of two power modes:

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

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

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

Shutting Down Using the Power Button

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

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

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

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

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

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

Shutting Down Using The Cisco IMC GUI

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

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

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

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

Step 4 Click **OK**.

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

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

Shutting Down Using The Cisco IMC CLI

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

Step 1 At the server prompt, enter:

Example:

server# **scope chassis**

Step 2 At the chassis prompt, enter:

Example:

server/chassis# **power shutdown**

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

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

Shutting Down Using The Cisco UCS Manager Equipment Tab

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

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

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

Step 3 Choose the server that you want to shut down.

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

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

Step 6 If a confirmation dialog displays, click **Yes**.

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

Step 7 If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

Shutting Down Using The Cisco UCS Manager Service Profile

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

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 of the server that you are shutting down.

Step 4 Choose the service profile of the server that you are shutting down.

Step 5 In the **Work** pane, click the **General** tab.

Step 6 In the **Actions** area, click **Shutdown Server**.

Step 7 If a confirmation dialog displays, click **Yes**.

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

Step 8 If a service procedure instructs you to completely remove power from the server, disconnect all power cords from the power supplies in the server.

Removing the Server Top Cover

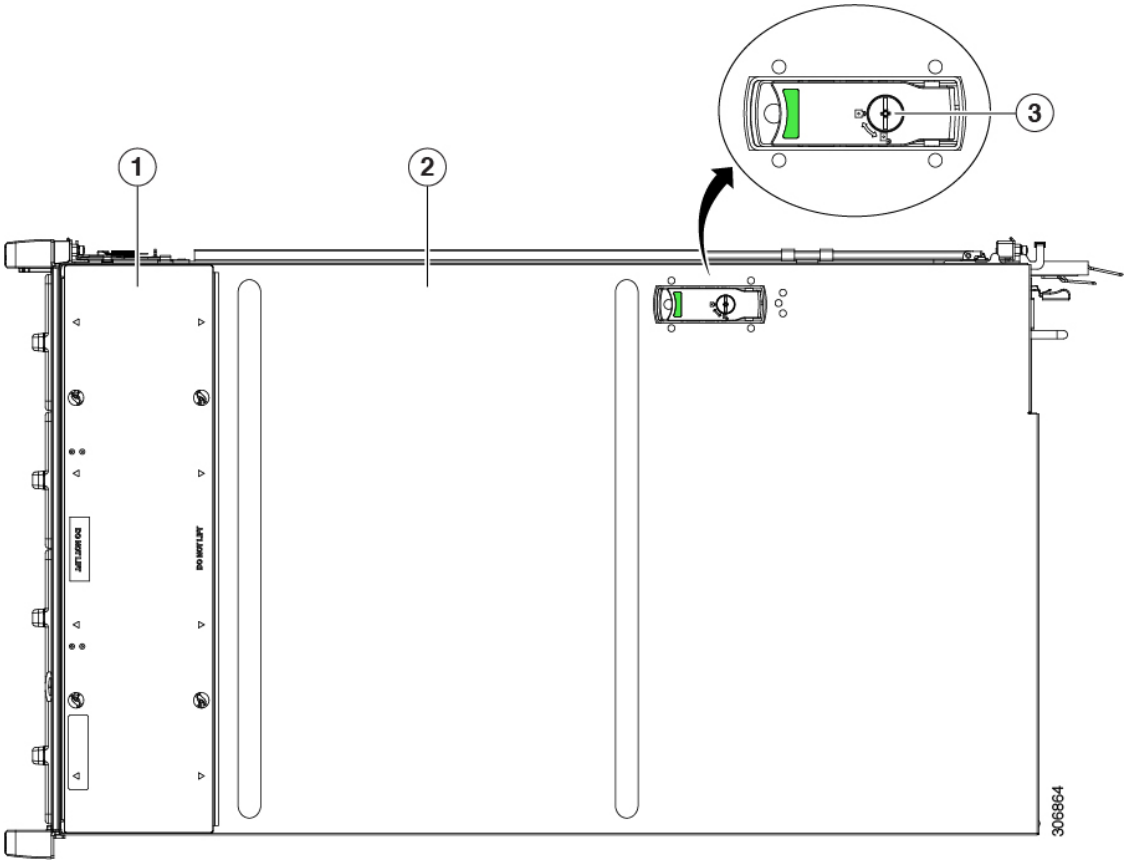
Step 1 Remove the top cover:

a) If the cover latch is locked, use a screwdriver to turn the lock 90-degrees counterclockwise to unlock it.
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 server and set it aside.

Step 2 Replace the top cover:

a) With the latch in the fully open position, place the cover on top of the server 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 16: Removing the Top Cover



1	Solid panel **Note** Never lift on this panel when lifting the system.	**3**	Cover lock
2	Sliding top cover		

Serviceable Component Locations

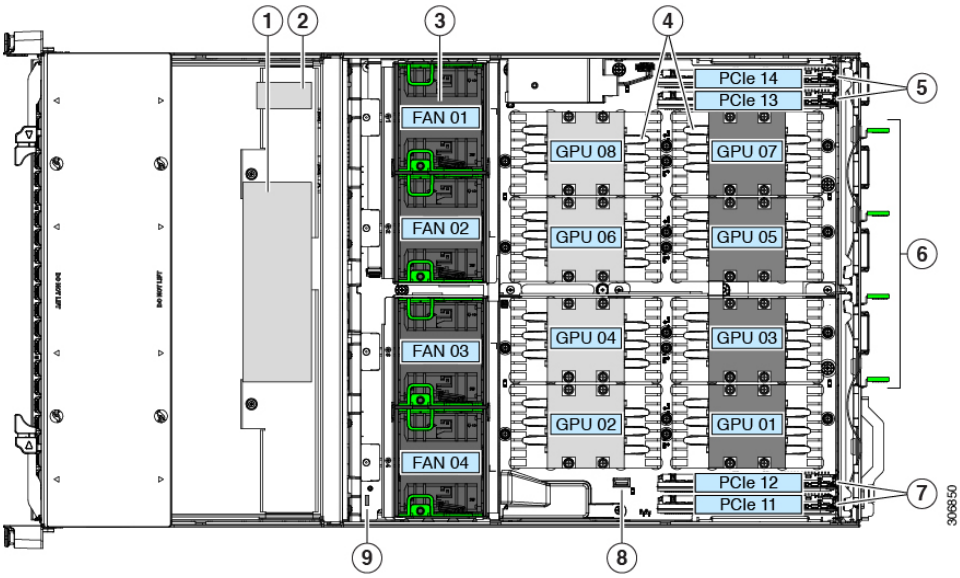
This topic shows the locations of the field-replaceable components and service-related items.

The Technical Specifications Sheet for this server, which includes supported component part numbers, are at Cisco UCS Servers Technical Specifications Sheets (scroll down to *Technical Specifications*).

- Serviceable Components Inside the Main Chassis, on page 40
- Serviceable Components Inside a CPU Module, on page 42
- Serviceable Components Inside an I/O Module, on page 43

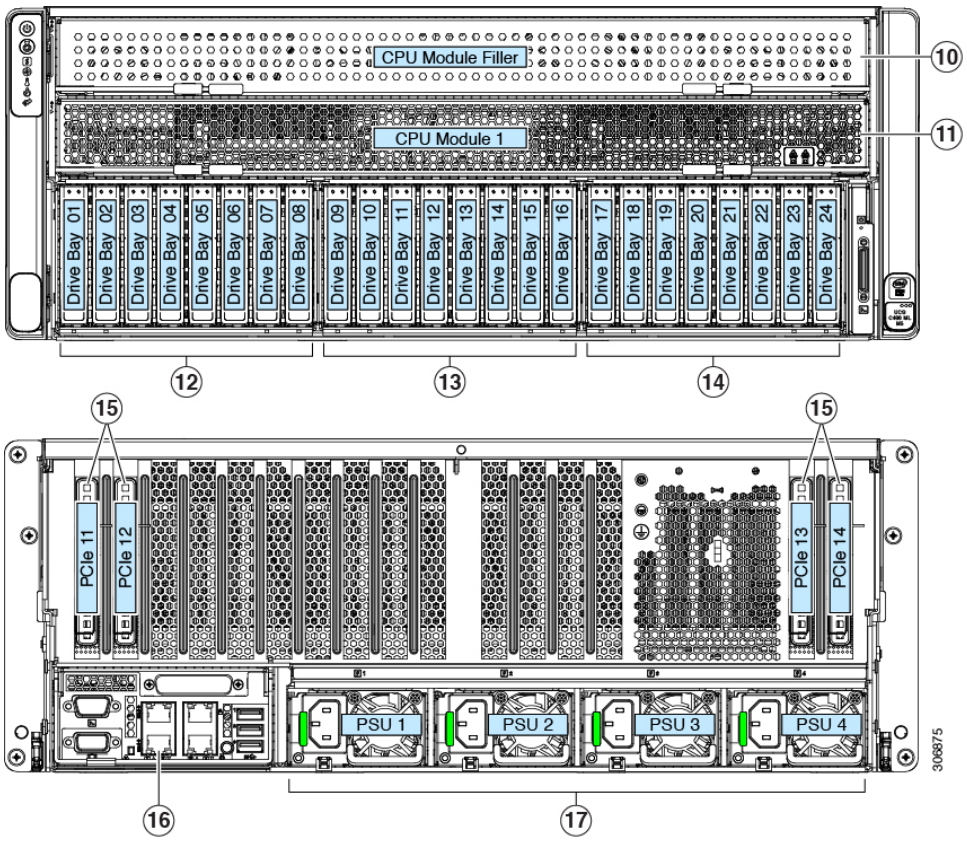
Serviceable Components Inside the Main Chassis

Figure 17: Serviceable Component Locations Inside the Main Chassis (Top View)



1	RAID controller card for front-loading SAS/SATA drives. (not visible in this view; position is near chassis floor under the CPU module)	**6**	Power supplies 1 – 4 (hot-swappable, redundant as 3+1)
2	Supercap (RAID backup) for front RAID controller (not visible in this view; mounting bracket position is on chassis wall under the CPU module)	**7**	PCIe slots 11 and 12 (Gen-3 x16) Slots 11 and 12 support standby power. Slot 11 is the primary slot for a Cisco UCS VIC card, slot 12 is the secondary slot.
3	Fan modules (four modules with two fans each; hot-swappable)	**8**	Internal, vertical USB 2.0 socket on motherboard
4	NVIDIA V100 SXM2 GPUs and heatsinks (eight) **Note** The GPUs are not customer-serviceable. Contact Cisco Support if you need service for the GPUs or their heatsinks.	**9**	Trusted platform module socket (TPM) on motherboard
5	PCIe slots 13 and 14 (Gen-3 x16) See PCIe Slot Specifications and Restrictions, on page 67 for slot specifications.	-	

Figure 18: Serviceable Component Locations Inside the Main Chassis (Front and Rear Views)

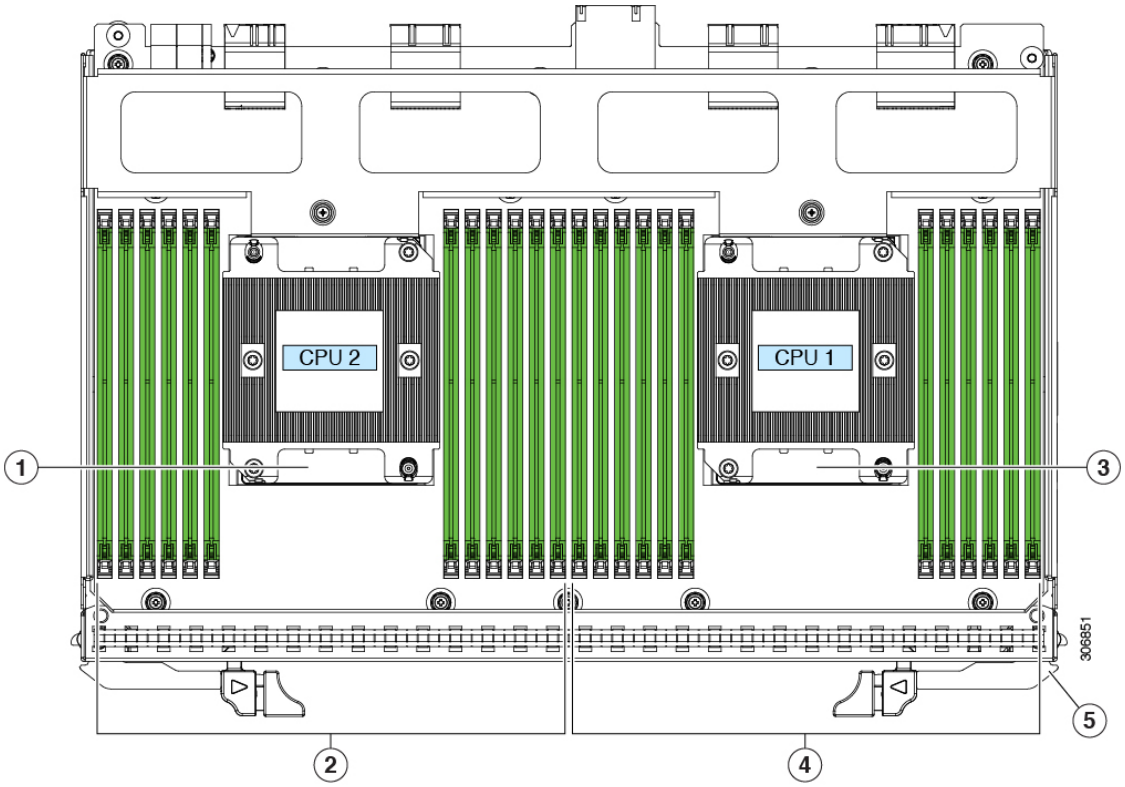


10	CPU module bay 2 (blank with filler module) There must be a blank filler module in upper bay 2 or the system will not boot.	**14**	Right bay module, supports either: • Optional DVD drive module • Drive bays 17 - 24 (shown) • All 8 bays supports SAS/SATA drives. • Bay 17 also supports NVMe drives.
11	CPU module bay 1 The system must have one CPU module in lower bay 1 to boot.	**15**	PCIe slots 11 through 14, rear panel openings
12	Left bay module (drive bays 1 - 8) • All 8 bays supports SAS/SATA drives. • Bays 1, 2, 7, 8 also support NVMe drives.	**16**	I/O module **Note** The I/O module is not field replaceable, nor can you move an I/O module from one chassis to another. This module contains a security chip that requires it to stay with the PCIe module in the same chassis, as shipped from the factory.

13	Center bay module (drive bays 9 - 16) • All 8 bays supports SAS/SATA drives. • Bay 9 also supports NVMe drives.	**17**	Power supplies 1 – 4 (hot-swappable, redundant as 3+1) All power supplies in the system must be identical (no mixing).

Serviceable Components Inside a CPU Module

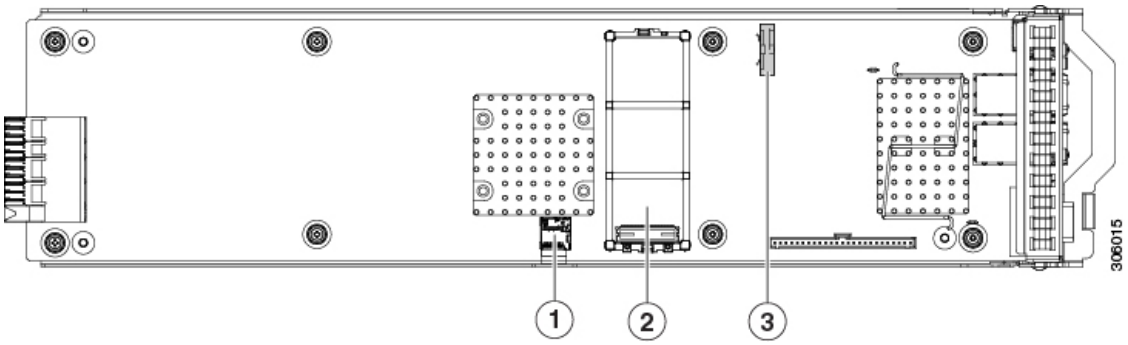
Figure 19: Serviceable Component Locations Inside a CPU Module



1	CPU 2	**4**	DIMM sockets controlled by CPU 1 (channels A, B, C, D, E, F.)
2	DIMM sockets controlled by CPU 2 (channels G, H, J, K, L, M.) See DIMM Population Rules and Memory Performance Guidelines, on page 86 for DIMM slot numbering.	**5**	Release levers for module (two each module)
3	CPU 1	-	

Serviceable Components Inside an I/O Module

Figure 20: Serviceable Component Locations Inside an I/O Module



1	Micro SD card socket	**3**	RTC battery vertical socket
2	Mini storage module connector Supports either an SD card carrier with two SD card slots or an M.2 SSD carrier with two SATA M.2 SSD slots.	-	

Replacing Components Inside the Main Chassis

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

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Caution When handling server components, handle them only by carrier edges and use an electrostatic discharge (ESD) wrist-strap or other grounding device to avoid damage.

Tip You can press the unit identification button on the front panel or rear panel to turn on a flashing, blue unit identification LED on both the front and rear panels of the server. This button allows you to locate the specific server 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.

Replacing a CPU Module

CPU Module Population Rules:

- This server operates with one CPU module, in lower bay 1.
- You must have a blank filler module in upper bay 2 or the server will not boot.

Note The CPU module has a fault LED on its front that turns amber to help to identify when there is a fault.

Caution Never remove a CPU module without shutting down and removing power from the server.

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

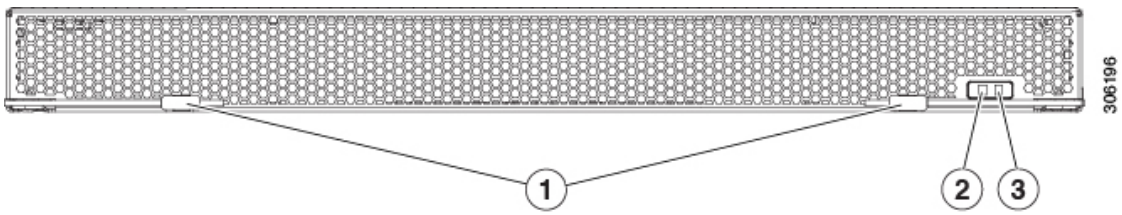
You do not have to pull the server out from the rack or remove the cover because the CPU module is accessed from the front of the chassis.

Step 2 Remove an existing CPU module:

Note Verify that the power LED on the front of the CPU module is off before removing the module.

a) Grasp the two ejector levers on the module and pinch their latches to release the levers.
b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Figure 21: CPU Module Front



1	Ejector levers (two)	**3**	CPU module fault LED
2	CPU module power status LED	-	

Step 3 If you are moving CPUs from the old CPU module to the new CPU module, see Moving an M5 Generation CPU, on page 81.

Step 4 If you are moving DIMMs from the old CPU module to the new CPU module, perform the following steps:

a) Open the ejector lever at each end of the DIMM slot and pick the DIMM straight up from the old CPU module board.
b) On the new CPU module board, align the new DIMM with an empty slot. Use the alignment feature in the DIMM slot to correctly orient the DIMM.
c) Push down evenly on the top corners of the DIMM until it is fully seated and the ejector levers on both ends lock into place.

Step 5 Install a new CPU module to the chassis:

a) With the two ejector levers open, align the new CPU module with lower bay 1.

b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 6 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 7 Fully power on the server by pressing the Power button.

Note Verify that the power LED on the front of the CPU module returns to solid green.

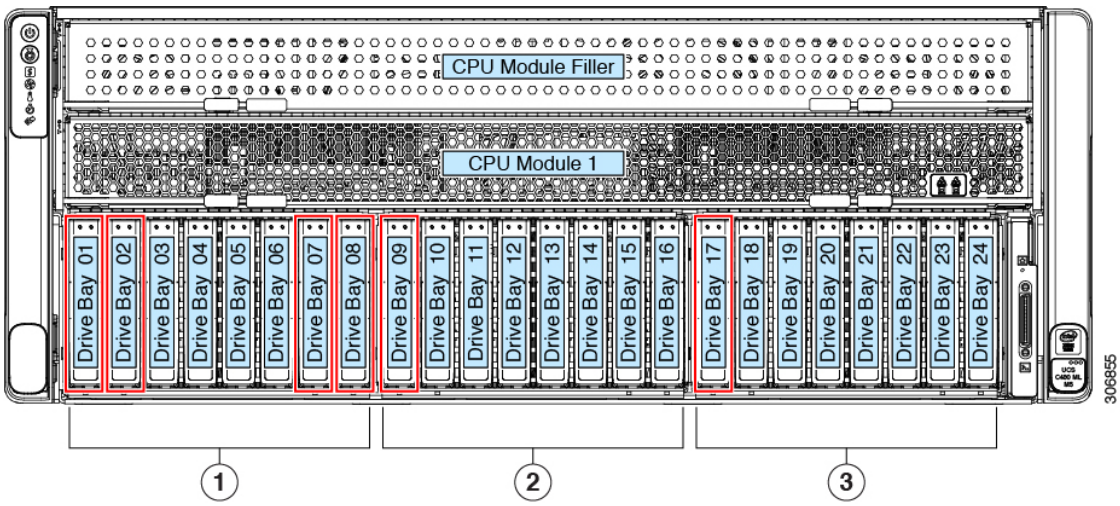
Replacing Front-Loading SAS/SATA Drives

Note You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable.

Front-Loading SAS/SATA Drive Population Guidelines

The front drives in the server are installed into three removable drive bay modules (UCSC-C480-8HDD). All 24 front drive bays support SAS/SATA drives.

Figure 22: Drive Bay Numbering



Observe these drive population guidelines for optimum performance:

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

4K Sector Format SAS/SATA Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. See the procedures in this section.
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- For operating system support on 4K sector drives, see the interoperability matrix tool for your server: Hardware and Software Interoperability Matrix Tools

Setting Up UEFI Mode Booting in the BIOS Setup Utility

Step 1 Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
Step 2 Go to the **Boot Options** tab.
Step 3 Set **UEFI Boot Options** to **Enabled**.
Step 4 Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.
Step 5 Go to the **Advanced** tab.
Step 6 Select **LOM** and **PCIe Slot Configuration**.
Step 7 Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.
Step 8 Press **F10** to save changes and exit the BIOS setup utility. Allow the server to reboot.
Step 9 After the OS installs, verify the installation:
a) Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
b) Go to the Boot Options tab.
c) Under **Boot Option Priorities**, verify that the OS you installed is listed as your **Boot Option #1**.

Setting Up UEFI Mode Booting in the Cisco IMC GUI

Step 1 Use a web browser and the IP address of the server to log into the Cisco IMC GUI management interface.
Step 2 Navigate to **Server** > **BIOS**.
Step 3 Under Actions, click **Configure BIOS**.
Step 4 In the Configure BIOS Parameters dialog, select the **Advanced** tab.
Step 5 Go to the **LOM** and **PCIe Slot Configuration** section.
Step 6 Set the **PCIe Slot: HBA Option ROM** to **UEFI Only**.
Step 7 Click **Save Changes**. The dialog closes.
Step 8 Under BIOS Properties, set **Configured Boot Order** to **UEFI**.
Step 9 Under Actions, click **Configure Boot Order**.
Step 10 In the Configure Boot Order dialog, click **Add Local HDD**.
Step 11 In the Add Local HDD dialog, enter the information for the 4K sector format drive and make it first in the boot order.

Step 12 Save changes and reboot the server. The changes you made will be visible after the system reboots.

Replacing a Front-Loading SAS/SATA Drive

Note You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable.

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

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

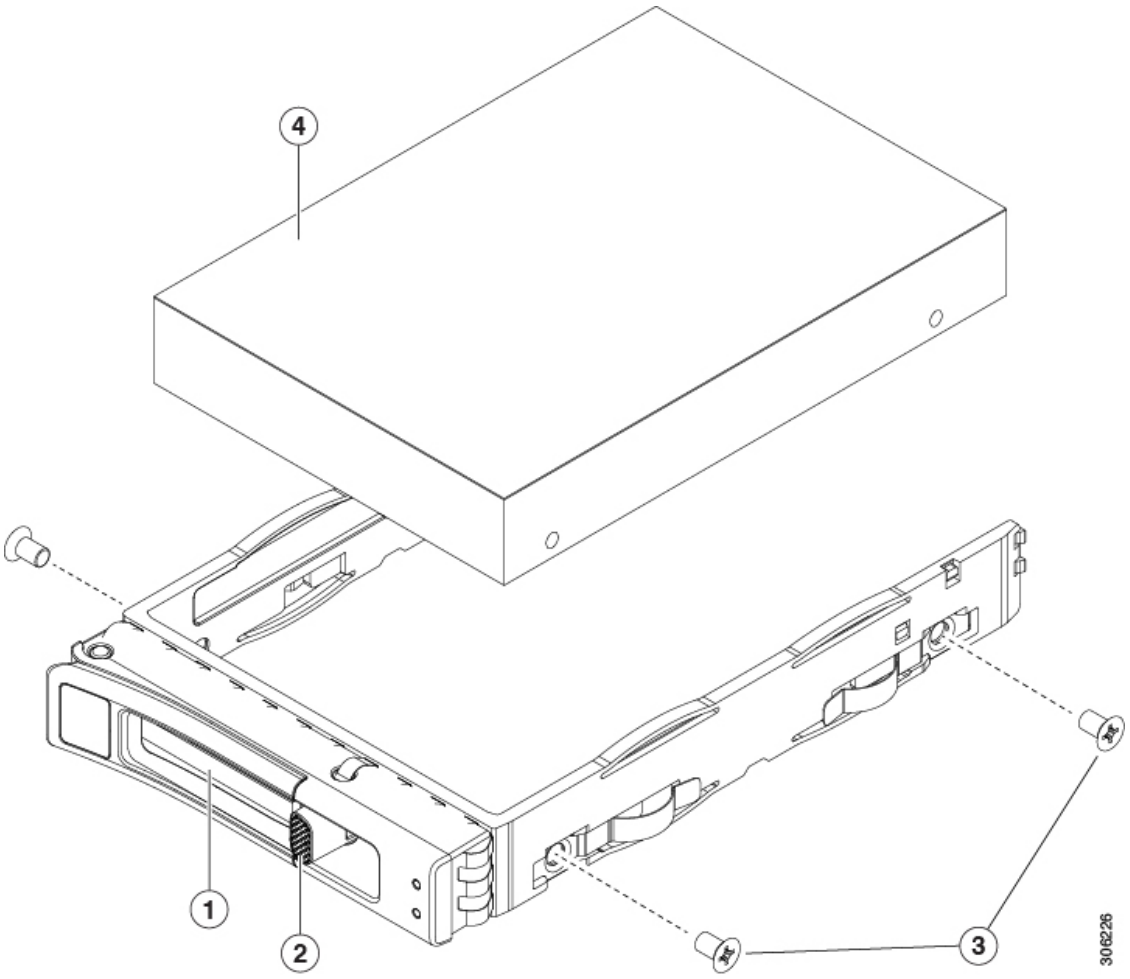
Step 2 Install a new drive:

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

Note When you insert the drive tray in the slot, the LEDs on the drive tray must be on the upper side. The ejector lever closes upward.

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 23: Replacing a Drive in a Drive Tray



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

Replacing Front-Loading NVMe SSDs

Note OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See Enabling Hot-Plug Support in the System BIOS, on page 50.

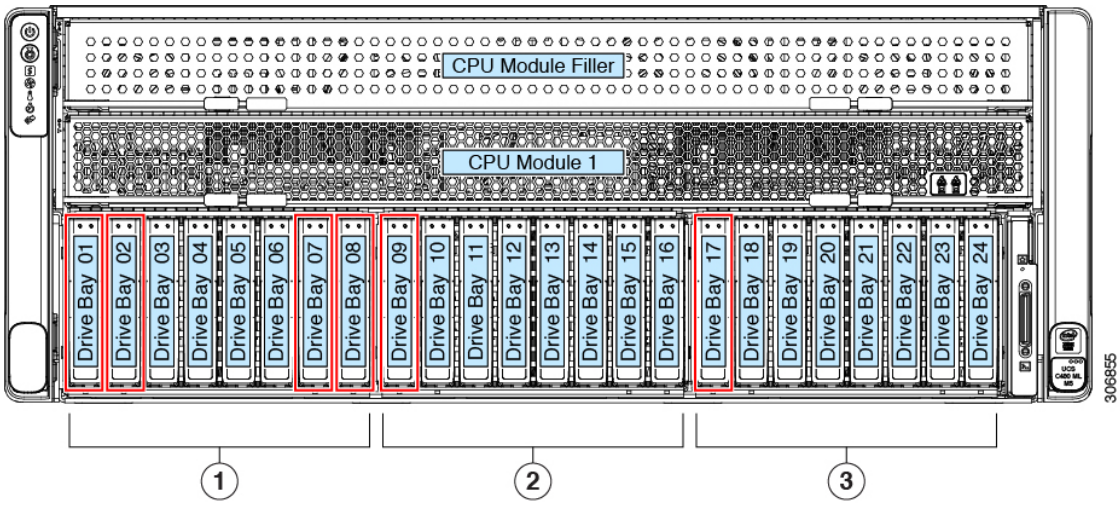
Note OS-surprise removal is not supported. OS-informed hot-insertion and hot-removal are supported on all supported operating systems except VMware ESXi.

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

Front-Loading NVMe SSD Population Guidelines

The following figure shows how the 24 drive bays are arranged in the 3 removable drive bay modules. Only the drive bays marked in red support NVMe drives: 1, 2, 7, 8, 9, and 17.

Figure 24: Drive Bay Numbering



- The support for NVMe drives differs, depending on the position of the drive bay module in the chassis. See the following table:

UCSC-C480-8HDD Position in Chassis	Bays That Support NVMe Drives
Left drive bay module	1, 2, 7, 8
Center drive bay module	9
Right drive bay module	17

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

Front-Loading NVME SSD Requirements and Restrictions

Observe these requirements:

- Hot-plug support must be enabled in the system BIOS. If you ordered the system with NVMe drives, hot-plug support is enabled at the factory. See Enabling Hot-Plug Support in the System BIOS, on page 50.

Observe these restrictions:

- NVMe 2.5-inch SSDs support booting only in UEFI mode. Legacy boot is not supported. For instructions on setting up UEFI boot, see Setting Up UEFI Mode Booting in the BIOS Setup Utility, on page 46 or Setting Up UEFI Mode Booting in the Cisco IMC GUI, on page 46.

- You cannot control NVMe PCIe SSDs with a SAS RAID controller because NVMe SSDs interface with the server via the PCIe bus.
- You can combine NVMe 2.5-inch SSDs and HHHL form-factor SSDs in the same system, but the same partner brand must be used. For example, two *Intel* NVMe SFF 2.5-inch SSDs and two *HGST* HHHL form-factor SSDs is an invalid configuration. A valid configuration is two *HGST* NVMe SFF 2.5-inch SSDs and two *HGST* HHHL form-factor SSDs.
- UEFI boot is supported in all supported operating systems. Hot-insertion and hot-removal are supported in all supported operating systems except VMWare ESXi.

Enabling Hot-Plug Support in the System BIOS

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

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

Enabling Hot-Plug Support Using the BIOS Setup Utility

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

Enabling Hot-Plug Support Using the Cisco IMC GUI

Step 1 Use a browser to log in to the Cisco IMC GUI for the server.
Step 2 Navigate to **Compute > BIOS > Advanced > PCI Configuration**.
Step 3 Set NVME SSD Hot-Plug Support to **Enabled**.
Step 4 Save your changes.

Replacing a Front-Loading NVMe SSD

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

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

Note OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See Enabling Hot-Plug Support in the System BIOS, on page 50.

Step 1 Remove an existing front-loading NVMe SSD:

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

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

b) Press the release button on the face of the drive tray.
c) Grasp and open the ejector lever and then pull the drive tray out of the slot.
d) Remove the four drive tray screws that secure the SSD to the tray and then lift the SSD out of the tray.

Step 2 Install a new front-loading NVMe SSD:

Note Be sure to install only to drive bays that support NVMe drives, as described in Front-Loading NVMe SSD Population Guidelines, on page 49. If you install an NVMe drive to a bay that does not support NVMe, the fault LED on the drive lights amber.

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

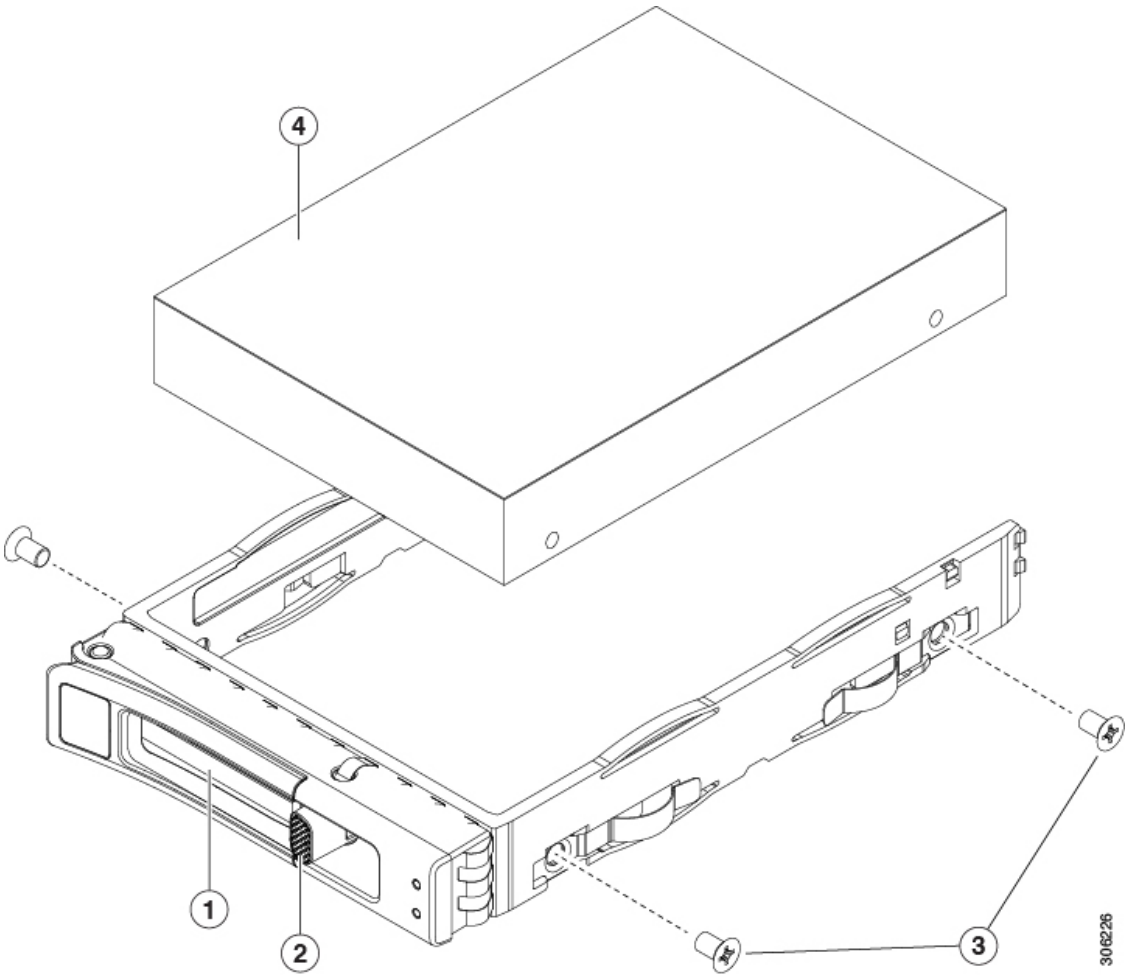
Note When you insert the drive tray in the slot, the LEDs on the drive tray must be on the upper side. The ejector lever closes upward.

b) With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
c) Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.

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

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

Figure 25: Replacing a Drive in a Drive Tray



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

Replacing a Front Drive Bay Module

The front drive bays are divided across three removable drive bay modules (UCSC-C480-8HDD) that have eight bays each.

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Remove the CPU module from the chassis to provide clearance:

a) Grasp the two ejector levers on the module and pinch their latches to release the levers.
b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 5 Remove an existing drive bay module:

a) Remove any drives from the existing module and set them aside.
b) From the top of the chassis, loosen the single captive screw that secures the module to the chassis brace.
c) Disconnect any SAS cables from the rear of the module.
d) Push the module out the front of the chassis.
e) Pull the module and its attached interposer board out the front of the chassis and then set it aside.

Step 6 Install a new drive module:

a) Insert the new module with attached interposer into the opening in the chassis front.
b) Gently slide the module into the opening, ensuring that the connector on the end of the interposer board engages with the socket on the chassis midplane. Press until the front edges of the module align evenly with the chassis.
c) Tighten the single captive screw that secures the module to the chassis brace.

Step 7 Connect any SAS cables that you disconnected earlier to the new drive module.

Step 8 Install your drives to the bays in the module.

Step 9 Reinstall the CPU module to the chassis:

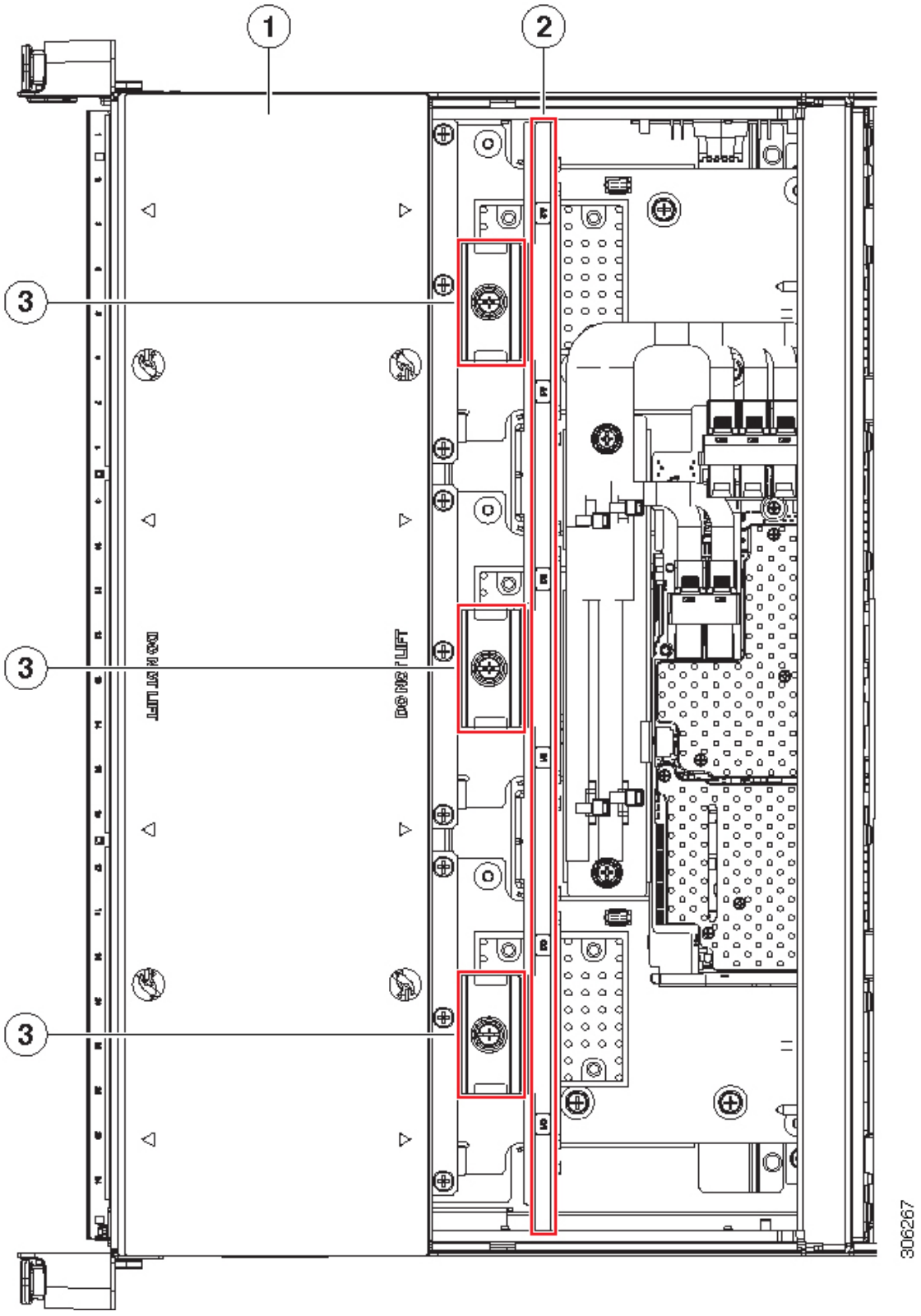
a) With the two ejector levers open, align the new CPU module with an empty bay.
b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 10 Replace the top cover to the server.

Step 11 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 12 Fully power on the server by pressing the Power button.

Figure 26: Front Drive-Bay Module Securing Screws (CPU Module Removed)



1	Front of server (view of front compartment shown with CPU module removed)	**3**	Thumbscrews that secure drive bay modules (one each module)
2	Chassis brace		

Replacing a Front RAID Controller Card

For detailed information about storage controllers in this server, see Supported Storage Controllers and Cables, on page 117.

The server supports one front RAID controller card for control of up to 24 front-loading SAS/SATA drives. The card installs to a dedicated, horizontal socket on the chassis midplane. The socket is below the CPU module and can be accessed from the top of the server after the CPU module is removed.

Firmware on the storage controller must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the server. If not compatible, upgrade or downgrade the storage controller firmware using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

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

Note **For servers running in standalone mode only:** After you replace front controller hardware (UCSC-RAID-M5HD), you must run the Cisco UCS Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the server SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

Step 1 Prepare the server for component installation:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 2 Remove the CPU module from the chassis to provide clearance:

a) Grasp the two ejector levers on the module and pinch their latches to release the levers.

b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.

c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 3 Remove any existing front RAID controller card from the server:

a) Disconnect any SAS and supercap cables from the existing card.

b) Remove the metal retainer plate that secures the front edge of the RAID card. Loosen its two captive screws and then lift the plate out of the chassis and set it aside.

c) Open the card's ejector lever to unseat it from the horizontal socket on the midplane.

d) Pull both ends of the card horizontally to disengage the card from the socket, and then set it aside.

Step 4 Install a new front RAID controller card:

a) Carefully align the card edge with the dedicated horizontal socket on the midplane.
b) Push on both corners of the card to seat its connector in the socket.
c) Fully close the ejector lever on the card to lock the card into the socket.
d) Reinstall the metal retainer plate. Align it over the two threaded standoffs, and then tighten both captive screws.
e) Reconnect any SAS and supercap cables to the new card.

Card connectors A1-A2 connect to SAS drive bay 1; card connectors B1-B2 connect to SAS drive bay 2; card connectors C1-C2 connect to SAS drive bay 3.

Step 5 Reinstall the CPU module to the chassis:

a) With the two ejector levers open, align the new CPU module with an empty bay.
b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 6 Replace the top cover to the server.

Step 7 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

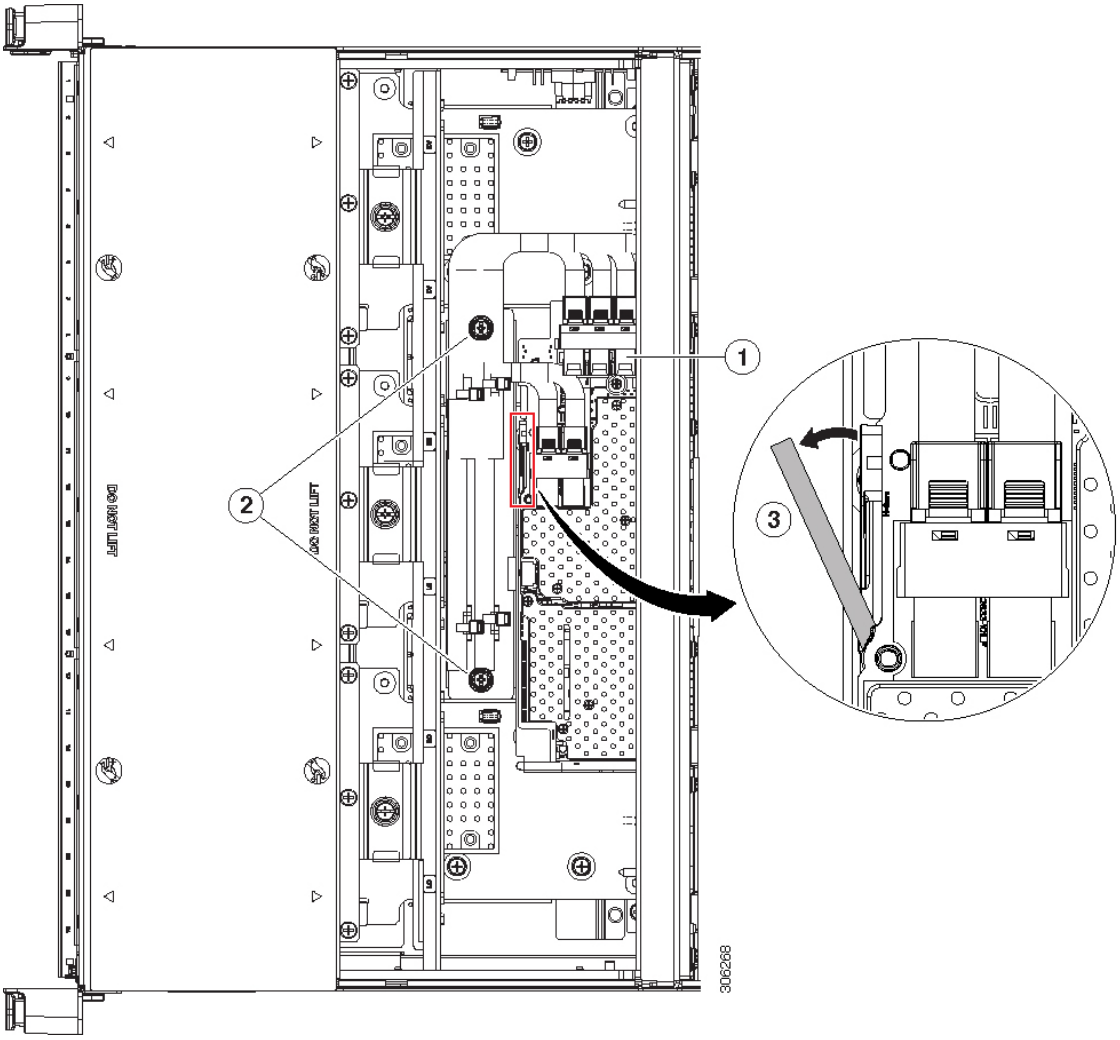
Step 8 Fully power on the server by pressing the Power button.

Step 9 If your server is running in standalone mode, use the Cisco UCS Host Upgrade Utility to update the controller firmware and program the correct suboem-id for the controller.

Note **For servers running in standalone mode only:** After you replace front controller hardware (UCSC-RAID-M5HD), you must run the Cisco UCS Host Upgrade Utility (HUU) to update the controller firmware, even if the firmware Current Version is the same as the Update Version. This is necessary to program the controller's suboem-id to the correct value for the server SKU. If you do not do this, drive enumeration might not display correctly in the software. This issue does not affect servers controlled in UCSM mode.

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

Figure 27: Front RAID Controller Card Location (CPU Module removed)



1	Location of front RAID card in dedicated horizontal socket (view of the front compartment shown with the CPU module removed)	**3**	Card ejector lever (magnified view)
2	Metal retainer plate securing screws		

Replacing the Front RAID Supercap Unit

The front supercap unit mounts to a bracket on the inner chassis wall, below the CPU modules.

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

Step 1 Prepare the server for component installation:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 2 Remove the CPU module from the chassis to provide clearance:

a) Grasp the two ejector levers on the module and pinch their latches to release the levers.

b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.

c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 3 Remove an existing supercap unit:

a) Disconnect the supercap cable from the existing supercap.

b) Lift gently on the top securing tab that holds the supercap unit to its bracket.

c) Lift the supercap unit free of the bracket and set it aside.

Step 4 Install a new supercap unit:

a) Lift gently on the top securing tab on the bracket while you set the supercap unit into the bracket. Relax the tab so that it closes over the top of the supercap.

b) Connect the supercap cable from the RAID controller card to the connector on the new supercap cable.

Step 5 Reinstall the CPU module to the chassis:

a) With the two ejector levers open, align the new CPU module with an empty bay.

b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.

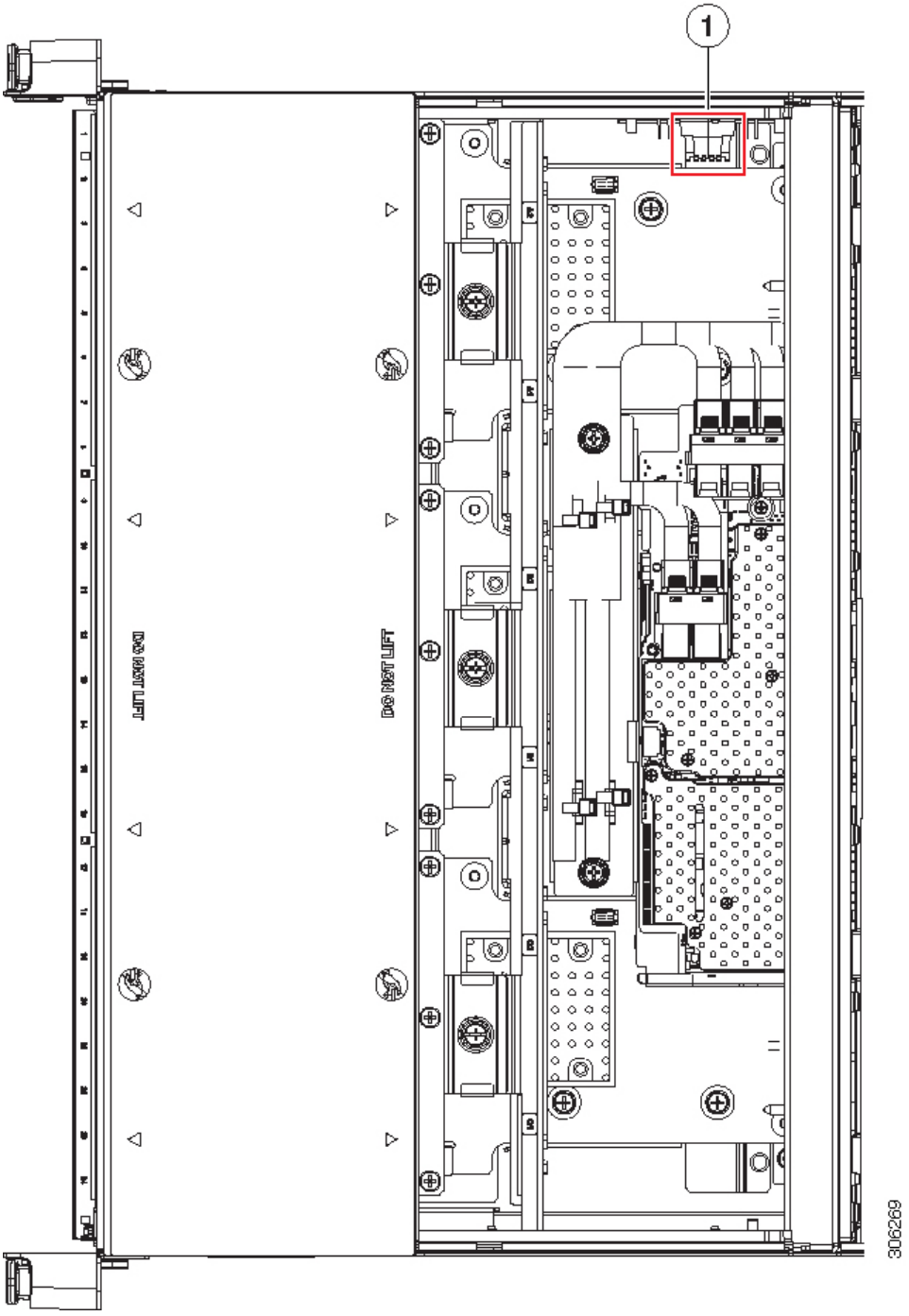
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 6 Replace the top cover to the server.

Step 7 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 8 Fully power on the server by pressing the Power button.

Figure 28: Front Supercap Bracket Location (Below CPU Module)



1	Supercap bracket location on inner chassis wall (view of the front compartment shown is with the CPU module removed)	-	

Replacing Fan Modules

The four hot-swappable fan modules in the server are numbered as shown in Serviceable Component Locations, on page 4. Each fan module contains two fans.

Tip There is a fault LED on the top of each fan module. This LED lights green when the module is correctly seated and is operating OK. The LED lights amber when the module has a fault or is not correctly seated.

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

Step 1 Remove an existing fan module:

a) Slide the server 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 server from the rack.

b) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

c) Grasp and squeeze the fan module release latches on its top. Lift straight up to disengage its connector from the motherboard.

Step 2 Install a new fan module:

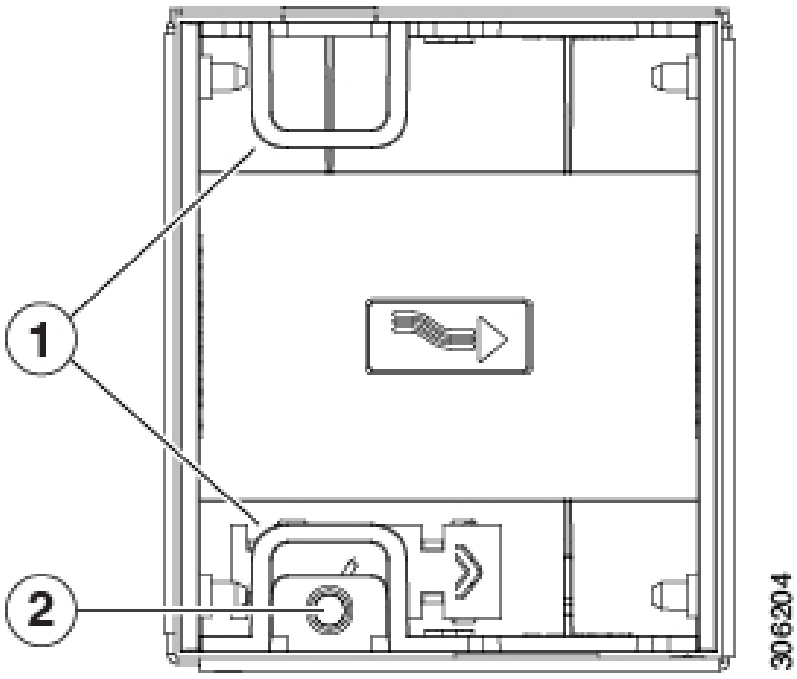
a) Set the new fan module in place. The arrow printed on the top of the fan module should point toward the rear of the server.

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

c) Replace the top cover to the server.

d) Replace the server in the rack.

Figure 29: Top View of Fan Module



1	Fan module release latches	**2**	Fan module fault LED

Replacing an Internal USB Drive

This section includes procedures for installing a USB drive and for enabling or disabling the internal USB port.

Replacing a USB Drive

The server has one vertical USB 2.0 socket on the motherboard.

Caution We do not recommend that you hot-swap the internal USB drive while the server is powered on because of the potential for data loss.

Step 1 Remove an existing internal USB drive:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.
d) Locate the USB socket on the motherboard as shown in the following figure.
e) Grasp the USB drive and pull it vertically to free it from the socket.

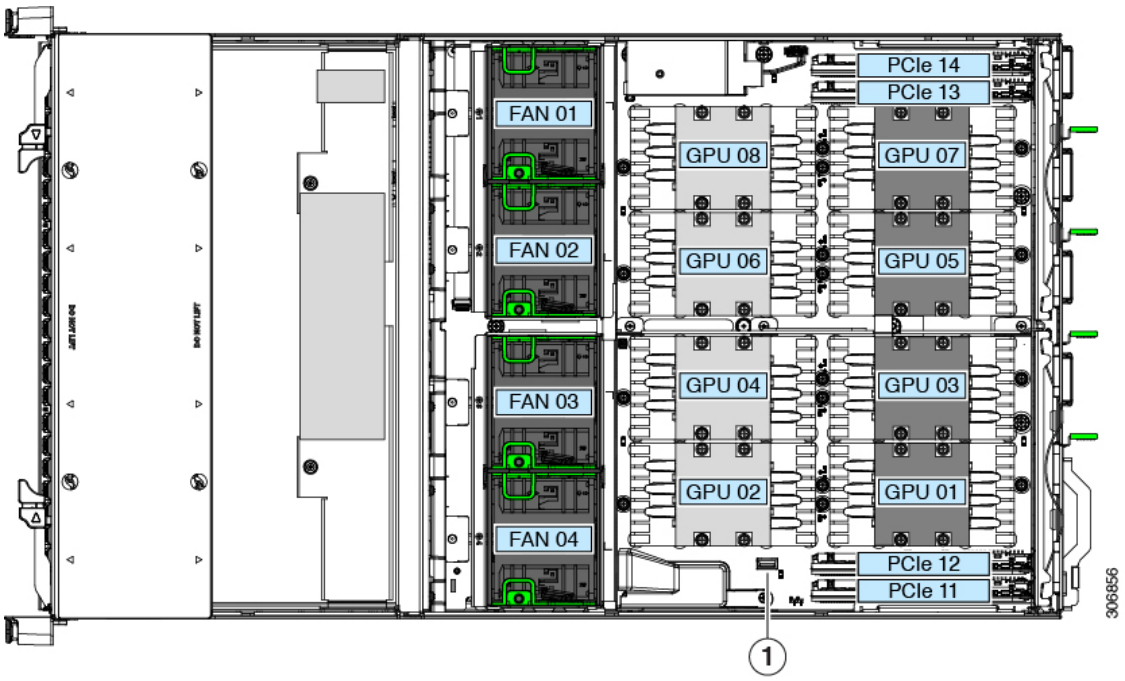
Step 2 Install a new internal USB drive:

a) Align the USB drive with the socket.
b) Push the USB drive vertically to fully engage it with the socket.
c) Replace the top cover to the server.

Step 3 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 4 Fully power on the server by pressing the Power button.

Figure 30: Internal USB 2.0 Socket Location



1	Location of vertical USB socket on motherboard	-	

Enabling or Disabling the Internal USB Port

The factory default is that all USB ports on the server are enabled. However, the internal USB port can be enabled or disabled in the server BIOS.

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.

Installing a Trusted Platform Module (TPM)

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

TPM Considerations

- This server supports TPM version 2.0. The TPM 2.0, UCSX-TPM2-002B(=), is compliant with Federal Information Processing (FIPS) Standard 140-2. FIPS support has existed, but FIPS 140-2 is now supported.
- Field replacement of a TPM is not supported; you can install a TPM after-factory only if the server does not already have a TPM installed.
- If the TPM 2.0 becomes unresponsive, reboot the server.

Installing and Enabling a TPM

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

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

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

Installing TPM Hardware

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

Step 1 Prepare the server for component installation:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 2 Install a TPM:

a) Locate the TPM socket on the motherboard, as shown below.

You might have to temporarily remove fan 04 to provide clearance.

Caution Avoid damaging the PLX switch heatsink that is adjacent to the TPM socket.

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

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

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

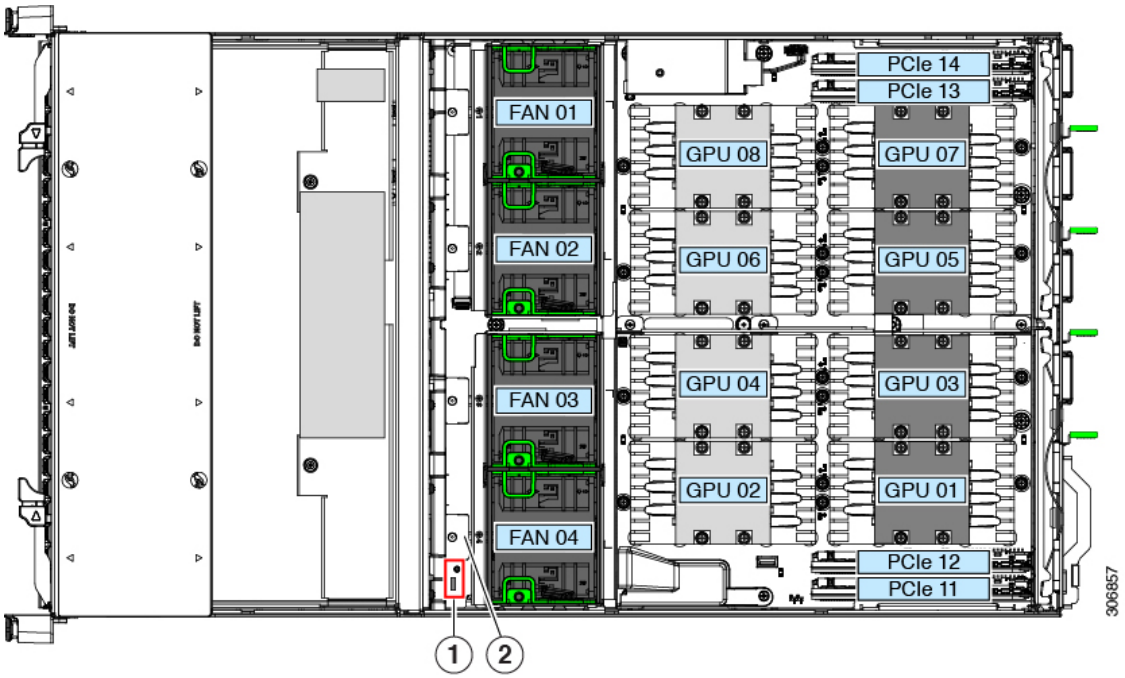
Step 3 Replace the cover to the server.

Step 4 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 5 Fully power on the server by pressing the Power button.

Step 6 Continue with Enabling the TPM in the BIOS, on page 64.

Figure 31: TPM Socket Location



1	TPM socket location on motherboard	-	

Enabling the TPM in the BIOS

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

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

Step 1 Enable TPM Support:

a) Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
b) Log in to the BIOS Setup Utility with your BIOS Administrator password.
c) On the BIOS Setup Utility window, choose the **Advanced** tab.
d) Choose **Trusted Computing** to open the TPM Security Device Configuration window.
e) Change TPM SUPPORT to **Enabled**.
f) Press **F10** to save your settings and reboot the server.

Step 2 Verify that TPM support is now enabled:

a) Watch during bootup for the F2 prompt, and then press **F2** to enter BIOS setup.
b) Log into the BIOS Setup utility with your BIOS Administrator password.
c) Choose the **Advanced** tab.
d) Choose **Trusted Computing** to open the TPM Security Device Configuration window.
e) Verify that TPM SUPPORT and TPM State are Enabled.

Step 3 Continue with Enabling the Intel TXT Feature in the BIOS, on page 65.

Enabling the Intel TXT Feature in the BIOS

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

Step 1 Reboot the server and watch for the prompt to press F2.

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

Step 3 Verify that the prerequisite BIOS values are enabled:

a) Choose the **Advanced** tab.
b) Choose **Intel TXT(LT-SX) Configuration** to open the Intel TXT(LT-SX) Hardware Support window.
c) Verify that the following items are listed as Enabled:

- VT-d Support (default is Enabled)
- VT Support (default is Enabled)
- TPM Support
- TPM State

d) Do one of the following:

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

e) Press **Escape** to return to the BIOS Setup utility **Advanced** tab.
f) On the Advanced tab, choose **Processor Configuration** to open the Processor Configuration window.
g) Set Intel (R) VT and Intel (R) VT-d to **Enabled**.

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

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

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

Replacing Power Supplies

The server requires four power supplies, which are redundant as 3+1.

Note The power supplies are hot-swappable and are accessible from the external rear of the server, so you do not have to pull the server out from the rack or remove the server cover.

- See also Power Specifications, on page 112 for more information about the supported power supplies.
- See also Rear-Panel LEDs, on page 33 for information about the power supply LEDs.

Replacing AC Power Supplies

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

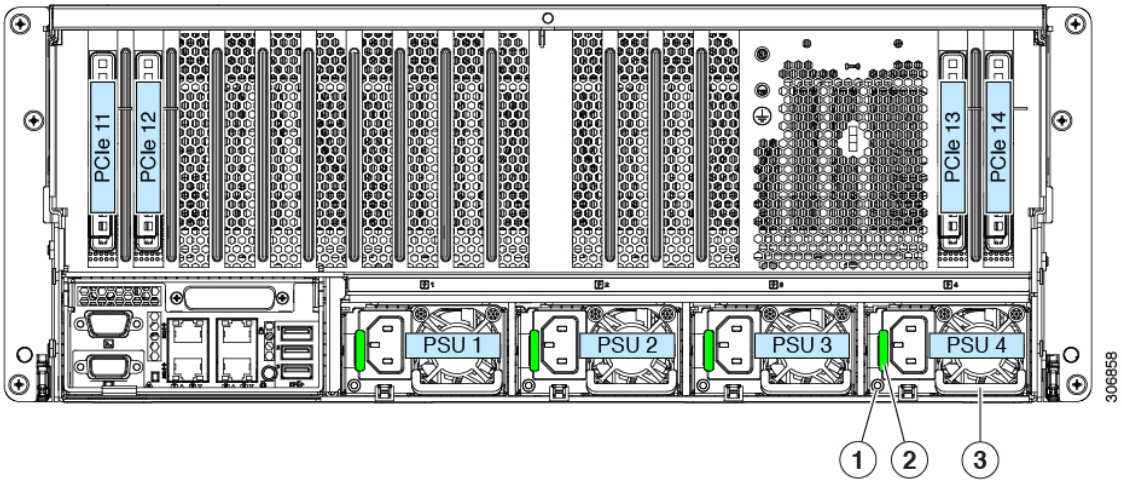
Step 1 Remove the power supply that you are replacing or a blank panel from an empty bay:

a) Remove the power cord from the power supply that you are replacing.
b) Grasp the power supply handle while pinching the release latch toward the handle.
c) Pull the power supply out of the bay.

Step 2 Install a new power supply:

a) Grasp the power supply handle and insert the new power supply into the empty bay.
b) Push the power supply into the bay until the release lever locks.
c) Connect the power cord to the new power supply.

Figure 32: AC Power Supplies



1	Power supply status LED	**3**	Power supply handle
2	Power supply release latch	-	

Replacing a PCIe Card

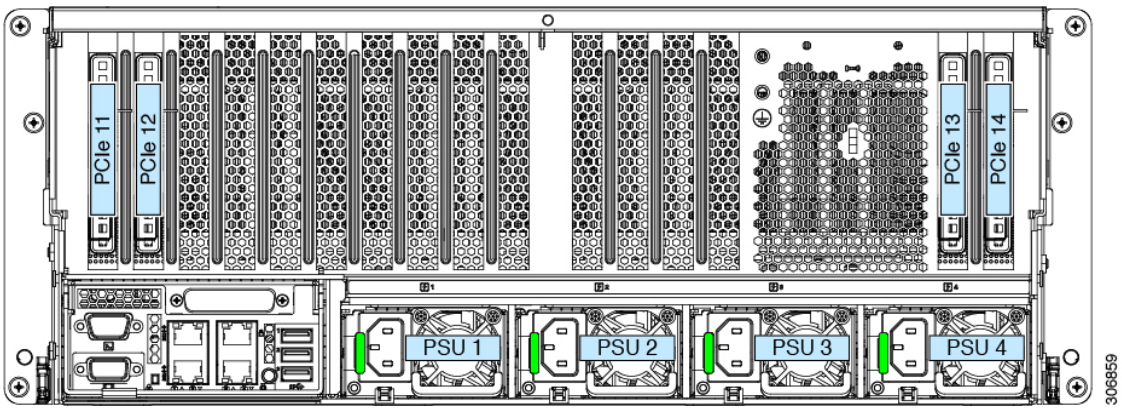
Note Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards not qualified or sold by Cisco are the responsibility of the customer. Although Cisco will always stand behind and support the C-Series rack-mount servers, customers using standard, off-the-shelf, third-party cards must go to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

PCIe Slot Specifications and Restrictions

The server provides four PCIe slots for vertical installation of up to four PCIe expansion cards.

The following figure shows the placement of PCIe slots 11 through 14.

Figure 33: PCIe Slot Numbering



PCIe Slot Specifications

Table 4: PCIe Slot Specifications

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length	Card Height (Rear Panel Opening)	NCSI Support	Standby Power Support	Cisco VIC Card Support
11	Gen-3 x16	x24 connector	Half length	Full height	Yes	Yes	Yes (primary slot)
12	Gen-3 x16	x24 connector	Half length	Full height	Yes	Yes	Yes
13	Gen-3 x16	x24 connector	Half length	Full height	Yes	No	Yes
14	Gen-3 x16	x24 connector	Half length	Full height	Yes	No	Yes

PCIe Population Guidelines and Restrictions

Note the following guidelines and restrictions:

- The C480 M5 ML server can use only half-length cards because of internal clearance.

Replacing a PCIe Card

Before installing PCIe cards, see PCIe Slot Specifications and Restrictions, on page 67.

Step 1 Prepare the server for component installation:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 2 Remove any existing card or a blanking panel:

a) Open the hinged retainer bar that covers the top of the PCIe slot.

Use your fingertips to pull back on the wire locking-latches at each end of the retainer bar, and then hinge the bar open to expose the tops of the PCIe slots.

b) Pull both ends of the card vertically to disengage the card from the socket, and then set it aside.

Step 3 Install a new PCIe card:

a) Carefully align the card edge with the socket while you align the card's rear tab with the rear panel opening.

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

c) Close the hinged retainer bar over the top of the PCIe slots.

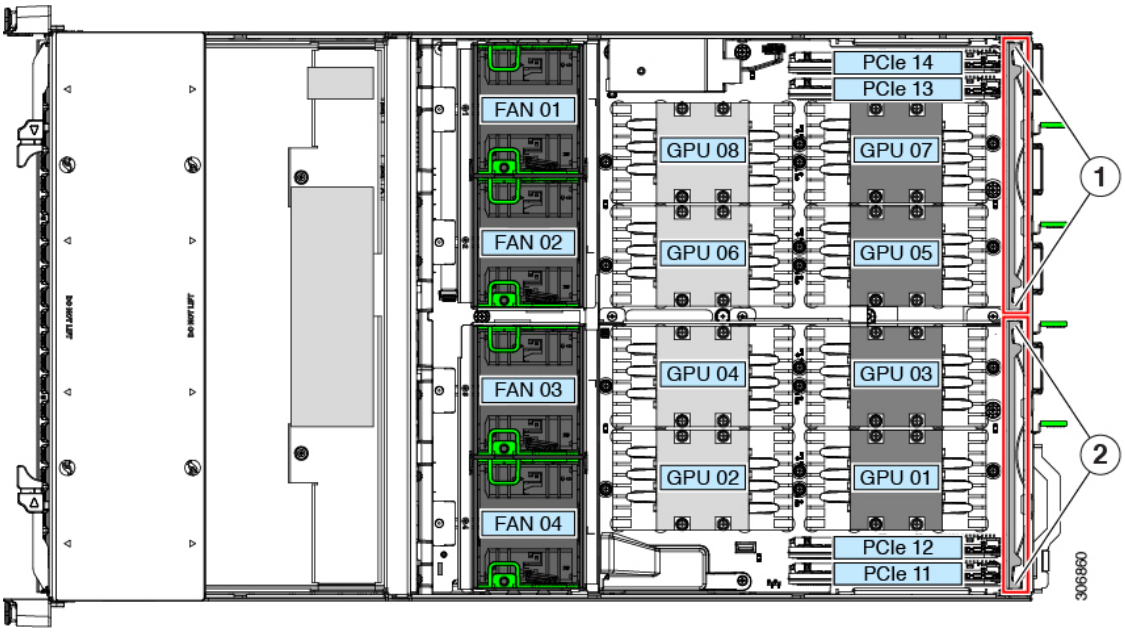
Use your fingertips to pull back on the wire locking-latches at each end of the retainer bar, and then hinge it closed to secure the tops of the PCIe slots. Push the wire locking-latches back to the forward, locked position.

Step 4 Replace the top cover to the server.

Step 5 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 6 Fully power on the server by pressing the Power button.

Figure 34: PCIe Slot Hinged Retainer Bars



1	Wire locking latches for left PCIe retainer bar (slots 10 - 12)	**2**	Wire locking latches for right PCIe retainer bar (slots 1 - 9)

Cisco Virtual Interface Card (VIC) Considerations

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

If you want to use the Cisco UCS VIC card for Cisco UCS Manager integration, see also the Installation For Cisco UCS Manager Integration, on page 129 for details about supported configurations, cabling, and other requirements.

Table 5: VIC Support and Considerations in This Server

VIC	How Many Supported in Server	Slots That Support the VIC	Primary Slot For Cisco UCS Manager Integration	Primary Slot For *Cisco Card* NIC Mode	Minimum Cisco IMC Firmware
Cisco UCS VIC 1455 UCSC-PCIE-C25Q-04	2	All	PCIe 11	PCIe 11	4.0(1)
Cisco UCS VIC 1495 UCSC-PCIE-C100-04	2	All	PCIe 11	PCIe 11	4.0(2)

- The primary slot for a VIC card is slot 1; the secondary slot for a VIC card is slot 2.
- The system can support up to two VIC cards total in UCSM mode. Only the VIC card installed in slot 1 can be used for both UCS Manager management and data traffic. A second VIC installed in slot 2 is used for data traffic only.

Replacing NVIDIA SXM2 V100 GPUs

Note The NVIDIA SXM2 V100 GPUs in this server are *not* customer-replaceable. Contact Cisco Support if you need service or replacement for these GPUs.

Replacing a Chassis Intrusion Switch

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

Step 1 Prepare the server for component installation:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

b) Slide the server 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 server from the rack.

c) Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 2 Remove an existing intrusion switch:

a) Disconnect the intrusion switch cable from the socket on the motherboard.
b) Slide the switch mechanism out from the pre-mounted bracket on the chassis wall.

The switch mounts inside the bracket that serves as the chassis-cover latch point.

Step 3 Install a new intrusion switch:

Note The kit for the intrusion switch (UCS-C480-INT-SW) includes a bracket and screw that are not used with this version of the server. You can discard the bracket and screw.

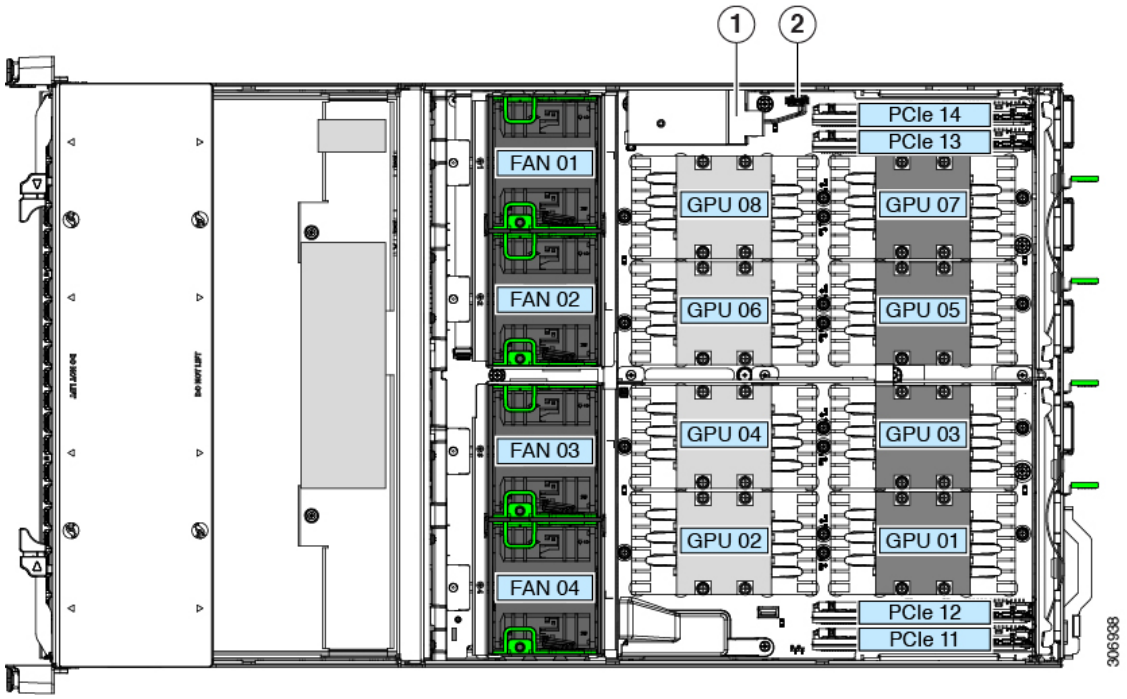
a) Slide the switch mechanism into the bracket that is pre-mounted on the chassis wall.
b) Connect the switch cable to the socket on the motherboard.

Step 4 Replace the cover to the server.

Step 5 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 6 Fully power on the server by pressing the Power button.

Figure 35: Chassis Intrusion Switch



1	Intrusion switch location (inside cover-latch bracket on inner chassis wall)	**2**	Cable connector on motherboard

Replacing Components Inside a CPU Module

Caution When handling server components, handle them only by carrier edges and use an electrostatic discharge (ESD) wrist-strap or other grounding device to avoid damage.

This section describes how to install and replace CPUs and DIMMs inside a CPU module.

Caution Never remove a CPU module without shutting down and removing power from the server.

Replacing CPUs and Heatsinks

This section contains information for replacing CPUs and heatsinks inside a CPU module.

Special Information For *Upgrades* to Second Generation Intel Xeon Scalable Processors

Caution You must upgrade your server firmware to the required minimum level before you upgrade to the Second Generation Intel Xeon Scalable processors that are supported in this server. Older firmware versions cannot recognize the new CPUs and this would result in a non-bootable server.

The minimum software and firmware versions required for this server to support Second Generation Intel Xeon Scalable processors are as follows:

Table 6: Minimum Requirements For Second Generation Intel Xeon Scalable processors

Software or Firmware	Minimum Version
Server Cisco IMC	4.0(4)
Server BIOS	4.0(4)
Cisco UCS Manager (UCS-integrated servers only)	4.0(4)

Do one of the following actions:

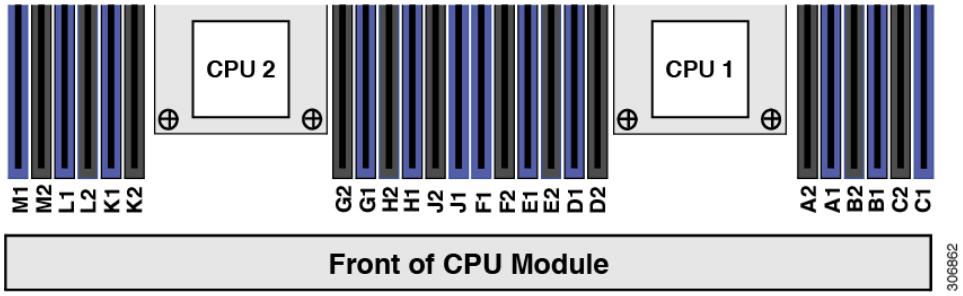
- If your server's firmware and Cisco UCS Manager software are already at the required minimums shown above (or later), you can replace the CPU hardware by using the procedure in this section.
- If your server's firmware and Cisco UCS Manager software are earlier than the required levels, use the instructions in the Cisco UCS C- and S-Series M5 Servers Upgrade Guide for Next Gen Intel Xeon Processors to upgrade your software. After you upgrade the software, return to this section as directed to replace the CPU hardware.

CPU Configuration Rules

The CPUs in this server install to sockets inside the removable CPU module. The CPU module has two CPU sockets.

The system numbers the CPUs in CPU module 1 (the lower bay) as CPU 1 and CPU 2.

Figure 36: CPU Numbering



- The server must have CPU module 1 installed in the lower CPU module bay 1.
- You must have a blank filler module UCSC-C480-CM-FLR in the upper bay 2 or the server will not boot.
- The maximum combined memory allowed in the 12 DIMM slots controlled by any one CPU is 768 GB. To populate the 12 DIMM slots with more than 768 GB of combined memory, you must use a high-memory CPU that has a PID that ends with an "M", for example, UCS-CPU-6142M.

Tools Required For CPU Replacement

You need the following tools and equipment for this procedure:

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

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

  New heatsinks have a pre-applied pad of TIM.

See also Additional CPU-Related Parts to Order with RMA Replacement CPUs, on page 80 and Additional CPU-Related Parts to Order with RMA Replacement CPU Modules, on page 81.

Replacing a CPU and Heatsink

Caution CPUs and their sockets are fragile and must be handled with extreme care to avoid damaging pins. The CPUs must be installed with heatsinks and thermal interface material to ensure cooling. Failure to install a CPU correctly might result in damage to the server.

Step 1

Caution Never remove a CPU module without shutting down and removing power from the server.

Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the CPU module is accessible from the front of the server.

Step 2 Remove the CPU module from the chassis:

Note Verify that the power LED on the front of the CPU module is off before removing the module.

a) Grasp the two ejector levers on the front of the CPU module and pinch their latches to release the levers.
b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

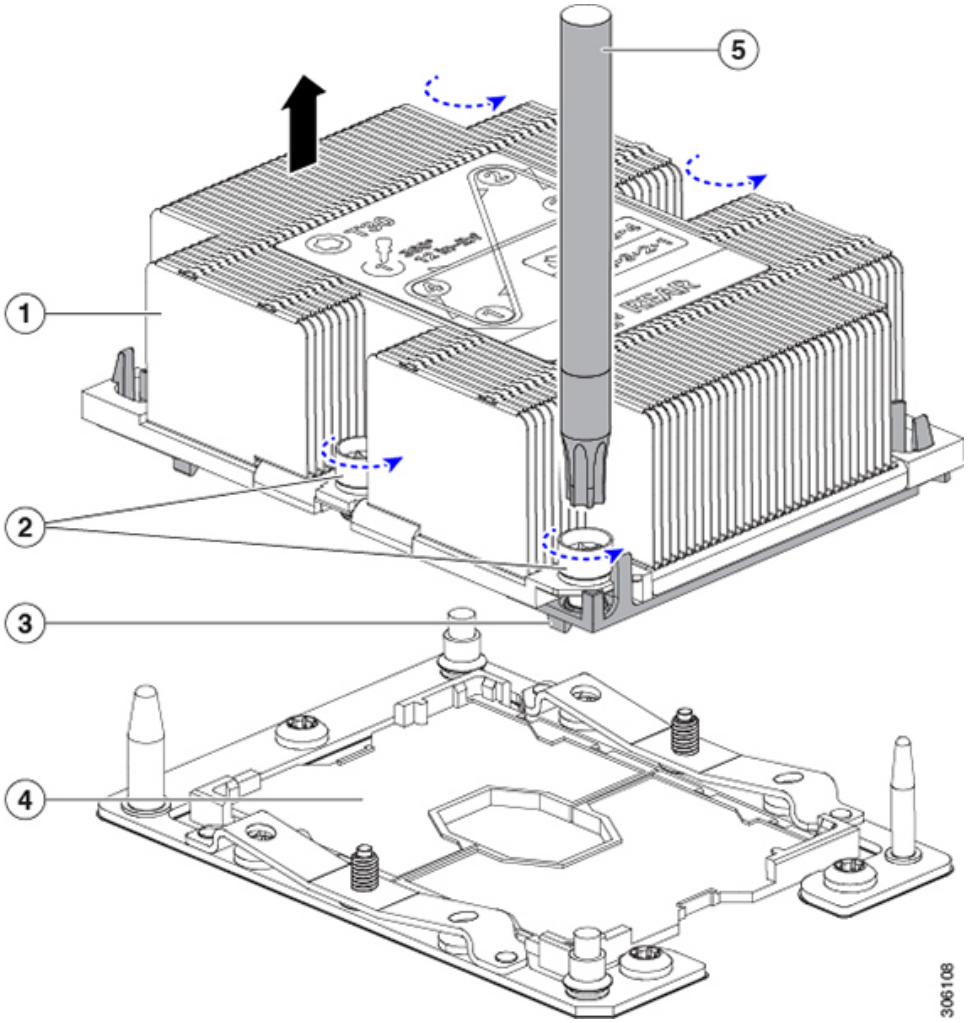
Step 3 Remove the existing CPU/heatsink assembly from the CPU module:

a) Use the T-30 Torx driver that is supplied with the replacement CPU to loosen the four captive nuts that secure the assembly to the board standoffs.

Note Alternate loosening the heatsink nuts evenly so that the heatsink remains level as it is raised. Loosen the heatsink nuts in the order shown on the heatsink label: 4, 3, 2, 1.

b) Lift straight up on the CPU/heatsink assembly and set it heatsink-down on an antistatic surface.

Figure 37: Removing the CPU/Heatsink Assembly



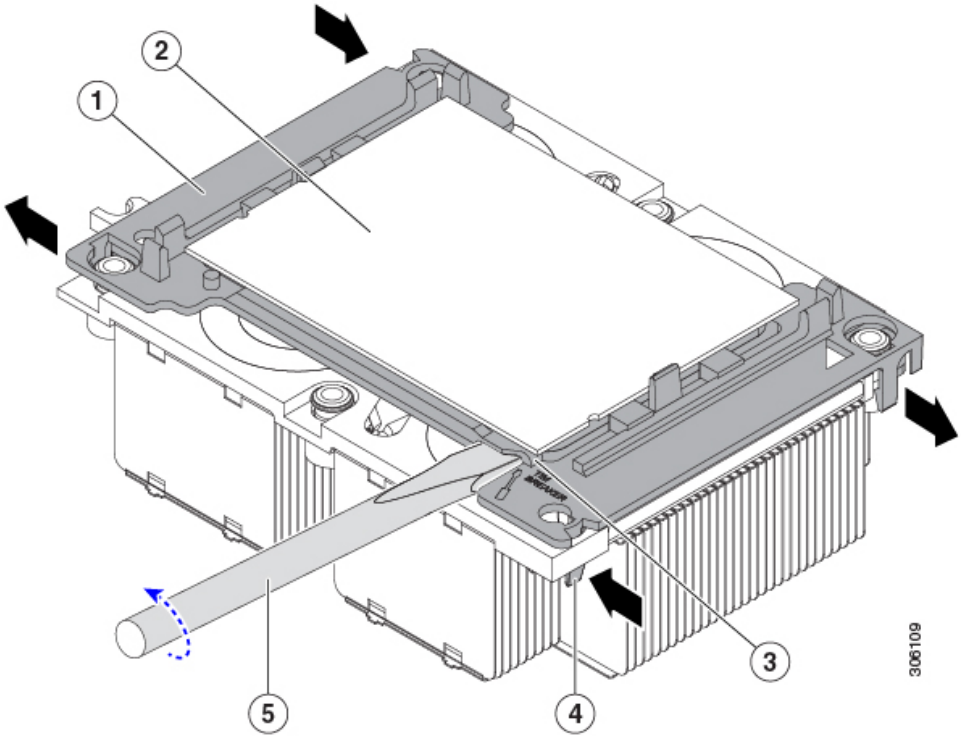
1	Heatsink	**4**	CPU socket on motherboard
2	Heatsink captive nuts (two on each side)	**5**	T-30 Torx driver
3	CPU carrier (below heatsink in this view)	-	

Step 4 Separate the heatsink from the CPU assembly (the CPU assembly includes the CPU and the plastic CPU carrier):

a) Place the heatsink with CPU assembly so that it is oriented upside-down as shown in the following figure.

Note the thermal-interface material (TIM) breaker location. TIM BREAKER is stamped on the CPU carrier next to a small slot.

Figure 38: Separating the CPU Assembly From the Heatsink



1	CPU carrier	**4**	CPU-carrier inner-latch nearest to the TIM breaker slot
2	CPU	**5**	#1 flat-head screwdriver inserted into TIM breaker slot
3	TIM BREAKER slot in CPU carrier	-	

b) Pinch inward on the CPU-carrier clip that is nearest the TIM breaker slot and then push up to disengage the clip from its slot in the heatsink corner.

c) Insert the blade of a #1 flat-head screwdriver into the slot marked TIM BREAKER.

Note In the following step, do not pry on the CPU surface. Use gentle rotation to lift on the plastic surface of the CPU carrier at the TIM breaker slot. Use caution to avoid damaging the heatsink surface.

d) Gently rotate the screwdriver to lift up on the CPU until the TIM on the heatsink separates from the CPU.

Note Do not allow the screwdriver tip to touch or damage the green CPU substrate.

e) Pinch the CPU-carrier clip at the corner opposite the TIM breaker and push up to disengage the clip from its slot in the heatsink corner.

f) On the remaining two corners of the CPU carrier, gently pry outward on the outer-latches and then lift the CPU-assembly from the heatsink.

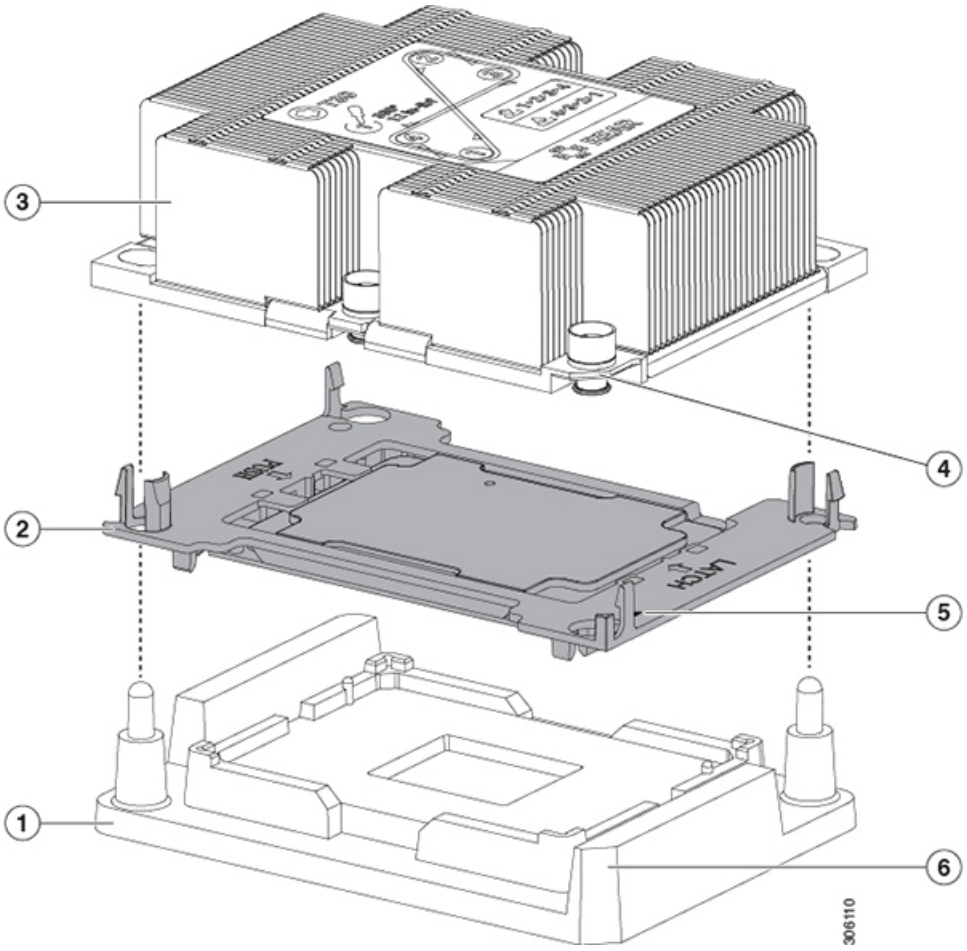
Note Handle the CPU-assembly by the plastic carrier only. Do not touch the CPU surface. Do not separate the CPU from the plastic carrier.

Step 5 The new CPU assembly is shipped on a CPU assembly tool. Take the new CPU assembly and CPU assembly tool out of the carton.

If the CPU assembly and CPU assembly tool become separated, note the alignment features shown in the following figure for correct orientation. The pin 1 triangle on the CPU carrier must be aligned with the angled corner on the CPU assembly tool.

Caution CPUs and their sockets are fragile and must be handled with extreme care to avoid damaging pins.

Figure 39: CPU Assembly Tool, CPU Assembly, and Heatsink Alignment Features



1	CPU assembly tool	**4**	Angled corner on heatsink (pin 1 alignment feature)
2	CPU assembly (CPU in plastic carrier frame)	**5**	Triangle cut into plastic carrier (pin 1 alignment feature)
3	Heatsink	**6**	Angled corner on CPU assembly tool (pin 1 alignment feature)

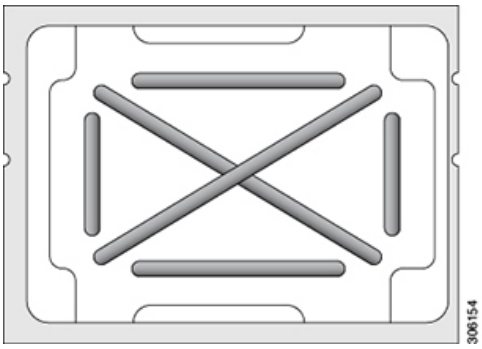
Step 6 Apply new TIM to the heatsink:

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

- If you are installing a new heatsink, it is shipped with a pre-applied pad of TIM. Go to step 7.
- If you are reusing a heatsink, you must remove the old TIM from the heatsink and then apply new TIM to the CPU surface from the supplied syringe. Continue with step **a** below.

a) Apply the cleaning solution that is included with the heatsink cleaning kit (UCSX-HSCK=) to the old TIM on the heatsink and let it soak for a least 15 seconds.
b) Wipe all of the TIM off the heatsink using the soft cloth that is included with the heatsink cleaning kit. Be careful to avoid scratching the heatsink surface.
c) Using the syringe of TIM provided with the new CPU (UCS-CPU-TIM=), apply 1.5 cubic centimeters (1.5 ml) of thermal interface material to the top of the CPU. Use the pattern shown below to ensure even coverage.

Figure 40: Thermal Interface Material Application Pattern



Step 7 With the CPU assembly on the CPU assembly tool, set the heatsink onto the CPU assembly. Note the Pin 1 alignment features for correct orientation. Push down gently until you hear the corner clips of the CPU carrier click onto the heatsink corners.

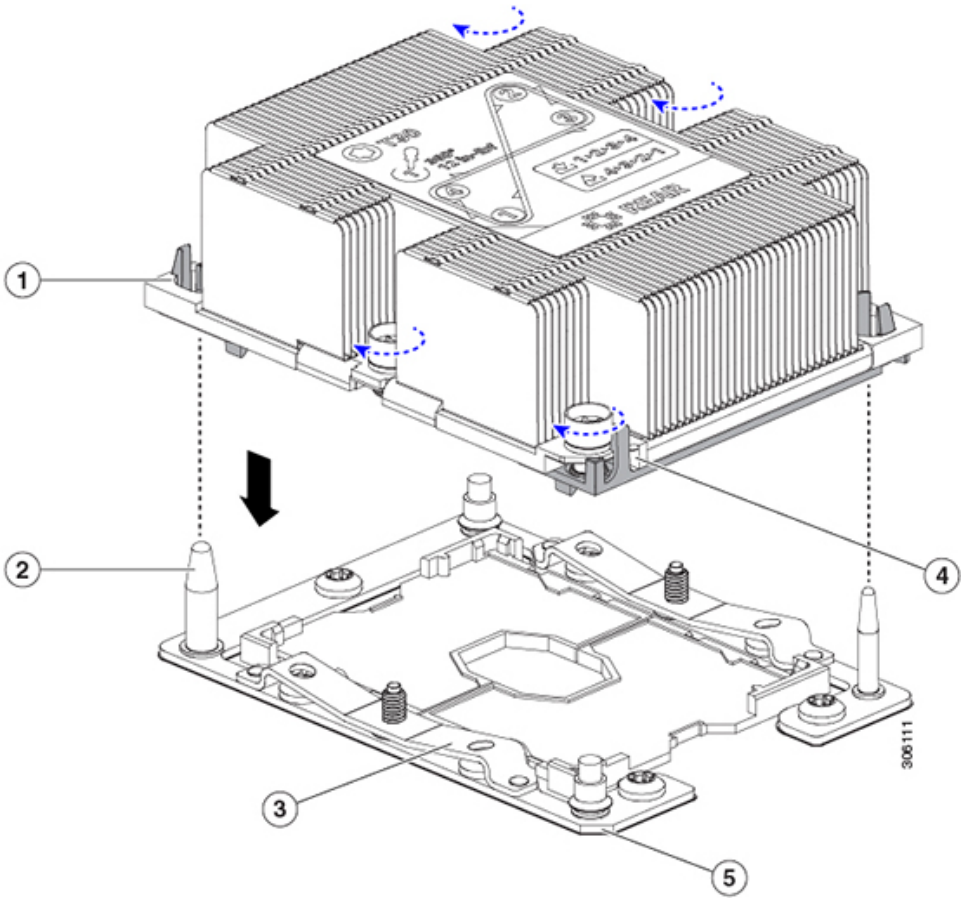
Caution In the following step, use extreme care to avoid touching or damaging the CPU contacts or the CPU socket pins.

Step 8 Install the CPU/heatsink assembly to the server:

a) Lift the heatsink with attached CPU assembly from the CPU assembly tool.
b) Align the assembly over the CPU socket on the board, as shown in the following figure.

Note the alignment features. The pin 1 angled corner on the heatsink must align with the pin 1 angled corner on the CPU socket. The CPU-socket posts must align with the guide-holes in the assembly.

Figure 41: Installing the Heatsink/CPU Assembly to the CPU Socket



1	Guide hole in assembly (two)	**4**	Angled corner on heatsink (pin 1 alignment feature)
2	CPU socket alignment post (two)	**5**	Angled corner on socket (pin 1 alignment feature)
3	CPU socket leaf spring	-	

c) Set the heatsink with CPU assembly down onto the CPU socket.
d) Use the T-30 Torx driver that is supplied with the replacement CPU to tighten the four captive nuts that secure the heatsink to the motherboard standoffs.

Note Alternate tightening the heatsink nuts evenly so that the heatsink remains level while it is lowered. Tighten the heatsink nuts in the order shown on the heatsink label: 1, 2, 3, 4. The captive nuts must be fully tightened so that the leaf springs on the CPU socket lie flat.

Step 9 Return the CPU module to the chassis:

a) With the two ejector levers open, align the CPU module with the empty bay.
b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 10 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 11 Fully power on the server by pressing the Power button.

Note Verify that the power LED on the front of the CPU module returns to solid green.

Additional CPU-Related Parts to Order with RMA Replacement CPUs

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

Note If you are moving existing CPUs to a new CPU module, it is not necessary to separate the CPU and heatsink. They can be moved as one assembly. See Additional CPU-Related Parts to Order with RMA Replacement CPU Modules, on page 81.

- Scenario 1—You are reusing the existing heatsinks:
  - Heat sink cleaning kit (UCSX-HSCK=)

    One cleaning kit can clean up to four CPUs.
  - Thermal interface material (TIM) kit for M5 servers (UCS-CPU-TIM=)

    One TIM kit covers one CPU.
- Scenario 2—You are replacing the existing heatsinks:
  - Heat sink (UCSC-HS-02-EX=)

    New heatsinks have a pre-applied pad of TIM.
  - Heat sink cleaning kit (UCSX-HSCK=)

    One cleaning kit can clean up to four CPUs.
- Scenario 3—You have a damaged CPU carrier (the plastic frame around the CPU):
  - CPU Carrier: UCS-M5-CPU-CAR=
  - #1 flat-head screwdriver (for separating the CPU from the heatsink)
  - Heatsink cleaning kit (UCSX-HSCK=)

    One cleaning kit can clean up to four CPUs.
  - Thermal interface material (TIM) kit for M5 servers (UCS-CPU-TIM=)

    One TIM kit covers one CPU.

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

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

Additional CPU-Related Parts to Order with RMA Replacement CPU Modules

When a return material authorization (RMA) of the CPU module is done on a C480 M5 CPU module, you move existing CPUs to the new CPU module.

Note Unlike previous generation CPUs, the M5 server CPUs do not require you to separate the heatsink from the CPU when you *move* the CPU-heatsink assembly. Therefore, no additional heatsink cleaning kit or thermal-interface material items are required.

- The only tool required for moving a CPU/heatsink assembly is a T-30 Torx driver.

To move a CPU to a new CPU module, use the procedure in Moving an M5 Generation CPU, on page 81.

Moving an M5 Generation CPU

Tool required for this procedure: T-30 Torx driver

Caution When you receive a replacement server for an RMA, it includes dust covers on all CPU sockets. These covers protect the socket pins from damage during shipping. You must transfer these covers to the system that you are returning, as described in this procedure.

Step 1 When moving an M5 CPU to a new server, you do not have to separate the heatsink from the CPU. Perform the following steps:

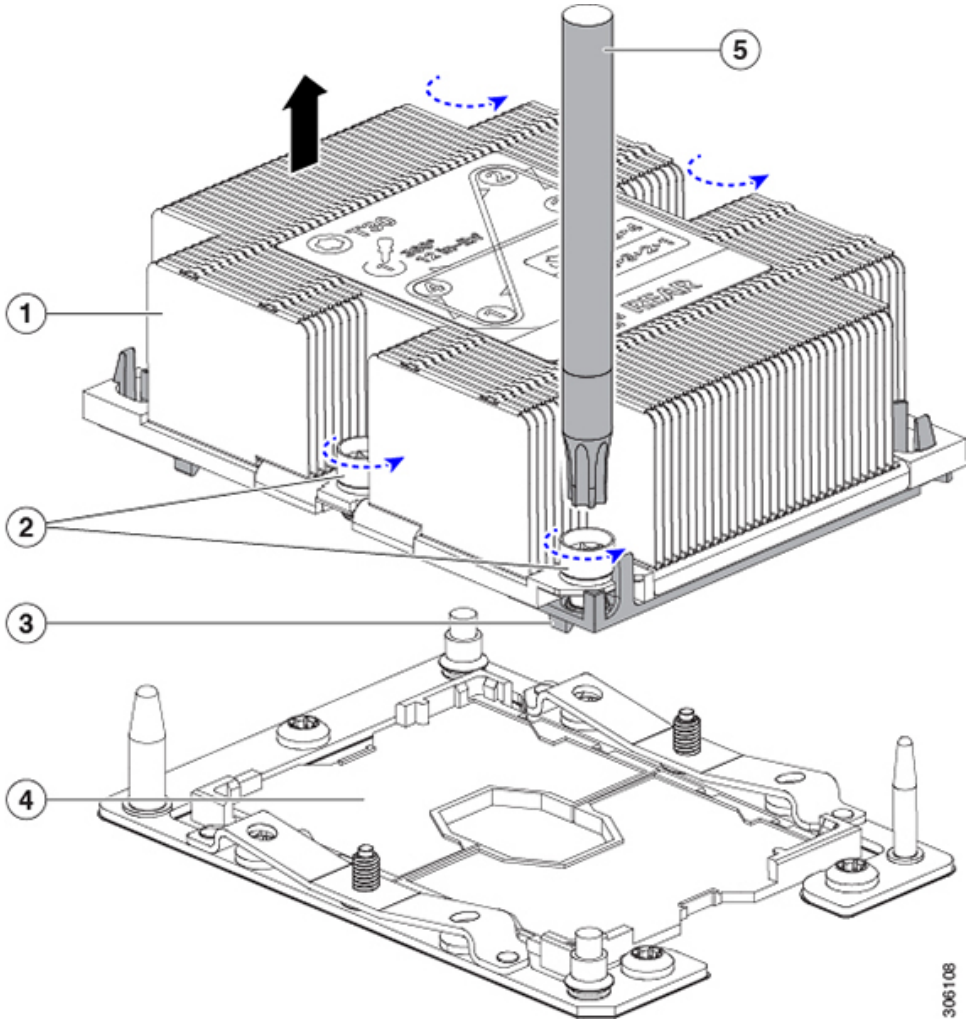
a) Use a T-30 Torx driver to loosen the four captive nuts that secure the assembly to the board standoffs.

Note Alternate loosening the heatsink nuts evenly so that the heatsink remains level as it is raised. Loosen the heatsink nuts in the order shown on the heatsink label: 4, 3, 2, 1.

b) Lift straight up on the CPU/heatsink assembly to remove it from the board.

c) Set the CPUs with heatsinks aside on an anti-static surface.

Figure 42: Removing the CPU/Heatsink Assembly



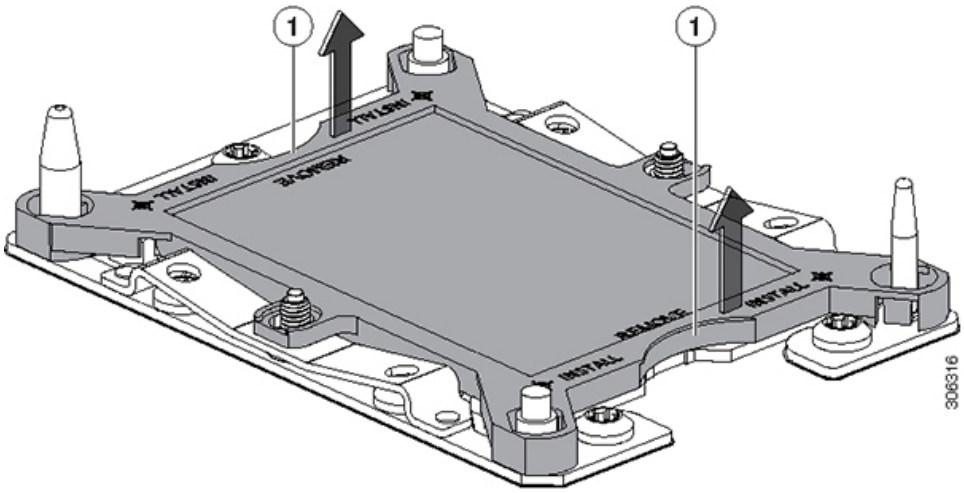
1	Heatsink	**4**	CPU socket on motherboard
2	Heatsink captive nuts (two on each side)	**5**	T-30 Torx driver
3	CPU carrier (below heatsink in this view)	-	

Step 2 Transfer the CPU socket covers from the new system to the system that you are returning:

a) Remove the socket covers from the replacement system. Grasp the two recessed finger-grip areas marked "REMOVE" and lift straight up.

Note Keep a firm grasp on the finger-grip areas at both ends of the cover. Do not make contact with the CPU socket pins.

Figure 43: Removing a CPU Socket Dust Cover



1	Finger-grip areas marked "REMOVE"	-	

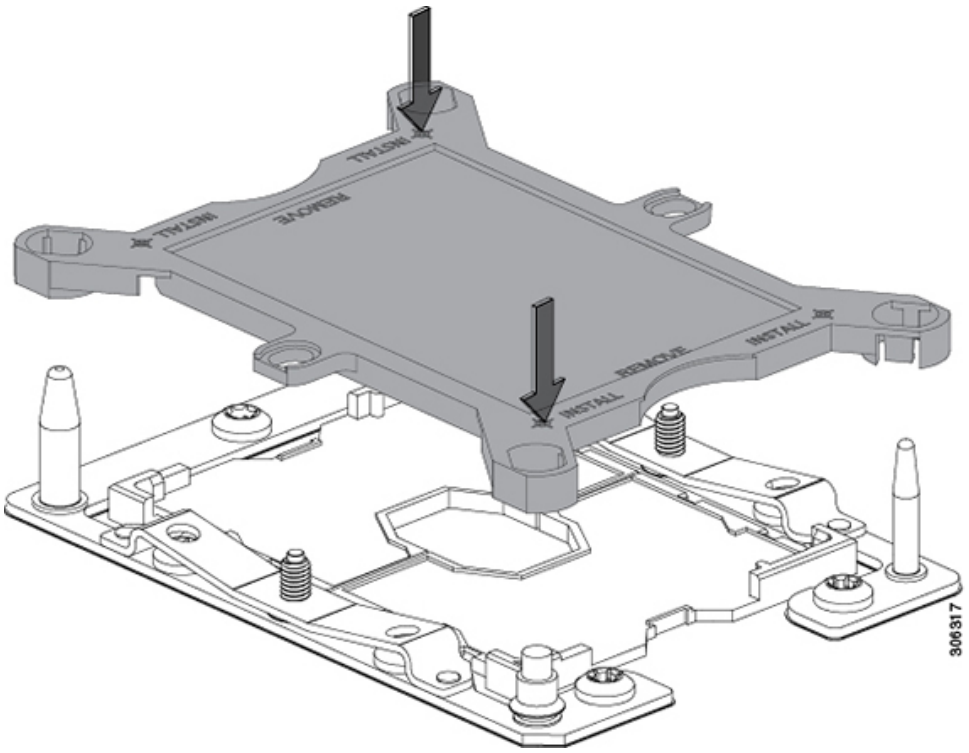
b) With the wording on the dust cover facing up, set it in place over the CPU socket. Make sure that all alignment posts on the socket plate align with the cutouts on the cover.

Caution In the next step, do not press down anywhere on the cover except the two points described. Pressing elsewhere might damage the socket pins.

c) Press down on the two circular markings next to the word "INSTALL" that are closest to the two threaded posts (see the following figure). Press until you feel and hear a click.

Note You must press until you feel and hear a click to ensure that the dust covers do not come loose during shipping.

Figure 44: Installing a CPU Socket Dust Cover



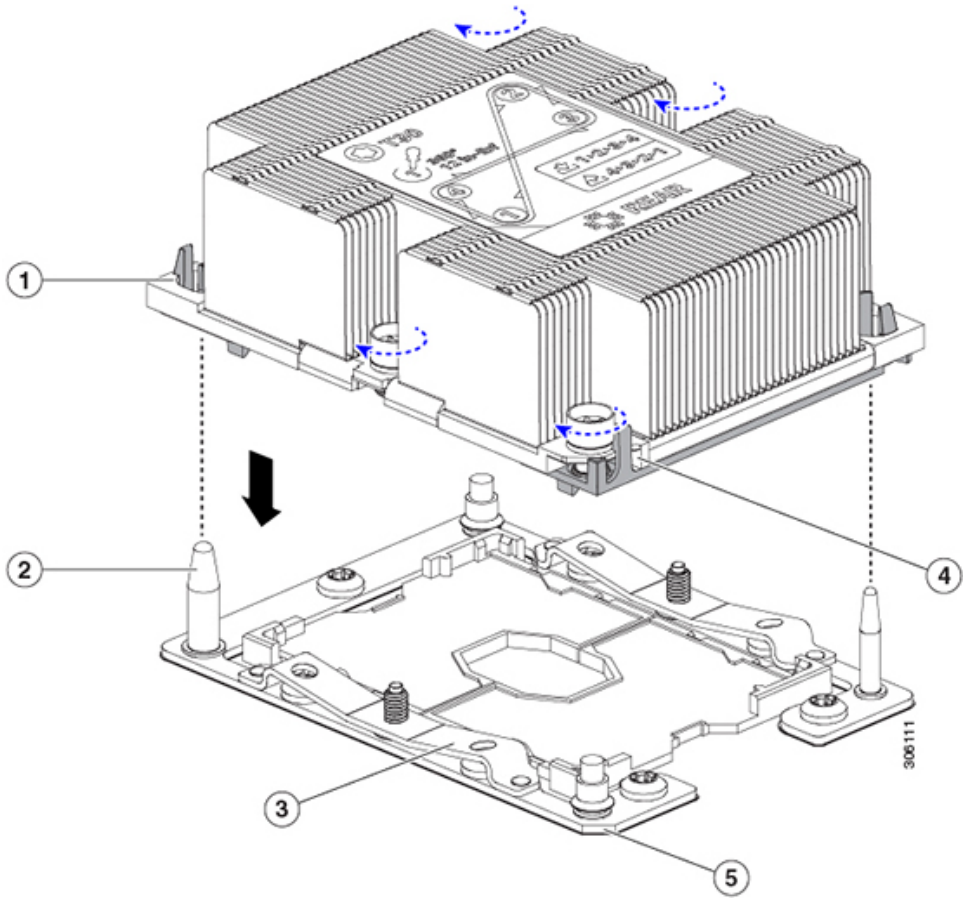
-	Press down on the two circular marks next to the word INSTALL.	-	

Step 3 Install the CPUs to the new system:

a) On the new board, align the assembly over the CPU socket, as shown below.

Note the alignment features. The pin 1 angled corner on the heatsink must align with the pin 1 angled corner on the CPU socket. The CPU-socket posts must align with the guide-holes in the assembly.

Figure 45: Installing the Heatsink/CPU Assembly to the CPU Socket



1	Guide hole in assembly (two)	**4**	Angled corner on heatsink (pin 1 alignment feature)
2	CPU socket alignment post (two)	**5**	Angled corner on socket (pin 1 alignment feature)
3	CPU socket leaf spring	-	

b) On the new board, set the heatsink with CPU assembly down onto the CPU socket.

c) Use a T-30 Torx driver to tighten the four captive nuts that secure the heatsink to the board standoffs.

Note Alternate tightening the heatsink nuts evenly so that the heatsink remains level while it is lowered. Tighten the heatsink nuts in the order shown on the heatsink label: 1, 2, 3, 4. The captive nuts must be fully tightened so that the leaf springs on the CPU socket lie flat.

Replacing Memory DIMMs

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 server might result in system problems or damage to the motherboard.

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

DIMM Population Rules and Memory Performance Guidelines

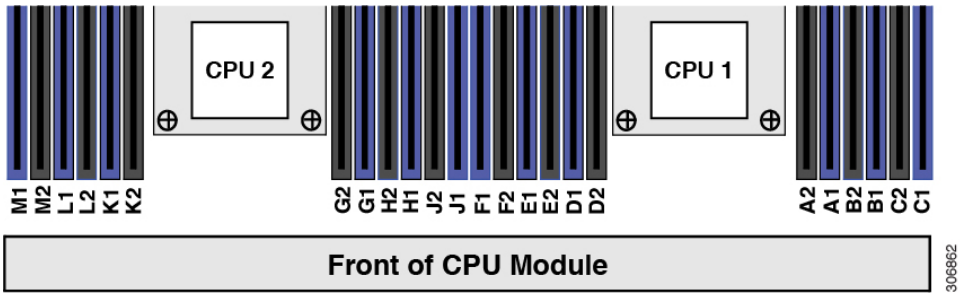
This topic describes the rules and guidelines for maximum memory performance.

Note You must use DIMM blanking panels in any DIMM slots that do not have DIMMs installed to ensure adequate air flow.

DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the CPU module board.

Figure 46: DIMM Slot Numbering



DIMM Population Rules

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

- Each CPU supports six memory channels.
  - CPU 1 supports channels A, B, C, D, E, F.
  - CPU 2 supports channels G, H, J, K, L, M.
- Each channel has two DIMM sockets (for example, channel A = slots A1, A2).

- For optimal performance, populate DIMMs in the order shown in the following table, depending on the number of DIMMs per CPU. Balance DIMMs evenly across the two CPUs as shown in the table.

Note The table below lists recommended configurations. Using 5, 6, 7, 9, 10, or 11 DIMMs per CPU is not recommended.

Note The CPU numbering in the lower CPU module 1 is CPU 1 and CPU 2; in the upper CPU module 2, the system numbers the CPUs as CPU 3 and CPU 4. The channel lettering is the same in both CPU modules. Balance the DIMMs evenly across all four CPUs, if present.

Table 7: DIMM Population Order

Number of DIMMs per CPU (Recommended Configurations)	Populate CPU 1 Slots		Populate CPU 2 Slots	
	Blue #1 Slots	Black #2 Slots	Blue #1 Slots	Black #2 Slots
1	(A1)	-	(G1)	-
2	(A1, B1)	-	(G1, H1)	-
3	(A1, B1, C1)	-	(G1, H1, J1)	-
4	(A1, B1); (D1, E1)	-	(G1, H1); (K1, L1)	-
8	(A1, B1); (D1, E1)	(A2, B2); (D2, E2)	(G1, H1); (K1, L1)	(G2, H2); (K2, L2)
12	(A1, B1); (C1, D1); (E1, F1)	(A2, B2); (C2, D2); (E2, F2)	(G1, H1); (J1, K1); (L1, M1)	(G2, H2); (J2, K2); (L2, M2)

- The maximum combined memory allowed in the 12 DIMM slots controlled by any one CPU is 768 GB. To populate the 12 DIMM slots with more than 768 GB of combined memory, you must use a high-memory CPU that has a PID that ends with an "M", for example, UCS-CPU-6134M.
- All DIMMs must be DDR4 DIMMs that support ECC. Non-buffered UDIMMs and non-ECC DIMMs are not supported.
- Memory mirroring reduces the amount of memory available by 50 percent because only one of the two populated channels provides data. When memory mirroring is enabled, you must install DIMMs in even numbers of channels.
- NVIDIA M-Series GPUs can support only less-than 1 TB memory in the server.
- NVIDIA P-Series and V-Series GPUs can support 1 TB or more memory in the server.
- AMD FirePro S7150 X2 GPUs can support only less-than 1 TB memory in the server.
- Observe the DIMM mixing rules shown in the following table.

Table 8: DIMM Mixing Rules

DIMM Parameter	DIMMs in the Same Channel	DIMMs in the Same Bank
DIMM Capacity For example, 16GB, 32GB, 64GB, 128GB	You can mix different capacity DIMMs in the same channel (for example, A1, A2).	You cannot mix DIMMs with different capacities and Revisions in the same bank (for example A1, B1). The Revision value depends on the manufactures. Two DIMMs with the same PID can have different Revisions.
DIMM speed For example, 2666 GHz	You can mix speeds, but DIMMs will run at the speed of the slowest DIMMs/CPUs installed in the channel.	You cannot mix DIMMs with different speeds and Revisions in the same bank (for example A1, B1). The Revision value depends on the manufactures. Two DIMMs with the same PID can have different Revisions.
DIMM type RDIMMs or LRDIMMs	You cannot mix DIMM types in a channel.	You cannot mix DIMM types in a bank.

Memory Mirroring

The Intel CPUs within the server support memory mirroring only when an even number of channels are populated with DIMMs. If one or three channels are populated with DIMMs, memory mirroring is automatically disabled.

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

Replacing DIMMs

Identifying a Faulty DIMM

Each DIMM socket has a corresponding DIMM fault LED, directly in front of the DIMM socket. See Internal Diagnostic LEDs, on page 34 for the locations of these LEDs.

Step 1 **Caution** Never remove a CPU module without shutting down and removing power from the server.

Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the CPU modules are accessible from the front of the server.

Step 2 Remove the CPU module from the chassis:

Note Verify that the power LED on the front of the CPU module is off before removing the module.

a) Grasp the two ejector levers on the front of the CPU module and pinch their latches to release the levers.

b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 3 Remove an existing DIMM (or DIMM blank) from the CPU module:

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

Step 4 Install a new DIMM:

Note Before installing DIMMs, see the memory population rules for this server: DIMM Population Rules and Memory Performance Guidelines, on page 86.

Note You must use DIMM blanking panels in any DIMM slots that do not have DIMMs installed to ensure adequate air flow.

a) Align the new DIMM with the empty slot on the CPU module board. Use the alignment feature in the DIMM slot to correctly orient the DIMM.
b) Push down evenly on the top corners of the DIMM until it is fully seated and the ejector levers on both ends lock into place.

Step 5 Return the CPU module to the chassis:

a) With the two ejector levers open, align the CPU module with an empty bay.
b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 6 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 7 Fully power on the server by pressing the Power button.

Note Verify that the power LED on the front of the CPU module returns to solid green.

Replacing Intel Optane DC Persistent Memory Modules

This topic contains information for replacing Intel Optane DC Persistent memory modules (DCPMMs), including population rules and methods for verifying functionality.

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

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

Note Intel Optane DC persistent memory modules require Intel Next Gen Xeon processors. You must upgrade the server firmware and BIOS to version 4.0(4) or later and install the supported Intel Next Gen Xeon processors before installing DCPMMs.

DCPMMs install to DIMM slots. DCPMMs can be configured to operate in three modes:

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

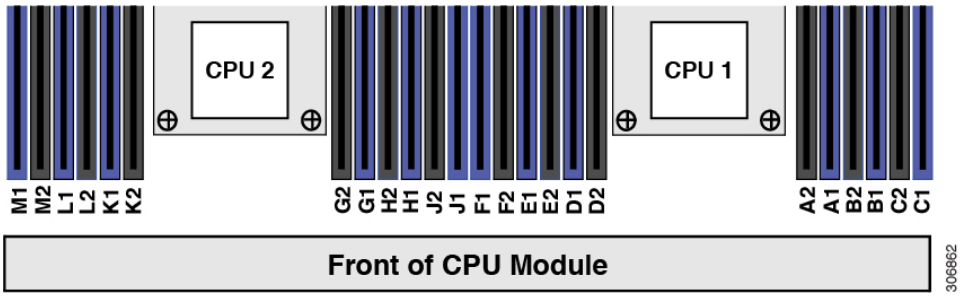
Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines

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

DIMM Slot Numbering

The following figure shows the numbering of the DIMM slots on the CPU module board.

Figure 47: DIMM Slot Numbering



Configuration Rules

Observe the following rules and guidelines:

- Intel Optane DC persistent memory modules require Intel Next Gen Xeon processors. You must upgrade the server firmware and BIOS to version 4.0(4) or later and then install the supported Intel Next Gen Xeon processors before installing DCPMMs.
- Each DCPMM in the server must be identical and must have the same SKU. If the DCPMM firmware detects that the system is populated with incompatible SKUs, it operates in read-only mode. In this case, it does not allow changes to the DCPMMs or their capacities.
- The following table shows supported DCPMM configurations for this server. Fill the DIMM slots for CPU 1 and CPU 2 in CPU module 1 as shown, depending on which DCPMM:DRAM ratio you want to populate.

Figure 48: Supported DCPMM Configurations for Dual CPU Configurations

DIMM to DCPMM Count	CPU 1											
	IMC1						IMC0					
	Channel 2		Channel 1		Channel 0		Channel 2		Channel 1		Channel 0	
	F2	F1	E2	E1	D2	D1	C2	C1	B2	B1	A2	A1
6 to 2		DIMM		DIMM	DCPMM	DIMM		DIMM		DIMM	DCPMM	DIMM
6 to 4		DIMM	DCPMM	DIMM	DCPMM	DIMM		DIMM	DCPMM	DIMM	DCPMM	DIMM
6 to 6	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM

DIMM to DCPMM Count	CPU 2											
	IMC1						IMC0					
	Channel 2		Channel 1		Channel 0		Channel 2		Channel 1		Channel 0	
	M2	M1	L2	L1	K2	K1	J2	J1	H2	H1	G2	G1
6 to 2		DIMM		DIMM	DCPMM	DIMM		DIMM		DIMM	DCPMM	DIMM
6 to 4		DIMM	DCPMM	DIMM	DCPMM	DIMM		DIMM	DCPMM	DIMM	DCPMM	DIMM
6 to 6	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM	DCPMM	DIMM

Installing Intel Optane DC Persistent Memory Modules

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

Understand which mode your DCPMM is operating in. App Direct mode has some additional considerations in this procedure.

Caution Replacing a DCPMM in App-Direct mode requires all data to be wiped from the DCPMM. Make sure to backup or offload data before attemping this procedure.

Step 1 **Caution** Never remove a CPU module without shutting down and removing power from the server.

Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the CPU modules are accessible from the front of the server.

Step 2 Remove an existing CPU module from the chassis:

Note Verify that the power LED on the front of the CPU module is off before removing the module.

a) Grasp the two ejector levers on the front of the CPU module and pinch their latches to release the levers.
b) Rotate both levers to the outside at the same time to evenly disengage the module from the midplane connectors.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 3 For App Direct mode, backup the existing data stored in all Optane DIMMs to some other storage.

Step 4 For App Direct mode, remove the Persistent Memory policy which will remove goals and namespaces automatically from all Optane DIMMs.

Step 5 Remove an existing DCPMM:

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

a) Locate the DCPMM that you are removing, and then open the ejector levers at each end of its DIMM slot.
b) Lift straight up on the DCPMM and set it aside.

Step 6 Install a new DCPMM:

Note Before installing DCPMMs, see the population rules for this server: Intel Optane DC Persistent Memory Module Population Rules and Performance Guidelines, on page 90.

a) Align the new DCPMM with the empty slot on the motherboard. Use the alignment feature in the DIMM slot to correctly orient the DCPMM.
b) Push down evenly on the top corners of the DCPMM until it is fully seated and the ejector levers on both ends lock into place.

Step 7 Return the CPU module to the chassis:

a) With the two ejector levers open, align the CPU module with an empty bay.
b) Push the module into the bay until it engages with the midplane connectors and is flush with the chassis front.
c) Rotate both ejector levers toward the center until they lay flat and their latches lock into the front of the module.

Step 8 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 9 Fully power on the server by pressing the Power button.

Note Verify that the power LED on the front of the CPU module returns to solid green.

Step 10 Perform post-installation actions:

Note If your Persistent Memory policy is Host Controlled, you must perform the following actions from the OS side.

- If the existing configuration is in 100% Memory mode, and the new DCPMM is also in 100% Memory mode (the factory default), the only action is to ensure that all DCPMMs are at the latest, matching firmware level.
- If the existing configuration is fully or partly in App-Direct mode and new DCPMM is also in App-Direct mode, then ensure that all DCPMMs are are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal. Goals are automatically deleted when the persistent memory policy is deleted, so you cannot edit or explicitly delete the existing goal before creating the new one.
  - For App Direct mode, reapply the Persistent Memory policy.
  - For App Direct mode, restore all the offloaded data to the DCPMMs.

  You can configure a DCPMM goal through the server's BIOS Setup Utility, Cisco IMC, Cisco UCS Manager, or OS-related utilities.
- If the existing configuration and the new DCPMM are in different modes, then ensure that all DCPMMs are at the latest matching firmware level and also re-provision the DCPMMs by creating a new goal. Goals are

automatically deleted when the persistent memory policy is deleted, so you cannot edit or explicitly delete the existing goal before creating the new one.

Step 11 If you added DCPMMs to the system, you must configure regions and namespaces. To use the server BIOS Setup Utility, see Server BIOS Setup Utility Menu for DCPMM, on page 93.

Server BIOS Setup Utility Menu for DCPMM

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

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

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

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

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

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

`Advanced > Intel Optane DC Persistent Memory Configuration`

From this tab, you can access other menu items:

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

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

  From the Regions page, you can configure memory goals that tell the DCPMM how to allocate resources.
  - `Create goal config`

- `Namespaces`: Displays namespaces and allows you to create or delete them when persistent memory is used. Namespaces can also be created when creating goals. A namespace provisioning of persistent memory applies only to the selected region.

  Existing namespace attributes such as the size cannot be modified. You can only add or delete namespaces.

- `Total capacity`: Displays the total resource allocation across the server.

Updating the DCPMM Firmware Using the BIOS Setup Utility

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

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

Replacing Components Inside an I/O Module

Caution When handling server components, handle them only by carrier edges and use an electrostatic discharge (ESD) wrist-strap or other grounding device to avoid damage.

Caution Never remove an I/O module without shutting down and removing power from the server.

This section describes how to install and replace I/O module components.

Note The I/O module is not field-replaceable, nor can you move an I/O module from one chassis to another. This module contains a security chip that requires it to stay with the PCIe module in the same chassis, as shipped from the factory.

Replacing the RTC Battery

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

[Statement 1015]

The real-time clock (RTC) battery retains system settings when the server is disconnected from power. The battery type is CR2032. Cisco supports the industry-standard CR2032 battery, which can be ordered from Cisco (PID N20-MBLIBATT) or purchased from most electronic stores.

Caution Removing the RTC battery impacts the following:

- Real clock time gets reset to default value.
- CMOS setting of the server is lost. You should reset the system setting after replacing the RTC battery.

Caution Never remove an I/O module without shutting down and removing power from the server.

Step 1 Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the I/O module is accessible from the rear of the server.

Step 2 Remove an I/O module from the chassis:

a) Disconnect any cables from the ports on the I/O module.
b) Push down on the locking clip on the I/O module's ejector-handle, and then hinge the handle upward to disengage the module's connector from the chassis midplane.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

Step 3 Remove the RTC battery:

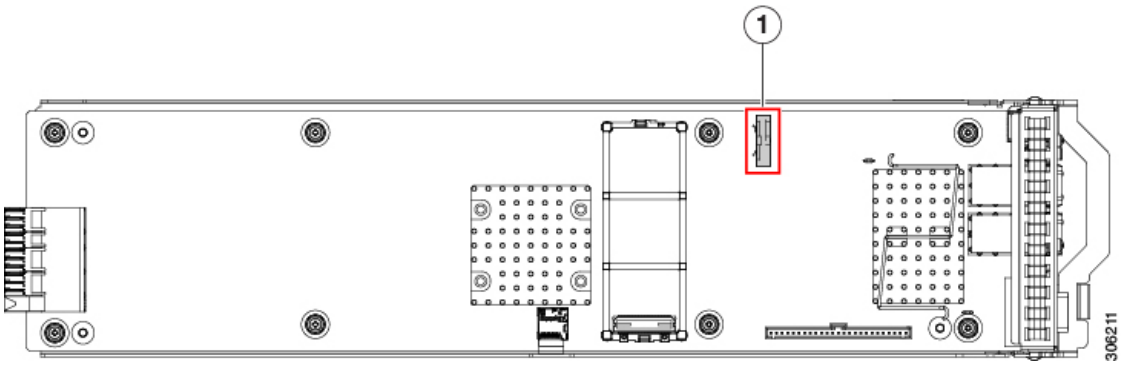
a) Locate the vertical RTC battery socket on the I/O module board.
b) Remove the battery from the socket. Gently pry the securing clip to the side to provide clearance, then lift up on the battery.

Step 4 Install a new RTC battery:

a) Insert the battery into its socket and press down until it clicks in place under the clip.

Note The flat, positive side of the battery marked “3V+” should face the clip on the socket (toward the module rear).

Figure 49: RTC Battery Socket Location Inside an I/O Module



1	RTC battery in vertical socket	-	

Step 5 Return the I/O module to the chassis:

a) With the ejector-handle open, align the I/O module with the empty bay.
b) Push the module into the bay until it engages with the midplane connector.
c) Hinge the ejector-handle down until it sits flat and its locking clip clicks. The module face mst be flush with the rear panel of the chassis.
d) Reconnect cables to the ports on the I/O module.

Step 6 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 7 Fully power on the server by pressing the Power button.

Replacing a Micro SD Card

There is one socket for a Micro SD card on the I/O module board.

⚠

Caution Never remove a CPU module without shutting down and removing power from the server.

Step 1 Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the I/O module is accessible from the rear of the server.

Step 2 Remove an I/O module from the chassis:

a) Disconnect any cables from the ports on the I/O module.
b) Push down on the locking clip on the I/O module's ejector-handle, and then hinge the handle upward to disengage the module's connector from the chassis midplane.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

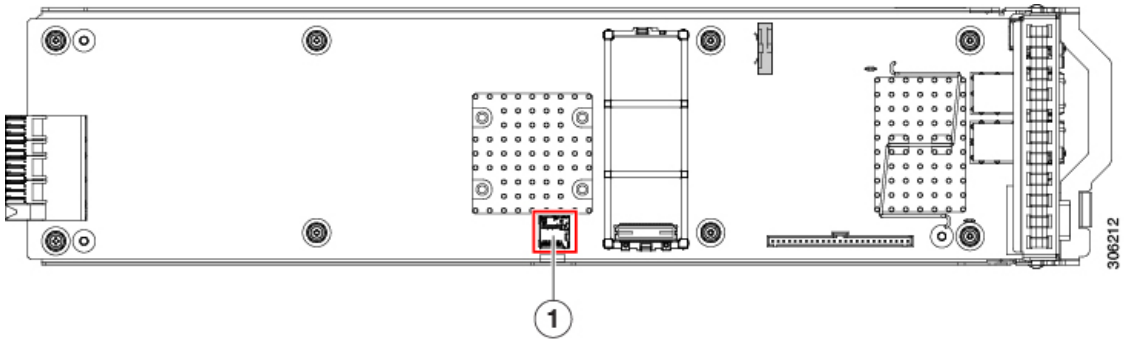
Step 3 Remove an existing Micro SD card:

a) Locate the Micro SD card.
b) Push horizontally on the Micro SD card and release it to make it spring out from the socket.
c) Grasp the Micro SD card and lift it from the socket.

Step 4 Install a new Micro SD card:

a) Align the new Micro SD card with the socket.
b) Gently push down on the card until it clicks and locks in place in the socket.

Figure 50: Micro SD Card Location Inside an I/O Module



1	Location of Micro SD card socket on the I/O module board	-	

Step 5 Return the I/O module to the chassis:

a) With the ejector-handle open, align the I/O module with the empty bay.
b) Push the module into the bay until it engages with the midplane connector.
c) Hinge the ejector-handle down until it sits flat and its locking clip clicks. The module face mst be flush with the rear panel of the chassis.
d) Reconnect cables to the ports on the I/O module.

Step 6 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 7 Fully power on the server by pressing the Power button.

Replacing a Mini-Storage Module

The mini-storage module plugs into an I/O module board socket to provide additional internal storage. The mini-storage module is available in two different versions:

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

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

Replacing a Mini-Storage Module Carrier

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

Caution Never remove an I/O module without shutting down and removing power from the server.

Step 1 Prepare the server for component removal:

a) Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36.

Note You do not have to pull the server out of the rack or remove the server cover because the I/O module is accessible from the rear of the server.

Step 2 Remove an I/O module from the chassis:

a) Disconnect any cables from the ports on the I/O module.
b) Push down on the locking clip on the I/O module's ejector-handle, and then hinge the handle upward to disengage the module's connector from the chassis midplane.
c) Pull the module straight out from the chassis and then set it on an antistatic surface.

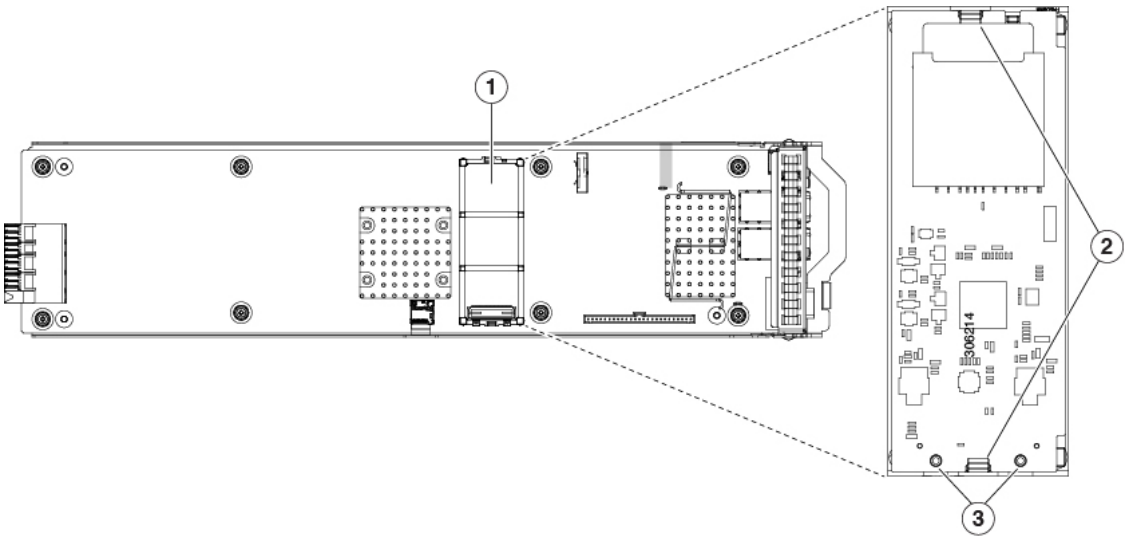
Step 3 Remove a carrier from its socket:

a) Locate the mini-storage module carrier.
b) Push outward on the securing clips that holds each end of the carrier.
c) Lift both ends of the carrier to disengage it from the socket on the motherboard.
d) Set the carrier on an anti-static surface.

Step 4 Install a new carrier to its socket:

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

Figure 51: Mini-Storage Module Location on I/O Module Board



1	Location of socket on board	**3**	Alignment pegs
2	Securing clips	-	

Step 5 Return the I/O module to the chassis:

a) With the ejector-handle open, align the I/O module with the empty bay.
b) Push the module into the bay until it engages with the midplane connector.
c) Hinge the ejector-handle down until it sits flat and its locking clip clicks. The module face mst be flush with the rear panel of the chassis.
d) Reconnect cables to the ports on the I/O module.

Step 6 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 7 Fully power on the server by pressing the Power button.

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

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

Population Rules For Mini-Storage SD Cards

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

Caution Never remove an I/O module without shutting down and removing power from the server.

Step 1 Power off the server and then remove the mini-storage module carrier from the I/O module as described in Replacing a Mini-Storage Module Carrier, on page 98.

Step 2 Remove an SD card:

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

b) Grasp and remove the SD card from the socket.

Step 3 Install a new SD card:

a) Insert the new SD card into the socket with its label side facing up (away from the carrier).

b) Press on the top of the SD card until it clicks in the socket and stays in place.

Step 4 Install the mini-storage module carrier back into the I/O module as described in Replacing a Mini-Storage Module Carrier, on page 98.

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

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

Population Rules For Mini-Storage M.2 SSDs

-
- You can use one or two M.2 SSDs in the carrier.
- M.2 slot 1 is on the top side of the carrier; M.2 slot 2 is on the underside of the carrier (the same side as the carrier's motherboard connector).

Note If you use the server's embedded software RAID controller with M.2 SATA SSDs, note that the numbering of the slots in the software interfaces is different than the physical slot numbering. Physical slot 1 is seen as slot 0 in the software; physical slot 2 is seens as slot 2 in the software.

- Dual SATA M.2 SSDs can be configured in a RAID 1 array through the BIOS Setup Utility's embedded SATA RAID interface. See Embedded SATA RAID Controller, on page 119.

Note You cannot control the M.2 SATA SSDs in the server with a HW RAID controller.

Note The embedded SATA RAID controller requires that the server is set to boot in UEFI mode rather than Legacy mode.

Caution Never remove an I/O module without shutting down and removing power from the server.

Step 1 Power off the server and then remove the mini-storage module carrier from the server as described in Replacing a Mini-Storage Module, on page 97.

Step 2 Remove an M.2 SSD:

a) Use a #1 Phillips-head screwdriver to remove the single screw that secures the M.2 SSD to the carrier.
b) Grasp the M.2 SSD and lift up on the end that is opposite its socket on the carrier.
c) Remove the M.2 SSD from its socket on the carrier.

Step 3 Install a new M.2 SSD:

a) Angle downward and insert the new M.2 SSD connector-end into the socket on the carrier with its label side facing up.
b) Press the M.2 SSD flat against the carrier.
c) Install the single screw that secures the end of the M.2 SSD to the carrier.

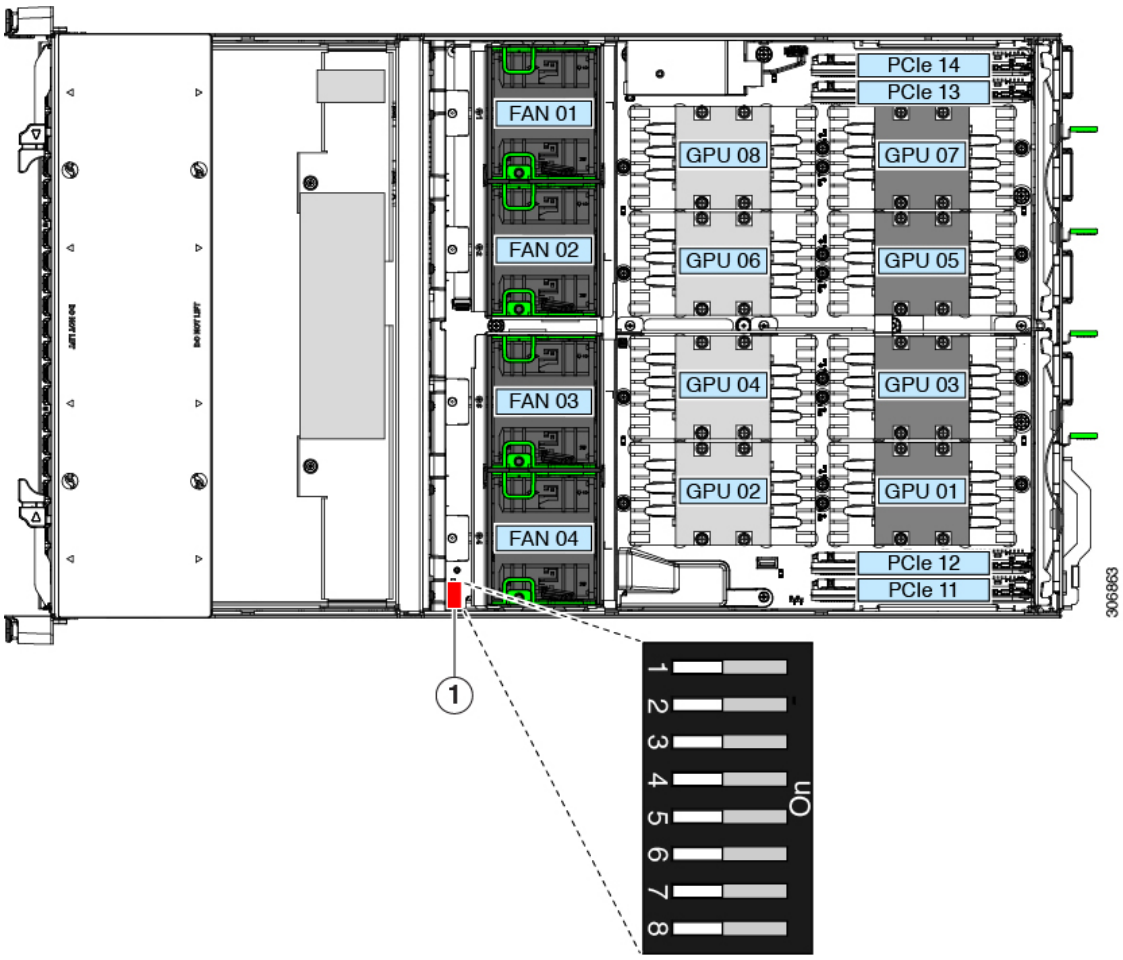
Step 4 Install the mini-storage module carrier back into the server and then power it on as described in Replacing a Mini-Storage Module, on page 97.

Service DIP Switches

This server includes a block of DIP switches (SW1) that you can use for certain service and Cisco IMC debug functions. The block is located on the chassis motherboard, as shown in the following figure.

The switches in the following figure are shown in the default, open position (off).

Figure 52: Location of DIP Switches on Chassis Motherboard



1	Location of DIP switch block SW1	-	

DIP Switch Function	Pin Numbers (Open - Closed)
Boot from alternate Cisco IMC image	8 - 9
Reset Cisco IMC to factory defaults	7 - 10
Reset Cisco IMC password to default	6 - 11
Clear CMOS	3 - 14
Recover BIOS	2 - 15
Password clear	1 - 16

Using the Clear Password Switch (Positions 1 - 16)

You can use this switch to clear the administrator password.

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Locate DIP switch block SW1 and the switch for pins 1 - 16 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 5 Move the DIP switch from position 1 to the closed, on position.

Step 6 Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 7 Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.

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

Step 8 Press the Power button to shut down the server to standby power mode.

Step 9 Remove AC power cords from the server to remove all power.

Step 10 Remove the top cover from the server.

Step 11 Move the DIP switch back to its default, off position.

Note If you do return the switch back to the default, open position, the password is cleared every time you power-cycle the server.

Step 12 Replace the top cover to the server.

Step 13 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 14 Fully power on the server by pressing the Power button.

Using the BIOS Recovery Switch (Positions 2 - 15)

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

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

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

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

```
****BIOS FLASH IMAGE CORRUPTED****
Flash a valid BIOS capsule file using Cisco IMC WebGUI or CLI interface.
IF Cisco IMC INTERFACE IS NOT AVAILABLE, FOLLOW THE STEPS MENTIONED BELOW.
```

```
1. Connect the USB stick with bios.cap file in root folder.
2. Reset the host.
IF THESE STEPS DO NOT RECOVER THE BIOS
1. Power off the system.
2. Mount recovery jumper.
3. Connect the USB stick with bios.cap file in root folder.
4. Power on the system.
Wait for a few seconds if already plugged in the USB stick.
REFER TO SYSTEM MANUAL FOR ANY ISSUES.
```

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

Procedure 1: Reboot With recovery.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 drive. The recovery folder contains the bios.cap file that is required in this procedure.

Note The 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 the FAT16 or FAT32 file system.

Step 3 Insert the USB drive into a USB port on the server.

Step 4 Reboot the server to standby power.

The server boots with the updated BIOS boot block. When the BIOS detects a valid bios.cap file on the USB 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 5 Wait for server to complete the BIOS update, and then remove the USB drive from the server.

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

Procedure 2: Use BIOS Recovery Switch and 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 drive. The recovery folder contains the bios.cap file that is required in this procedure.

Note The 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 the FAT16 or FAT32 file system.

Step 3 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 4 Slide the server 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 server from the rack.

Step 5 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 6 Locate DIP switch block SW1 and the switch for pins 2 - 15 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 7 Move the DIP switch from position 2 to the closed, on position.

Step 8 Insert the USB thumb drive that you prepared in Step 2 into a USB port on the server.

Step 9 Reconnect power cords to all power supplies and allow the server to boot to standby power.

You do not have to return the server to main power for the change to take effect. Only Cisco IMC (the BMC) must reboot. The change takes effect after Cisco IMC finishes booting.

Cisco IMC boots with the updated BIOS boot block. When the BIOS detects a valid bios.cap file on the USB 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 10 Wait for the BIOS update to complete, and then remove the USB drive from the server.

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

Step 11 Remove all power cords again to fully remove power from the server.

Step 12 Move the DIP switch back to its default, off position.

Note If you do not return the switch to the default open position, after recovery completion you see the prompt, “Please remove the recovery jumper.”

Step 13 Replace the top cover to the server.

Step 14 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode.

Step 15 Fully power on the server to main power by pressing the Power button.

Using the Clear CMOS Switch (Positions 3 - 14)

You can use this switch to clear the server’s CMOS settings in the case of a system hang. For example, if the server 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 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Locate DIP switch block SW1 and the switch for pins 3 - 14 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 5 Move the DIP switch from position 3 to the closed, on position.

Step 6 Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.

Step 7 Return the server to main power mode by pressing the Power button on the front panel. The server is in main power mode when the Power LED is green.

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

Step 8 Press the Power button to shut down the server to standby power mode.

Step 9 Remove AC power cords from the server to remove all power.

Step 10 Remove the top cover from the server.

Step 11 Move the DIP switch back to its default, off position.

Note If you do not return the switch to the default, open position, the CMOS settings are reset to the defaults every time you power-cycle the server.

Step 12 Replace the top cover to the server.

Step 13 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode.

Step 14 Fully power on the server to main power by pressing the Power button.

Using the Reset Cisco IMC Password to Default Switch (Positions 6 - 11)

You can use this Cisco IMC debug switch to force the Cisco IMC password back to the default.

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Locate DIP switch block SW1 and the switch for pins 6 - 11 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 5 Move the DIP switch from position 6 to the closed, on position.

Step 6 Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.

You do not have to return the server to main power for the change to take effect. Only Cisco IMC (the BMC) must reboot. The change takes effect after Cisco IMC finishes booting.

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

```
'Reset to default CIMC password' debug functionality is enabled.
On input power cycle, CIMC password will be reset to defaults.
```

Note If you do not move the switch back to the default, open position, the server will reset the Cisco IMC password to the default every time that you power-cycle the server. The switch has no effect if you reboot Cisco IMC.

Step 7 Remove AC power cords from the server to remove all power.

Step 8 Remove the top cover from the server.

Step 9 Move the DIP switch back to its default, off position.

Step 10 Replace the top cover to the server.

Step 11 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode.

Step 12 Fully power on the server by pressing the Power button.

Using the Reset Cisco IMC to Defaults Switch (Positions 7 - 10)

You can use this Cisco IMC debug header to force the Cisco IMC settings back to the defaults.

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Locate DIP switch block SW1 and the switch for pins 7 - 10 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 5 Move the DIP switch from position 7 to the closed, on position.

Step 6 Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.

You do not have to return the server to main power for the change to take effect. Only Cisco IMC (the BMC) must reboot. The change takes effect after Cisco IMC finishes booting.

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

```
'CIMC reset to factory defaults' debug functionality is enabled.
On input power cycle, CIMC will be reset to factory defaults.
```

Note If you do not move the switch back to the default, open position, the server will reset the Cisco IMC to the default settings every time that you powe- cycle the server. The switch has no effect if you reboot Cisco IMC.

Step 7 Remove AC power cords from the server to remove all power.

Step 8 Remove the top cover from the server.

Step 9 Move the DIP switch back to its default, off position.

Step 10 Replace the top cover to the server.

Step 11 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode.

Step 12 Fully power on the server by pressing the Power button.

Using the Boot Alternate Cisco IMC Image Switch (Positions 8 - 9)

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

Step 1 Shut down and remove power from the server as described in Shutting Down and Removing Power From the Server, on page 36. Disconnect power cords from all power supplies.

Step 2 Slide the server 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 server from the rack.

Step 3 Remove the top cover from the server as described in Removing the Server Top Cover, on page 38.

Step 4 Locate DIP switch block SW1 and the switch for pins 8 - 9 (see Service DIP Switches, on page 101).

You might have to temporarily remove fan 04 to provide clearance.

Step 5 Move the DIP switch from position 8 to the closed, on position.

Step 6 Reinstall the top cover and reconnect AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.

You do not have to return the server to main power for the change to take effect. Only Cisco IMC (the BMC) must reboot. The change takes effect after Cisco IMC finishes booting.

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

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

Note If you do not move the switch back to the default, open position, the server will boot from an alternate Cisco IMC image every time that you power cycle the server or reboot Cisco IMC.

Step 7 Remove AC power cords from the server to remove all power.

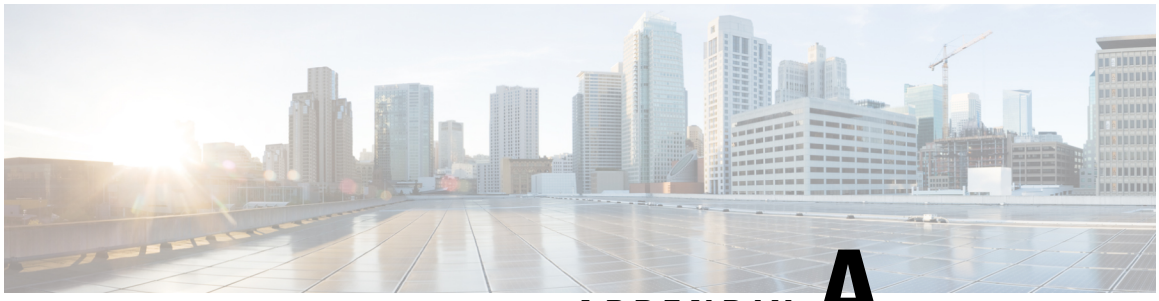
Step 8 Remove the top cover from the server.

Step 9 Move the DIP switch back to its default, off position.

Step 10 Replace the top cover to the server.

Step 11 Reconnect power cords to all power supplies and then allow the server to boot to standby power mode (indicated when the front panel Power button LED lights amber).

Step 12 Fully power on the server by pressing the Power button.



APPENDIX A

Server Specifications

- Server Specifications, on page 111
- Power Cord Specifications, on page 113

Server Specifications

This appendix lists the physical, environmental, and power specifications for the server.

- Physical Specifications, on page 111
- Environmental Specifications, on page 111
- Power Specifications, on page 112

Physical Specifications

The following table lists the physical specifications for the server versions.

Table 9: Physical Specifications

Description	Specification
Height	7.0 in. (177.8 mm) 4 rack-unit (4RU)
Width	19.0 in. (482.6 mm)
Depth (length including front handles and power supplies)	32.7 in. (830.6 mm)
Maximum weight (fully loaded chassis)	146 lb. (66.2 Kg)

Environmental Specifications

The following table lists the environmental requirements and specifications for the server.

Table 10: Physical 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. For more information, see the Cisco Unified Computing System Site Planning Guide: Data Center Power and Cooling.
Temperature, non-operating (when the server is stored or transported)	–40 to 149°F (–40 to 65°C)
Humidity (RH), operating	10 to 90%
Humidity (RH), non-operating (when the server is stored or transported)	5 to 93%
Altitude, operating	0 to 10,000 feet (0 to 3048 m)
Altitude, non-operating (when the server is stored or transported)	0 to 39,370 feet (0 to 12,000 m)
Sound pressure level Measure A-weighted per ISO7779 LpAm (dBA)	• Minimum configuration: 57.6 dBA • Typical configuration: 63.5 dBA • Maximum configuration: 70.5 dBA
Sound power	• Minimum configuration: 7.08 bels • Typical configuration: 7.67 bels • Maximum configuration: 8.24 bels

Power Specifications

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

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

http://ucspowercalc.cisco.com

The power specifications for the supported power supply options are listed in the following sections.

1600 W AC Power Supply

This section lists the specifications for each 1600 W AC power supply (Cisco part number UCSC-PSU1-1600W).

Table 11: 1600 W AC Specifications

Description	Specification
AC Input Voltage	Nominal range: 200–240 VAC (Range: 180–264 VAC)
AC Input Frequency	Nominal range: 50 to 60Hz (Range: 47–63 Hz)
Maximum AC Input current	9.5 A at 200 VAC
Maximum input volt-amperes	1250 VA at 200 VAC
Maximum inrush current	30 A at 35° C
Maximum hold-up time	80 ms at 1600 W
Maximum output power per PSU	1600 W at 200–240 VAC
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 Cord Specifications

Each power supply in the server has a power cord. Standard power cords or jumper power cords are available for connection to the server. The shorter jumper power cords, for use in racks, are available as an optional alternative to the standard power cords.

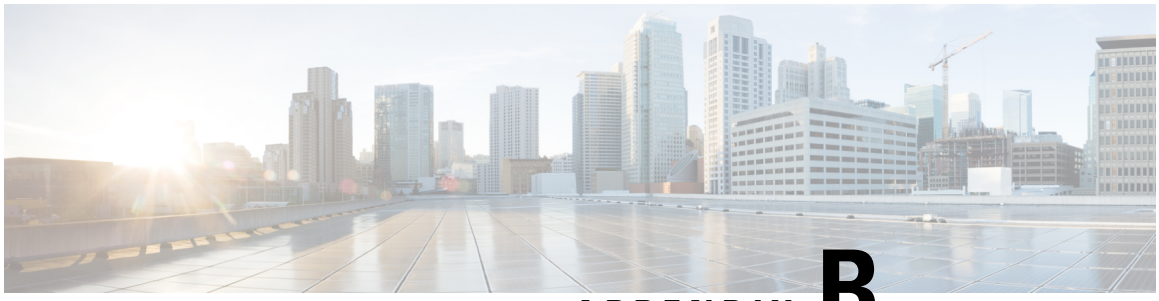
Note Only the approved power cords or jumper power cords listed below are supported.

Table 12: Supported Power Cords

Description	Length (Feet)	Length (Meters)

CAB-250V-10A-AR AC power cord, 250 V, 10 A Argentina	8.2	2.5
CAB-C13-C14-2M AC cabinet jumper power cord, 250 V, 10 A, C13 to C14	6.6	2.0
CAB-C13-C14-2M-JP AC Power Cord, C13 to C14 Japan PSE Mark	6.6	2.0
CAB-9K10A-EU AC Power Cord, 250 V, 10 A; CEE 7/7 Plug Europe	8.2	2.5
CAB-250V-10A-IS AC Power Cord, 250 V, 10 A Israel	8.2	2.5
CAB-250V-10A-CN AC power cord, 250 V, 10 A PR China	8.2	2.5
CAB-ACTW AC power cord, 250 V, 10 A Taiwan	7.5	2.3
CAB-9K10A-AU AC power cord, 250 V, 10 A, 3112 plug, Australia	8.2	2.5
CAB-250V-10A-ID AC power Cord, 250 V, 10 A, India	8.2	2.5
CAB-9K10A-SW AC power cord, 250 V, 10 A, MP232 plug Switzerland	8.2	2.5

CAB-250V-10A-BR AC power Cord, 250 V, 10 A Brazil	8.2	2.5
CAB-9K10A-UK AC power cord, 250 V, 10 A (13 A fuse), BS1363 plug United Kingdom	8.2	2.5
CAB-AC-L620-C13 AC power cord, NEMA L6-20 to C13 connectors	6.6	2.0
CAB-9K10A-IT AC power cord, 250 V, 10 A, CEI 23-16/VII plug Italy	8.2	2.5
R2XX-DMYMPWRCORD No power cord; PID option for ordering server with no power cord	NA	NA



APPENDIX B

Storage Controller Considerations

This appendix provides storage controller information.

- Supported Storage Controllers and Cables, on page 117
- Storage Controller Card Firmware Compatibility, on page 118
- RAID Backup (Supercap), on page 118
- Write-Cache Policy for Cisco 12G SAS Modular RAID Controllers, on page 118
- Mixing Drive Types in RAID Groups, on page 118
- Storage Controller Cable Connectors and Backplanes, on page 119
- Embedded SATA RAID Controller, on page 119
- For More RAID Utility Information, on page 128

Supported Storage Controllers and Cables

This server supports one PCIe-style, SAS RAID controller. Optionally, the server has a software-based SATA RAID controller embedded in the system that you can use to control two internal M.2 SATA SSDs.

Note NVMe PCIe SSDs cannot be controlled by a SAS/SATA RAID controller.

This server supports the RAID controller options and cable requirements shown in the following table.

Controller	Maximum Drives Controlled	RAID Levels	Optional Supercap Backup?	Required SAS Cables
Embedded RAID (PCH SATA)	Two internal M.2 SATA SSDs.	0, 1	No	No cables are required for control of internal SATA M.2 drives.
Cisco 12G Modular RAID Controller UCSC-RAID-M5HD Includes 4-GB cache; controls up to 24 drives	24 front-loading SAS/SATA drives	0, 1, 5, 6, 10, 50, 60	Yes	Use the SAS/SATA cables that come with the chassis (not orderable separately).

Storage Controller Card Firmware Compatibility

Firmware on the storage controller must be verified for compatibility with the current Cisco IMC and BIOS versions that are installed on the server. If not compatible, upgrade or downgrade the storage controller firmware using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

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

RAID Backup (Supercap)

This server supports installation of one supercap unit. The front supercap unit backs up the front RAID controller for front-loading drives.

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

For supercap unit replacement instructions, see Replacing the Front RAID Supercap Unit, on page 57.

Write-Cache Policy for Cisco 12G SAS Modular RAID Controllers

For this server and other Cisco Generation M5 servers, the default write-cache policy for the Cisco Modular RAID controllers is *Write Through* (irrespective of the presence of a charged supercap or "good BBU"). This utilizes the optimal performance characteristics of the controller.

The write policy can be set to *Write Back*, if preferred. You can set the write policy using the following methods:

- For standalone servers, use the Cisco IMC interface to set Virtual Drive Properties > Write Policy. See the "Managing Storage Adapters" section in your Cisco IMC Configuration Guide.

  Cisco IMC GUI and CLI Configuration Guides

- For Cisco UCS-integrated servers, use the Cisco UCS Manager interface to set the write-cache policy as part of virtual drive configuration in your storage profile.

  Cisco UCS Manager Configuration Guides

- Use the LSI Option ROM Configuration Utility.

Mixing Drive Types in RAID Groups

The following table lists the technical capabilities for mixing hard disk drive (HDD) and solid state drive (SSD) types in a RAID group. However, see the recommendations that follow for the best performance.

Table 13: Mixing Drive Types

Mix of Drive Types in RAID Group	Allowed?

SAS HDD + SATA HDD	Yes
SAS SSD + SATA SSD	Yes
HDD + SSD	No

Drive Type Mixing Best Practices

For the best performance follow these guidelines:

- Use either all SAS or all SATA drives in a RAID group.
- Use the same capacity for each drive in the RAID group.
- Never mix HDDs and SSDs in the same RAID group.

Storage Controller Cable Connectors and Backplanes

This section describes cabling for the storage controllers and backplanes.

Embedded SATA RAID

This software RAID option controls only two internal M.2 SATA SSDs. No cabling or other hardware is required.

Cisco 12G Modular SAS RAID Controller With 4-GB Cache (UCSC-RAID-M5HD)

This hardware RAID option can control up to 24 front-loading SAS/SATA drives. The card plugs into a dedicated, horizontal socket on the drive midplane. SAS/SATA cables are used to connect the controller to the backplanes of the front drive modules.

1. Cable card connectors A1 and A2 to the two connectors on front drive module 1.
2. Cable card connectors B1 and B2 to the two connectors on front drive module 2.
3. Cable card connectors C1 and C2 to the two connectors on front drive module 3.

Embedded SATA RAID Controller

The server includes an embedded SATA MegaRAID controller that can be used to control internal SATA M.2 drives. This controller supports RAID levels 0 and 1.

Note The VMware ESX/ESXi operating system is not supported with the embedded SATA MegaRAID controller in SW RAID mode. You can use VMWare in AHCI mode.

Note The Microsoft Windows Server 2016 Hyper-V hypervisor is supported for use with the embedded MegaRAID controller in SW RAID mode, but all other hyperviors are not supported. All Hypervisors are supported in AHCI mode.

Note You cannot control the M.2 SATA SSDs in the server with a HW RAID controller.

Embbeded SATA RAID Requirements

The embedded SATA RAID controller requires the following items:

- The embedded SATA RAID controller must be enabled in the server BIOS. If you ordered the server with embedded SATA RAID, it is enabled at the factory.
- M.2 mini-storage module with two SATA M.2 SSDs.
- The software RAID controller requires UEFI boot mode; Legacy boot mode is not supported.
- (Optional) LSI MegaSR drivers for Windows or Linux.
- If you use an embedded RAID controller with Linux, both the pSATA and the sSATA controller must be set to `LSI SW RAID` mode.

Embedded SATA RAID Controller Considerations

Note the following considerations:

- The default setting for this embedded controller hub is SATA RAID 0 and 1 support for two M.2 SATA drives. The hub is divided into two SATA controllers that have different functions. See Embedded SATA RAID: Two SATA Controllers, on page 120.
- When you order the server with this embedded controller, the controller is enabled in the BIOS. Instructions for enabling the controller are included for the case in which a server is reset to defaults. See Enabling SATA Mode , on page 121.
- The required drivers for this controller are already installed and ready to use. However, if you will use this controller with Windows or Linux, you must download and install additional drivers for those operating systems. See Installing LSI MegaSR Drivers For Windows and Linux, on page 122.

Embedded SATA RAID: Two SATA Controllers

The embedded RAID platform controller hub (PCH) is split into two controllers: primary SATA (pSATA) and secondary SATA (sSATA). These two controllers are seen as separate RAID controllers in the Cisco IMC interface and are configurable separately.

- The primary pSATA controller controls only the optional DVD drive; otherwise, it is disabled.

- The secondary sSATA controller controls two internal M.2 SATA drives, when they are present in the M.2 mini-storage module option.
- Each controller is listed separately in the BIOS. You can enable or disable the controllers in the BIOS. See Enabling SATA Mode , on page 121.

Enabling SATA Mode

This procedure uses the server's BIOS Setup Utility

Step 1 Set the SATA mode:

a) Boot the server and press **F2** when prompted to enter the BIOS Setup utility.
b) Choose the **Advanced** tab, and then choose **LOM and PCIe Slots Configuration**.
c) For the primary pSATA controller, select **pSATA** and then choose one of the options from the dialog:
   - SWR—Enable the embedded pSATA RAID controller.
   - AHCI—Enable control of a DVD drive by AHCI through your OS rather than the embedded RAID controller.
   - Disabled—Disable the embedded pSATA RAID controller.
d) For the secondary sSATA controller, select **M.2** and then choose one of the options from the dialog:
   - SWR—Enable the embedded sSATA RAID controller for control of internal SATA M.2 drives.
   - AHCI—Enable control of the internal SATA M.2 drives by AHCI through your OS rather than the embedded RAID controller.
   - Disabled—Disable the embedded sSATA RAID controller.

Step 2 Press **F10** to save your changes and exit the utility.

Accessing the LSI Software RAID Configuration Utility

To configure RAID settings for the embedded SATA RAID controller, use the utility that is built into the BIOS. Each controller is controlled by its own instance of the utility.

Step 1 Boot the server and press **F2** when prompted to enter the BIOS Setup utility.

Step 2 Choose the **Advanced** tab.

Step 3 Select the instance of the utility that is for the controller that you want to manage (primary or secondary):

- For the pSATA controller, select **LSI Software RAID Configuration Utility (SATA)**.
- For the sSATA controller, select **LSI Software RAID Configuration Utility (sSATA)**.

Installing LSI MegaSR Drivers For Windows and Linux

Note The required drivers for this controller are already installed and ready to use. However, if you will use this controller with Windows or Linux, you must download and install additional drivers for those operating systems.

This section explains how to install the LSI MegaSR drivers for the following supported operating systems:

- Microsoft Windows Server
- Red Hat Enterprise Linux (RHEL)
- SUSE Linux Enterprise Server (SLES)

For the specific supported OS versions, see the Hardware and Software Compatibility Matrix for your server release.

Downloading the MegaSR Drivers

The MegaSR drivers are included in the C-Series driver ISO for your server and OS.

Step 1 Find the drivers ISO file download for your server online and download it to a temporary location on your workstation:
a) See the following URL: http://www.cisco.com/cisco/software/navigator.html.
b) Type the name of your server in the **Select a Product** search field and then press **Enter**.
c) Click **Unified Computing System (UCS) Drivers**.
d) Click the release number that you are downloading.
e) Click the Download icon to download the drivers ISO file.

Step 2 Continue through the subsequent screens to accept the license agreement and then browse to a location where you want to save the driver ISO file.

Microsoft Windows Server Drivers

Installing Microsoft Windows Server Drivers

The Windows Server operating system automatically adds the driver to the registry and copies the driver to the appropriate directory.

Before you begin

Before you install this driver on the sSATA embedded controller, you must configure a RAID drive group.

To access the configuration utility, open the BIOS Setup Utility, go to the **Advanced** tab, and then choose the utility instance for the sSATA embedded controller: **LSI Software RAID Configuration Utility (sSATA)**.

Step 1 Download the Cisco UCS C-Series drivers' ISO, as described in Downloading the MegaSR Drivers, on page 122.

Step 2 Prepare the drivers on a USB thumb drive:

a) Burn the ISO image to a disk.
b) Browse the contents of the drivers folders to the location of the embedded MegaRAID drivers: /<OS>/Storage/Intel/C600-M5/
c) Expand the Zip file, which contains the folder with the MegaSR driver files.
d) Copy the expanded folder to a USB thumb drive.

Step 3 Start the Windows driver installation using one of the following methods:

- To install from local media, connect an external USB DVD drive to the server (if the server does not have a DVD drive installed), and then insert the first Windows installation disk into the DVD drive. Skip to Step 6.
- To install from remote ISO, log in to the server's Cisco IMC interface and continue with the next step.

Step 4 Launch a Virtual KVM console window and click the **Virtual Media** tab.

a) Click **Add Image** and browse to select your remote Windows installation ISO file.
b) Check the check box in the **Mapped** column for the media that you just added, and then wait for mapping to complete.

Step 5 Power cycle the server.

Step 6 Press **F6** when you see the F6 prompt during bootup. The Boot Menu window opens.

Step 7 On the Boot Manager window, choose the physical disk or virtual DVD and press **Enter**. The Windows installation begins when the image is booted.

Step 8 Press **Enter** when you see the prompt, "Press any key to boot from CD."

Step 9 Observe the Windows installation process and respond to prompts in the wizard as required for your preferences and company standards.

Step 10 When Windows prompts you with "Where do you want to install Windows," install the drivers for embedded MegaRAID:

a) Click **Load Driver**. You are prompted by a Load Driver dialog box to select the driver to be installed.
b) Connect the USB thumb drive that you prepared in Step 3 to the target server.
c) On the Windows Load Driver dialog, click **Browse**.
d) Use the dialog box to browse to the location of the drivers folder on the USB thumb drive, and then click **OK**.

   Windows loads the drivers from the folder and when finished, the driver is listed under the prompt, "Select the driver to be installed."

e) Click **Next** to install the drivers.

Updating Microsoft Windows Server Drivers

Step 1 Click **Start**, point to **Settings**, and then click **Control Panel**.

Step 2 Double-click **System**, click the **Hardware** tab, and then click **Device Manager**. Device Manager starts.

Step 3 In Device Manager, double-click **SCSI and RAID Controllers**, right-click the device for which you are installing the driver, and then click **Properties**.

Step 4 On the Driver tab, click **Update Driver** to open the Update Device Driver wizard, and then follow the wizard instructions to update the driver.

Linux Drivers

Dowloading the Driver Image File

See Downloading the MegaSR Drivers, on page 122 for instructions on downloading the drivers. The Linux driver is included in the form of `dud-[driver version].img`, which is the boot image for the embedded MegaRAID stack.

Note The LSI MegaSR drivers that Cisco provides for Red Hat Linux and SUSE Linux are for the original GA versions of those distributions. The drivers do not support updates to those OS kernels.

Preparing Physical Thumb Drive for Linux

This topic describes how to prepare physical Linux thumb drive from the driver image files.

This procedure requires a CD or DVD drive that you can use to burn the ISO image to disk; and a USB thumb drive.

Alternatively, you can mount the dud.img file as a virtual floppy disk, as described in the installation procedures.

For RHEL and SLES, you can use a driver disk utility to create disk images from image files.

Step 1 Download the Cisco UCS C-Series drivers ISO, as described in Downloading the MegaSR Drivers, on page 122 and save it to your Linux system.

Step 2 Extract the dud.img or dd.iso driver file:

Note For RHEL 7.1 and later, there is no dud.img file--the driver is contained in a dd.iso file.

a) Burn the Cisco UCS C-Series Drivers ISO image to a disc.
b) Browse the contents of the drivers folders to the location of the embedded MegaRAID drivers: /<OS>/Storage/Intel/C600-M5/
c) Expand the Zip file, which contains the folder with the driver files.

Step 3 Copy the driver update disk image `dud-[driver version].img` (or dd.iso) to your Linux system.

Step 4 Insert a blank USB thumb drive into a port on your Linux system.

Step 5 Create a directory and mount the dud.img or dd.iso image to that directory:

Example:

```
mkdir <destination_folder>
mount -oloop <driver_image> <destination_folder>
```

Step 6 Copy the contents in the directory to your USB thumb drive.

Installing the Red Hat Enterprise Linux Driver

For the specific supported OS versions, see the Hardware and Software Compatibility Matrix for your server release.

This topic describes the fresh installation of the RHEL device driver on systems that have the embedded MegaRAID stack.

Note If you use an embedded RAID controller with Linux and a DVD drive is present on the pSATA controller, both the pSATA and the sSATA controller must be set to `LSI SW RAID` mode.

Before you begin

Before you install this driver on the sSATA embedded controller, you must configure a RAID drive group.

To access the configuration utility, open the BIOS Setup Utility, go to the **Advanced** tab, and then choose the utility instance for the sSATA embedded controller: **LSI Software RAID Configuration Utility (sSATA)**.

Step 1 Prepare the `dud.img` file using one of the following methods:

Note For RHEL 7.1 and later, there is no dud.img file--the driver is contained in a dd.iso file.

- To install from physical disk, use the procedure in Preparing Physical Thumb Drive for Linux, on page 124, then continue with step 3.
- To install from *virtual* disk, download the Cisco UCS C-Series drivers' ISO, as described in Downloading the MegaSR Drivers, on page 122, then continue with the next step.

Step 2 Extract the `dud.img` (or dd.iso) file:

a) Burn the Cisco UCS C-Series Drivers ISO image to a disk.
b) Browse the contents of the drivers folders to the location of the embedded MegaRAID drivers: /<OS>/Storage/Intel/C600-M5/
c) Copy the `dud-<driver version>.img` (or dd.iso) file to a temporary location on your workstation.
d) If you are using RHEL 7.x, rename the saved dd.iso to dd.img.

Note If you are using RHEL 7.x, renaming the dd.iso file to dd.img simplifies this procedure and saves time. The Cisco UCS virtual drive mapper can map only one .iso at a time, and only as a virtual CD/DVD. Renaming the file to dd.img allows you to mount the RHEL installation ISO as a virtual CD/DVD and the renamed dd.img as a virtual floppy disk or removable disk at the same time. This avoids the steps of unmounting and remounting the RHEL ISO when the dd.iso driver file is prompted for.

Step 3 Start the Linux driver installation using one of the following methods:

- To install from local media, connect an external USB CD/DVD drive to the server and then insert the first RHEL installation disk into the drive. Then continue with Step 5.
- To install from virtual disk, log in to the server's Cisco IMC interface. Then continue with the next step.

Step 4 Launch a Virtual KVM console window and click the **Virtual Media** tab.

a) Click **Add Image** and browse to select your remote RHEL installation ISO image.

Note An .iso file can be mapped only as a virtual CD/DVD.

b) Click **Add Image** again and browse to select your RHEL 6.x `dud.img` or the RHEL 7.x dd.img file that you renamed in step 2.

Note Map the .img file as a virtual floppy disk or virtual removable disk.

c) Check the check boxes in the **Mapped** column for the media that you just added, then wait for mapping to complete.

Step 5 Power-cycle the target server.

Step 6 Press **F6** when you see the F6 prompt during bootup. The Boot Menu window opens.

Note Do not press Enter in the next step to start the installation. Instead, press **e** to edit installation parameters.

Step 7 On the Boot Menu window, use the arrow keys to select **Install Red Hat Enterprise Linux** and then press **e** to edit installation parameters.

Step 8 Append one of the following blacklist commands to the end of the line that begins with **linuxefi**:

- For RHEL 6.x (32- and 64-bit), type:

```
linux dd blacklist=isci blacklist=ahci nodmraid noprobe=<atadrive number>
```

Note The noprobe values depend on the number of drives. For example, to install RHEL 6.x on a RAID 5 configuration with three drives, type:

```
Linux dd blacklist=isci blacklist=ahci nodmraid noprobe=ata1 noprobe=ata2
```

- For RHEL 7.x (32- and 64-bit), type:

```
linux dd modprobe.blacklist=ahci nodmraid
```

Step 9 **Optional:** To see full, verbose installation status steps during installation, delete the **Quiet** parameter from the line.

Step 10 On the Boot Menu window, press **Ctrl+x** to start the interactive installation.

Step 11 Below **Driver disk device selection**, select the option to install your driver .img file. (Type **r** to refresh the list if it is not populated.)

Note The installer recognizes the driver file as an .iso file, even though you renamed it to dd.img for mapping.

Type the number of the driver device ISO in the list. Do *not* select the RHEL ISO image. In the following example, type **6** to select device sdb:

```
5) sr0 iso9660 RHEL-7.6\x20Server.x
6) sdb iso9660 CDROM
# to select, 'r' - refresh, or 'c' -continue: 6
```

The installer reads the driver file and lists the drivers.

Step 12 Under **Select drivers to install**, type the number of the line that lists the megasr driver. In the following example, type **1**:

```
1) [ ] /media/DD-1/rpms/x86_61/kmod-megasr-18.01.2010.1107_e17.6-1.x86_61.rpm
# to toggle selection, or 'c' -continue: 1
```

Your selection is displayed with an X in brackets.

```
1) [X] /media/DD-1/rpms/x86_61/kmod-megasr-18.01.2010.1107_e17.6-1.x86_61.rpm
```

Step 13 Type **c** to continue.

Step 14 Follow the RHEL installation wizard to complete the installation.

Step 15 When the wizard's Installation Destination screen is displayed, ensure that **LSI MegaSR** is listed as the selection. If it is not listed, the driver did not load successfully. In that case, select **Rescan Disc**.

Step 16 After the installation completes, reboot the target server.

Installing the SUSE Linux Enterprise Server Driver

For the specific supported OS versions, see the Hardware and Software Compatibility Matrix for your server release.

This topic describes the fresh installation of the SLES driver on systems that have the embedded MegaRAID stack.

Note If you use an embedded RAID controller with Linux and a DVD drive is present on the pSATA controller, both the pSATA and the sSATA controller must be set to `LSI SW RAID` mode.

Before you begin

Before you install this driver on the sSATA embedded controller, you must configure a RAID drive group.

To access the configuration utility, open the BIOS Setup Utility, go to the **Advanced** tab, and then choose the utility instance for the sSATA embedded controller: **LSI Software RAID Configuration Utility (sSATA)**.

Step 1 Prepare the `dud.img` (or .iso) file using one of the following methods:

- To install from physical disk, use the procedure in Preparing Physical Thumb Drive for Linux, on page 124, then continue with step 4.
- To install from *virtual* disk, download the Cisco UCS C-Series drivers' ISO, as described in Downloading the MegaSR Drivers, on page 122, then continue with the next step.

Step 2 Extract the `dud.img` file that contains the driver:

a) Burn the ISO image to a disk.
b) Browse the contents of the drivers folders to the location of the embedded MegaRAID drivers: /<OS>/Storage/Intel/C600-M5/...
c) Within the SLES folder for your version, the `dud-<driver version>.img` file is packaged in a compressed `.gz` file. Extract the .img file from the .gz file.
d) Copy the `dud-<driver version>.img` file to a temporary location on your workstation.

Step 3 Start the Linux driver installation using one of the following methods:

- To install from local media, connect an external USB DVD drive to the server and then insert the first SLES installation disk into the drive. Then continue with Step 5.
- To install from remote ISO, log in to the server's Cisco IMC interface. Then continue with the next step.

Step 4 Launch a Virtual KVM console window and click the **Virtual Media** tab.

a) Click **Add Image** and browse to select your remote SLES installation ISO file.
b) Click **Add Image** again and browse to select your `dud-<driver version>.img` file.
c) Check the check boxes in the **Mapped** column for the media that you just added, then wait for mapping to complete.

Step 5 Power-cycle the target server.

Step 6 Press **F6** when you see the F6 prompt during bootup. The Boot Menu window opens.

Step 7 On the Boot Manager window, select the physical or virtual SLES installation ISO and press **Enter**.

The SLES installation begins when the image is booted.

Step 8 When the first SLES screen appears, select **Installation**.

Step 9 Press **e** to edit installation parameters.

Step 10 Append the following parameter to the end of the line that begins with **linuxefi**:

```
brokenmodules=ahci
```

Step 11 **Optional**: To see detailed status information during the installation, add the following parameter to the line that begins with **linuxefi**:

```
splash=verbose
```

Step 12 Press **Ctrl+x** to start the installation.

The installation proceeds. The installer finds the LSI driver automatically in the `dud-<driver version>.img` file that you provided. With verbose status messages, you see the driver being installed when `LSI MegaRAID SW RAID Module` is listed.

Step 13 Follow the SLES installation wizard to complete the installation. Verify installation of the driver when you reach the **Suggested Partitioning** screen:

a) On the **Suggested Partitioning** screen, select **Expert Partitioner**.

b) Navigate to **Linux > Hard disks** and verify that there is a device listed for the `LSI - LSI MegaSR` driver. The device might be listed as a type other than sda. For example:

```
dev/sdd: LSI - LSI MegaSR
```

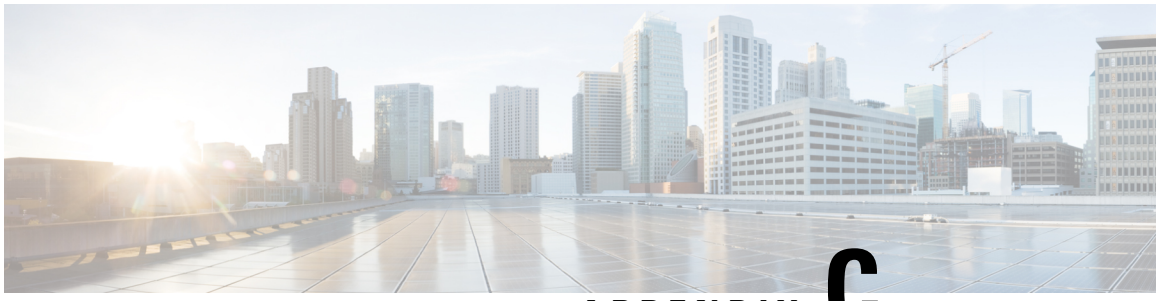
If no device is listed, the driver did not install properly. In that case, repeat the steps above.

Step 14 When installation is complete, reboot the target server.

For More RAID Utility Information

The Broadcom utilities have help documentation for more information about using the utilities.

- For basic information about RAID and for using the utilities for the RAID controller cards that are supported in Cisco servers, see the Cisco UCS Servers RAID Guide.
- For hardware SAS MegaRAID configuration—Broadcom 12Gb/s MegaRAID SAS Software User Guide, Version 2.8
- For embedded software MegaRAID and the utility that is accessed via the server BIOS (refer to Chapter 4)—Broadcom Embedded MegaRAID Software User Guide, March 2018.



APPENDIX C

Installation For Cisco UCS Manager Integration

- Installation For Cisco UCS Manager Integration, on page 129

Installation For Cisco UCS Manager Integration

The Cisco UCS Manager integration instructions are in the integration guides found here:

Cisco UCS C-Series Server Integration with UCS Manager Configuration Guides

Refer to the guide that is for the version of Cisco UCS Manager that you are using.

Also refer to the release notes for Cisco UCS Manager software and C-Series Cisco IMC software for any special considerations regarding integration in your release.

- Cisco UCS Manager Release Notes
- Cisco C-Series Software Release Notes

Installation For Cisco UCS Manager Integration