



Cisco UCS C460 M4 Server Installation and Service Guide

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Preface

This preface describes the audience, organization, and conventions of the *Cisco UCS C460 M4 Server Installation and Service Guide*. It also provides information about how to obtain related documentation.

Audience

This guide is for experienced network administrators who configure and maintain Cisco servers.

Conventions

This document uses the following conventions for notes, cautions, and safety warnings. Notes and cautions contain important information that you should know.



Note

Means *reader take note*. Notes contain helpful suggestions or references to material that are not covered in the publication.



Caution

Means *reader be careful*. Cautions contain information about something you might do that could result in equipment damage or loss of data.

Safety warnings appear throughout this guide in procedures that, if performed incorrectly, can cause physical injuries. A warning symbol precedes each warning statement.



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

SAVE THESE INSTRUCTIONS

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus

TÄRKEITÄ TURVALLISUUSOHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention

IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung

WICHTIGE SICHERHEITSHINWEISE

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! VIKTIGA SÄKERHETSANVISNINGAR

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

Opozorilo FONTOS BIZTONSÁGI ELOÍRÁSOK

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejte helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

的标准工作程序。详 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

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이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel VIGTIGE SIKKERHEDSANVISNINGER

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemeskadedigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير

إرشادات الأمان الهامة

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض للإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

הרהר

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena

ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА

Ostrzeżenie

WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie

DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Opozorilo POMEMBNI VARNOSTNI NAPOTKI

Ta opozorilni simbol pomeni nevarnost. Nahajate se v situaciji, kjer lahko pride do telesnih poškodb. Preden pričnete z delom na napravi, se morate zavedati nevarnosti udara električnega toka, ter tudi poznati preventivne ukrepe za preprečevanje takšnih nevarnosti. Uporabite obrazložitevno številko na koncu posameznega opozorila, da najdete opis nevarnosti v priloženem varnostnem priročniku.

SHRANITE TE NAPOTKE!

警告

重要安全性指示

此警告符號代表危險，表示可能造成人身傷害。使用任何設備前，請留心電路相關危險，並熟悉避免意外的標準作法。您可以使用每項警告後的聲明編號，查詢本裝置隨附之安全性警告譯文中的翻譯。請妥善保留此指示

Related Documentation

The documentation set for the Cisco Unified Computing System (UCS) C-Series rack-mount servers is described in the roadmap document at the following link:

[Cisco UCS C-Series Documentation Roadmap](#)

Documentation Feedback

To provide technical feedback on this document, or to report an error or omission, please send your comments to ucs-docfeedback@external.cisco.com. We appreciate your feedback.

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- To obtain general networking, training, and certification titles, visit [Cisco Press](#).
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Cisco Bug Search Tool

[Cisco Bug Search Tool](#) (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.



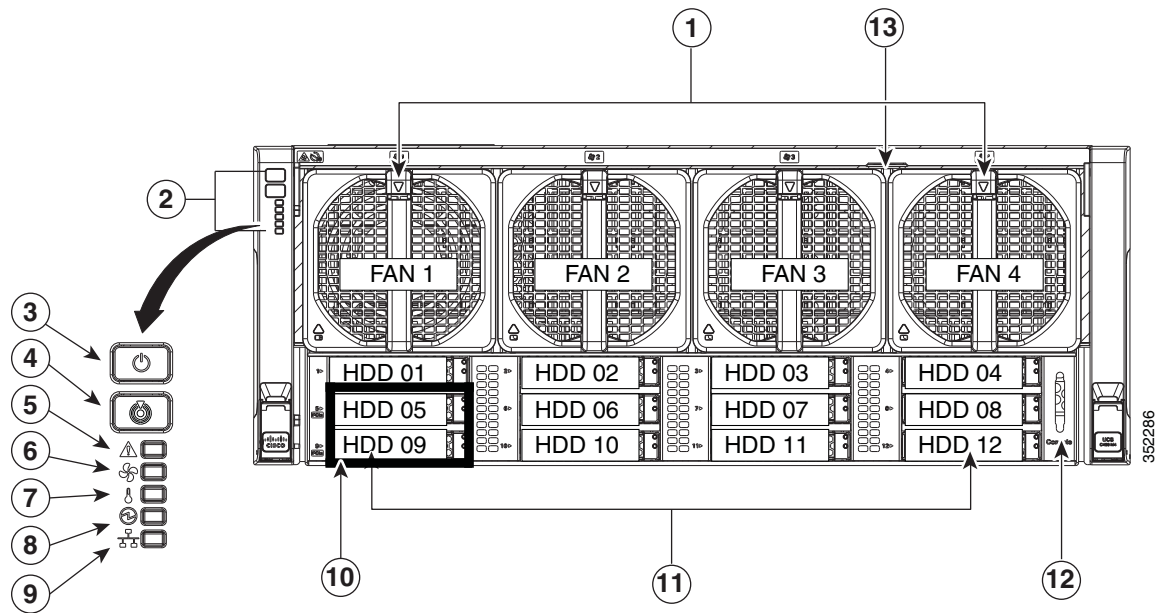
Overview

This chapter provides an overview of the Cisco UCS C460 M4 server.

Front Panel Features

Figure 1-1 shows the front panel features of the server.

Figure 1-1 Front Panel Features

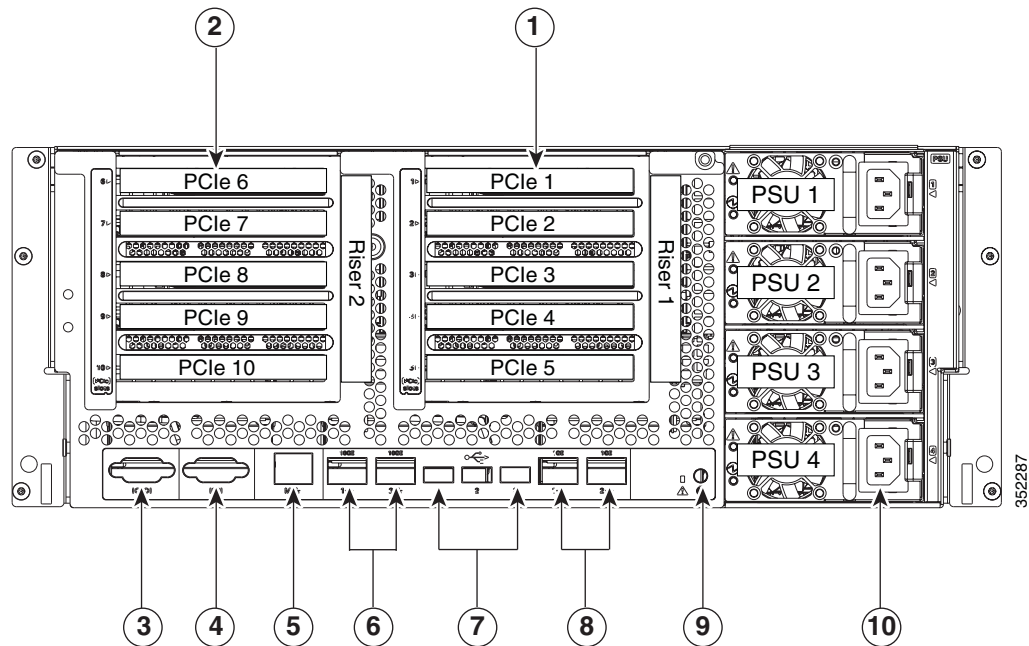


1	Cooling fans (hot-swappable and accessible from the front panel)	8	Power supply status LED
2	Operations panel	9	Network link activity LED
3	Power button/LED	10	Drive bays 5 and 9 support NVMe PCIe solid state drives (SSDs) and SAS/SATA drives.
4	Identification button/LED	11	Drive bays 1–12 support SAS/SATA drives.
5	System status LED	12	KVM console connector (used with a KVM cable that provides two USB, one VGA, and one serial connector)
6	Fan status LED	13	Pull-out asset tag
7	Temperature status LED	–	

Rear Panel Features

Figure 1-2 shows the rear panel features of the server.

Figure 1-2 Rear Panel Features

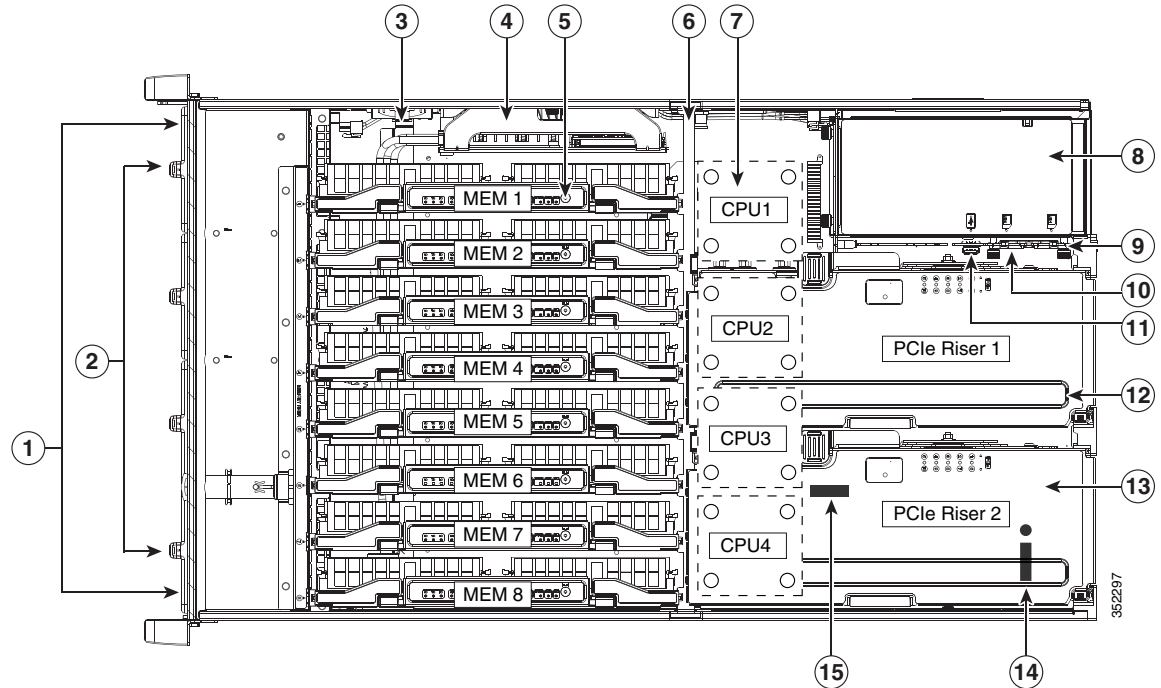


1	PCIe riser 1 (slots 1–5) See PCIe Slots, page 3-51 for slot specifications.	6	10 Gb Ethernet ports (two)
2	PCIe riser 2 (slots 6–10)	7	USB 2.0 ports (three)
3	Serial port (DB-9 connector)	8	1 Gb Ethernet ports (two)
4	VGA video port (DB-15 connector)	9	Rear identification LED/button
5	1 Gb Ethernet dedicated management port M1	10	Power supplies 1–4 (hot-swappable, redundant as 2+2)

Replaceable Component Locations

This section shows the locations of the components that are discussed in this chapter. The view in [Figure 1-3](#) is from the top down with the top cover removed.

Figure 1-3 Replaceable Component Locations



1	Drive bays (up to 12 2.5-inch drives) <ul style="list-style-type: none"> All 12 bays support SAS/SATA drives. Bays 5 and 9 support NVMe PCIe SSD drives and SAS/SATA drives. 	9	Media riser card (includes two bays for Cisco Flexible Flash drives, an internal USB port, and the DIP switches)
2	Fan modules (four, hot-swappable and front-accessible)	10	Cisco Flexible Flash drive (SD card) bays (two on the media riser card)
3	RAID backup unit (supercap power module) mounting bracket on chassis wall	11	Internal, vertical USB 2.0 port (on the media riser card)
4	RAID controller card socket (dedicated internal PCIe socket)	12	PCIe riser 1 (PCIe slots 1–5)
5	Memory risers with DIMMs (up to 8 risers with 12 DIMM sockets each)	13	PCIe riser 2, optional (PCIe slots 6–10)
6	Chassis mid-brace	14	TPM socket and screw hole (on motherboard, not visible under riser in this view)
7	CPUs and heat sinks (two or four) The CPUs and their heat sinks are below the memory risers and PCIe risers.	15	RTC battery (on motherboard, not visible under riser in this view)
8	Power supplies (two or four, redundant as 2+2) Power supplies are hot-swappable.		

Server Features Overview

Table 1-1 lists the features of the server.

Table 1-1 Cisco UCS C460 M4 Server Features


Feature	Description
Chassis	Four rack-unit (4RU) chassis.
Processors	Different versions of CPUs are available: <ul style="list-style-type: none"> Two or four Intel Xeon E7-4800 v2 or E7-8800 EX v2 Series processors. Two or four Intel Xeon E7-4800 v3 or E7-8800 EX v3 Series processors. Two or four Intel Xeon E7-4800 v4 or E7-8800 EX v4 Series processors.
Memory	The server has up to 8 hot-pluggable memory risers that each have 12 DIMM slots, for a total of 96 DIMM slots. Each CPU can control 2 memory risers (up to 24 DIMMs). Memory risers are hot-pluggable. ^{1 2} <div style="margin-top: 10px;">  <p>Note See the release notes for your operating system and your Cisco IMC/BIOS release for details and restrictions on hot-plugging: Cisco IMC Release Notes.</p> </div>
Multi-bit error protection	This server supports multi-bit error protection.
Storage	The server can hold up to 12 drives: <ul style="list-style-type: none"> All 12 drive bays support SAS and SATA drives. Drive bays 5 and 9 also support NVMe PCIe SSD drives that are compliant with the Non-Volatile Memory Express (NVMe) protocol. SAS and SATA drives are hot-swappable ³ ; PCIe drives are hot-pluggable. ⁴
Disk Management	For a list of supported RAID controller options, see RAID Controller Considerations, page C-1 . There is one dedicated motherboard slot for a RAID controller card. Note: At this time, the RAID controller can control only 8 of the 12 drive bays. See Replacing SAS/SATA Hard Drives or Solid State Drives, page 3-14 . Note: The RAID controller cannot control PCIe drives.
RAID Backup	The optional supercap power module (SCPM) mounts to a bracket on the chassis wall.
PCIe I/O	One or two PCIe risers with five horizontal PCIe slots each. See PCIe Slots, page 3-51 for slot specifications.
InfiniBand	The bus slots in this server support the InfiniBand architecture.

Table 1-1 Cisco UCS C460 M4 Server Features (continued)

Feature	Description
Network and management I/O	<p>The server provides these rear panel connectors:</p> <ul style="list-style-type: none"> • One 10/100/1000 dedicated management Ethernet port • Two 1-Gb BASE-T Ethernet ports • Two 10-Gb BASE-T Ethernet ports • One RS-232 serial port (DB-9 connector) • One VGA video port (DB-15 connector) • Three USB 2.0 connectors <p>The server also has one front-panel KVM connector that is used with the included KVM cable, which provides two USB, one VGA, and one serial connector.</p>
WoL	The 1-Gb BASE-T Ethernet LAN ports support the wake-on-LAN (WoL) standard.
Cisco Flexible Flash drive	Up to two Cisco Flexible Flash drives in the SD card slots that are on the media riser.
Internal USB	The server includes one internal USB 2.0 slot on the internal media riser.
Power	Four power supplies, 1400 W each. Hot-swappable and redundant as 2+2.
ACPI	This server supports the advanced configuration and power interface (ACPI) 4.0 standard.
Cooling	Four fan modules, hot-swappable and front-accessible. In addition, there is 1 fan in each power supply.
Baseboard management	Cisco Integrated Management Controller (Cisco IMC) firmware. Depending on your settings, the Cisco IMC can be accessed through the 10/100/1000 dedicated management ports, the 1-Gb LOM ports, or a Cisco virtual interface card.
Video	Resolution up to 1600 x1200, 16 bpp at 60 Hz. Up to 256 MB of video memory.

1. Hot-pluggable = Software shutdown of the component is required before removing while the server is powered on.
2. Memory hot-plug requires an operating system that supports this feature.
3. Hot-swappable = No preconditioning of the component is required before removal while the server is powered on.
4. Hot-pluggable = The component must be shut down in the operating system before removal while the server is powered on.



Installing the Server

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

- [Unpacking and Inspecting the Server, page 2-2](#)
- [Preparing for Server Installation, page 2-3](#)
- [Installing the Server in a Rack, page 2-5](#)
- [Initial Server Setup, page 2-11](#)
- [NIC Modes and NIC Redundancy Settings, page 2-14](#)
- [System BIOS and Cisco IMC Firmware, page 2-15](#)



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

SAVE THESE INSTRUCTIONS

Unpacking and Inspecting the Server


Caution

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

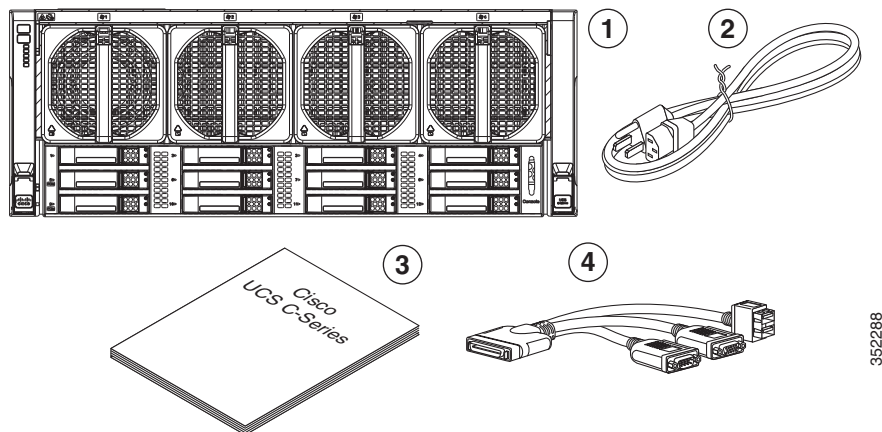

Note

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

To inspect the shipment, follow these steps:

- Step 1** Remove the server from its cardboard container and save all packaging material.
- Step 2** Compare the shipment to the equipment list provided by your customer service representative and [Figure 2-1](#). Verify that you have all items.
- Step 3** Check for damage and report any discrepancies or damage to your customer service representative. Have the following information ready:
- Invoice number of shipper (see the packing slip)
 - Model and serial number of the damaged unit
 - Description of damage
 - Effect of damage on the installation

Figure 2-1 Shipping Box Contents



1	Server	3	Documentation
2	Power cord (up to four)	4	KVM cable

Preparing for Server Installation

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

- [Installation Guidelines, page 2-3](#)
- [Rack Requirements, page 2-4](#)
- [Equipment Requirements, page 2-4](#)
- [Slide Rail Adjustment Range, page 2-4](#)

Installation Guidelines



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

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 servicing 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 [Server Specifications](#).
- Ensure that the cabinet or rack meets the requirements listed in the “[Rack Requirements](#)” section on [page 2-4](#).
- Ensure that the site power meets the power requirements listed in the [Server Specifications](#). If available, you can use an uninterruptible power supply (UPS) to protect against power failures.



Caution

Avoid 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.

Rack Requirements

This section provides the requirements for the standard open racks, assuming an external ambient air temperature range of 41°F to 95°F (5°C to 35°C).

The rack must be of the following type:

- A standard 19-in. (48.3-cm) wide, four-post EIA rack, with mounting posts that conform to English universal hole spacing, per section 1 of ANSI/EIA-310-D-1992.
- The rack post holes can be square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), #12-24 UNC, or #10-32 UNC when you use the supplied slide rails.
- The minimum vertical rack space per server must be four RUs, equal to 7 in. (17.78 cm).

Equipment Requirements

The slide rails supplied by Cisco Systems for this server do not require tools for installation if you install them in a rack that has square 0.38-inch (9.6 mm), round 0.28-inch (7.1 mm), or #12-24 UNC threaded holes.

Slide Rail Adjustment Range

The slide rails for this server have an adjustment range of 26 to 36 inches (660 to 914 mm).

Installing the Server in a Rack

This section contains the following topics:

- [Installing the Slide Rails, page 2-5](#)
- [Installing the Cable Management Arm \(Optional\), page 2-9](#)
- [Reversing the Cable Management Arm \(Optional\), page 2-10](#)



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.

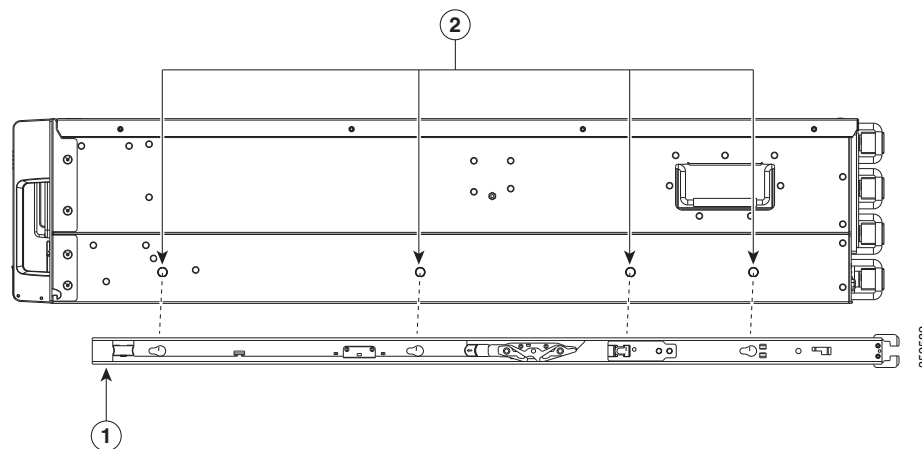
Statement 1006

Installing the Slide Rails

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

- Align an inner rail with one side of the server so that the four keyed slots in the rail align with the four pegs on the side of the server (see [Figure 2-2](#)).
- Set the keyed slots over the pegs, and then slide the rail toward the rear to lock it in place on the pegs.
- Install the second inner rail to the opposite side of the server.

Figure 2-2 Attaching Inner Rail to Side of Server

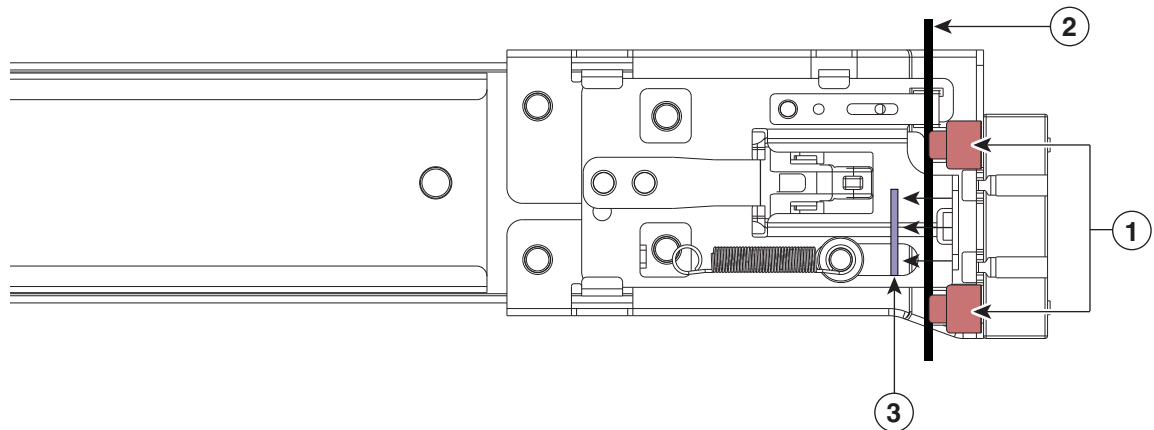


1	Inner rail	2	Pegs on side of server
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Step 2 Open the front securing plate on both slide-rail assemblies. The front end of the slide-rail assembly has a spring-loaded securing plate that must be open before you can insert the mounting pegs into the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

On the *outside* of the assembly, push the green arrow button toward the rear to open the securing plate (see [Figure 2-3](#)).

Figure 2-3 Front Securing Mechanism, Inside of Front End



1	Front mounting pegs	3	Securing plate shown pulled back to open position
2	Rack post		

Step 3 Install the slide rails into the rack:

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

The slide rail front-end wraps around the outside of the rack post and the mounting pegs enter the rack-post holes from the outside-front (see [Figure 2-3](#)).



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

- b. Push the mounting pegs into the rack-post holes.
- c. Press the securing plate release button, marked PUSH. The spring-loaded securing plate closes to lock the pegs in place.
- d. Adjust the slide-rail length, and then push the rear mounting pegs into the corresponding rear rack-post holes. The slide rail must be level front-to-rear.
The rear mounting pegs enter the rear rack-post holes from the inside of the rack post.
- e. Attach the second slide-rail assembly to the opposite side of the rack. Ensure that the two slide-rail assemblies are at the same height with each other and are level front-to-back.
- f. Pull the inner slide rails on each assembly out toward the rack front until they hit the internal stops and lock in place.

Step 4 Insert the server into the slide rails:

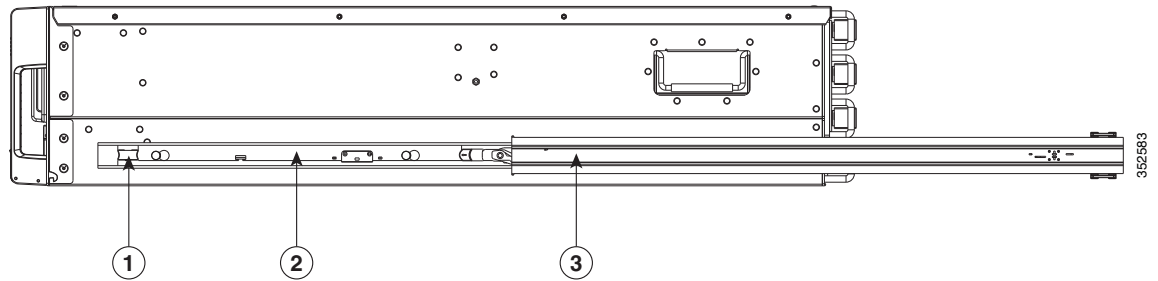


Caution

This server weighs approximately 130 pounds (59 kilograms) when fully loaded with components. We recommend that you use a minimum of two people or a mechanical lift when lifting the server. Attempting this procedure alone could result in personal injury or equipment damage.

- a. Align the rear of the inner rails that are attached to the server sides with the front ends of the empty slide rails on the rack.
- b. Push the server into the slide rails until it stops at the internal stops.
- c. Slide the release clip toward the rear on both inner rails, and then continue pushing the server into the rack until its front slam latches engage with the rack posts.

Figure 2-4 Inner Rail Release Clip

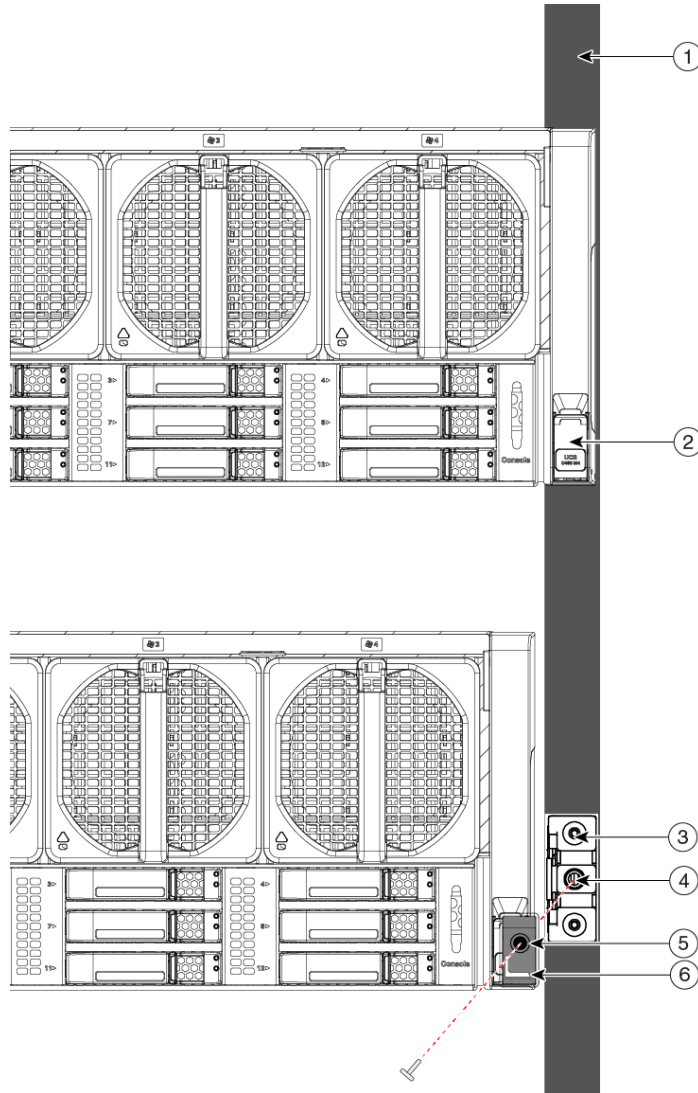


1	Inner rail release clip	3	Outer rail attached to rack post
2	Inner rail attached to server		

Step 5 (Optional) Secure the server in the rack more permanently by using the two screws that are provided with the slide rails. Perform this step if you plan to move the rack with servers installed (see [Figure 2-5](#)).

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

Figure 2-5 Optional Securing Screws



1	Rack post	4	Screw hole on front end of slide rail
2	Slam latch on server (closed)	5	Screw hole on slam latch when open
3	Front end of slide rail on rack post	6	Slam latch on server (open)

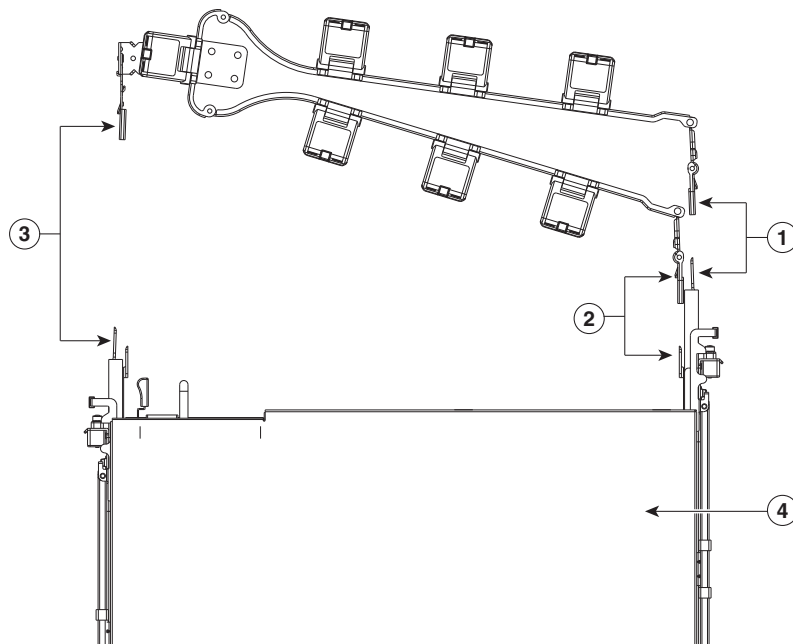
Installing the Cable Management Arm (Optional)



Note The CMA is reversible left to right. To reverse the CMA, see [Reversing the Cable Management Arm \(Optional\)](#), page 2-10 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 (see [Figure 2-6](#)). Slide the tab over the end of the rail until it clicks and locks.
- Step 2** Slide the CMA tab that is closest to the server over the end of the inner rail that is attached to the server (see [Figure 2-6](#)). Slide the tab over the end of the rail until it clicks and locks.
- Step 3** Pull out the width-adjustment slider that is at the opposite end of the CMA assembly until it matches the width of your rack (see [Figure 2-6](#)).
- Step 4** Slide the CMA tab that is at the end of the width-adjustment slider onto the end of the stationary slide rail that is attached to the rack post (see [Figure 2-6](#)). Slide the tab over the end of the rail until it clicks and locks.
- Step 5** Open the hinged flap at the top of each plastic cable guide and route your cables through the cable guides as desired.

Figure 2-6 Attaching the Cable Management Arm to the Rear of the Slide Rails

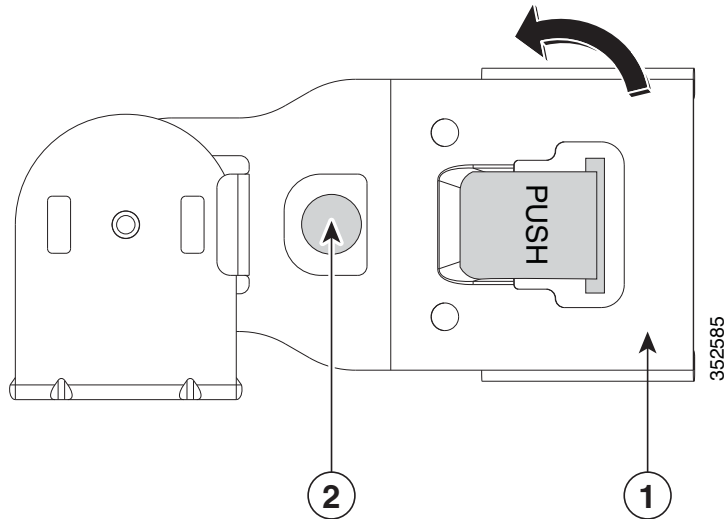


1	CMA tab on arm farthest from server and end of stationary outer slide rail	3	CMA tab on width-adjustment slider and end of stationary outer slide rail
2	CMA tab on arm closest to the server and end of inner slide rail attached to server	4	Rear of server

Reversing the Cable Management Arm (Optional)

- Step 1** Rotate the entire CMA assembly 180 degrees. The plastic cable guides must remain pointing upward.
- Step 2** Flip the tabs at the end of each CMA arm so that they point toward the rear of the 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 2-7 Reversing the CMA



1	CMA tab on end of width-adjustment slider	2	Metal button for rotating
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Initial Server Setup

This section includes the following topics:

- [Connecting and Powering on the Server \(Standalone Mode\)](#), page 2-11
- [NIC Modes and NIC Redundancy Settings](#), page 2-14

Connecting and Powering on the Server (Standalone Mode)

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 a Cisco UCS integration, specific cabling and settings are required. See [Installation for Cisco UCS Integration](#), page E-1.

**Note**

The server is shipped with a default NIC mode called Shared LOM EXT, default NIC redundancy is active-active, and DHCP is enabled. Shared LOM EXT mode enables the 1-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 dedicated management ports to access the Cisco IMC, you can connect to the server and change the NIC mode as described in [Step 4](#) of the following procedure. In that step, you can also change the NIC redundancy and set static IP settings.

Step 1

Attach a supplied power cord to each power supply in your server, and then attach the power cord to a grounded AC power outlet. See the [Power Specifications](#), page A-3 for power specifications.

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

You can verify the power status by looking at the Power Status LED (see [Figure 1-1 on page 1-1](#)):

- Off—No AC power is present in 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.

**Note**

During bootup, the server beeps once for each USB device that is attached to the server. Even if no external USB devices are attached, there is a short beep for each virtual USB device such as a virtual floppy drive, CD/DVD drive, keyboard, or mouse. A beep is also emitted if a USB device is hot-plugged or hot-unplugged during a BIOS power-on self test (POST), or while you are accessing the BIOS Setup utility or the EFI shell.

Step 2

Connect a USB keyboard and VGA monitor by connecting the supplied KVM cable to the KVM connector on the front panel (see [Figure 1-1 on page 1-1](#)).

**Note**

Alternatively, you can use the VGA and USB ports on the rear panel. However, you cannot use the front panel VGA and the rear panel VGA at the same time. If you are connected to one VGA connector and you then connect a video device to the other connector, the first VGA connector is disabled.

Step 3

Connect Ethernet cables to the server ports or card ports that you want to use.

- Step 4** Set NIC mode and NIC redundancy, and choose whether to enable DHCP or set static network settings:
- Press the **Power** button to boot the server. Watch for the prompt to press F8.
 - During bootup, press **F8** when prompted to open the BIOS 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 !, @, #, \$, %, ^, &, *, -, _, =, “
- c. Set the NIC mode to your choice for which ports to use to access the Cisco IMC for server management (see [Figure 1-2 on page 1-2](#) for identification of the ports):
- Shared LOM EXT (default)—This is shared LOM extended mode, which is the factory default. This default includes Active-active NIC redundancy with DHCP enabled. With this mode, the shared LOM and Cisco Card interfaces are both enabled.

In this mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the 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 the Cisco IMC through a Cisco card in standalone mode.

- Dedicated—The 1-Gb dedicated management port is used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- Shared LOM—The 1-Gb Ethernet ports are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- Shared LOM 10G—The 10 Gb Ethernet ports are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- Cisco Card—The ports on an installed Cisco UCS virtual interface card (VIC) are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.

**Note**

Cisco Card NIC mode is currently supported only with a Cisco UCS VIC that is installed in PCIe slot 5 or 10. See also [Special Considerations for Cisco UCS Virtual Interface Cards, page 3-54](#).

- d. Use this utility to change 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.
 - Active-standby—If an active Ethernet port fails, traffic fails over to a standby port.
 - Active-active—All Ethernet ports are used simultaneously. See [NIC Modes and NIC Redundancy Settings, page 2-14](#) for more information.

- e. Choose whether to enable DHCP for dynamic network settings or to enter static network settings.



Note Before you enable DHCP, your DHCP server must be preconfigured 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 that are assigned to the Cisco IMC. The MAC address printed on the label is the beginning of the range of six contiguous MAC addresses.

- f. (Optional) Use this utility to make VLAN settings and to set a default Cisco IMC user password.



Note Changes to the settings take effect after approximately 45 seconds. Press **F5** to refresh the window and wait until the new settings appear before you reboot the server in the next step.

- g. 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 window during bootup.

- Step 5** Use a browser and the IP address of the Cisco IMC to connect to the Cisco IMC Setup Utility. The IP address is based upon the settings that you made in [Step 4](#) (either a static address or the address assigned by your DHCP server).



Note The 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. The links to these documents are in the C-Series documentation roadmap:

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

NIC Modes and NIC Redundancy Settings

NIC Modes

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

- **Shared LOM EXT (default)**—This is shared LOM extended mode, which is the factory default. This default includes Active-active NIC redundancy with DHCP enabled. With this mode, the shared LOM and Cisco Card interfaces are both enabled.

In this mode, DHCP replies are returned to both the shared LOM ports and the Cisco card ports. If the 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 the Cisco IMC through a Cisco card in standalone mode.

- **Dedicated**—The 1-Gb dedicated management port is used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- **Shared LOM**—The 1-Gb Ethernet ports are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- **Shared LOM 10G**—The 10 Gb Ethernet ports are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.
- **Cisco Card**—The ports on an installed Cisco UCS virtual interface card (VIC) are used to access the Cisco IMC. You must select a NIC redundancy and IP setting.

NIC Redundancy

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.
- **Active-standby**—If an active Ethernet port fails, traffic fails over to a standby port.
- **Active-active**—All Ethernet ports are used simultaneously.

The active/active setting uses Mode 5 or Balance-TLB (adaptive transmit load balancing). This channel bonding does not require any special switch support. The outgoing traffic is distributed according to the current load (computed relative to the speed) on each slave. Incoming traffic is received by the current slave. If the receiving slave fails, another slave takes over the MAC address of the failed receiving slave.

System BIOS and Cisco IMC Firmware

This section includes information about the system BIOS and it includes the following topics:

- [Updating the BIOS and Cisco IMC Firmware, page 2-15](#)
- [Accessing the System BIOS, page 2-16](#)

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 match or the server does not boot. The Cisco Host Upgrade Utility (HUU) simultaneously upgrades the BIOS, Cisco IMC, and other firmware to compatible levels.

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

- We recommend that you use the Cisco Host Upgrade Utility to simultaneously upgrade the Cisco IMC, BIOS, LOM, LSI storage controller, and Cisco UCS VIC firmware to compatible levels.

See the *Cisco Host Upgrade Utility Quick Reference Guide* for your firmware level at the documentation roadmap link that is listed in this section.

- You can upgrade the BIOS using the EFI interface or from a Windows or Linux platform.

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

- You can upgrade the Cisco IMC 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 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 documentation roadmap at the following URL:

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

Accessing the System BIOS



Note Details about the BIOS settings are displayed on the BIOS windows.

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 window of the utility.

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

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 window is displayed.

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



Maintaining the Server

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

- [Standalone Server Monitoring and Management Tools, page 3-1](#)
- [Status LEDs and Buttons, page 3-2](#)
- [Preparing for Server Component Installation, page 3-8](#)
- [Replaceable Component Locations, page 3-11](#)
- [Replacing Server Components, page 3-13](#)
- [Service DIP Switches, page 3-74](#)

Standalone Server Monitoring and Management Tools

Cisco Integrated Management Interface

You can monitor the server inventory, health, and system event logs by using the built-in Cisco Integrated Management Controller (Cisco IMC) GUI or CLI interfaces. See the user documentation for your firmware release at the following link: [Cisco IMC configuration guides](#)

Server Configuration Utility

Use the Cisco Server Configuration Utility (SCU) for C-Series servers to simplify the following tasks:

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

You can download the ISO image from Cisco.com. See the user documentation for this utility at the following link: [Server Configuration Utility Guides](#)

Status LEDs and Buttons

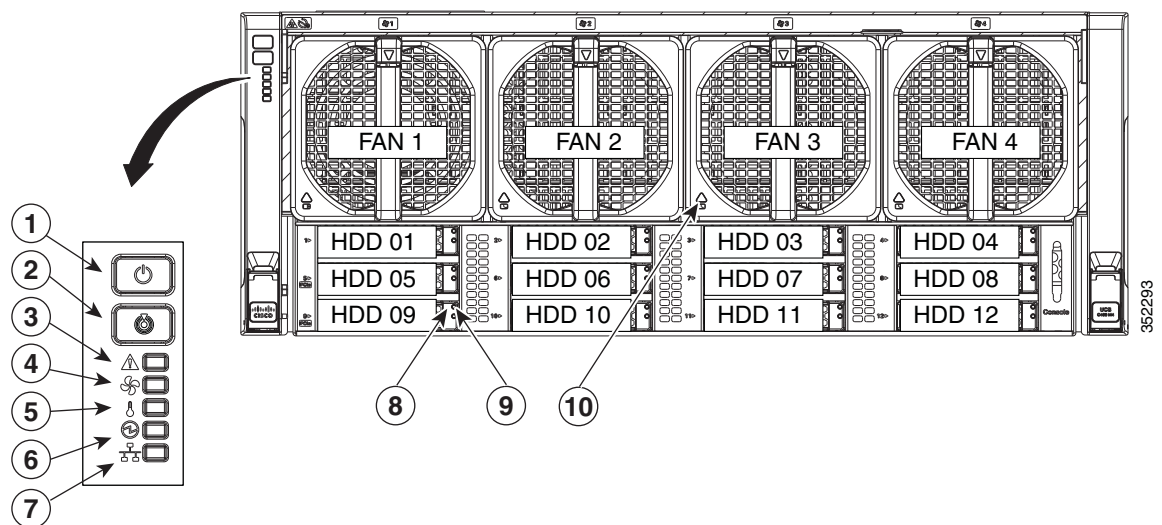
This section describes the location and meaning of LEDs and buttons and includes the following topics:

- [Front-Panel LEDs, page 3-2](#)
- [Rear-Panel LEDs and Buttons, page 3-5](#)
- [Internal Diagnostic LEDs, page 3-7](#)

Front-Panel LEDs

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

Figure 3-1 Front-Panel LEDs



1	Power button and Power status LED	6	Power supply status LED
2	Identification button and LED	7	Network link activity LED
3	System status LED	8	Hard drive fault LED (on each drive tray) Note: NVMe PCIe drive LEDs have slightly different behavior. See the following table for an explanation of LED states.
4	Fan status LED	9	Hard drive activity LED (on each drive tray)
5	Temperature status LED	10	Fan fault LED (on each fan module)

Table 3-1 Front-Panel LEDs States

	LED Name	State
1	Power button/Power status LED	<ul style="list-style-type: none"> • 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 components.
2	Identification	<ul style="list-style-type: none"> • Off—The Identification LED is not in use. • Blue—The Identification LED is activated.
3	System status	<ul style="list-style-type: none"> • Green—The server is running in normal operating condition. • Green, blinking—The server is performing system initialization and memory check. • Amber, steady—The server is in a degraded operational state. For example: <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> – Boot failed. – Fatal CPU and/or bus error is detected. – Server is in an over-temperature condition.
4	Fan status	<ul style="list-style-type: none"> • Green—All fan modules are operating properly. • Amber, steady—One fan module has failed. • Amber, blinking—Critical fault; two or more fan modules have failed.
5	Temperature status	<ul style="list-style-type: none"> • Green—The server is operating at normal temperature. • Amber, steady—One or more temperature sensors have exceeded a warning threshold. • Amber, blinking—One or more temperature sensors have exceeded a critical threshold.
6	Power supply status	<ul style="list-style-type: none"> • 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.
7	Network link activity	<ul style="list-style-type: none"> • Off—The Ethernet link is idle. • Green—One or more Ethernet LOM ports are link-active. • Green, blinking—One or more Ethernet LOM ports are traffic-active.

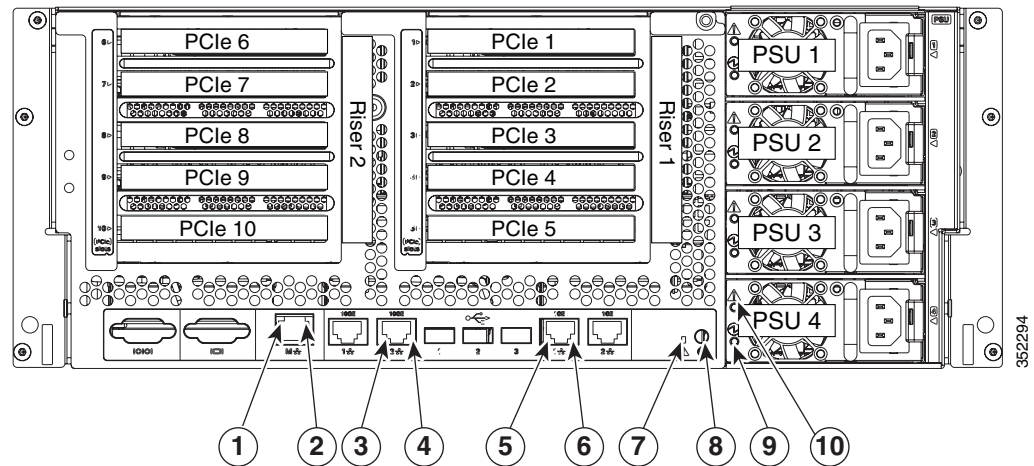
Table 3-1 Front-Panel LEDs States (continued)

	LED Name	State
8 SAS	SAS/SATA drive fault	<ul style="list-style-type: none"> Off—The drive is operating properly. Amber—This drive has failed. Amber, blinking—The device is rebuilding.
9 SAS	SAS/SATA drive activity	<ul style="list-style-type: none"> Off—There is no drive in the drive tray (no access, no fault). Green—The drive is ready. Green, blinking—The drive is reading or writing data.
8 PCIe	NVMe PCIe SSD status	<ul style="list-style-type: none"> Off—The drive is not in use and can be safely removed. Green—The drive is in use and functioning properly. Green, blinking—the driver is initializing following insertion or the driver is unloading following an eject command. Amber—The drive has failed. Amber, blinking—A drive Locate command has been issued in the software.
9 PCIe	NVMe PCIe SSD activity	<ul style="list-style-type: none"> Off—No drive activity. Green, blinking—There is drive activity.
10	Fan fault	<ul style="list-style-type: none"> Off—The fan is operating properly. Amber—The fan has failed.

Rear-Panel LEDs and Buttons

Figure 3-2 shows the rear-panel LEDs and buttons. Table 3-2 on page 3-5 defines the rear-panel LED states.

Figure 3-2 Rear-Panel LEDs and Buttons



1	1 Gb dedicated management Ethernet link speed	6	10-Gb Ethernet link status
2	1 Gb dedicated management Ethernet link status	7	System status LED
3	1-Gb Ethernet link speed	8	Rear identification button and LED
4	1-Gb Ethernet link status	9	Power supply status
5	10-Gb Ethernet link speed	10	Power supply fault

Table 3-2 Rear-Panel LED States

	LED Name	State
1	1-Gb (dedicated management) Ethernet link speed	<ul style="list-style-type: none"> Off—Link speed is 10 Mbps. Amber—Link speed is 100 Mbps. Green—Link speed is 1 Gbps.
2	1-Gb (dedicated management) Ethernet link status	<ul style="list-style-type: none"> Off—No link is present. Green—Link is active. Green, blinking—Traffic is present on the active link.
3	1-Gb Ethernet link speed	<ul style="list-style-type: none"> Off—Link speed is 10 Mbps. Amber—Link speed is 100 Mbps. Green—Link speed is 1 Gbps.

Table 3-2 Rear-Panel LED States (continued)

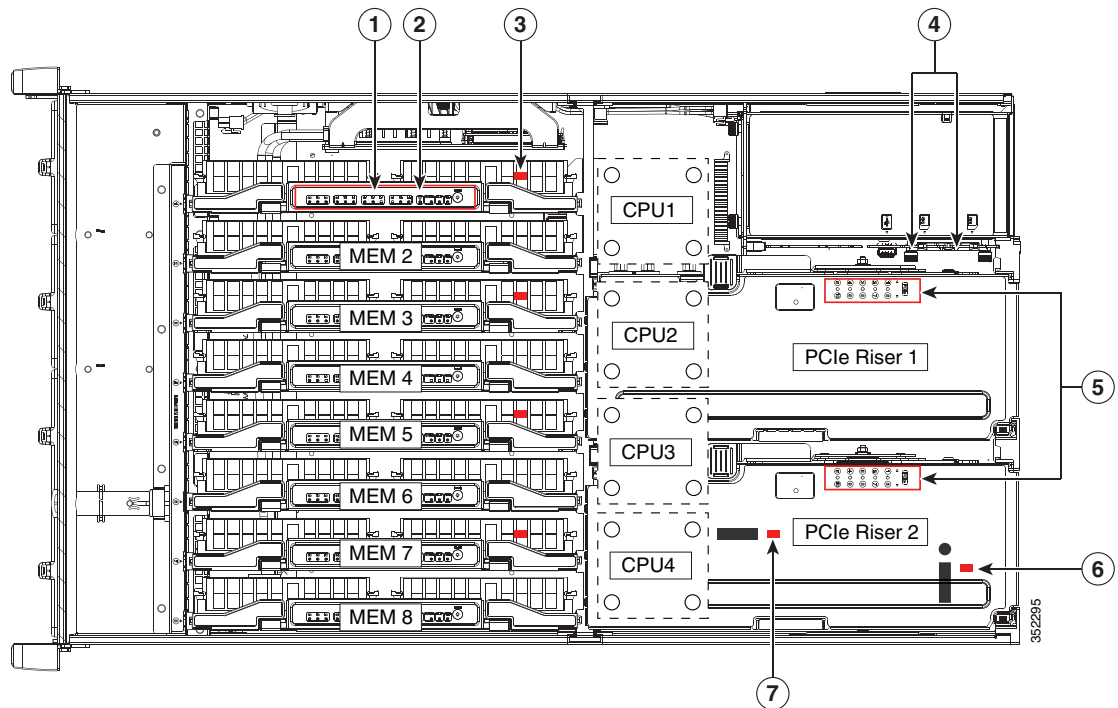
	LED Name	State
4	1-Gb Ethernet link status	<ul style="list-style-type: none"> • Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
5	10-Gb Ethernet link speed	<ul style="list-style-type: none"> • Off—Link speed is 10/100 Mbps. • Amber—Link speed is 1 Gbps. • Green—Link speed is 10 Gbps.
6	10-Gb Ethernet link status	<ul style="list-style-type: none"> • Off—No link is present. • Green—Link is active. • Green, blinking—Traffic is present on the active link.
7	System status	<ul style="list-style-type: none"> • Green—The server is running in normal operating condition. • Green, blinking—The server is performing system initialization and memory check. • Amber, steady—The server is in a degraded operational state. For example: <ul style="list-style-type: none"> – 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: <ul style="list-style-type: none"> – Boot failed. – Fatal CPU and/or bus error is detected. – Server is in an over-temperature condition.
8	Identification	<ul style="list-style-type: none"> • Off—The identification LED is not in use. • Blue—The identification LED is activated.
9	Power supply AC input	<ul style="list-style-type: none"> • Green, steady—The power supply is operating normally and supplying DC power to the server. • Green, blinking—AC power is OK, DC output not enabled (sleep mode).
10	Power supply fault	<ul style="list-style-type: none"> • Off—The power supply is operating normally. • Amber, blinking—An event warning threshold has been reached, but the power supply continues to operate. • Amber, steady—A critical fault threshold has been reached, causing the power supply to shut down.

Internal Diagnostic LEDs

The server is equipped with a supercap voltage source that can activate internal fault LEDs up to 30 minutes after AC power is removed. The server has internal fault LEDs for CPU sockets, DIMM sockets, the motherboard RTC battery, PCIe sockets, TPM socket, and Cisco Flexible Flash drive bays.

To use these LEDs to identify a failed component, press the front or rear identification button with AC power removed (see [Figure 3-1](#) or [Figure 3-2](#) for the identification button location). See [Figure 3-3](#) for the locations of these internal LEDs.

Figure 3-3 Internal Diagnostic LED Locations



1	DIMM fault LEDs on each memory riser (one LED for each DIMM socket)	5	PCIe card fault LEDs on each PCIe riser (one LED for each PCIe socket)
2	Memory riser fault LED on each memory riser	6	TPM fault LED on motherboard (CR9)
3	CPU fault LEDs on motherboard (directly in front of each CPU socket): <ul style="list-style-type: none"> • CPU1 LED = CR4 • CPU2 LED = CR5 • CPU3 LED = CR6 • CPU4 LED = CR7 	7	RTC battery fault LED on motherboard (CR8)
4	Cisco Flexible Flash Drive fault LEDs on the media riser <ul style="list-style-type: none"> • Slot 1 = CR11 (on media riser) • Slot 2 = CR9 (on media riser) 		

Table 3-3 Internal Diagnostic LED States

LED Name	State
Internal diagnostic LEDs (all)	<ul style="list-style-type: none"> • Off—Component is functioning normally. • Amber—Component has failed.

Preparing for Server Component Installation

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

- [Required Equipment](#), page 3-8
- [Shutting Down and Powering Off the Server](#), page 3-8
- [Removing or Replacing the Front Bezel \(Optional\)](#), page 3-9
- [Removing or Replacing the Server Top Cover](#), page 3-10

Required Equipment

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

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

Shutting Down and Powering Off the Server

The server can run in two power modes:

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

You can invoke a graceful shutdown or a hard shutdown by using either the Cisco Integrated Management Controller (Cisco IMC) interface or the Power button on the front panel.

-
- Step 1** Check the color of the Power Status LED (see the “[Front-Panel LEDs](#)” section on page 3-2).
- Green—The server is in main power mode and must be shut down before it can be safely powered off. Go to [Step 2](#).
 - Amber—The server is already in standby mode and can be safely powered off. Go to [Step 3](#).
- Step 2** Invoke either a graceful shutdown or a hard shutdown:



Caution

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

- Graceful shutdown—Press and release the **Power** button. The operating system performs a graceful shutdown and the server goes to standby mode, which is indicated by an amber Power Status LED.
 - Emergency shutdown—Press and hold the **Power** button for 4 seconds to force the main power off and immediately enter standby mode.
- Step 3** Disconnect the power cords from the power supplies in your server to completely remove AC power and power off the server.
-

Removing or Replacing the Front Bezel (Optional)

You must remove the optional front bezel to access the hot-swappable drives and fan modules.

Step 1 Remove the front bezel:

- a. If the bezel is locked, use the key to unlock it.
- b. Slide the finger latch that is on the left side upward, and then swing the left edge of the bezel away from the server.
- c. Lift the bezel from the server and set it aside.

Step 2 Replace the front bezel:

- a. Align the bezel with the front of the server.
 - b. Set the three pegs on the right-hand edge of the bezel into the three indentations in the server.
 - c. Swing the left side of the bezel inward until the latch on the bezel engages with the server.
-

Removing or Replacing the Server Top Cover


Tip

You do not have to remove the cover to replace fan modules, hard drives, or power supplies.

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. See [Figure 3-4](#).
- b. Lift on the end of the latch with 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.

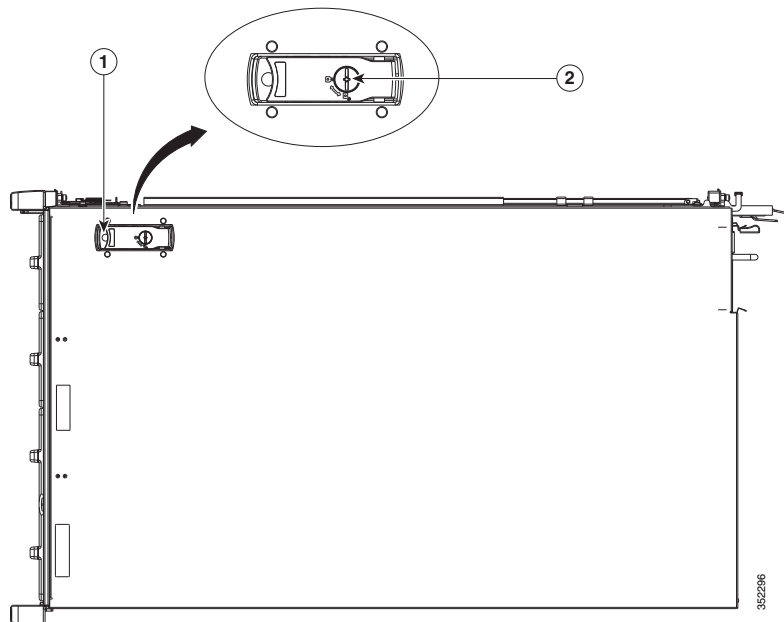
Step 2 Replace the top cover:

Note

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

- 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 chassis front panel. The opening in the latch should fit over the peg that sticks up from the chassis.
- b. Press the cover latch down to the closed position. The cover is pushed forward to the closed position as you push down the latch.
- c. If desired, lock the latch by using a screwdriver to turn the lock 90-degrees clockwise.

Figure 3-4 Removing the Top Cover

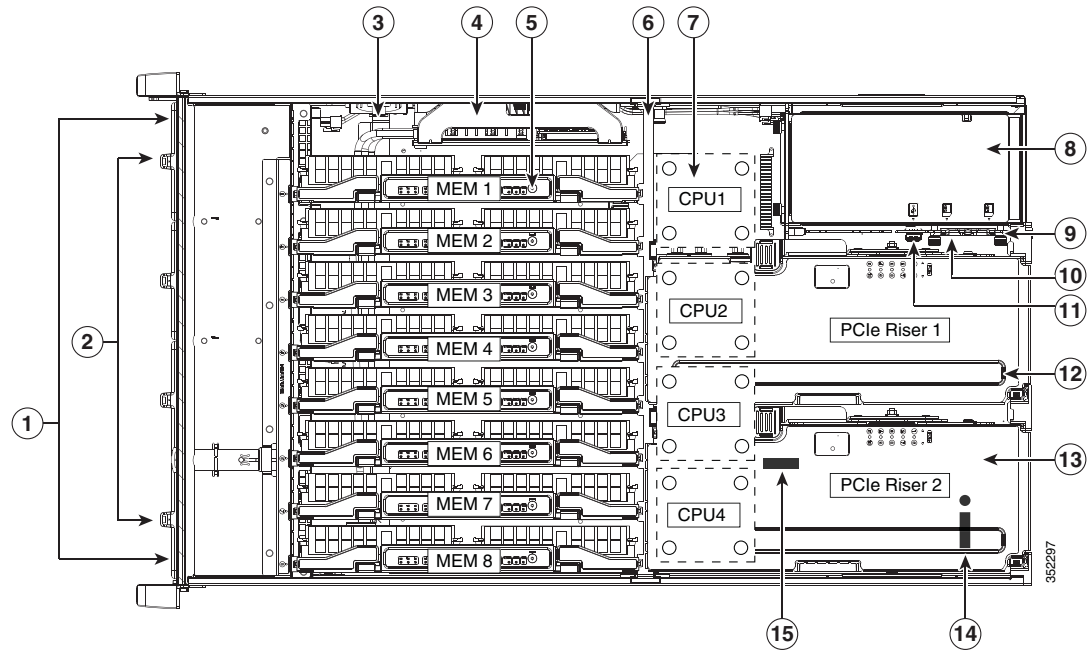


1	Cover latch	2	Cover latch lock
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Replaceable Component Locations

This section shows the locations of the components that are discussed in this chapter. The view in [Figure 3-5](#) is from the top down with the top cover removed.

Figure 3-5 Replaceable Component Locations



1	Drive bays (up to 12 2.5-inch drives) <ul style="list-style-type: none"> All 12 bays support SAS/SATA drives. Bays 5 and 9 support NVMe PCIe SSD drives and SAS/SATA drives. 	9	Media riser card (includes two bays for Cisco Flexible Flash drives, an internal USB port, and the DIP switches)
2	Fan modules (four, hot-swappable and front-accessible)	10	Cisco Flexible Flash drive (SD card) bays (two on the media riser card)
3	RAID backup unit (supercap power module) mounting bracket on the chassis wall	11	Internal, vertical USB 2.0 port (on the media riser card)
4	RAID controller card socket (dedicated internal PCIe socket)	12	PCIe riser 1 (PCIe slots 1–5)
5	Memory risers with DIMMs (8 risers with 12 DIMM sockets each)	13	PCIe riser 2 (PCIe slots 6–10)
6	Chassis mid-brace	14	TPM socket and screw hole (on motherboard, not visible under riser in this view)
7	CPUs and heat sinks (two or four) The CPUs and their heat sinks are below the memory risers and PCIe risers.	15	RTC battery (on motherboard, not visible under riser in this view)
8	Power supplies (two or four, redundant as 2+2) Power supplies are hot-swappable.		

Hot-Swap or Hot-Plug Replacement

Certain components can be removed and replaced without powering off and removing AC power from the server. This type of replacement has two varieties: hot-swap and hot-plug.

- Hot-swap replacement—You do not have to precondition or shut down the component in the software before you remove it for the following:
 - SAS/SATA drives
 - Cooling fan modules
 - Power supplies (when 2+2 redundant)
- Hot-plug replacement—You must take the component offline before removing it and bring it back online before using it for the following:
 - Memory risers (requires operating system support)
 - NVMe PCIe SSD drives

**Note**

See the release notes for your operating system and your Cisco IMC/BIOS release for details and restrictions on hot-plugging: [Cisco IMC Release Notes](#).

Replacing Server Components

**Warning**

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

Statement 1029

**Caution**

When handling server components, wear an ESD strap to avoid electrostatic damage.

**Caution**

This server weighs approximately 130 pounds (59 kilograms) when fully loaded with components. We recommend that you use a minimum of two people when lifting the server. Attempting to lift the server alone could result in personal injury or equipment damage.

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

- [Replacing SAS/SATA Hard Drives or Solid State Drives, page 3-14](#)
- [Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD, page 3-19](#)
- [Replacing an HHHL Form Factor NVMe PCIe SSD, page 3-22](#)
- [Replacing Fan Modules, page 3-25](#)
- [Replacing Memory Risers, page 3-26](#)
- [Replacing DIMMs, page 3-29](#)
- [Replacing CPUs and Heat Sinks, page 3-35](#)
- [Replacing a RAID Controller Card, page 3-43](#)
- [Replacing a Modular RAID Controller Transportable Memory Module \(TMM\), page 3-44](#)
- [Replacing the Supercap Power Module \(RAID Backup Unit\), page 3-47](#)
- [Replacing a PCIe Riser, page 3-49](#)
- [Replacing a PCIe Card, page 3-51](#)
- [Replacing an NVIDIA GPU Card, page 3-61](#)
- [Replacing the Motherboard RTC Battery, page 3-61](#)
- [Replacing a Media Riser Card, page 3-63](#)
- [Replacing a Cisco Flexible Flash Drive, page 3-65](#)
- [Replacing an Internal USB Drive, page 3-67](#)
- [Installing and Enabling a Trusted Platform Module, page 3-68](#)
- [Replacing Power Supplies, page 3-73](#)

Replacing SAS/SATA Hard Drives or Solid State Drives

This section includes the following topics:

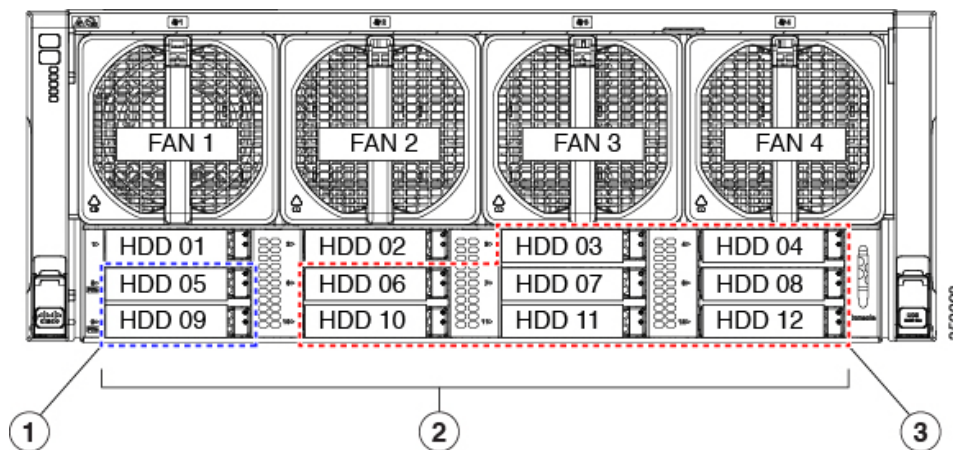
- [SAS/SATA Drive Population Guidelines](#), page 3-14
- [Replacing a SAS or SATA Drive](#), page 3-17

SAS/SATA Drive Population Guidelines

The server can hold up to 12 SAS/SATA hard drives or solid state drives (SSDs). [Figure 3-6](#) shows the drive bays and the drive bay numbering.

All drive bays support SAS and SATA drives. Drive bays 5 and 9 also support NVMe PCIe SSDs.

Figure 3-6 Drive Bays and Drive Bay Numbering



1	Drive bays 5 and 9 These two bays support NVMe PCIe SSDs and SAS/SATA drives.	3 Drive bays 3, 4, 6, 7, 8, 10, 11, and 12 When using the Cisco UCS 12G SAS Modular 8-Port RAID Controller (UCSC-MRAID12G), the 8 SAS/SATA drives must be in these 8 drive bays.
2	Drive bays 1–12 All bays support SAS and SATA drives. When using the Cisco UCS 12G SAS Modular 12-Port RAID Controller (UCSC-MRAIDC460), you can control all 12 SAS/SATA drives.	

Observe these drive population guidelines for optimum performance:

- When using the Cisco UCS 12G SAS Modular **12-Port** RAID Controller (UCSC-MRAIDC460), you can control all 12 SAS/SATA drives. You can populate all 12 drive bays with SAS/SATA drives.
- When using the Cisco UCS 12G SAS Modular **8-Port** RAID Controller (UCSC-MRAID12G), the eight SAS/SATA drives must be in bays 3, 4, 6, 7, 8, 10, 11, and 12, as shown in [Figure 3-6](#).
See [RAID Controller Cabling, page C-6](#) for information about cabling for specific bays and how those bays are grouped.
- Keep an empty drive blanking tray in any unused slots to ensure proper airflow.
- You can mix hard drives and SSDs in the same server. However, you cannot configure a logical volume (virtual drive) that contains a mix of hard drives and SSDs. When you create a logical volume, it must contain all hard drives or all SSDs.

4K Sector Format Drives Considerations

- You must boot 4K sector format drives in UEFI mode, not legacy mode. See [Setting Up Booting in UEFI Mode in the BIOS Setup Utility, page 3-16](#) or [Setting Up Booting in UEFI Mode in the Cisco IMC GUI, page 3-16](#).
- Do not configure 4K sector format and 512-byte sector format drives as part of the same RAID volume.
- Operating system support on 4K sector drives is as follows: Windows: Win2012 and Win2012R2; Linux: RHEL 6.5, 6.6, 6.7, 7.0, 7.2; SLES 11 SP3, and SLES 12. ESXi/Vmware is not supported.

Setting Up Booting in UEFI Mode in the BIOS Setup Utility

- Step 1** Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
 - Step 2** Go to the **Boot Options** tab.
 - Step 3** Set **UEFI Boot Options** to **Enabled**.
 - Step 4** Under **Boot Option Priorities**, set your OS installation media (such as a virtual DVD) as your **Boot Option #1**.
 - Step 5** Go to the **Advanced** tab.
 - Step 6** Select **LOM and PCIe Slot Configuration**.
 - Step 7** Set the **PCIe Slot ID: HBA Option ROM** to **UEFI Only**.
 - Step 8** Press **F10** to save changes and exit the BIOS setup utility. Allow the 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 Booting in UEFI Mode 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 SAS or SATA Drive

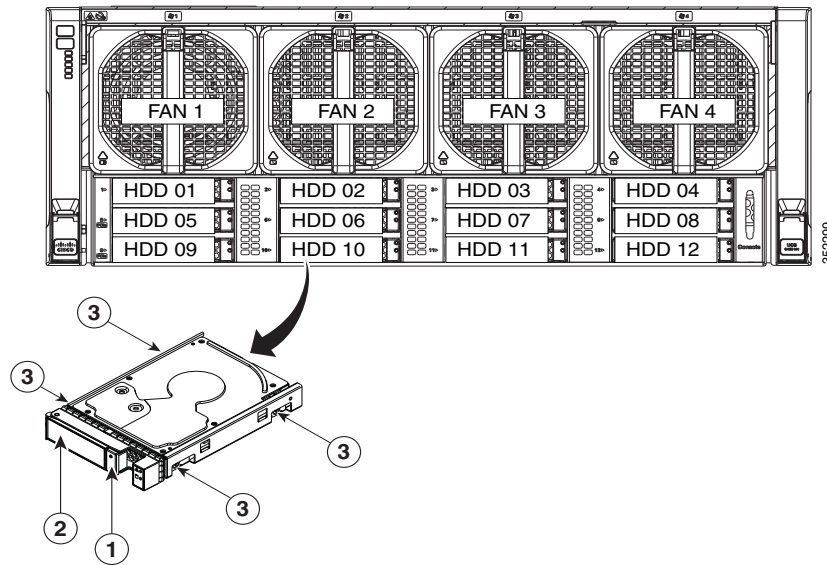
**Tip**

You do not have to shut down the server or drive to replace SAS/SATA hard drives or SSDs because they are hot-swappable. To replace an NVMe PCIe SSD drive, which must be shut down before removal, see [Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD, page 3-19](#)

For information about drive tray LEDs, see [Front-Panel LEDs, page 3-2](#).

-
- Step 1** Remove the drive that you are replacing or remove a blank tray from an empty bay:
- Remove the front bezel from the server, if one is attached. See [Removing or Replacing the Front Bezel \(Optional\), page 3-9](#).
 - Press the release button on the face of the drive tray. See [Figure 3-7](#).
 - Grasp and open the ejector lever and then pull the drive tray out of the slot.
 - 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:
- Place a new drive in the empty drive tray and replace the four drive tray screws.
 - With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
 - Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.
 - Replace the front bezel to the server, if you removed one.

Figure 3-7 Removing Drives



1	Release button	3	Drive tray securing screws (4)
2	Ejector lever		

Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD

This section is for replacing 2.5-inch small form-factor (SFF) NVMe PCIe SSDs in front-panel drive bays. To replace HHHL form-factor NVMe PCIe SSDs in the PCIe slots, see [Replacing an HHHL Form Factor NVMe PCIe SSD](#), page 3-22.

- [2.5-Inch Form-Factor NVMe PCIe SSD Population Guidelines](#), page 3-19
- [2.5-Inch Form-Factor NVMe PCIe SSD Requirements and Restrictions](#), page 3-19
- [Enabling Hot-Plug Support in the System BIOS](#), page 3-20
- [Replacing an NVMe SFF 2.5-Inch PCIe SSD](#), page 3-21

2.5-Inch Form-Factor NVMe PCIe SSD Population Guidelines

Populate NVMe SFF 2.5-inch SSDs only in bays 5 and 9 (see [Figure 3-6](#)).

- Four-CPU systems—You can populate bays 5 and 9.
- Two-CPU systems—In a two-CPU system, bay 9 not available. Therefore, you can populate only bay 5.

Number of CPUs in System	NVMe SFF 2.5-Inch SSD Drive Bays Supported
4	Bays 5 and 9
2	Bay 5 only

2.5-Inch Form-Factor NVMe PCIe SSD Requirements and Restrictions

Observe these restrictions for NVMe SFF 2.5-inch SSDs:

- You can boot (UEFI only) from an NVMe SFF 2.5-inch SSD only with Cisco IMC 2.0(13) or later server firmware. For Cisco UCS Manager-integrated servers, booting is supported only with Cisco UCS Manager 3.1(2) or later software.
- NVMe SFF 2.5-inch SSDs support booting only in UEFI mode. Legacy boot is not supported.
- You cannot control an NVMe SFF 2.5-inch SSD with a SAS RAID controller because NVMe SSDs communicate with the server via the PCIe bus.
- You can combine NVMe SFF 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 10 HHHL form-factor HGST SSDs is an invalid configuration. A valid configuration is two *HGST* NVMe SFF 2.5-inch SSDs and 10 *HGST* HHHL form-factor SSDs.
- UEFI boot is supported in the five operating systems listed in [Table 3-4](#), when your server is running Cisco IMC 2.0(13) or later firmware. Refer to this table for OS-informed hot-insertion and hot-removal support by operating system:

Table 3-4 2.5-Inch Form Factor NVMe SSD Hot Insertion/Hot Removal Support By OS

NVMe SSD	NVMe SSD Firmware Minimum	Win 2012	Win 2012R	RHEL 7.2	SLES 12 SP1	ESXi 6.2
Intel UCS-PCI25-8003	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-16003	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-40010	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
Intel UCS-PCI25-80010	8DV1CB06	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-38TB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-16TB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported
HGST UCS-SDHPCIE-800GB	KMCCP105	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Hot insertion Hot removal	Not supported

Enabling Hot-Plug Support in the System BIOS

In Cisco IMC 2.0(13) and later, 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. See the following procedures.

Enabling Hot-Plug Support in the BIOS Setup Utility

-
- Step 1** Enter the BIOS setup utility by pressing the **F2** key when prompted during bootup.
 - Step 2** Locate the setting: **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 in the Cisco IMC GUI

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

Replacing an NVMe SFF 2.5-Inch PCIe SSD



Note OS-surprise removal is not supported. OS-informed hot-insertion and hot-removal are supported only with Cisco IMC release 2.0(13) and later and they depend on your OS version. See [Table 3-4](#) for support by OS.



Note OS-informed hot-insertion and hot-removal must be enabled in the system BIOS. See [Enabling Hot-Plug Support in the System BIOS](#), page 3-20.

For information about drive tray LEDs, see [Front-Panel LEDs](#), page 3-2.

- Step 1** Shut down the NVMe SFF 2.5-inch SSD to initiate an OS-informed removal. Use your operating system interface to shut down the drive, and then observe the drive-tray status 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.
- Step 2** Remove the SSD that you are replacing:
- a. Remove the front bezel from the server, if one is attached. See [Removing or Replacing the Front Bezel \(Optional\)](#), page 3-9.
 - b. Press the release button on the face of the drive tray. See [Figure 3-7](#).
 - c. Grasp and open the ejector lever and then pull the drive tray out of the slot.
 - d. 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 3** Install a new SSD:
- a. Place a new drive in the empty drive tray and replace the four drive tray screws.
 - b. With the ejector lever on the drive tray open, insert the drive tray into the empty drive bay.
 - c. Push the tray into the slot until it touches the backplane, and then close the ejector lever to lock the drive in place.
- Step 4** Observe the drive-tray status LED and wait until it returns to solid green before accessing the SSD:
- Off—The SSD is not in use.
 - Green, blinking—the driver is initializing following hot-plug insertion.
 - Green—The SSD is in use and functioning properly.
- Step 5** Replace the front bezel to the server, if you removed one.

Replacing an HHHL Form Factor NVMe PCIe SSD

The half-height, half-length- (HHHL-) form-factor NVMe PCIe SSDs install to the PCIe riser slots in the same way as a PCIe card. To install a 2.5-inch form-factor NVMe SSD in the front-panel drive bays, see [Replacing a 2.5-Inch Form-Factor NVMe PCIe SSD, page 3-19](#).

- [HHHL Form-Factor NVMe SSD Population Guidelines, page 3-22](#)
- [HHHL-Format NVMe SSD Requirements and Restrictions, page 3-22](#)
- [Replacing an HHHL Form-Factor NVMe PCIe SSD, page 3-22](#)

HHHL Form-Factor NVMe SSD Population Guidelines

Observe the following population guidelines when installing HHHL form-factor NVMe SSDs:

- Four-CPU systems—You can populate up to 10 HHHL form-factor SSDs, using PCIe slots 1–10.
- Two-CPU systems—In a two-CPU system, PCIe riser 2, which has slots 6 - 10 is not available. Therefore, the maximum number of HHHL form-factor SSDs you can populate is 5, in PCIe slots 1–5.

Number of CPUs in System	PCIe Slots Supported
4	1 – 10
2	1 – 5

HHHL-Format NVMe SSD Requirements and Restrictions

Observe these restrictions for NVMe PCIe SSDs:

- You cannot boot from an HHHL form-factor NVMe PCIe SSD.
- You cannot control an HHHL form-factor SSD with a SAS RAID controller because NVMe SSDs communicate with the server via the PCIe bus.
- You can combine NVMe SFF 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 10 HHHL form-factor HGST SSDs is an invalid configuration. A valid configuration is two *HGST* NVMe SFF 2.5-inch SSDs and 10 *HGST* HHHL form-factor SSDs.

Replacing an HHHL Form-Factor NVMe PCIe SSD



Note

In a two-CPU server, PCIe riser 2 (PCIe slots 6–10) is not available.

Step 1 Shut down and power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).

Step 2 Slide the server out the front of the rack far enough so that you can remove the top cover.



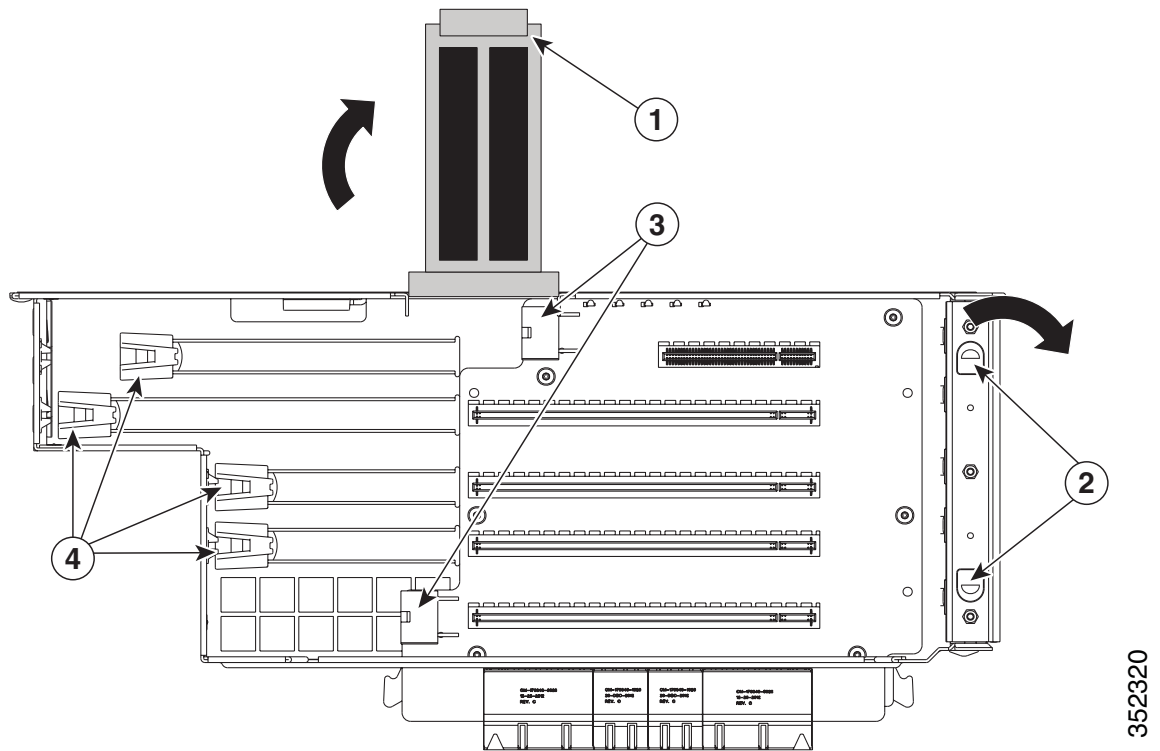
Caution

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

Step 3 Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

- Step 4** Remove the PCIe riser from the server:
- Lift on the blue plastic retaining latch at the top of the PCIe riser until the latch is vertical (see [Figure 3-8](#)). The lever action disengages the riser's connector from the motherboard socket.
 - Lift straight up on both ends of the PCIe riser and remove it from the server. Set the riser on an antistatic surface.
 - Open the hinged blue plastic card cover (see [Figure 3-8](#)).
 - Open the hinged card-tab retainer (see [Figure 3-8](#)). Pinch the two blue finger grips toward the center and swing open the retainer.
- Step 5** Pull evenly on both corners of the HHHL form-factor SSD to remove it from the socket on the PCIe riser.
- Step 6** Install an HHHL form-factor SSD to the PCIe riser:
- Align the new HHHL form-factor SSD with the empty socket on the PCIe riser assembly.
 - Push down evenly on both ends of the card until it is fully seated in the socket.
 - Close the hinged card-tab retainer and press it down until it clicks and locks in place.
 - Close the hinged blue plastic card cover.
- Step 7** Install the PCIe riser:
- Align the riser so that its connector is over the motherboard socket.
 - With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until its connector makes contact with the motherboard socket.
 - Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.
- Step 8** Replace the top cover.
- Step 9** Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-8 PCIe Riser Card Retention Features



1	Hinged blue plastic card cover	3	Power connectors
2	Hinged card-tab retainer finger grips	4	Adjustable card braces

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Replacing Fan Modules

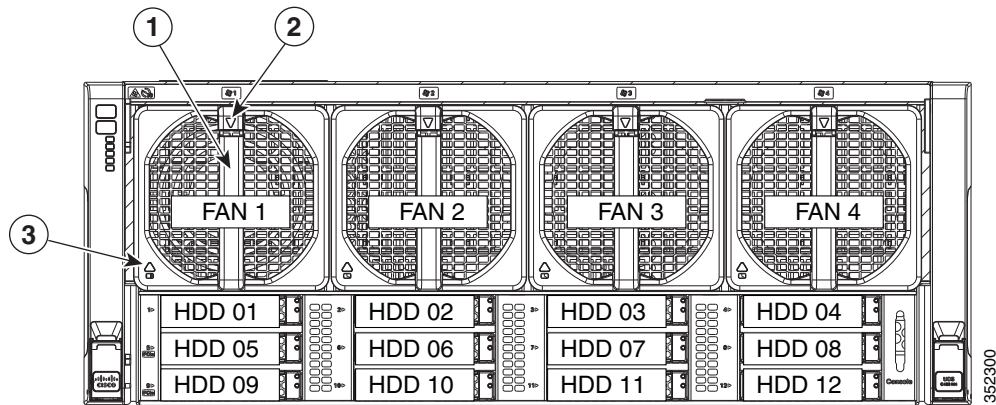
The four fan modules in the server are numbered as shown in [Figure 3-9](#). You do not have to shut down or power off the server to replace fan modules because they are hot-swappable.


Tip

Each fan module has a fault LED on its face that lights amber if the fan module fails.

- Step 1** Remove the fan module that you are replacing (see [Figure 3-9](#)):
- Remove the front bezel from the server, if one is attached. See [Removing or Replacing the Front Bezel \(Optional\)](#), page 3-9.
 - Grasp the handle on the front of the fan module while depressing the release button with your thumb.
 - Pull the fan module straight out of the bay.
- Step 2** Install a new fan module:
- Grasp the fan module by its handle and align it with the empty fan bay.
 - Push the fan module straight into the bay until the release button clicks to lock the fan module in place.
 - Replace the front bezel to the server, if you removed one.

Figure 3-9 Fan Modules



1	Fan module handle	2	Fan module release button
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Replacing Memory Risers



Caution

DDR4 memory risers are available for use with DDR4 DIMMs and EX v3 or v4 CPUs. You must upgrade the firmware before you upgrade the hardware. See [Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35](#).

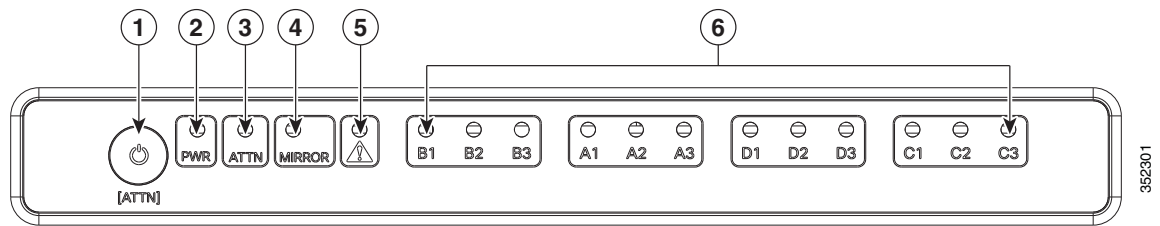
The 8 memory risers connect to motherboard sockets and each riser provides 12 DIMM slots. Each riser has two memory buffers, each with two DDR channels of three DIMMs. The memory riser is hot-pluggable when you use the Attention button to take the riser offline, as described in the procedure in this section. (This feature is available only on supported operating systems. Some operating systems support only hot-add, but not hot-remove.)



Note

See the release notes for your operating system and your Cisco IMC/BIOS release for details and restrictions on hot-plugging: [Cisco IMC Release Notes](#).

Figure 3-10 Memory Riser LEDs (Top View)



1	Attention button (used for hot-plugging)	4	Mirror activity LED (lights when memory mirroring is enabled in the BIOS)
2	Power LED (indicates when the riser has power)	5	Memory riser fault LED (indicates when the memory riser has failed)
3	Attention LED (indicates when hot-plugging is safe)	6	DIMM fault LEDs (indicate which DIMM on the riser has failed)

Memory Riser Population Guidelines

Use the following guidelines when populating memory risers:

- Each CPU supports two memory risers.
- The minimum memory riser configuration is one riser installed on CPU1 or CPU2, with at least one DIMM. The minimum DIMM capacity must meet the requirements of the OS installed.
- If not installing all memory risers, populate the even-numbered riser slots first to ensure optimum CPU airflow.

Identifying a Faulty Memory Riser or DIMM

The memory riser includes fault LEDs on its top panel (see [Figure 3-10](#)):

- If the memory riser fault LED is lit, replace the memory riser as described in [Replacing a Memory Riser, page 3-27](#).
- If one or more of the numbered DIMM fault LEDs are lit, replace the corresponding DIMMs on the riser as described in [Replacing DIMMs, page 3-29](#).

Replacing a Memory Riser

The qualified and supported part numbers for this component are subject to change over time. For the most up-to-date list of replaceable components, see the following URL and then scroll to *Technical Specifications*:

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

-
- Step 1** Remove the memory riser that you are replacing (see [Figure 3-11](#)):
- a. Slide the server out the front of the rack far enough so that you can remove the top cover.
 - b. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

**Caution**

Memory risers are hot-pluggable, which means that you do not have to remove power from the server, but you must shut down the riser before removing it as described in the following steps.

- c. Press the attention button on the top of the memory riser to shut down the riser in the BIOS (see [Figure 3-10](#)).
- d. Wait until the attention LED (ATTN) and the power LED (PWR) turn off.
- e. Press both green riser-latch release buttons on the top of the riser (see [Figure 3-11](#)).
- f. Lift on both riser latches at the same time. The lever action disengages the riser's connector from the motherboard socket.
- g. Grasp the open retaining latches and lift the memory riser straight up and out of the server.
- h. To remove DIMMs from the memory riser, use the instructions in [Replacing DIMMs, page 3-29](#).

- Step 2** Install a new memory riser:

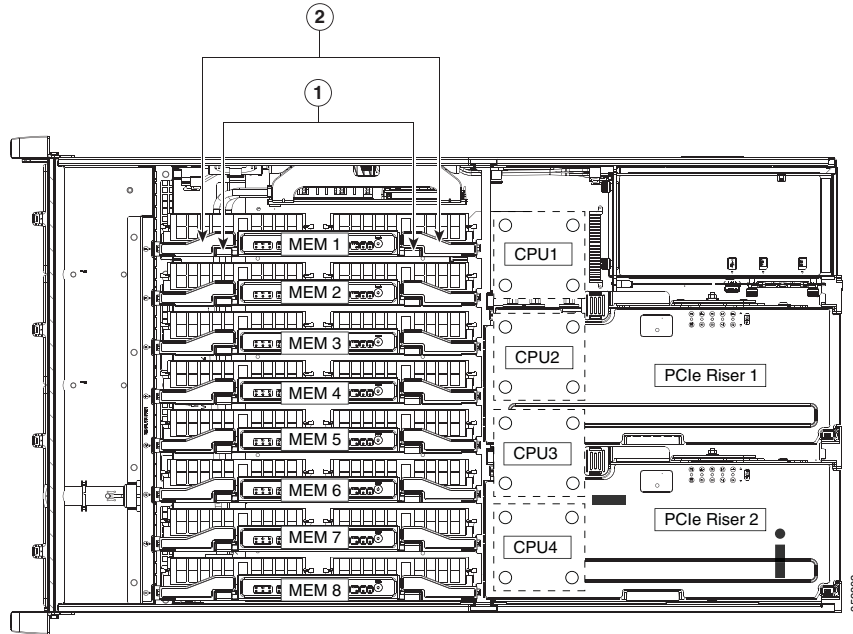
**Note**

When you install more than one memory riser, you must install and activate one riser at a time before you install and activate the next riser. That is, do not attempt to install all risers and then activate them.

- a. To install DIMMs to the new memory riser, use the instructions in [Replacing DIMMs, page 3-29](#).
- b. Ensure that the riser retaining latches are in the open position.
- c. Align the riser with the empty motherboard socket and the card guides at each end of the riser (on the chassis mid-brace and the rear of the fan cage).
- d. Lower the riser until it makes contact with the motherboard socket.
- e. Close each retaining latch at the same time to fully engage the riser with the motherboard socket.
- f. Press the attention button on the top of the memory riser (see [Figure 3-10](#)), and then wait until the attention LED (ATTN) turns off and the power LED (PWR) turns on.
- g. If you have more memory risers to install, follow steps [a.](#) through [f.](#) for each riser.

- h. Replace the top cover.
- i. Replace the server in the rack.

Figure 3-11 Removing Memory Risers



1	Riser-latch release buttons (two on each riser)	2	Riser retaining latches (two on each riser)
----------	---	----------	---

Replacing DIMMs

**Caution**

DDR4 DIMMs are available for use with DDR4 memory risers and EX v3 or v4 CPUs. You must upgrade the firmware before you upgrade the hardware. See [Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35](#).

This section includes the following topics:

- [DIMM Performance Guidelines and Population Rules, page 3-29](#)
- [Replacing a DIMM, page 3-34](#)

**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 the memory.

DIMM Performance Guidelines and Population Rules

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

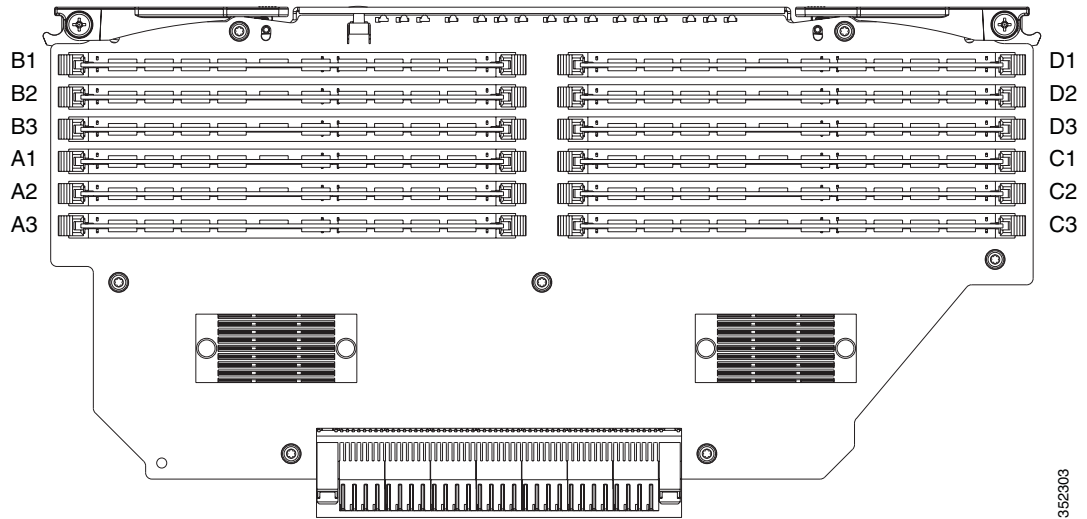
- [DIMM Sockets, page 3-29](#)
- [DIMM Population Rules, page 3-30](#)
- [Memory Mirroring Mode, page 3-33](#)
- [Lockstep Channel Mode, page 3-33](#)

DIMM Sockets

[Figure 3-12](#) shows the DIMM sockets and how they are numbered on a memory riser.

- Each memory riser has 12 DDR3 DIMM sockets.
- Channels are labeled with letters as shown in [Figure 3-12](#). For example, channel A = DIMM slots A1, A2, A3.
- Each channel has three DIMM sockets. The blue socket in a channel is always socket 1.

Figure 3-12 DIMM Sockets on a Memory Riser



DIMM Population Rules

Observe the following guidelines when installing or replacing DIMMs:

- The minimum configuration without memory mirroring is one memory riser installed on a slot for CPU1 or CPU2, with one DIMM. The minimum DIMM capacity must meet the requirements of the OS installed.
- The minimum configuration with memory mirroring is one memory riser installed on a slot for CPU1 or CPU2, with two matched DIMM pairs. A matched DIMM pair is two DIMMs with the same Cisco part number (same capacity, same rank, and same buffer type (RDIMM or LRDIMM)).
- For optimal performance, spread DIMMs evenly across all CPUs and DDR channels.
- Any DIMM installed in a memory riser that corresponds to an empty CPU slot is inaccessible. In a two-CPU server, memory risers 5–8 are not available.
- Populate the DIMM 1 slots on a riser first, then the DIMM 2 slots, then the DIMM 3 slots. For example, populate the DIMM slots on a riser in this order:
 1. A1, C1, B1, D1
 2. A2, C2, B2, D2
 3. A3, C3, B3, D3
- See the following tables for the recommended population order for optimum performance.
 - [Table 3-5](#): Two-CPU/four-riser system
 - [Table 3-6](#): Four-CPU/eight-riser system
- Do not mix RDIMMs and LRDIMMs.
- NVIDIA K-Series and M-Series GPUs can support only less-than 1 TB memory in the server.
- NVIDIA P-Series GPUs can support 1 TB or more memory in the server.
- AMD FirePro S7150 X2 can support only less-than 1 TB memory in the server.

Table 3-5 describes the recommended population order for a two-CPU system that has four memory risers. In a two-CPU system, only CPU1 and CPU2 are populated. Only the memory risers controlled by CPU1 and CPU2 (MEM1, MEM2, MEM3, and MEM4) are populated.

Table 3-5 *DIMM Population for Two-CPU/Four-Riser System Optimum Performance*

No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket
First: 1	CPU1	1	A1	25	CPU1	1	B2
2	CPU2	3	A1	26	CPU2	3	B2
3	CPU1	2	A1	27	CPU1	2	B2
4	CPU2	4	A1	28	CPU2	4	B2
5	CPU1	1	C1	29	CPU1	1	D2
6	CPU2	3	C1	30	CPU2	3	D2
7	CPU1	2	C1	31	CPU1	2	D2
8	CPU2	4	C1	32	CPU2	4	D2
9	CPU1	1	B1	33	CPU1	1	A3
10	CPU2	3	B1	34	CPU2	3	A3
11	CPU1	2	B1	35	CPU1	2	A3
12	CPU2	4	B1	36	CPU2	4	A3
13	CPU1	1	D1	37	CPU1	1	C3
14	CPU2	3	D1	38	CPU2	3	C3
15	CPU1	2	D1	39	CPU1	2	C3
16	CPU2	4	D1	40	CPU2	4	C3
17	CPU1	1	A2	41	CPU1	1	B3
18	CPU2	3	A2	42	CPU2	3	B3
19	CPU1	2	A2	43	CPU1	2	B3
20	CPU2	4	A2	44	CPU2	4	B3
21	CPU1	1	C2	45	CPU1	1	D3
22	CPU2	3	C2	46	CPU2	3	D3
23	CPU1	2	C2	47	CPU1	2	D3
24	CPU2	4	C2	Last: 48	CPU2	4	D3

Table 3-6 describes the recommended population order for a four-CPU system that has eight memory risers.

Table 3-6 DIMM Population For Four-CPU/Eight-Riser System Optimum Performance

No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket	No. of DIMMs Installed	CPU	Riser	DIMM Socket
First: 1	CPU1	1	A1	25	CPU1	1	D1	49	CPU1	1	B2	73	CPU1	1	C3
2	CPU2	3	A1	26	CPU2	3	D1	50	CPU2	3	B2	74	CPU2	3	C3
3	CPU3	5	A1	27	CPU3	5	D1	51	CPU3	5	B2	75	CPU3	5	C3
4	CPU4	7	A1	28	CPU4	7	D1	52	CPU4	7	B2	76	CPU4	7	C3
5	CPU1	2	A1	29	CPU1	2	D1	53	CPU1	2	B2	77	CPU1	2	C3
6	CPU2	4	A1	30	CPU2	4	D1	54	CPU2	4	B2	78	CPU2	4	C3
7	CPU3	6	A1	31	CPU3	6	D1	55	CPU3	6	B2	79	CPU3	6	C3
8	CPU4	8	A1	32	CPU4	8	D1	56	CPU4	8	B2	80	CPU4	8	C3
9	CPU1	1	C1	33	CPU1	1	A2	57	CPU1	1	D2	81	CPU1	1	B3
10	CPU2	3	C1	34	CPU2	3	A2	58	CPU2	3	D2	82	CPU2	3	B3
11	CPU3	5	C1	35	CPU3	5	A2	59	CPU3	5	D2	83	CPU3	5	B3
12	CPU4	7	C1	36	CPU4	7	A2	60	CPU4	7	D2	84	CPU4	7	B3
13	CPU1	2	C1	37	CPU1	2	A2	61	CPU1	2	D2	85	CPU1	2	B3
14	CPU2	4	C1	38	CPU2	4	A2	62	CPU2	4	D2	86	CPU2	4	B3
15	CPU3	6	C1	39	CPU3	6	A2	63	CPU3	6	D2	87	CPU3	6	B3
16	CPU4	8	C1	40	CPU4	8	A2	64	CPU4	8	D2	88	CPU4	8	B3
17	CPU1	1	B1	41	CPU1	1	C2	65	CPU1	1	A3	89	CPU1	1	D3
18	CPU2	3	B1	42	CPU2	3	C2	66	CPU2	3	A3	90	CPU2	3	D3
19	CPU3	5	B1	43	CPU3	5	C2	67	CPU3	5	A3	91	CPU3	5	D3
20	CPU4	7	B1	44	CPU4	7	C2	68	CPU4	7	A3	92	CPU4	7	D3
21	CPU1	2	B1	45	CPU1	2	C2	69	CPU1	2	A3	93	CPU1	2	D3
22	CPU2	4	B1	46	CPU2	4	C2	70	CPU2	4	A3	94	CPU2	4	D3
23	CPU3	6	B1	47	CPU3	6	C2	71	CPU3	6	A3	95	CPU3	6	D3
24	CPU4	8	B1	48	CPU4	8	C2	72	CPU4	8	A3	Last: 96	CPU4	8	D3

Memory Mirroring Mode

When you enable memory mirroring mode in the server BIOS, the memory subsystem simultaneously writes identical data to two channels. If a memory read from one of the channels returns incorrect data due to an uncorrectable memory error, the system automatically retrieves the data from the other channel. A transient or soft error in one channel does not affect the mirrored data, and operation continues.

Memory mirroring reduces the amount of memory available to the operating system by 50 percent because only one of the two populated channels provides data.

Lockstep Channel Mode

In this mode, the main memory channel from the CPU to the memory buffer runs at the same clock rate of each of the two memory subchannels from the buffer to the DIMMs, and both DIMM subchannels are accessed simultaneously for a double-width access. For example, if the CPU channel clock speed is 1600 MHz, each of the DIMM subchannels operates at 1600 MHz. For this reason, lockstep mode is referred to as 1:1. Memory lockstep mode provides protection against both single-bit and multi-bit errors. Memory lockstep allows two memory channels to work as a single channel, moving a data word two channels wide and providing eight bits of memory correction.

Lockstep channel mode requires that all four memory channels on a CPU must be populated identically with regards to size and organization. DIMM socket populations within a channel do not have to be identical but the same DIMM slot location across all four channels must be populated the same.

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

Replacing a DIMM

This section includes the following topics:

- [Identifying a Faulty Memory Riser or DIMM, page 3-34](#)
- [Replacing DIMMs, page 3-34](#)

Identifying a Faulty Memory Riser or DIMM

The memory riser includes fault LEDs on its top panel (see [Figure 3-10](#)).

- If the riser fault LED is lit, replace the memory riser as described [Replacing a Memory Riser, page 3-27](#).
- If one or more of the numbered DIMM fault LEDs are lit, replace the corresponding DIMMs as described in [Replacing DIMMs, page 3-29](#).

Replacing DIMMs

Step 1 Remove the DIMMs that you are replacing:

- Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).



Caution

Memory risers are hot-pluggable, which means that you do not have to remove power from the server, but you must shut down the riser before removing it.

- Locate the memory riser that has the faulty DIMM, and then shut down and remove the riser as described in [Replacing Memory Risers, page 3-26](#).
- Locate the faulty DIMM and remove it from the socket on the riser by opening the ejector levers at both ends of the DIMM socket.

Step 2 Install a new DIMM:



Note

Before installing DIMMs, refer to the population guidelines. See [DIMM Performance Guidelines and Population Rules, page 3-29](#).

- Align the new DIMM with the socket on the riser. Use the alignment key in the DIMM socket to correctly orient the DIMM.
 - Push the DIMM into the socket until it is fully seated and the ejector levers on either side of the socket lock into place.
 - Replace the memory riser to its motherboard socket and bring it back online by using the procedure in [Replacing Memory Risers, page 3-26](#).
 - Replace the top cover.
-

Replacing CPUs and Heat Sinks



Caution

Xeon v3 or v4 Series CPUs are available for use with DDR4 memory risers and DDR4 DIMMs. You must upgrade the firmware before you upgrade the hardware. See [Special Information For Upgrades to Intel Xeon v4 CPUs](#), page 3-35.

This section contains the following topics:

- [Special Information For Upgrades to Intel Xeon v4 CPUs](#), page 3-35
- [CPU Configuration Rules](#), page 3-36
- [Replacing a CPU and Heat Sink](#), page 3-36
- [Additional CPU-Related Parts to Order with RMA Replacement Motherboards](#), page 3-42

Special Information For *Upgrades* to Intel Xeon v4 CPUs



Caution

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

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

Table 3-7 Minimum Requirements For Intel Xeon v4 CPUs

Software or Firmware	Minimum Version
Server CIMC	2.0(12)
Server BIOS	2.0(12)
Cisco UCS Manager (UCSM-managed system only)	2.2(8) or 3.1(2)



Note

Cisco UCS Manager Release 2.2(4) introduced a server pack feature that allows Intel v4 CPUs to run with Cisco UCS Manager Release 2.2(4) or later.

The UCS Manager Capability Catalog must be updated to 2.2(7c) or later.

The server Cisco IMC/BIOS must be running the minimum version or later as described in [Table 3-7](#).

Do one of the following actions:

- If your server's firmware and/or Cisco UCS Manager software are already at the required levels shown in [Table 3-7](#), you can replace the CPU hardware by using the procedure in this section.
- If your server's firmware and/or Cisco UCS Manager software is earlier than the required levels, use the instructions in the [Cisco UCS C-Series Servers Upgrade Guide for Intel Xeon v4 CPUs](#) to upgrade your software. After you upgrade the software, return to the procedure in this section as directed to replace the CPU hardware.

CPU Configuration Rules

The server supports two or four CPUs. See [Figure 3-12 on page 3-30](#) for the CPU socket numbering.

- The minimum configuration is two identical CPUs (CPU1 and CPU2).
- The server must have either two or four identical CPUs to operate; populate CPU1 and CPU2 first, then populate CPU3 and CPU4.
- In a two-CPU server (CPU1 and CPU2), the following components are not available because they require CPU3 and CPU4 to be installed:
 - PCIe riser 2 (PCIe slots 6–10)
 - Memory risers 5–8



Caution

In a two-CPU system, you must have the CPU filler panel installed in place of CPU3 and CPU4 to maintain correct airflow and cooling.

Replacing a CPU and Heat Sink



Caution

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



Caution

The Intel Pick-n-Place tools used in this procedure are required to prevent damage to the contact pins between the motherboard and the CPU. Do not attempt this procedure without the required tools, which are included with each CPU option kit. If you do not have the tool, you can order a spare (Cisco PID UCS-CPU-EP-PNP=).

Step 1

Prepare the server for replacement:

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

Step 2 Provide clearance for removing the CPU:

- a. Remove all memory risers from the server.

With power removed from the server, you do not have to shut down the memory risers before removal. Press both green riser-latch release buttons on the top of the riser (see [Figure 3-11](#)), and then lift on both riser latches at the same time.



Note It is important that each memory riser is returned to the same slot it was removed from to maintain your DIMM configuration. Label the risers or organize them in order as you remove them and set them aside on an antistatic surface.

- b. Remove both PCIe risers from the server.

Lift on the retaining latch at the top of the riser until it is vertical (see [Figure 3-20](#)).

- c. Remove the chassis mid-brace (see [Figure 3-5 on page 3-11](#)).





Note The securing mechanism for the mid-brace differs, depending on when the system was produced.

- Older systems have a spring-loaded plunger that secures each end of the mid-brace. Access these plungers on the inside of the chassis. Pull inward on the spring-loaded plunger that secures each end of the mid-brace, then lift straight up.
- Newer systems have two screws that secure each end of the mid-brace. Access these screws on the outside of the chassis. Remove the two screws at each end of the mid-brace, then lift straight up.

Step 3 Use a Number 2 Phillips-head screwdriver to loosen the four captive screws that secure the heat sink, and then lift it off of the CPU.



Note Loosen each screw evenly to avoid damaging the heat sink or CPU.

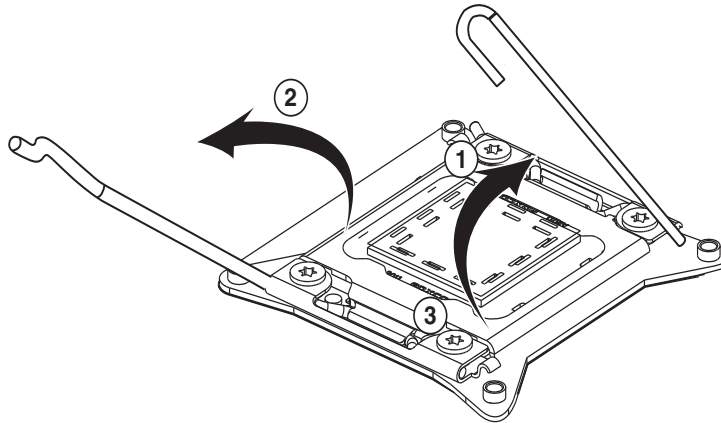
Step 4 Unclip the first CPU retaining latch that is labeled with the  icon, and then unclip the second retaining latch that is labeled with the  icon. See [Figure 3-13](#).





Note You must hold the first retaining latch open before you can lift the second retaining latch.

Step 5 Open the hinged CPU cover plate. See [Figure 3-13](#).

Figure 3-13 CPU Socket Retaining Latches



332093

1	CPU retaining latch, 	3	Hinged CPU cover plate
2	CPU retaining latch, 		

Step 6 Remove a protective cap from the socket (if present).

If you are installing a new CPU to a socket that was shipped empty, the socket has a protective cap that is intended to prevent bent contact pins. If you are removing an old CPU instead, skip to [Step 7](#).

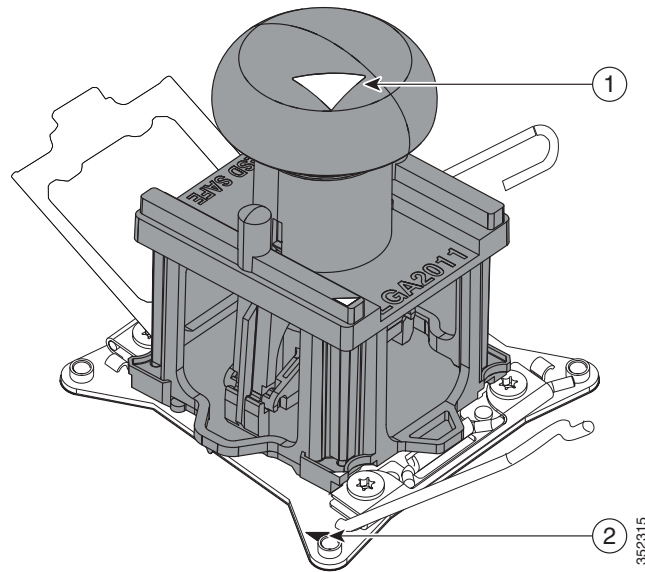
**Caution**

If you are adding CPUs to a server that previously had only two CPUs, remove the CPU filler panels and the PCIe filler panel, if present, to ensure correct airflow and cooling.

Step 7 Remove the old CPU:

- a. Set the Pick-n-Place tool on the CPU in the socket, aligning the arrow on the tool with the registration mark on the socket (the small triangular mark). See [Figure 3-14](#).
- b. Press the top button on the tool to grasp the installed CPU.
- c. Lift the tool and CPU straight up.
- d. Press the top button on the tool to release the old CPU on an antistatic surface.

Figure 3-14 Pick-n-Place Tool

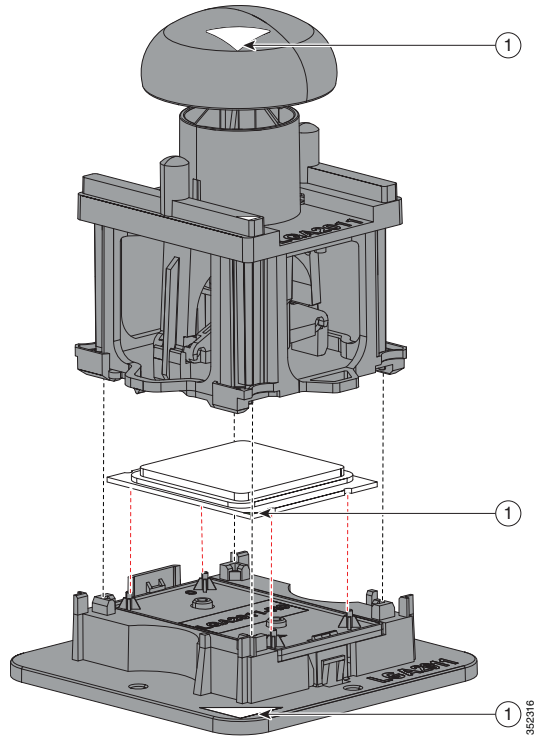


1 Arrow on tool	2 Registration mark on CPU socket
-----------------	-----------------------------------

Step 8 Insert the new CPU into the Pick-n-Place tool:

- a. Remove the new CPU from the packaging and place it on the pedestal that is included in the kit. Align the registration mark on the corner of the CPU with the arrow on the corner of the pedestal (see [Figure 3-15](#)).
- b. Press down on the top button of the tool to lock it open.
- c. Set the Pick-n-Place tool on the CPU pedestal, aligning the arrow on the tool with the arrow on the corner of the pedestal. Make sure that the tabs on the tool are fully seated in the slots on the pedestal.
- d. Press down on the top button of the tool to grasp and lock in the CPU.
- e. Lift the tool and CPU straight up off the pedestal.

Figure 3-15 CPU and Pick-n-Place Tool on Pedestal



1	Arrow marks for alignment
----------	---------------------------

Step 9 Install a new CPU:



**Note**

Do not install an Intel Xeon v3 or v4 Series CPU unless your server meets the minimum firmware requirements, as described in [Special Information For Upgrades to Intel Xeon v4 CPUs, page 3-35](#).

- a. Set the Pick-n-Place tool that is holding the CPU over the empty CPU socket on the motherboard.

**Note**

Align the arrow on the top of the tool with the registration mark (small triangle) that is stamped on the metal of the CPU socket, as shown in [Figure 3-14 on page 3-39](#).

- b. Press the top button on the tool to set the CPU into the socket. Remove the empty tool.
- c. Close the hinged CPU cover plate.
- d. Clip down the CPU retaining latch with the  icon first, and then clip down the CPU retaining latch with the  icon. See [Figure 3-13 on page 3-38](#).

Step 10 Install a heat sink:

**Caution**

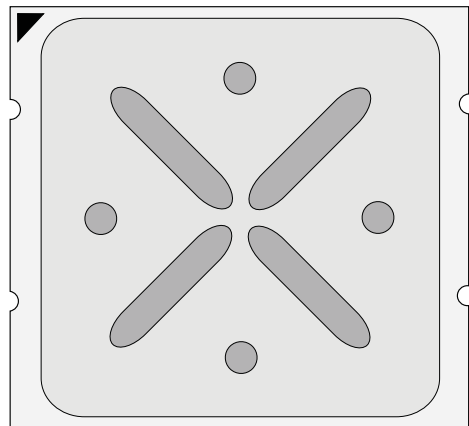
The heat sink must have a new thermal grease on the heat sink-to-CPU surface to ensure proper cooling. If you are reusing a heat sink, you must remove the old thermal grease. If you are installing a new heat sink, skip to Step c below.

- a. Apply the cleaning solution, which is included with the heatsink cleaning kit (shipped with spare CPUs), to the old thermal grease and let it soak for a least 15 seconds.
- b. Wipe all of the old thermal grease off the old heat sink using the soft cloth that is included with the heatsink cleaning kit. Be careful to not scratch the heat sink surface.
- c. Apply thermal grease from the syringe that is included with the new CPU to the top of the CPU.
Apply about half the syringe contents to the top of the CPU in the pattern that is shown in [Figure 3-16](#).

**Note**

If you do not have a syringe of thermal grease, you can order a spare (Cisco PID UCS-CPU-GREASE3=).

Figure 3-16 Thermal Grease Application Pattern



- d. Align the heat sink captive screws with the motherboard standoffs, and then use a Number 2 Phillips-head screwdriver to tighten the captive screws evenly.

**Note**

Orient the heat sink so that the arrow label on the heat sink points toward the rear of the server.

**Note**

Alternate tightening each screw evenly to avoid damaging the heat sink or CPU.

Step 11 Replace components that you removed:

- a. Replace the chassis mid-brace.

**Note**

The securing mechanism for the mid-brace differs, depending on when the system was produced.

- Older systems have a spring-loaded plunger that secures each end of the mid-brace. Access these plungers on the inside of the chassis. Pull inward on the spring-loaded plunger that secures each end of the mid-brace while you set the mid-brace in place, then release the plungers.

- Newer systems have two screws that secure each end of the mid-brace. Access these screws on the outside of the chassis. Set the mid-brace in place, then replace the two screws at each end.
- b. Replace both PCIe risers to the server.
- a. Replace all memory risers to the server.



Note It is important that each memory riser is returned to the same slot it was removed from to maintain your DIMM configuration.

Step 12 Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Additional CPU-Related Parts to Order with RMA Replacement Motherboards

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

- Scenario 1—You are reusing the existing heat sinks:
 - Heat sink cleaning kit (UCSX-HSCK=)
 - Thermal grease kit for C460 M4 (UCS-CPU-GREASE3=)
 - Intel CPU Pick-n-Place tool for EX CPUs (UCS-CPU-EP-PNP=)
- Scenario 2—You are replacing the existing heat sinks:
 - Heat sink (UCSC-HS-01-EX=)
 - Heat sink cleaning kit (UCSX-HSCK=)
 - Intel CPU Pick-n-Place tool for EX CPUs (UCS-CPU-EP-PNP=)

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

It is important to clean the old thermal interface material off of the CPU prior to installing the heat sinks. When you order new heat sinks, you must order the heat sink cleaning kit.

Replacing a RAID Controller Card

The server has a dedicated internal PCIe slot for a RAID controller card.

See also:

- [Replacing a Modular RAID Controller Transportable Memory Module \(TMM\)](#), page 3-44
- [Replacing the Supercap Power Module \(RAID Backup Unit\)](#), page 3-47

RAID Card Firmware Compatibility

Firmware on the RAID 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 RAID controller firmware accordingly using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: [HUU Guides](#)

Replacement Procedure

- Step 1** Remove an internal RAID controller card (see [Figure 3-17](#)):
- Power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
 - Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.
- Loosen the single captive thumbscrew that secures the RAID card bracket to the chassis wall.
- Grasp the metal card bracket and then lift straight up to remove the card from the motherboard socket.
- Detach cables from the RAID controller card.

- Step 2** Install an internal RAID controller card:

- Attach cables to the new card.



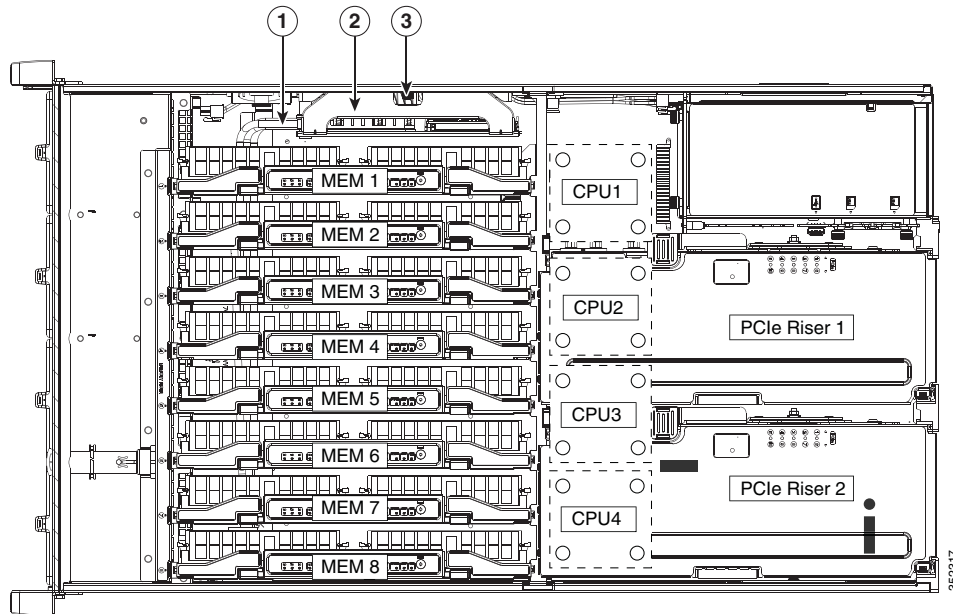
Note See [RAID Controller Cabling](#), page C-6 if you need more information.

- Align the card and bracket over the motherboard socket. The metal bracket has alignment features that hook over flanges on the inner chassis wall to help keep the card perfectly vertical.
- Press down on both top corners of the metal bracket to seat the card in the socket evenly.
- Tighten the captive thumbscrew on the RAID card bracket to secure it to the chassis wall.
- Replace the top cover.
- Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Replacing Server Components

- Step 3** See [Restoring RAID Configuration After Replacing a RAID Controller](#), page C-9 to restore your RAID configuration.

Figure 3-17 Internal RAID Controller Card



1	SAS cables from drive backplane	3	Captive thumbscrew
2	RAID controller card bracket		

Replacing a Modular RAID Controller Transportable Memory Module (TMM)

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

See also:

- [Replacing a RAID Controller Card](#), page 3-43
- [Replacing the Supercap Power Module \(RAID Backup Unit\)](#), page 3-47

- Step 1** Remove an internal Cisco modular RAID controller card (see [Figure 3-17](#)):

- Power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
- Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.
- Loosen the single captive thumbscrew that secures the RAID card bracket to the chassis wall.
- Grasp the metal card bracket and then lift straight up to remove the card from the motherboard socket.
- Detach cables from the RAID controller card.

- Step 2** Remove an existing TMM (if any) from a modular RAID controller card:
- The plastic bracket on the card has a securing plastic clip at each end of the TMM. Gently spread each clip away from the TMM (see [Figure 3-18](#)).
 - Pull straight up on the TMM to lift it off the two plastic guide pegs and the socket on the card.
- Step 3** Install a TMM to the modular RAID controller card:
- Align the TMM over the bracket on the card. Align the connector on the underside of the TMM with the socket on the card. Align the two guide holes on the TMM over the two guide pegs on the card (see [Figure 3-18](#)).

**Caution**

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

- Gently lower the TMM so that the guide holes on the TMM go over the guide pegs on the card.
 - Press down on the TMM until the plastic clips on the bracket close over each end of the TMM.
 - Press down on the TMM to fully seat its connector with the socket on the card.
- Step 4** Install an internal RAID controller card:
- Attach SAS cables to the card.

**Note**

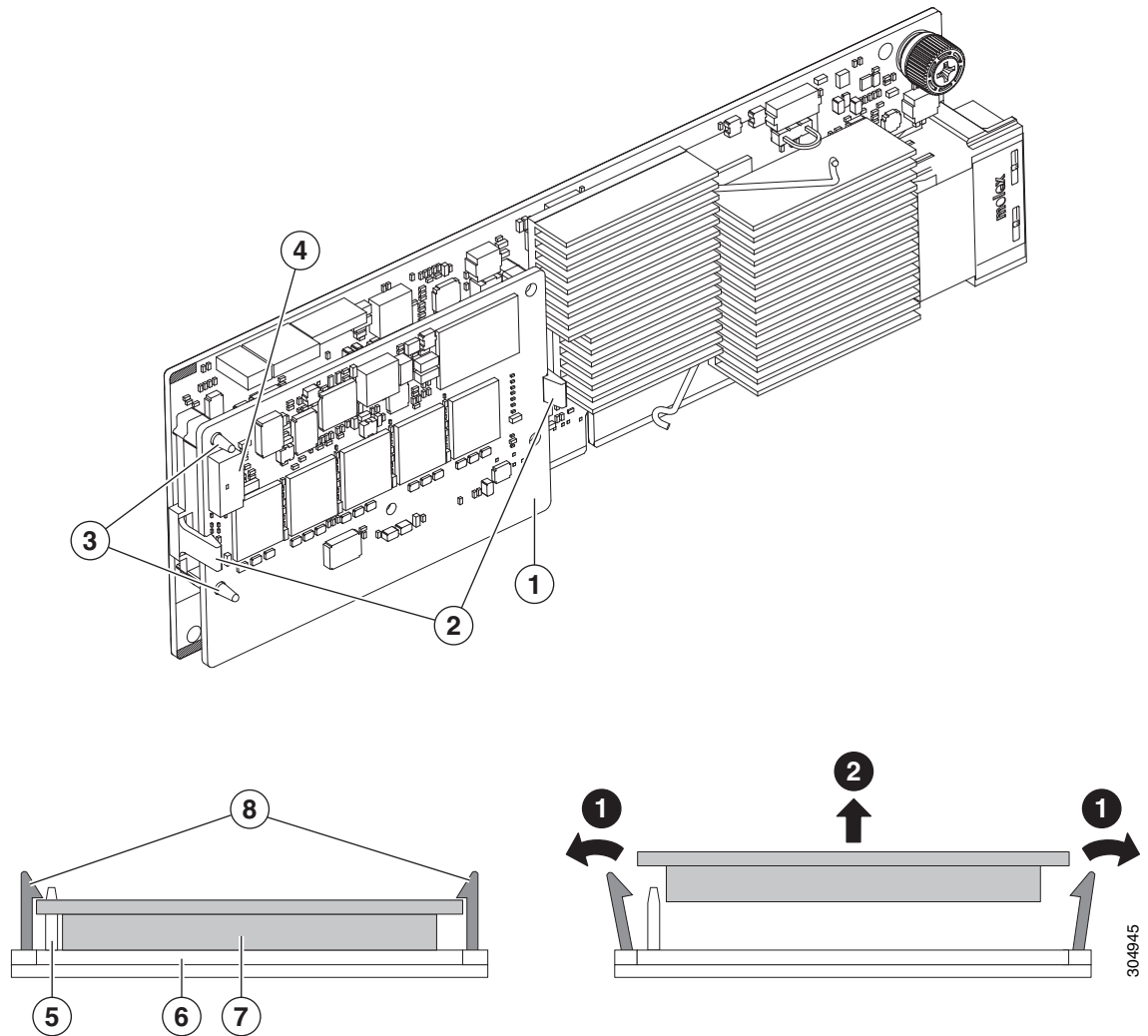
See [RAID Controller Cabling, page C-6](#) if you need more information.

**Note**

If this is a first-time installation of your TMM, you must also install a supercap power module (SCPM). The SCPM cable attaches to a connector on the TMM. See [Replacing the Supercap Power Module \(RAID Backup Unit\), page 3-47](#).

- Connect the cable from the supercap power module (RAID battery) to the connector on the TMM (see [Figure 3-18](#)).
- Align the card and bracket over the motherboard socket. The metal bracket has alignment features that hook over flanges on the inner chassis wall to help keep the card perfectly vertical.
- Press down on both top corners of the metal bracket to seat the card in the socket evenly.
- Tighten the captive thumbscrew on the RAID card bracket to secure it to the chassis wall.
- Replace the top cover.
- Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-18 TMM on Modular RAID Controller Card



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

Replacing the Supercap Power Module (RAID Backup Unit)

The server supports installation of one supercap power module (SCPM). This SCPM mounts in a plastic bracket on the chassis wall adjacent to the internal RAID controller card.

The SCPM provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

See also:

- [Replacing a RAID Controller Card, page 3-43](#)
- [Replacing a Modular RAID Controller Transportable Memory Module \(TMM\), page 3-44](#)

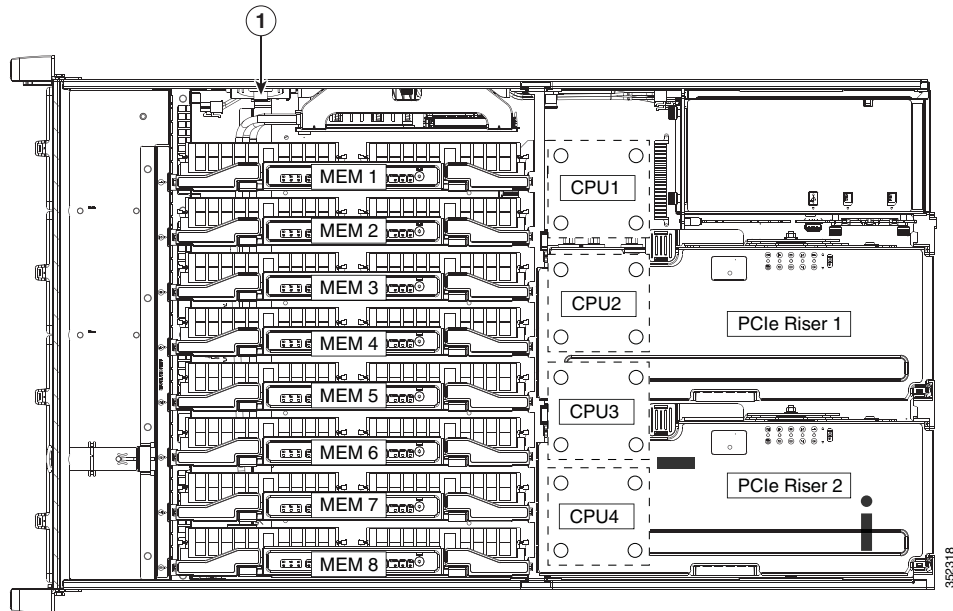
-
- Step 1** Remove an SCPM (see [Figure 3-19](#)):
- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
 - b. Slide the server out the front of the rack far enough so that you can remove the top cover.



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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).
 - d. Disconnect the SCPM cable from the RAID controller card.
 - e. Pull the SCPM from the clips on the plastic SCPM bracket. There is no lock on the clip, but gentle pressure is required to free the SCPM from the bracket clips.
- Step 2** Install a new SCPM:
- a. Slide the new SCPM into the clips on the SCPM bracket. Push in on the SCPM until the plastic bracket clips close around it.
 - b. Connect the cable from the new SCPM to the RAID controller card.
 - c. Replace the top cover.
 - d. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-19 Supercap Power Module Mounting Bracket



1 SCPM plastic mounting bracket

Replacing a PCIe Riser

The server contains two PCIe risers for horizontal installation of PCIe cards. These risers each provide five horizontal slots.

**Note**

In a two-CPU server, PCIe riser 2 is not available.

**Caution**

If your server is configured with only one PCIe riser (riser 1), you must have the two PCIe riser filler panels installed in place of riser 2 in order to keep correct airflow and cooling.

Step 1

Remove the PCIe riser (see [Figure 3-20](#)):

- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- b. Slide the server out the front of the rack far enough so that you can remove the top cover.

**Caution**

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

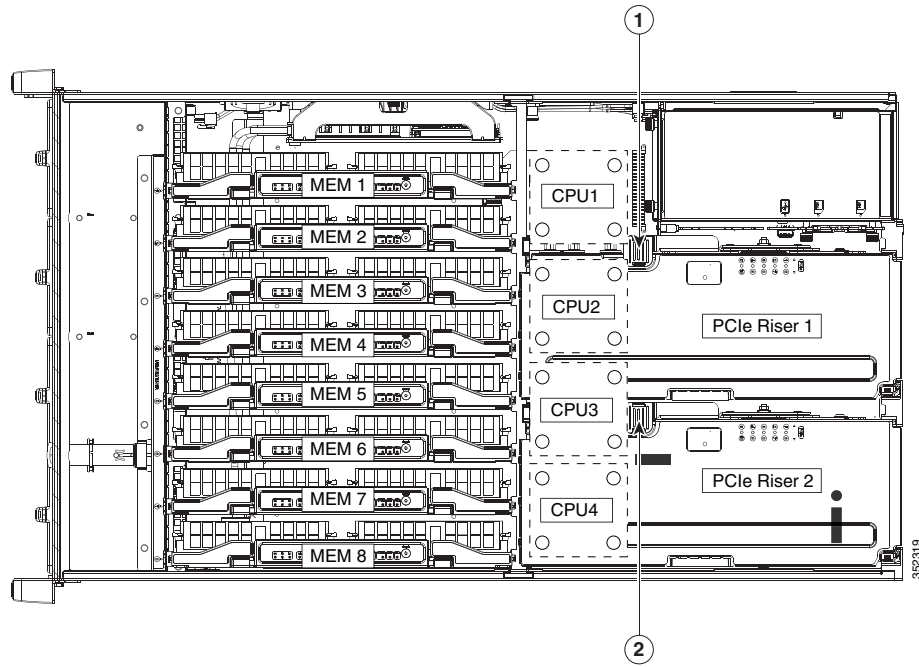
- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).
- d. Lift on the blue plastic retaining latch at the top of the riser until the latch is vertical (see [Figure 3-20](#)). The lever action disengages the riser's connector from the motherboard socket.
- e. Lift straight up on both ends of the PCIe riser and remove it from the server.

Step 2

Install a new PCIe riser:

- a. Align the riser so that its connector is over the motherboard socket.
- b. With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until the blue plastic retaining latch begins to close.
- c. Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.
- d. Replace the top cover.
- e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-20 PCIe Riser Retaining Latches



1	PCIe riser 1 retaining latch (closed position)	2	PCI riser 2 retaining latch (closed position)
---	--	---	---

Replacing a PCIe Card



Caution

Cisco supports all PCIe cards qualified and sold by Cisco. PCIe cards that are not qualified or sold by Cisco are the responsibility of the customer. Although Cisco always supports 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 third-party card occurs.

This server has ten PCIe expansion slots. See [Figure 3-21](#) and [Table 3-8](#) for information about the slots. This section includes the following topics:

- [PCIe Slots, page 3-51](#)
- [PCIe Configuration Guide For Optimum Performance, page 3-52](#)
- [Special Considerations for Cisco UCS Virtual Interface Cards, page 3-54](#)
- [Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards, page 3-55](#)
- [Replacing a PCIe Card, page 3-56](#)
- [Installing Multiple PCIe Cards and Resolving Limited Resources, page 3-58](#)

PCIe Slots

[Figure 3-21](#) shows the PCIe slot numbering. [Table 3-8](#) lists the specifications for each slot.

Figure 3-21 PCIe Slot Numbering

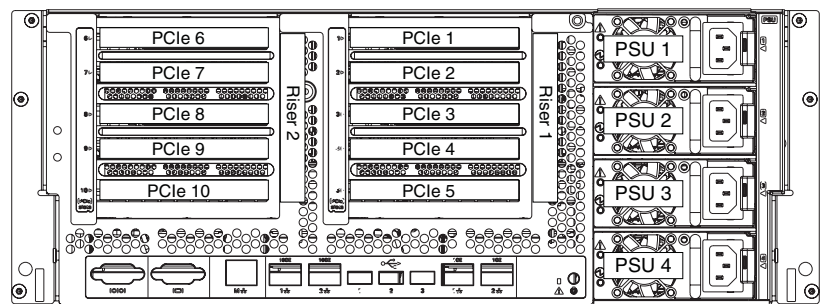


Table 3-8 PCIe Expansion Slots

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length ¹	Card Height ²	NCSI ³ Support	VIC Standby Power Support
Slot 1	Gen-3 x8	x8 connector	Full length	Full height	No	No
Slot 2	Gen-3 x16	x16 connector	Full length	Full height	Yes	No
Slot 3	Gen-3 x4	x16 connector	3/4 length	Full height	Yes	No
Slot 4	Gen-3 x8	x16 connector	3/4 length	Full height	Yes	Yes
Slot 5	Gen-3 x8	x16 connector	1/2 length	Full height	Yes	Yes
Slot 6	Gen-3 x8	x8 connector	Full length	Full height	No	No
Slot 7	Gen-3 x16	x16 connector	Full length	Full height	Yes	No
Slot 8	Gen-3 x8	x16 connector	3/4 length	Full height	Yes	No

Table 3-8 *PCIe Expansion Slots (continued)*

Slot Number	Electrical Lane Width	Connector Length	Maximum Card Length ¹	Card Height ²	NCSI ³ Support	VIC Standby Power Support
Slot 9	Gen-3 x16	x16 connector	3/4 length	Full height	Yes	Yes
Slot 10	Gen-3 x8	x16 connector	1/2 length	Full height	Yes	Yes

1. This is the supported length because of internal clearance.
2. This is the size of the rear panel opening.
3. NCSI = Network Communications Services Interface protocol.

PCIe Configuration Guide For Optimum Performance

For the best performance, we recommend that you populate PCIe cards in the order shown in [Table 3-9](#) for each type of add-on card.

For each card type, populate the primary slot first. Secondary slots can be used for additional cards of the same type and should be populated in the order shown in the table. The alternate slots can be used in the order shown in the table, but with reduced functionality. See [Figure 3-21](#) for the slot locations.


Note

In a two-CPU system, PCIe riser 2 (PCIe slots 6–10) is not available.

Table 3-9 *PCIe Slot Population*

PCIe Card Type	Primary Slot	Secondary Slots	Alternate Slots
RAID controller	Internal dedicated slot	—	—
Low-profile (half-height) network adapter	Riser 1—slot 5 Riser 2—slot 10	Riser 2—slot 8 Riser 2—slot 9 Riser 1—slot 2 Riser 2—slot 7 Riser 1—slot 1 Riser 2—slot 6	Riser 1—slot 3 Riser 1—slot 4
Cisco UCS Virtual Interface Card (x8) VIC 1225 and VIC 1225T	Riser 1—slot 4	Riser 1—slot 5 Riser 2—slot 9 Riser 2—slot 10	Riser 1—slot 3 Riser 2—slot 8 Riser 1—slot 2 Riser 2—slot 7
Cisco UCS Virtual Interface Card (x16) VIC 1285 and VIC 1385 (x16)	Riser 2—slot 9 Riser 1—slot 4 Riser 1—slot 5 Riser 2—slot 10	Riser 1—slot 2 Riser 2—slot 7	Riser 2—slot 8 Riser 1—slot 3
NVIDIA GPU	Riser 2—slot 7+6 ¹ Riser 1—slot 2+1	—	—

Table 3-9 *PCIe Slot Population*

PCIe Card Type	Primary Slot	Secondary Slots	Alternate Slots
Cisco UCS Fusion ioDrive2 Storage Accelerator	Riser 2—slot 8 Riser 1—slot 2	Riser 2—slot 7 Riser 2—slot 6 Riser 1—slot 1 Riser 2—slot 9 Riser 2—slot 10 Riser 1—slot 5	Riser 1—slot 3 Riser 1—slot 4
Cisco UCS Fusion ioDrive3 Storage Accelerator	Riser 2—slot 8 Riser 1—slot 2	Riser 2—slot 7 Riser 2—slot 6 Riser 1—slot 1 Riser 2—slot 9 Riser 2—slot 10 Riser 1—slot 5	Riser 1—slot 3 Riser 1—slot 4

1. The double-width GPU cards cover two slots.

Special Considerations for Cisco UCS Virtual Interface Cards

Table 3-10 describes the requirements for the supported Cisco UCS virtual interface cards (VICs).

If you want to use the Cisco UCS VIC card for Cisco UCS Manager integration, also see the [Cisco UCS C-Series Server Integration with UCS Manager Guides](#) for details about supported configurations, cabling, and other requirements.

Table 3-10 Cisco UCS C460 M4 Requirements for Virtual Interface Cards

Virtual Interface Card (VIC)	Number of VICs Supported in Server	Slots that Support VICs ¹	Primary Slot for Cisco UCS Manager Integration	Primary Slot for Cisco Card NIC Mode	Minimum Cisco IMC Firmware	Minimum VIC Firmware
Cisco UCS VIC 1225 ^{2, 3} UCSC-PCIE-CSC-02	8	PCIE 2 PCIE 3 PCIE 4	PCIE 4 PCIE 9	PCIE 4 PCIE 9	1.4(7)	2.1(0)
Cisco UCS VIC1225T UCSC-PCIE-C10T-02	8	PCIE 5 PCIE 7 PCIE 8	PCIE 4 PCIE 9	PCIE 4 PCIE 9	1.5(1)	2.1(1)
Cisco UCS VIC1285 UCSC-PCIE-C40Q-02	8	PCIE 9 PCIE 10	Not supported at this time	PCIE 9	1.5(4)	2.2(1b)
Cisco UCS VIC1385 UCSC-PCIE-C40Q-03	8		PCIE 4 PCIE 9	PCIE 9	2.0(4)	4.0(4b)

1. See [PCIe Slots](#), page 3-51.
2. The Cisco UCS VIC 1225 (UCSC-PCIE-CSC-02) cannot be installed in the same system with the Intel X540 Dual Port 10GBase-T Adapter (UCSC-PCIE-ITG).
3. Only one Cisco 1225 VIC can be used for both UCSM management and data traffic in the C460 M4 server. The Cisco 1225 VIC in slot 4 handles management and data traffic. If a second Cisco 1225 VIC is installed in slot 9, it is used for data traffic only.

Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards

Figure 3-10 describes the requirements for the supported Cisco UCS Fusion ioDrive2 cards.

Table 3-11 Cisco UCS C460 M4 Requirements for Fusion ioDrive2 Cards

Card	Max. Number of Cards Supported	Supporting Slots ¹	Minimum Cisco IMC Firmware	Card Height (rear-panel tab)
Cisco UCS 3.0 TB MLC Fusion ioDrive2 UCSC-F-FIO-3000M	2	PCIE 4 PCIE 9	1.5(2)	Full height
Cisco UCS 1205 GB MLC Fusion ioDrive2 UCSC-F-FIO-1205M	6	PCIE 2 PCIE 4	1.5(2)	Half height ²
Cisco UCS 785 GB MLC Fusion ioDrive2 UCSC-F-FIO-785M	6	PCIE 5 PCIE 7	1.5(2)	Half height
Cisco UCS 365 GB MLC Fusion ioDrive2 UCSC-F-FIO-365M	6	PCIE 8 PCIE 9	1.5(2)	Half height

1. See [PCIe Slots](#), page 3-51.

2. A rear-panel tab adapter is required to fit the half-height cards in the server's full-height slots.

Replacing a PCIe Card


Note

If you are installing a Cisco UCS Virtual Interface Card (VIC), see [Special Considerations for Cisco UCS Virtual Interface Cards](#), page 3-54. If you are installing a Cisco UCS Fusion ioDrive2 card, see [Special Considerations for Cisco UCS Fusion ioDrive2 Storage Accelerator Cards](#), page 3-55.


Note

In a two-CPU server, PCIe riser 2 (PCIe slots 6–10) is not available.

Step 1

Remove a PCIe card (or a blank filler panel) from the PCIe riser assembly:

- a. Shut down and power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
- b. Slide the server out the front of the rack far enough so that you can remove the top cover.


Caution

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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.
- d. Lift on the blue plastic retaining latch at the top of the PCIe riser until the latch is vertical (see [Figure 3-20](#)). The lever action disengages the riser's connector from the motherboard socket.
- e. Lift straight up on both ends of the PCIe riser and remove it from the server. Set the riser on an antistatic surface.
- f. Open the hinged blue plastic card cover (see [Figure 3-22](#)).
- g. Open the hinged card-tab retainer (see [Figure 3-22](#)). Pinch the two blue finger grips toward the center and swing open the retainer.
- h. If the card has a dedicated power cable, disconnect the cable from the PCIe riser power connector.
- i. Pull evenly on both corners of the PCIe card to remove it from the socket on the PCIe riser.

Step 2

Install a PCIe card:

- a. Align the new PCIe card with the empty socket on the PCIe riser assembly.

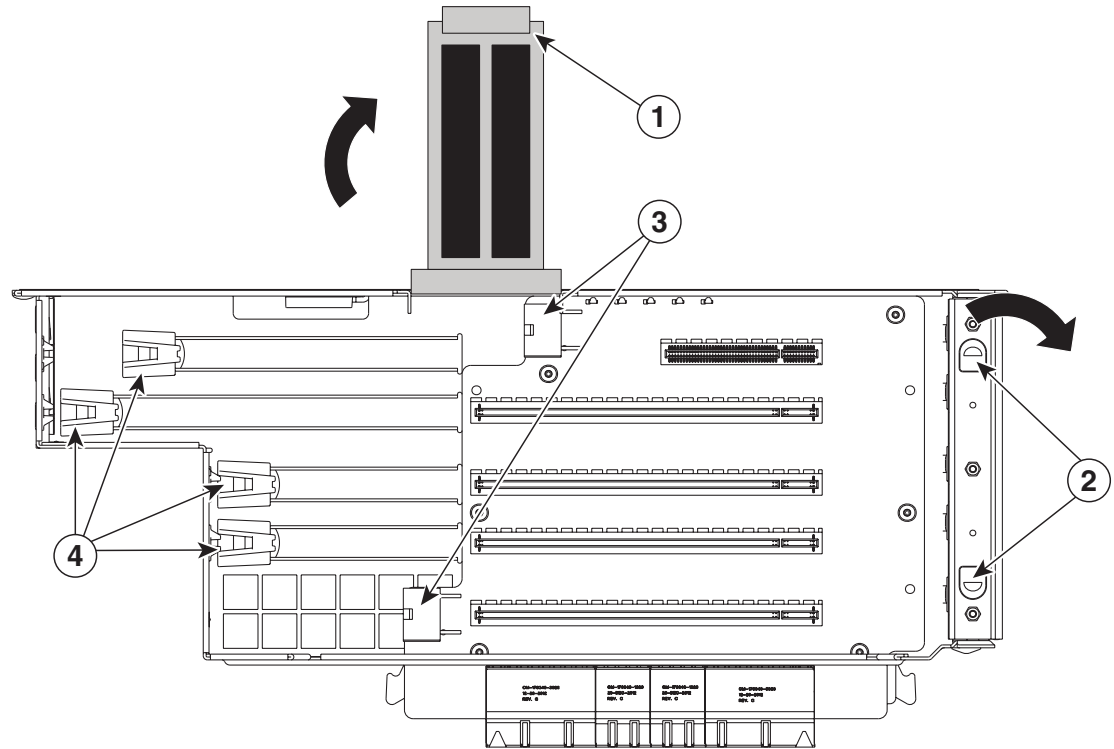

Note

The riser assembly includes adjustable braces that can be used to support the end of a card if the card length is shorter than the slot (see [Figure 3-22](#)). You can slide these blue plastic braces to adjust for the length of your card. These braces can also be removed if they are not required.

- b. Push down evenly on both ends of the card until it is fully seated in the socket.
Ensure that the card's rear-panel tab sits flat against the PCIe riser rear-panel opening.
- c. If the card has a dedicated power cable, connect it to the power connector on the riser.
- d. Close the hinged card-tab retainer and press it down until it clicks and locks in place.
- e. Close the hinged blue plastic card cover.
- f. Align the riser so that its connector is over the motherboard socket.
- g. With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until its connector makes contact with the motherboard socket.

- h. Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.
- i. Replace the top cover.
- j. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-22 *PCIe Riser Card Retention Features*



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1	Hinged blue plastic card cover	3	Power connectors
2	Hinged card-tab retainer finger grips	4	Adjustable card braces

Installing Multiple PCIe Cards and Resolving Limited Resources

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

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

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

- [Resolving Insufficient Memory Space to Execute Option ROMs, page 3-58](#)
- [Resolving Insufficient 16-Bit I/O Space, page 3-59](#)

Resolving Insufficient Memory Space to Execute Option ROMs

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

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

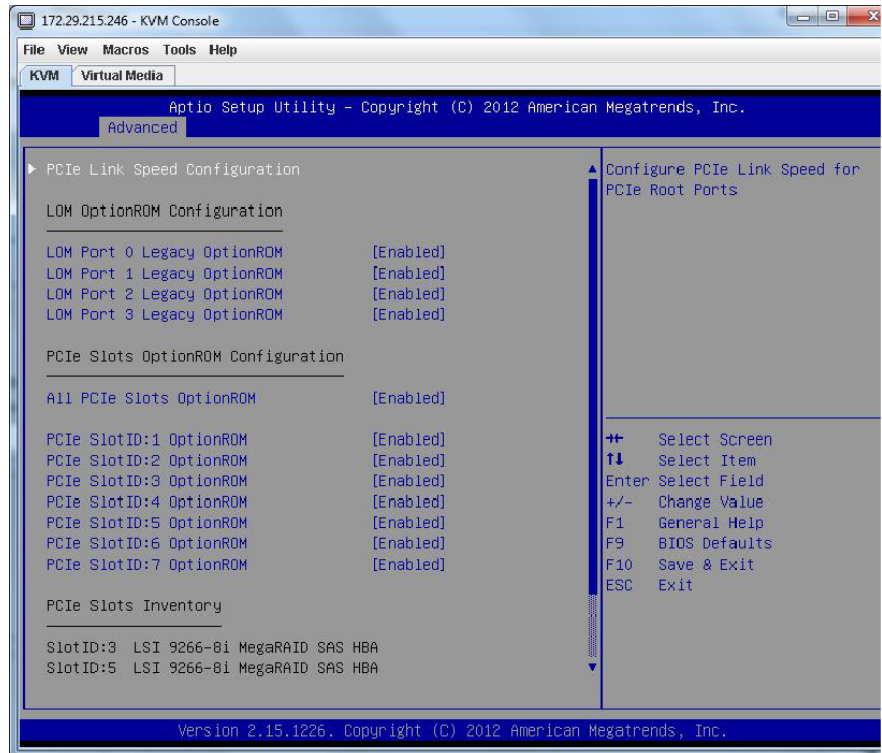
```
PCI OUT OF RESOURCES CONDITION:
ERROR: Insufficient PCI Resources Detected!!!

System is running with Insufficient PCI Resources!
In order to display this message some
PCI devices were set to disabled state!
It is strongly recommended to power off the system
and remove some PCI/PCI Express cards from the system!
To continue booting, proceed to <Save & Exit> Menu Option
and select Boot Device or <Discard Changes and Exit>.

WARNING: If you choose to continue booting some Operating
Systems might not be able to complete boot correctly!
```

To resolve this issue, disable the option ROMs that are not needed for system booting. The BIOS Setup Utility provides the setup options to enable or disable the option ROMs at the PCIe slot level for the PCIe expansion slots and at the port level for the onboard NICs. These options can be found in the BIOS Setup Utility **Advanced > PCI Configuration** window (see [Figure 3-23](#)).

Figure 3-23 BIOS Setup Utility Advanced > PCI Configuration Window



- Guidelines for RAID controller booting

When the server is configured in the factory, the RAID controllers are installed in PCIe slot 3 or slot 5 for a single RAID controller configuration, or in both slot 3 and slot 5 for a dual RAID controller configuration.

If the server is configured to boot primarily from RAID storage, make sure that the option ROMs for slot 3 or slot 5 are enabled in the BIOS, depending upon your RAID controller configuration. If the RAID controller does not appear in the system boot order even with the option ROMs for slot 3 and slot 5 enabled, the RAID controller option ROM might not have sufficient memory space to execute. In that case, disable other option ROMs that are not needed for the system configuration to free up some memory space for the RAID controller option ROM.

- Guidelines for onboard NIC preboot execution environment (PXE) booting

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

Resolving Insufficient 16-Bit I/O Space

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

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

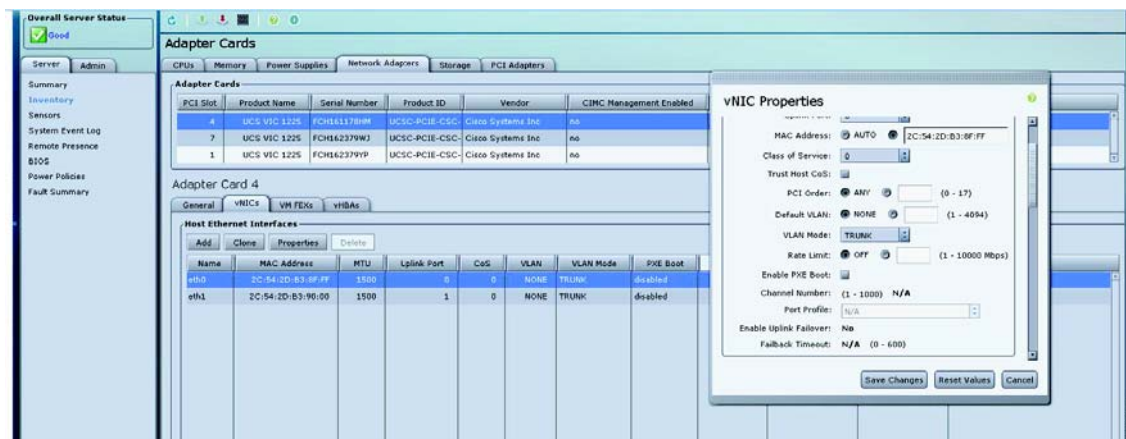
- The system might get stuck in an infinite reset loop.
- The BIOS might appear to hang while initializing PCIe devices.
- The PCIe option ROMs might take excessive time to complete, which appears to lock up the system.
- PCIe boot devices might not be accessible from the BIOS.
- PCIe option ROMs might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

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

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

Uncheck the “Enable PXE boot entry” in the vNIC properties dialog box to disable the PXE boot, as shown in [Figure 3-24](#).

Figure 3-24 vNIC Properties Dialog Box



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Replacing an NVIDIA GPU Card

See [GPU Card Installation](#), page D-1.

Replacing the Motherboard RTC Battery



Warning

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

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

Step 1

Remove the RTC battery (see [Figure 3-25](#)):

- a. Power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
- b. Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.
- d. Remove PCIe riser 2 from the server to provide clearance. See [Replacing a PCIe Riser](#), page 3-49 for instructions.
- e. Locate the RTC battery. See [Figure 3-25](#).
- f. Bend the battery retaining clip away from the battery and pull the battery from the socket.

Step 2

Install the RTC battery:

- a. Bend the retaining clip away from the battery socket and insert the battery in the socket.

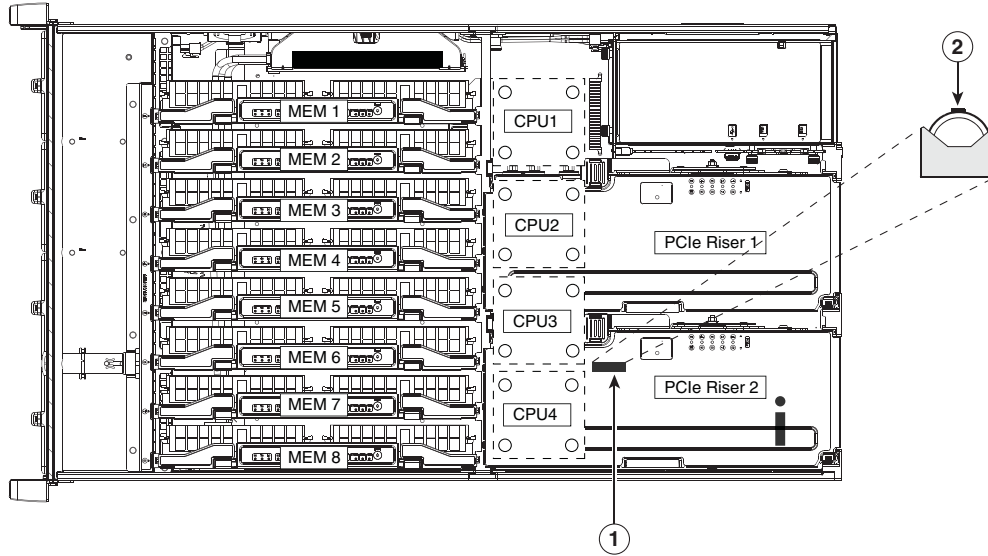


Note

The flat, positive side of the battery marked “+” should face the retaining clip.

- b. Push the battery into the socket until it is fully seated and the retaining clip clicks over the top of the battery.
- c. Replace PCIe riser 2 to the server. See [Replacing a PCIe Riser](#), page 3-49 for instructions.
- d. Replace the top cover.
- e. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-25 Location of the Motherboard RTC Battery



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1	RTC battery socket on motherboard, under PCIe riser 2.	2	Battery clip The flat, positive (+) side of the battery faces the clip.
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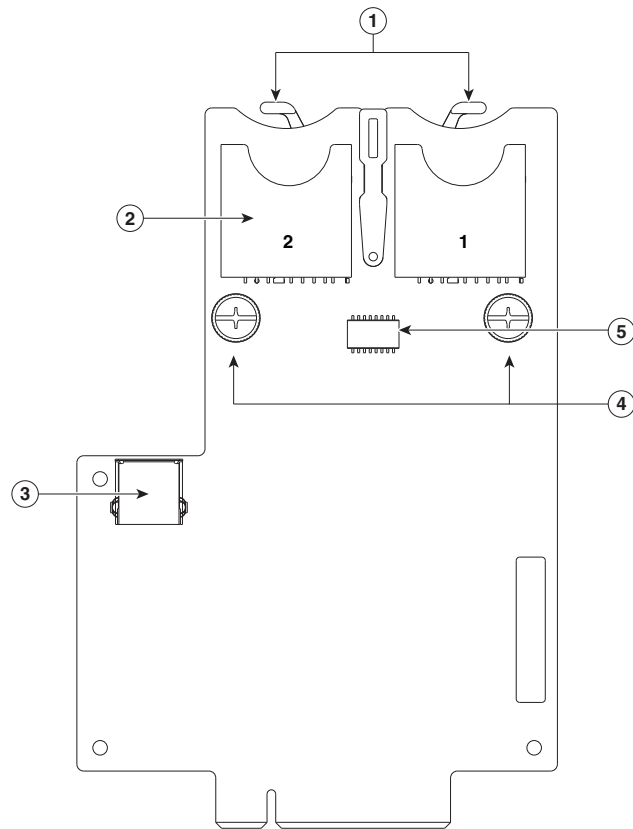
Replacing a Media Riser Card

The media riser is a modular card that has a designated motherboard socket inside the server (see [Figure 3-27](#)). The media riser provides bays for Cisco Flexible Flash drives (SD cards) and an internal USB 2.0 port. The media riser card also includes the server's DIP switch panel.

For more information about Cisco Flexible Flash cards, see [Replacing a Cisco Flexible Flash Drive](#), page 3-65.

For more information about DIP switches, see [Service DIP Switches](#), page 3-74.

Figure 3-26 Media Riser Card



1	SD Card retainer clips	4	Captive thumbscrews
2	Cisco Flexible Flash card bays (SD card bays)	5	DIP switch panel
3	Vertical USB 2.0 port		

- Step 1** Remove the media riser card (see [Figure 3-27](#)):
- Power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
 - Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

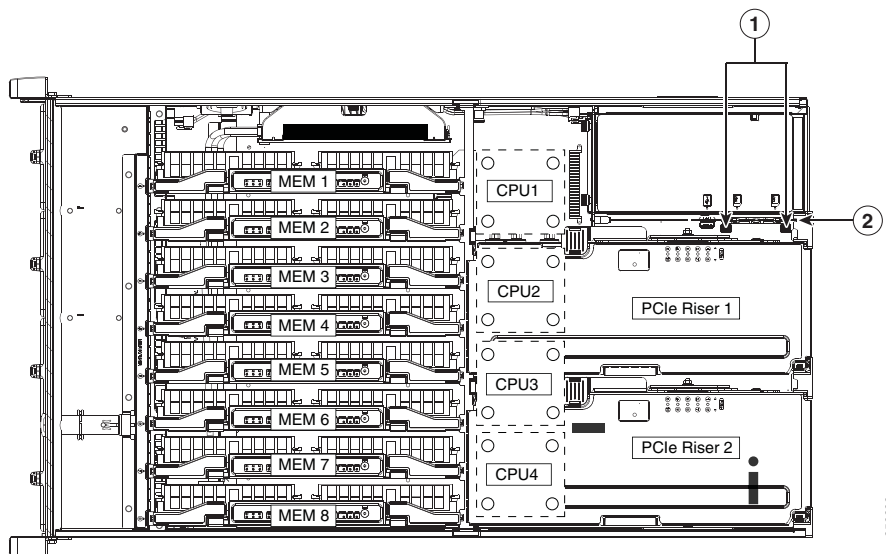
If you cannot safely view and access the component, remove the server from the rack.

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.
- d. Remove PCIe riser 1 to provide clearance. See [Replacing a PCIe Riser](#), page 3-49 for instructions.
- e. Loosen both thumbscrews on the media riser card.
- f. Lift the media riser card straight up from the motherboard connector.

Step 2 Install a new media riser card:

- a. Align the new media riser card with its designated socket on the motherboard. Use the alignment channel in the chassis rear wall to keep the card vertically straight. See [Figure 3-27](#).
- b. Push down evenly on both ends of the card until it is fully seated in its motherboard socket.
- c. Tighten both thumbscrews to secure the card.
- d. Replace PCIe riser 1 to the server. See [Replacing a PCIe Riser](#), page 3-49 for instructions.
- e. Replace the top cover.
- f. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Figure 3-27 Media Riser Card Location



1	Captive thumbscrews on media riser card	2	Alignment channel in chassis wall
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Replacing a Cisco Flexible Flash Drive

This section includes the following topics:

- [Monitoring and Managing a Cisco Flexible Flash Drive, page 3-65](#)
- [Synchronizing RAID After Installing a Second Cisco Flexible Flash Drive, page 3-65](#)
- [Replacing a Cisco Flexible Flash Drive, page 3-65](#)

Monitoring and Managing a Cisco Flexible Flash Drive

You can monitor and manage your Cisco Flexible Flash drives by using the Cisco IMC GUI interface or the CLI interface. See the *Cisco UCS C-Series Rack-Mount Server Configuration Guide* or the *Cisco UCS C-Series Rack-Mount Server CLI Configuration Guide* in the documentation roadmap link below.

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

Synchronizing RAID After Installing a Second Cisco Flexible Flash Drive

After you install or replace a second Cisco Flexible Flash drive, you must synchronize the RAID partition by using the Cisco UCS Server Configuration Utility (SCU).

The SCU provides an option to synchronize the Hypervisor VD, configured as a RAID-1 disk. This feature is available only when both Cisco Flexible Flash drive slots are populated.

When one member slot of the SD card is corrupt, use this option to synchronize the hypervisor data across two members of the RAID-1 virtual disk. You can initiate this synchronization only if two cards are detected and the RAID-1 group is determined as unhealthy (one member is corrupt).

-
- Step 1** Click the **Hypervisor Sync** icon on the toolbar of the SCU interface.
A dialog box prompts you to confirm that you want to synchronize the Hypervisor RAID.
- Step 2** Click **Yes**.
A dialog box is displayed when the synchronization is complete.
- Step 3** Click **OK**.
After you click OK, the Hypervisor Sync icon on the toolbar is greyed out.
-

For more information about the utility, see the [Cisco UCS Server Configuration Utility User Guide](#).

Replacing a Cisco Flexible Flash Drive

-
- Step 1** Remove the Cisco Flexible Flash drive that you are replacing (see [Figure 3-27](#)):
- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
 - b. Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

- d. Locate the Cisco Flexible Flash drive that you are replacing on the media riser card. See [Figure 3-26](#).
- e. Pull back the retainer clip that is over the bay [Figure 3-26](#), and then push down on the top of the Cisco Flexible Flash drive and release it to allow it to spring up in the socket.
- f. Remove the Cisco Flexible Flash drive from the socket.

Step 2 Install a Cisco Flexible Flash drive:



Note To be usable for Cisco Flexible Flash, an SD card must be at least 16 GB in size.

- a. Pull the back the retainer clip, and then insert the Cisco Flexible Flash drive into the bay on the media riser card, with the label side facing outward.
 - b. Press down on the top of the card until it clicks in the bay and stays in place.
 - c. Replace the top cover.
 - d. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.
-

Replacing an Internal USB Drive

This section contains the following topics:

- [Internal USB Drive Replacement Procedure, page 3-67](#)
- [Enabling or Disabling the Internal USB Port, page 3-67](#)

Internal USB Drive Replacement Procedure

- Step 1** Remove the USB flash drive that you are replacing:
- a. Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
 - b. Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- c. Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).
 - d. Pull the USB flash drive from the vertical socket on the media riser card (see [Figure 3-27](#) for the location of the media riser card).
- Step 2** Install a USB flash drive:
- a. Insert the new USB flash drive into the vertical socket on the media riser card.



Note

For a short USB flash drive, you might need to remove PCIe riser 1 to gain clearance to the USB slot.

- b. Replace the top cover.
- c. Replace the server in the rack, replace cables, then power on the server by pressing the **Power** button.

Enabling or Disabling the Internal USB Port

The factory default is for all USB ports on the server to be 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, choose **USB Configuration**.
- Step 4** On the USB Configuration window, select **USB Ports Configuration**.
- Step 5** Scroll to **USB Port: Internal**, press **Enter**, and then choose either Enabled or Disabled from the menu.
- Step 6** Press **F10** to save and exit the utility.

Installing and Enabling a Trusted Platform Module

The trusted platform module (TPM) is a small circuit board that connects to a motherboard socket and is secured by a one-way screw. The socket location is on the motherboard, under PCIe riser 2.

TPM 2.0 Considerations

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

If there is an existing TPM 1.2 installed in the server, you cannot upgrade to TPM 2.0.

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



Caution

If your Intel v3 or Intel v4 system is currently supported and protected by TPM version 2.0, a potential security exposure might occur if you downgrade the system software and BIOS to a version earlier than those shown in [Table 3-12](#).



Note

If the TPM 2.0 becomes unresponsive, reboot the server.

Table 3-12 *TPM Matrix by Intel CPU Version*

Intel CPU	TPM Version Supported	Minimum Cisco IMC Version	Minimum UCS Manager (UCSM) Version
Intel v3	TPM 1.2	2.0(3)	2.2(3)
	TPM 2.0	2.0(12)	2.2(8) or 3.1(2)
Intel v4	TPM 1.2	2.0(12)	2.2(8) or 3.1(2)
	TPM 2.0	2.0(12)	2.2(8) or 3.1(2)

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

1. [Installing the TPM Hardware, page 3-69](#)
2. [Enabling TPM Support in the BIOS, page 3-70](#)
3. [Enabling the Intel TXT Feature in the BIOS, page 3-72](#)

Installing the TPM Hardware

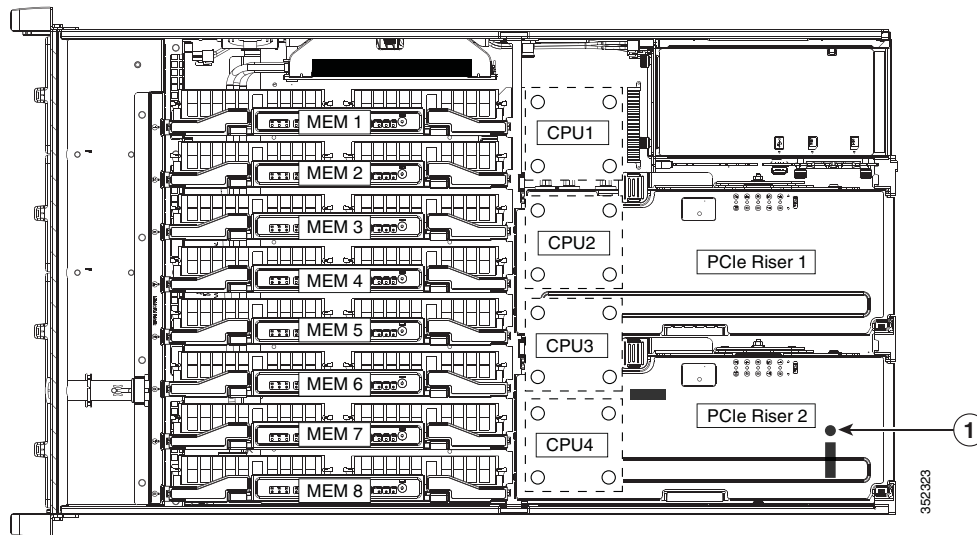
- Step 1** Prepare the server for component installation:
- Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
 - Slide the server out the front of the rack far enough so that you can remove the top cover. You might have to detach cables from the rear panel to provide clearance.

**Caution**

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

- Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).
 - Remove PCIe riser 2 to provide clearance. See [Replacing a PCIe Riser, page 3-49](#) for instructions.
- Step 2** Install a TPM:
- Locate the TPM socket on the motherboard, as shown in [Figure 3-28](#).
 - Align the connector that is on the bottom of the TPM circuit board with the motherboard TPM socket. Align the screw hole and standoff on the TPM board with the screw hole that is adjacent to the TPM socket.
 - Push down evenly on the TPM to seat it in the motherboard socket.
 - Install the single one-way screw that secures the TPM to the motherboard.
 - Replace PCIe riser 2 to the server. See [Replacing a PCIe Riser, page 3-49](#) for instructions.
 - Replace the top cover.
 - Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.
- Step 3** Continue with [Enabling TPM Support in the BIOS, page 3-70](#).

Figure 3-28 TPM Socket Location on Motherboard



- | | |
|----------|---|
| 1 | TPM socket and screw hole on the motherboard under PCIe riser 2 |
|----------|---|

Enabling TPM Support in the BIOS



Note

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



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, page 3-72](#).

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
 - If VT-d Support and VT Support are already enabled, skip to [Step 4](#).
 - If VT-d Support and VT Support are not enabled, continue with the next steps to enable them.
 - d. Press **Escape** to return to the BIOS Setup utility **Advanced** tab.
 - e. On the Advanced tab, choose **Processor Configuration** to open the Processor Configuration window.
 - f. Set Intel (R) VT and Intel (R) VT-d to **Enabled**.
- Step 4** Enable the Intel Trusted Execution Technology (TXT) feature:
- a. Return to the Intel TXT(LT-SX) Hardware Support window if you are not already there.
 - b. Set TXT Support to **Enabled**.
- Step 5** Press **F10** to save your changes and exit the BIOS Setup utility.
-

Replacing Power Supplies

The server requires four 1400 W power supplies. When four power supplies are installed they are redundant as 2+2.

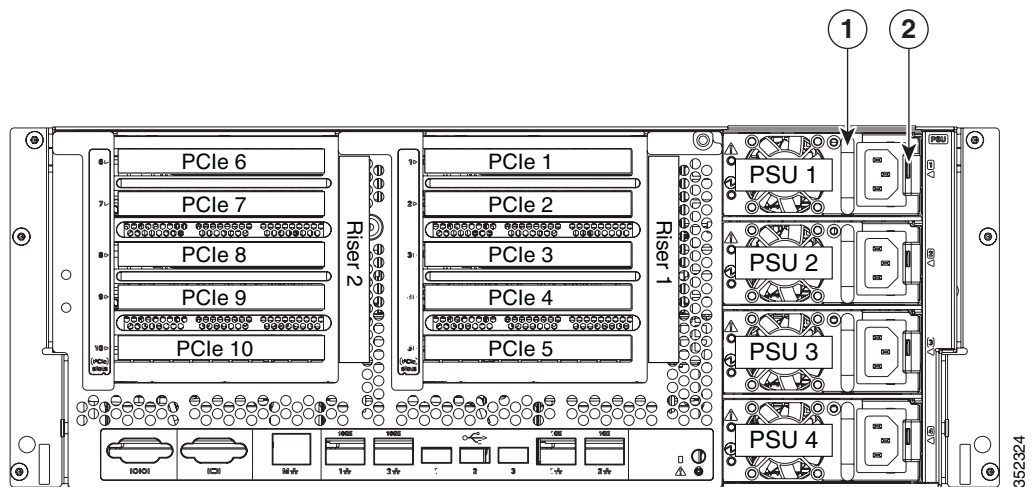


Note

If you have ordered a server with power supply redundancy (four power supplies), you do not have to power off the server to replace power supplies because they are redundant as 2+2.

- Step 1** Remove the power supply that you are replacing or a blank panel from an empty bay (see [Figure 3-29](#)):
- a. Perform one of the following actions:
 - If your server has only two power supplies, shut down and power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
 - If your server has four power supplies, you do not have to power off the server.
 - b. Remove the power cord from the power supply that you are replacing.
 - c. Grasp the power supply handle while pinching the release lever toward the handle.
 - d. Pull the power supply out of the bay.
- Step 2** Install a new power supply:
- a. Grasp the power supply handle and insert the new power supply into the empty bay.
 - b. Push the power supply into the bay until the release lever locks.
 - c. Connect the power cord to the new power supply.
 - d. If you powered off the server, press the **Power** button to return the server to main power mode.

Figure 3-29 Removing and Replacing Power Supplies



- | | | | |
|----------|---------------------|----------|----------------------------|
| 1 | Power supply handle | 2 | Power supply release lever |
|----------|---------------------|----------|----------------------------|

Service DIP Switches

This server includes a dual in-line package (DIP) switch panel on the media riser card.

This section includes the following topics:

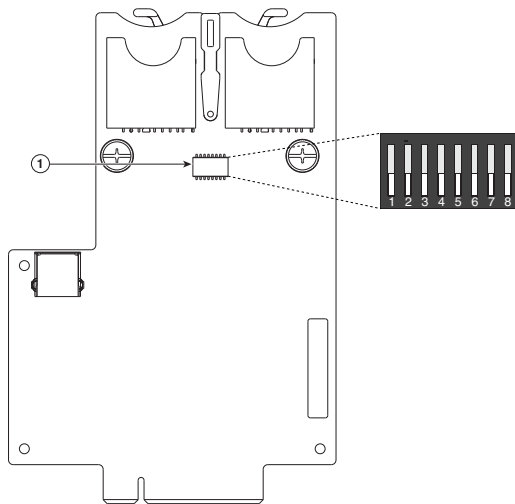
- [DIP Switch Location on the Media Riser Card, page 3-74](#)
- [Using the Clear Password DIP Switch, page 3-75](#)
- [Using the BIOS Recovery DIP Switch, page 3-76](#)
- [Using the Clear CMOS DIP Switch, page 3-79](#)

DIP Switch Location on the Media Riser Card

The panel of DIP switches is located on the media riser card (see [Figure 3-30](#)). The default position for all switches is open (down). See [Table 3-13](#) for definitions of the supported switch functions.

The media riser is the removable card that also includes the Cisco Flexible Flash drive (SD card) bays and the internal USB slot. See [Figure 3-27 on page 3-64](#) for the location of the media riser in the server.

Figure 3-30 DIP Switches on the Media Riser Card



1	DIP switch panel on the media riser card Switches are shown in the open (down) position.	—	
----------	---	---	--

Table 3-13 Supported DIP Switch Functions

Switch Number	Function
1	Clear Password
2	Recover BIOS
3	Clear CMOS
4–8	Reserved

Using the Clear Password DIP Switch

You can use DIP switch #1 to clear the BIOS administrator password.

Step 1 Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).

Step 2 Disconnect all power cords from the power supplies.

Step 3 Slide the server out the front of the rack far enough so that you can remove the top cover.



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

Step 4 Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

Step 5 Locate the media riser card in the server. See [Figure 3-27 on page 3-64](#).

Step 6 Remove PCIe riser 1 from the server to provide clearance. See [Replacing a PCIe Riser, page 3-49](#).

Step 7 Locate the BIOS recovery DIP switch 1 on the media riser card. See [Figure 3-30](#).

Step 8 Use a small pointed object such as a screwdriver to move DIP switch 1 to the closed (upper) position.

Step 9 Reconnect AC power cords to the server. The server powers up to standby power mode.

Step 10 Return the server to main power mode by pressing the **Power** button on the front panel.

Step 11 After the server has fully booted, power off the server again and disconnect all power cords.

Step 12 Move DIP switch 1 back to the default open (lower) position.



Note If you do not move the switch back to the default position, the Cisco IMC clears the password each time that you boot the server.

Step 13 Replace PCIe riser 1 to the server. See [Replacing a PCIe Riser, page 3-49](#).

Step 14 Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.

Using the BIOS Recovery DIP Switch

You can use DIP switch #2 to recover a corrupted BIOS.



Note

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

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

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

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

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

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



Note

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

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

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

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



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

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

Step 4 Reboot the server.

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

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

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

Step 6 Wait for server to complete the BIOS update, and then remove the USB thumb 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 DIP switch and recovery.cap (or bios.cap) File

See [Figure 3-30](#) for the location of the DIP switch on the media riser card.

- Step 1** Download the BIOS update package and extract it to a temporary location.
- Step 2** Copy the contents of the extracted recovery folder to the root directory of a USB thumb drive. The recovery folder contains the recovery.cap (or bios.cap) file that is required in this procedure.



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

- Step 3** Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).
- Step 4** Disconnect all power cords from the power supplies.
- Step 5** Slide the server out the front of the rack far enough so that you can remove the top cover.



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

- Step 6** Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).
- Step 7** Locate the media riser card in the server. See [Figure 3-27 on page 3-64](#).
- Step 8** Remove PCIe riser 1 from the server to provide clearance. See [Replacing a PCIe Riser, page 3-49](#).
- Step 9** Locate the BIOS recovery DIP switch 2 on the media riser card. See [Figure 3-30](#).
- Step 10** Use a small pointed object such as a screwdriver to move DIP switch 2 to the closed (upper) position.
- Step 11** Reconnect AC power cords to the server. The server powers up to standby power mode.
- Step 12** Insert the USB thumb drive that you prepared in [Step 2](#) into a USB port on the server.
- Step 13** Return the server to main power mode by pressing the **Power** button on the front panel. The server boots with the updated BIOS boot block.
- Step 14** Wait for the server to complete the BIOS update, and then remove the USB thumb drive from the server.



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

- Step 15** After the server has fully booted, power off the server again and disconnect all power cords.
- Step 16** Move DIP switch 2 back to the default open (lower) position.



Note If you do not move the switch back to the default position, the Cisco IMC attempts to recover the BIOS each time that you boot the server.

- Step 17** Replace PCIe riser 1 to the server. See [Replacing a PCIe Riser, page 3-49](#).
- Step 18** Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.
-

Using the Clear CMOS DIP Switch

You can use DIP switch #3 to clear the CMOS settings.

Step 1 Power off the server as described in [Shutting Down and Powering Off the Server, page 3-8](#).

Step 2 Disconnect all power cords from the power supplies.

Step 3 Slide the server out the front of the rack far enough so that you can remove the top cover.



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

Step 4 Remove the top cover as described in [Removing or Replacing the Server Top Cover, page 3-10](#).

Step 5 Locate the media riser card in the server. See [Figure 3-27 on page 3-64](#).

Step 6 Remove PCIe riser 1 from the server to provide clearance. See [Replacing a PCIe Riser, page 3-49](#).

Step 7 Locate the BIOS recovery DIP switch 3 on the media riser card. See [Figure 3-30](#).

Step 8 Use a small pointed object such as a screwdriver to move DIP switch 3 to the closed (upper) position.

Step 9 Reconnect AC power cords to the server. The server powers up to standby power mode.

Step 10 Return the server to main power mode by pressing the **Power** button on the front panel.

Step 11 After the server has fully booted, power off the server again and disconnect all power cords.

Step 12 Move DIP switch 3 back to the default open (lower) position.



Note If you do not move the switch back to the default position, the Cisco IMC clears the CMOS settings each time that you boot the server.

Step 13 Replace PCIe riser 1 to the server. See [Replacing a PCIe Riser, page 3-49](#).

Step 14 Replace the top cover, replace the server in the rack, replace power cords and any other cables, and then power on the server by pressing the **Power** button.



Server Specifications

This appendix lists the technical specifications for the Cisco UCS C460 M4 Server and includes the following sections:

- [Physical Specifications, page A-1](#)
- [Environmental Specifications, page A-2](#)
- [Power Specifications, page A-3](#)

Physical Specifications

[Table A-1](#) lists the physical specifications for the server.

Table A-1 *Physical Specifications*

Description	Specification
Height	6.9 in (175.8 mm)
Width	17.6 in (447 mm)
Length (including front handles and power supplies)	32.7 in (830 mm)
Length (including inner rack rail)	33.6 in (853 mm)
Weight (maximum configuration)	130 lbs (59 kg)
Weight (maximum configuration plus slide rails and cable management arm)	142 lbs (64 kg)

Environmental Specifications

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

Table A-2 *Environmental Specifications*

Description	Specification
Temperature, operating	5°C to 35°C (41°F to 95°F)
Temperature, nonoperating	-40°C to 65°C (-40°F to 149°F)
Humidity, operating	10% to 90%
Humidity, nonoperating	5% to 93%
Altitude, operating Derated 1°C for each 305 m	0 m to 3048 m (0 ft to 10,000 ft)
Altitude, nonoperating	0 m to 12,192 m (0 ft to 40,000 ft)
Acoustic noise, idle	LWAd 6.6 Bel (66.4 dBA) LpAm TBD dBA

Power Specifications

The power specifications for the power supply options are listed in the following sections:

- [1200 W AC Power Supply, page A-3](#)
- [1400 W AC Power Supply, page A-4](#)

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

<http://ucspowercalc.cisco.com>

1200 W AC Power Supply

[Table A-3](#) lists the specifications for each 1200 W AC power supply (Cisco part number UCSC-PSU2V2-1200W=).

Table A-3 1200 W AC Power Supply Specifications

Description	Specification
AC input voltage	Nominal range: 100–120 VAC, 200–240 VAC (Range: 90–132 VAC, 180–264 VAC)
AC input frequency	Nominal range: 50 to 60Hz (Range: 47–63 Hz)
Maximum AC input current	11 A at 100 VAC 7 A at 200 VAC
Maximum input volt-amperes	1456 VA
Maximum output power per PSU	800 W at 100–120 VAC 1200 W at 200–240 VAC
Maximum inrush current	35 A (sub-cycle duration)
Maximum hold-up time	12 ms at 1200 W
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1
Input connector	IEC60320 C14

1400 W AC Power Supply

Table A-4 lists the specifications for each 1400 W AC power supply (Cisco part number UCSC-PSU2V2-1400=).

Table A-4 1400 W AC Power Supply 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	8.5 A at 200 VAC
Maximum input volt-amperes	1700 VA
Maximum output power per PSU	1400 W at 200–240 VAC
Maximum inrush current	<30 A at 25° C (sub-cycle duration)
Maximum hold-up time	12 ms at 1200 W
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1
Input connector	IEC60320 C14



Power Cord Specifications

This appendix provides supported power cable specifications.

Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to the server. The jumper power cords, for use in racks, are available as an optional alternative to the standard power cords.



Note

Only the approved power cords or jumper power cords provided with the server are supported.

[Table B-1](#) lists the power cords for the server power supplies.

Table B-1 Supported Power Cords for the Server

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

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

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



RAID Controller Considerations

This appendix provides RAID controller information, and it includes the following sections:

- [Supported RAID Controllers and Required Cables, page C-2](#)
- [Write-Cache Policy for Cisco 12G SAS Modular RAID Controller, page C-3](#)
- [Cisco 12G SAS Modular RAID Controller Considerations, page C-3](#)
- [Cisco UCS SAS 9300-8e HBA Considerations, page C-3](#)
- [Supercap Power Module \(RAID Backup Unit\), page C-5](#)
- [RAID Controller Cabling, page C-6](#)
- [Restoring RAID Configuration After Replacing a RAID Controller, page C-9](#)
- [For More Information, page C-9](#)

Supported RAID Controllers and Required Cables

This server supports the RAID controller options and cable requirements shown in [Table C-1](#).



Note

Do not mix controller types in the server.



Note

NVMe PCIe SSDs cannot be controlled by a SAS RAID controller.

Table C-1 Cisco UCS C460 M4 Server Supported RAID Options

Controller	Style	Maximum Drives	Optional SCPM?	RAID Levels	Required Cables
LSI MegaRAID SAS 9361CV-8i	PCIe	8 internal	Yes	0, 1, 5, 6, 10, 50, 60	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6 .
Cisco UCS 12G SAS Modular 8-Port RAID Controller (UCSC-MRAID12G) Can be ordered with modular flash-based write cache (FBWC) option: 512 MB Note: See also Cisco 12G SAS Modular RAID Controller Considerations, page C-3 .	PCIe	8 internal	Yes	0, 1, 5, 10, 50	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6 .
Cisco UCS 12G SAS Modular 12-Port RAID Controller (UCSC-MRAIDC460) Can be ordered with modular flash-based write cache (FBWC) options: 1 GB, 2 GB, 4 GB Note: See also Cisco 12G SAS Modular RAID Controller Considerations, page C-3 .	PCIe	12 internal	Yes	0, 1, 5, 6, 10, 50, 60	Use the SAS cables that come with the chassis. See RAID Controller Cabling, page C-6 .
LSI 9300-8e HBA (non-RAID) NOTE: See also Cisco UCS SAS 9300-8e HBA Considerations, page C-3 .	PCIe	Up to 1024 external drives (JBOD)	No	Non-RAID	External cables not sold by Cisco NOTE: This HBA does not support optical cables for connection to external storage (copper only).

Cisco 12G SAS Modular RAID Controller Considerations

Stripe-Size Limitation When No Flash-Backed Write Cache is Present

This controller can be ordered with several modular flash-backed write cache (FBWC) options: 512 MB (when using UCSC-MRAID12G); or 1 GB, 2 GB, or 4 GB (when using UCSC-MRAIDC460).

- If the controller has a FBWC and you are using a RAID configuration that uses striping (RAID 0, 10, 50, or 60), then the full list of stripe sizes is available (8, 16, 32, 64, 128, 256, 512, or 1024 KB).
- If the controller does not have a FBWC, then the only stripe size available is 64 KB.

Write-Cache Policy for Cisco 12G SAS Modular RAID Controller

For this server and other Cisco Generation M4 servers, the default write-cache policy for the Cisco Modular RAID controller is *Write Through* (irrespective of the presence of a charged Supercap power module or “good BBU”). This utilizes the optimal performance characteristics of the controller.

If you have Cisco IMC 2.0(5) or later firmware installed to the M4 server, 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.

Cisco UCS SAS 9300-8e HBA Considerations

This section contains the following topics:

- [Optical Cables Not Supported for 9300-8e HBA, page C-3](#)
- [Mixing Rules for 9300-8e HBA, page C-3](#)
- [Bad Drive and Predictive Failure Behavior for 9300-8e HBA, page C-4](#)
- [Setting the Preferred Boot Device For 9300-8e HBA, page C-4](#)

Optical Cables Not Supported for 9300-8e HBA

The 9300-8e HBA does not support optical cables for connection to external storage (copper only).

Mixing Rules for 9300-8e HBA

Mixing the Cisco UCS 9300-8e HBA in the same server as the Cisco UCS 12G SAS Modular HBA requires the following firmware levels:

- Cisco IMC/BIOS 2.0(8) or later
- Cisco UCS Manager 2.2(6) or later (for integrated servers only)

Bad Drive and Predictive Failure Behavior for 9300-8e HBA

The bad drive and predictive failure behavior for the Cisco UCS SAS 9300-e HBA cards is different than that for LSI MegaRAID cards. The list below compares behavior for these HBA cards and LSI MegaRAID cards.

- Bad/invalid/OMB drive handling:
 - MegaRAID: The bad drive is marked BAD in the GUI/CLI interfaces and the fault LED on the drive is solid amber.
 - HBA: The bad drive is not shown in the GUI/CLI and there is no LED indication.
- Drive predictive failure:
 - MegaRAID: If the drive is part of a RAID volume with a spare, the software performs an auto-copy backup and then marks the drive failed/BAD with the fault LED on the drive solid amber.
 - HBA: There is no error handling and there is no LED indication. The operating system must handle the fault.

Setting the Preferred Boot Device For 9300-8e HBA

Currently, the boot device order for these HBAs does not map to a physical slot as seen in the Boot Option dialog of the server BIOS Setup Utility. This makes it difficult to differentiate between multiple devices.

Use the following procedure to select the preferred boot device in the LSI BIOS CU SAS Topology screen. When you select the preferred boot device in the BIOS CU SAS Topology screen, it is displayed at the top of the list in the server BIOS Setup Utility Boot Option dialog, making it easy to identify.

-
- Step 1** In the LSI SAS BIOS CU, navigate to the SAS Topology screen.
- Step 2** Press **Alt+B** to select or deselect a device as the preferred boot device. On this screen, you can identify the device by slot number.
- Step 3** Press **Alt+A** to select or deselect a device as the alternate boot device. On this screen, you can identify the device by slot number. The alternate boot device is used if the preferred boot device is not detected.
- Step 4** Return to the BIOS CU SAS Topology screen.
The Device Info column shows which devices you selected with the designators `Boot` and `Alt`.
- Step 5** In the server BIOS Setup Utility, open the Boot Option dialog.
The preferred device that you selected in the LSI BIOS CU is listed at the top of the list.
- Step 6** Select the device at the top of the list as your boot option.
-

RAID Card Firmware Compatibility

Firmware on the RAID 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 RAID controller firmware accordingly using the Host Upgrade Utility (HUU) for your firmware release to bring it to a compatible level.

See the HUU guide for your Cisco IMC release for instructions on downloading and using the utility to bring server components to compatible levels: [HUU Guides](#)

Supercap Power Module (RAID Backup Unit)

This server supports installation of one supercap power module (SCPM) backup unit. The unit mounts to a bracket on the chassis wall adjacent to the internal RAID controller slot (see [Replacing the Supercap Power Module \(RAID Backup Unit\)](#), page 3-47).

The SCPM provides approximately 3 years of backup for the disk write-back cache DRAM in the case of sudden power loss by offloading the cache to the NAND flash.

RAID Controller Cabling

This section contains the following topics:

- [SAS Cable-to-Drive Bay Mapping, page C-6](#)
- [Cabling an 8-Port RAID Controller, page C-7](#)
- [Cabling a 12-Port RAID Controller, page C-8](#)

SAS Cable-to-Drive Bay Mapping

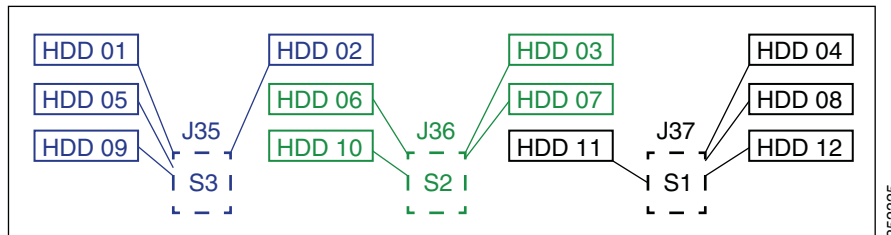
The server chassis comes with three SAS cables pre-attached to the drive backplane SAS ports. It is important to know which SAS cable ports on the drive backplane control the drive bays when attaching SAS cables to your RAID controller card. See [Figure C-1](#).



Note

The view shown in the diagram in [Figure C-1](#) is facing the *front* of the server. The SAS ports on the drive backplane are shown in their physical position on the reverse (interior) side of the backplane.

Figure C-1 SAS Cable to Drive Bay Mapping (Facing the Front of the Server)



Cabling an 8-Port RAID Controller

An 8-port RAID controller can control 8 drives.



Note

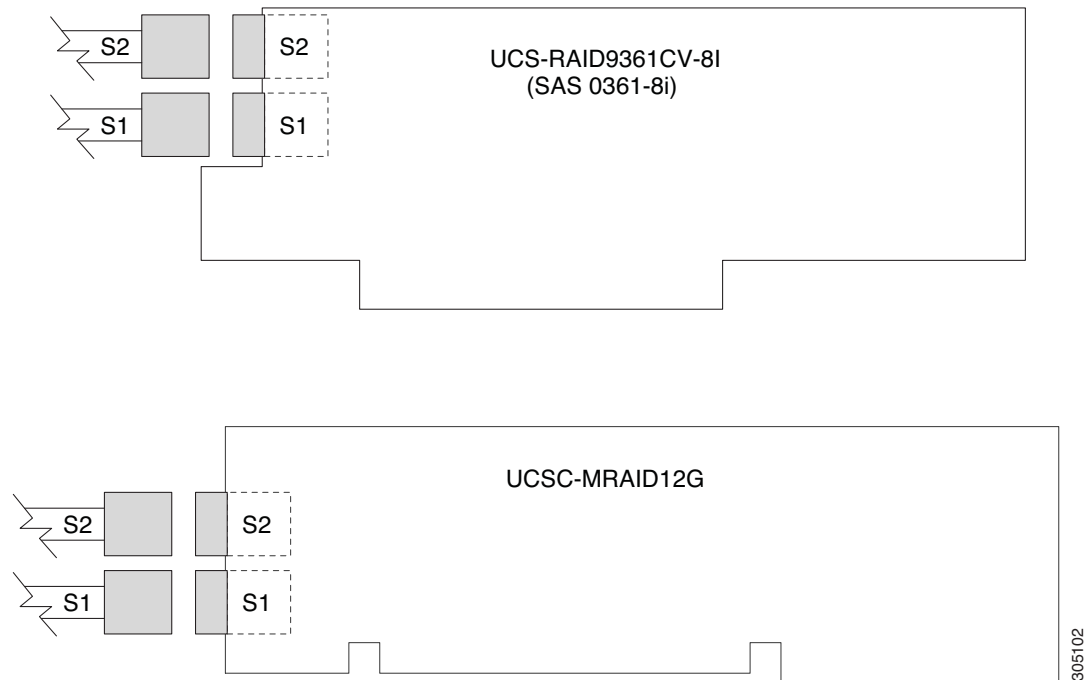
When using an 8-port RAID controller, you must populate the eight drives that you want to control in drive bays (3, 6, 7, 10) and (4, 8, 11, 12). That is, you must populate the bays that are controlled by SAS backplane ports S1 and S2 as shown in [Figure C-1](#).

The connectors on the card might not be labeled. See [Figure C-2](#) for the card connector numbering.

Step 1 Attach the S1 SAS cable from drive backplane port J37 to the S1 port on the RAID controller card.

Step 2 Attach the S2 SAS cable from drive backplane port J36 to the S2 port on the RAID controller card.

Figure C-2 Cabling 8-Port RAID Controller Cards



305102

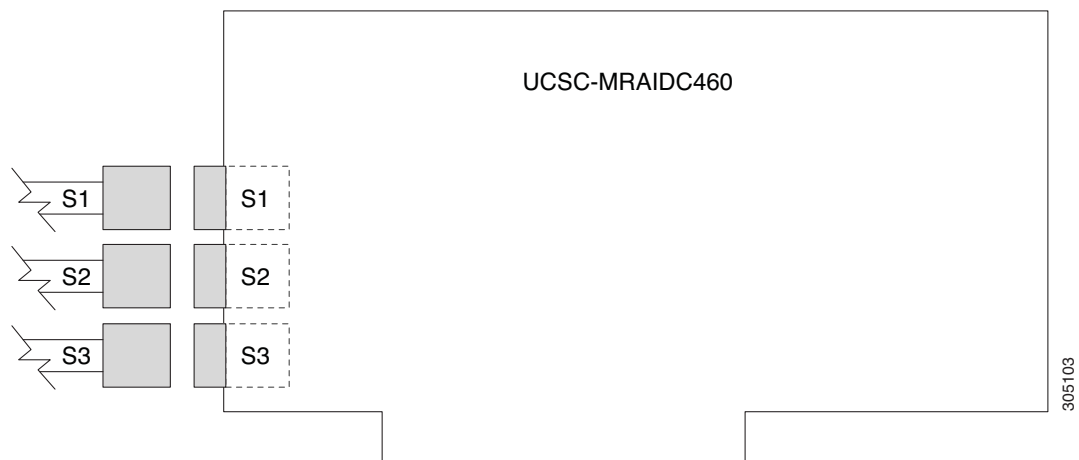
Cabling a 12-Port RAID Controller

A 12-port RAID controller can control 12 drives.

The connectors on the card might not be labeled. See [Figure C-3](#) for the card connector numbering.

-
- Step 1** Attach the S1 SAS cable from drive backplane port J37 to the S1 port on the RAID controller card.
 - Step 2** Attach the S2 SAS cable from drive backplane port J36 to the S2 port on the RAID controller card.
 - Step 3** Attach the S3 SAS cable from drive backplane port J35 to the S3 port on the RAID controller card
-

Figure C-3 Cabling a 12-Port RAID Controller Card



Restoring RAID Configuration After Replacing a RAID Controller

When you replace a RAID controller, the RAID configuration that is stored in the controller is lost.

-
- Step 1** Replace your RAID controller. See [Special Considerations for Cisco UCS Virtual Interface Cards, page 3-54](#).
- Step 2** If this was a full chassis swap, replace all drives into the drive bays, in the same order that they were installed in the old chassis.
- Step 3** Reboot the server and watch for the prompt to press F.
- Step 4** Press **F** when you see the following onscreen prompt:
- ```
Foreign configuration(s) found on adapter.
Press any key to continue or 'C' load the configuration utility,
or 'F' to import foreign configuration(s) and continue.
```
- Step 5** Press any key (other than C) to continue when you see the following onscreen prompt:
- ```
All of the disks from your previous configuration are gone. If this is  
an unexpected message, then please power of your system and check your cables  
to ensure all disks are present.  
Press any key to continue, or 'C' to load the configuration utility.
```
- Step 6** Watch the subsequent windows for confirmation that your RAID configuration was imported correctly:
- If you see the following message, your configuration was successfully imported. The LSI virtual drive is also listed among the storage devices.

```
N Virtual Drive(s) found on host adapter.
```
 - If you see the following message, your configuration was not imported. This problem can occur if you do not press F quickly enough when prompted. In this case, reboot the server and try the import operation again when you are prompted to press F.

```
0 Virtual Drive(s) found on host adapter.
```
-

For More Information

The LSI 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, see the [Cisco UCS Servers RAID Guide](#).

Full LSI documentation is also available:

LSI MegaRAID SAS Software User's Guide (for LSI MegaRAID)

http://www.lsi.com/DistributionSystem/AssetDocument/80-00156-01_RevH_SAS_SW_UG.pdf

■ For More Information



GPU Card Installation

This appendix contains the following topics:

- [Overview of Server Firmware Requirements, page D-1](#)
- [GPU Population Rules, page D-2](#)
- [Requirement For All Supported GPUs: Memory-Mapped I/O Greater than 4 GB, page D-2](#)
- [Installing a GPU Card, page D-3](#)
- [Using NVIDIA GRID License Server For M-Series GPUs, page D-6](#)
- [Installing Drivers to Support GPU Cards, page D-16](#)

Overview of Server Firmware Requirements

[Table D-1](#) lists the minimum server firmware versions for the supported GPU cards.

Table D-1 Server Firmware Minimum Versions

GPU	Cisco IMC/BIOS Minimum Version
NVIDIA GRID K1	1.5(6)
NVIDIA GRID K2	1.5(6)
NVIDIA Tesla K10	1.5(7)
NVIDIA Tesla K20	1.5(7)
NVIDIA Tesla K20X	1.5(7)
NVIDIA Tesla K40	1.5(7)
NVIDIA Tesla K80	2.0(6)
NVIDIA Tesla M60	2.0(9)
NVIDIA Tesla M10	3.0(3)
NVIDIA Tesla P100 12GB	3.0(3)
NVIDIA Tesla P100 16GB	3.0(3)
AMD FirePro S7150 X2	3.0(3)

GPU Population Rules

- The GPU cards are double-wide and cover two slots. A GPU cards in slot 2 also covers slot 1. A GPU card in slot 7 also covers slot 6.
- NVIDIA K-Series and M-Series GPUs can support only less-than 1 TB memory in the server.
- NVIDIA P-Series GPUs can support 1 TB or more memory in the server.
- AMD FirePro S7150 X2 can support only less-than 1 TB memory in the server.
- [Table D-2](#) shows the rules for populating NVIDIA GPU cards in the server.

Table D-2 GPU Population Rules

Single GPU	Dual GPU	Mix Two Different GPUs
PCIE 2 or PCIE 7 ¹	PCIE 2 and PCIE 7	Not supported at this time

1. If you have a GPU card in slot 7, you cannot also have a Qlogic QLE2562 HBA card in slot 9.

Requirement For All Supported GPUs: Memory-Mapped I/O Greater than 4 GB

All supported GPU cards require enablement of the BIOS setting that allows greater than 4 GB of memory-mapped I/O (MMIO).

Standalone Server

If the server is used in standalone mode, this BIOS setting is enabled by default:

Advanced > PCI Configuration > Memory Mapped I/O Above 4 GB [**Enabled**]

If you need to change this from a different setting, enter the BIOS Setup Utility by pressing F2 when prompted during bootup.

Cisco UCS Manager Controlled Server

If the server is integrated with Cisco UCS Manager and controlled by a service profile, this setting is enabled by default in the service profile when a GPU is present.

To change this setting manually, use the following procedure.

-
- Step 1** Refer to the Cisco UCS Manager configuration guide (GUI or CLI) for your release for instructions on configuring service profiles:
[Cisco UCS Manager Configuration Guides](#)
- Step 2** Refer to the chapter on Configuring Server-Related Policies > Configuring BIOS Settings.
- Step 3** In the section of your profile for PCI Configuration BIOS Settings, set `Memory Mapped IO Above 4GB Config` to one of the following:
- **Disabled**—Does not map 64-bit PCI devices to 64 GB or greater address space.
 - **Enabled**—Maps I/O of 64-bit PCI devices to 64 GB or greater address space.
 - **Platform Default**—The policy uses the value for this attribute contained in the BIOS defaults for the server. Use this only if you know that the server BIOS is set to use the default enabled setting for this item.
- Step 4** Reboot the server.



Note Cisco UCS Manager pushes BIOS configuration changes through a BIOS policy or default BIOS settings to the Cisco Integrated Management Controller (CIMC) buffer. These changes remain in the buffer and do not take effect until the server is rebooted.

Installing a GPU Card

Double-Wide GPU Power Cables

In the table below, the cable that is used with the GPU is listed. It is also indicated whether the cable is included in the GPU BOM or must be ordered separately.

Separate = Cable must be ordered separately when the ordering tool prompts you.

Included = Cable is included with the GPU; no additional action is needed

Double-Wide GPU	GPU Power Cable	Cable Included When the GPU Card is Ordered With a System Order?	Cable Included When the GPU Card is Ordered as a Spare?
Nvidia GRID K1	UCSC-AUXCBL8-EX	Included	Separate
Nvidia GRID K2	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla K10	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla K20	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla K20X	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla K40	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla K80	UCSC-300W-460M4	Included	Separate
Nvidia Tesla M60	UCSC-300W-460M4	Included	Separate
Nvidia Tesla M10	UCSC-AUXCBL8-EX	Included	Separate
Nvidia Tesla P100 12GB	UCSC-300W-460M4	Included	Separate
Nvidia Tesla P100 16GB	UCSC-300W-460M4	Included	Separate
AMD FirePro S7150 X2	UCSC-300W-460AMD	Included	Separate

Procedure

- Step 1** Remove a GPU card (or a blank filler panel) from the PCIe riser assembly:
- Shut down and power off the server as described in [Shutting Down and Powering Off the Server](#), page 3-8.
 - Slide the server out the front of the rack far enough so that you can remove the top cover.



Caution

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

- Remove the top cover as described in [Removing or Replacing the Server Top Cover](#), page 3-10.

- d. Lift the blue plastic retaining latch at the top of the PCIe riser until the latch is vertical (see [Figure 3-20](#)). The lever action disengages the riser's connector from the motherboard socket.
- e. Lift straight up on both ends of the PCIe riser and remove it from the server. Set the riser on an antistatic surface.
- f. Open the hinged blue plastic card cover (see [Figure 3-22](#)).
- g. Open the hinged card-tab retainer (see [Figure 3-22](#)). Pinch the two blue finger-grips toward the center and swing open the retainer.
- h. Pull evenly on both corners of the GPU card to remove it from the socket on the PCIe riser.
- i. Disconnect the GPU card's power cable from the PCIe riser power connector.

Step 2 Install a GPU card:

- a. Connect the *white* connector of the included power cable to the *white* power-connector on the riser. The power connector is adjacent to PCIE 2 on riser 1 or PCIE 6 on riser 2 (see [Figure 3-22](#)).

For a list of cables that go with supported double-wide GPUs, see [Double-Wide GPU Power Cables](#), page D-3.



Caution

Do not reverse the GPU power cable. Connect the *black* connector on the cable to the *black* connector on the GPU card. Connect the *white* connector on the cable to the *white* connector on the PCIe riser. Never connect a 6-pin cable connector to an 8-slot receptacle.



Note

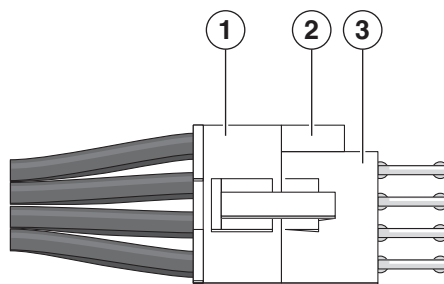
Your GPU card might be shipped with two power cables: a straight cable and a Y-cable. The straight cable is used for connecting power to the GPU card in this server; do not use the Y-cable, which is used for connecting the GPU card in external devices only.



Note

If your cable has a 10-pin connector, the white 10-pin connector on the cable connects to a white 8-pin socket on the riser. The cable connector is keyed so that when you insert it, only 8 pins are used. Two pins of the cable connector sit outside the riser socket (see [Figure D-1](#).)

Figure D-1 High-Power GPU Power Cable (UCSC-300W-460M4) 10-Pin Connector



1	White 10-pin cable connector	3	8-pin socket on PCIe riser
2	Two pins on cable connector that are outside the socket on riser (not used)		

- b. Connect the *black* connector of the power cable to the *black* connector on the GPU card.
- c. Align the new GPU card with the empty socket on the PCIe riser assembly (PCIE 2 on riser 1 or PCIE 7 on riser 2).

- d. Push down evenly on both ends of the card until it is fully seated in the socket.
Ensure that the card's rear-panel tab sits flat against the PCIe riser rear-panel opening.
- e. Close the hinged card-tab retainer and press it down until it clicks and locks in place.
- f. Close the hinged blue plastic card cover.
- g. Align the riser so that its connector is over the motherboard socket.
- h. With the blue plastic retaining latch fully open (vertical), lower the riser into the chassis alignment channels until its connector makes contact with the motherboard socket.
- i. Close the retaining latch until it is flat to fully engage the riser with the motherboard socket.
- j. Replace the top cover.
- k. Replace the server in the rack, replace cables, and then power on the server by pressing the **Power** button.

Step 3 If you installed a Tesla M60 or M10 GPU, continue with [Using NVIDIA GRID License Server For M-Series GPUs](#), page D-6.

Using NVIDIA GRID License Server For M-Series GPUs

Installation Overview

This section applies to the following GPUs:

- NVIDIA Tesla M10
- NVIDIA Tesla M60

Use the topics in this appendix in the following order:

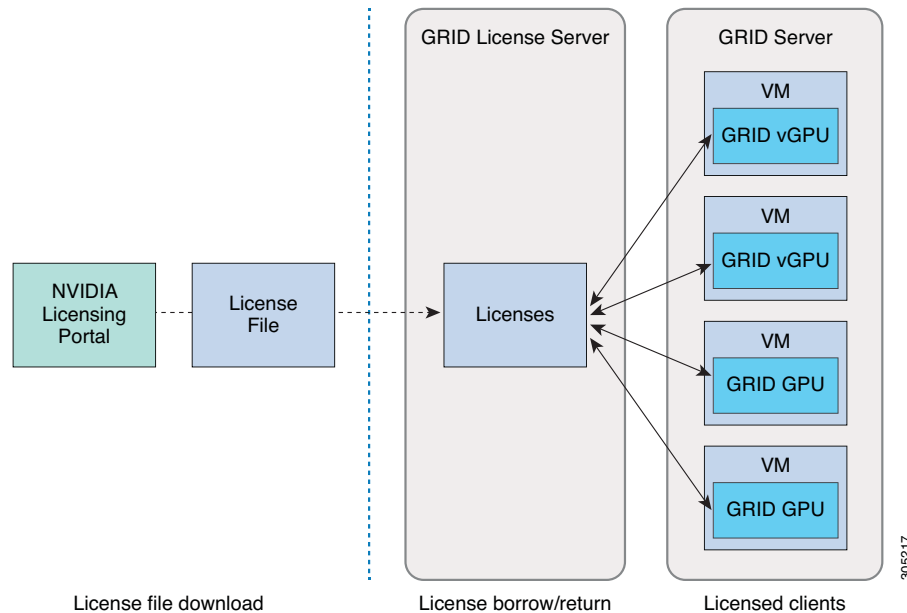
1. Install the hardware.
 - [Installing a GPU Card, page D-3](#)
2. Register your product activation keys with NVIDIA.
 - [NVIDIA GRID License Server Overview, page D-7](#)
 - [Registering Your Product Activation Keys With NVIDIA, page D-8](#)
3. Download the GRID software suite.
 - [Downloading the GRID Software Suite, page D-8](#)
4. Install the GRID License Server software to a host.
 - [Installing NVIDIA GRID License Server Software, page D-9](#)
5. Generate licenses on the NVIDIA Licensing Portal and download them.
 - [Installing GRID Licenses From the NVIDIA Licensing Portal to the License Server, page D-11](#)
6. Manage your GRID licenses.
 - [Managing GRID Licenses, page D-12](#)
7. Decide whether to use the GPU in compute mode or graphics mode.
 - [Switching Between Compute Mode and Graphics Mode, page D-14](#)

NVIDIA GRID License Server Overview

The NVIDIA Tesla M-Series GPU combines Tesla and GRID functionality when the licensed GRID features such as *GRID vGPU* and *GRID Virtual Workstation* are enabled. These features are enabled during OS boot by borrowing a software license that is served over the network from the NVIDIA GRID License Server virtual appliance. The license is returned to the license server when the OS shuts down.

You obtain the licenses that are served by the GRID License Server from NVIDIA's Licensing Portal as downloadable license files, which you install into the GRID License Server via its management interface (see [Figure D-2](#)).

Figure D-2 GRID Licensing Architecture



There are three editions of GRID licenses, which enable three different classes of GRID features. The GRID software automatically selects the license edition based on the features that you are using (see [Table D-3](#)).

Table D-3 GRID Licensing Editions

GRID License Edition	GRID Features
NVIDIA GRID Virtual Applications	<ul style="list-style-type: none"> Designed for PC-level applications and server-based desktops.
GRID Virtual PC	<ul style="list-style-type: none"> Designed for virtual desktops that can use PC Windows applications, browsers, and high-definition video.
GRID Virtual Workstation	<ul style="list-style-type: none"> Designed for remote, professional graphics applications with full performance on any device.

Registering Your Product Activation Keys With NVIDIA

After your order is processed, NVIDIA sends you a Welcome email that contains your product activation keys (PAKs) and a list of the types and quantities of licenses that you purchased.

-
- Step 1** Select the **Log In** link, or the **Register** link if you do not already have an account.
The NVIDIA Software Licensing Center > License Key Registration dialog opens.
- Step 2** Complete the License Key Registration form and then click **Submit My Registration Information**.
The NVIDIA Software Licensing Center > Product Information Software dialog opens.
- Step 3** If you have additional PAKs, click **Register Additional Keys**. For each additional key, complete the form on the License Key Registration dialog and then click **Submit My Registration Information**.
- Step 4** Agree to the terms and conditions and set a password when prompted.
-

Downloading the GRID Software Suite

-
- Step 1** Return to the NVIDIA Software Licensing Center > Product Information Software dialog.
- Step 2** Click the **Current Releases** tab.
- Step 3** Click the **NVIDIA GRID** link to access the Product Download dialog. This dialog includes download links for:
- NVIDIA License Manager software
 - The gpumodeswitch utility
 - The host driver software
- Step 4** Use the links to download the software.
-

Installing NVIDIA GRID License Server Software

For full installation instructions and troubleshooting, refer to the *NVIDIA GRID License Server User Guide*. Also refer to the *NVIDIA GRID License Server Release Notes* for the latest information about your release.

<http://www.nvidia.com>

Platform Requirements for NVIDIA GRID License Server

- The hosting platform can be a physical or a virtual machine. NVIDIA recommends using a host that is dedicated only to running the License Server.
- The hosting platform must run a supported Windows OS.
- The hosting platform must have a constant IP address.
- The hosting platform must have at least one constant Ethernet MAC address.
- The hosting platform's date and time must be set accurately.

Installing on Windows

The License Server requires a Java runtime environment and an Apache Tomcat installation. Apache Tomcat is installed when you use the NVIDIA installation wizard for Windows.

-
- Step 1** Download and install the latest Java 32-bit runtime environment from <https://www.oracle.com/downloads/index.html>.



Note Install the 32-bit Java Runtime Environment, regardless of whether your platform is Windows 32-bit or 64-bit.

- Step 2** Create a server interface:
- On the NVIDIA Software Licensing Center dialog, click **Grid Licensing > Create License Server**.
 - On the Create Server dialog, fill in your desired server details.
 - Save the .bin file that is generated onto your license server for installation.

- Step 3** Unzip the NVIDIA License Server installer Zip file that you downloaded previously and run `setup.exe`.

- Step 4** Accept the EULA for the NVIDIA License Server software and the Apache Tomcat software. Tomcat is installed automatically during the License Server installation.

- Step 5** Use the installer wizard to step through the installation.



Note On the Choose Firewall Options dialog, select the ports to be opened in the firewall. NVIDIA recommends that you use the default setting, which opens port 7070 but leaves port 8080 closed.

- Step 6** Verify the installation. Open a web browser on the License Server host and connect to the URL <http://localhost:8080/licserver>. If the installation was successful, you see the NVIDIA License Client Manager interface.
-

Installing on Linux

The License Server requires a Java runtime environment and an Apache Tomcat installation. You must install both separately before installing the License Server on Linux.

Step 1 Verify that Java was installed with your Linux installation. Use the following command:

```
java -version
```

If no Java version is displayed, use your Linux package manager to install with the following command:

```
sudo yum install java
```

Step 2 Use your Linux package manager to install the tomcat and tomcat-webapps packages.

a. Use the following command to install Tomcat:

```
sudo yum install java
```

b. Enable the Tomcat service for automatic startup on boot:

```
sudo systemctl enable tomcat.service
```

c. Start the Tomcat service:

```
sudo systemctl start tomcat.service
```

d. Verify that the Tomcat service is operational. Open a web browser on the License Server host and connect to the URL <http://localhost:8080>. If the installation was successful, you see the Tomcat webapp.

Step 3 Install the License Server:

a. Unpack the License Server tar file using the following command:

```
tar xfz NVIDIA-linux-2015.09-0001.tgz
```

b. Run the unpacked setup binary as root:

```
sudo ./setup.bin
```

c. Accept the EULA and then continue with the installation wizard to finish the installation.



Note On the Choose Firewall Options dialog, select the ports to be opened in the firewall. NVIDIA recommends that you use the default setting, which opens port 7070 but leaves port 8080 closed.

Step 4 Verify the installation. Open a web browser on the License Server host and connect to the URL <http://localhost:8080/licserver>. If the installation was successful, you see the NVIDIA License Client Manager interface.

Installing GRID Licenses From the NVIDIA Licensing Portal to the License Server

Accessing the GRID License Server Management Interface

Open a web browser on the License Server host and access the URL <http://localhost:8080/licserver>.
If you configured the License Server host's firewall to permit remote access to the License Server, the management interface is accessible from remote machines at the URL <http://hostname:8080/licserver>.

Reading Your License Server's MAC Address

Your License Server's Ethernet MAC address is used as an identifier when registering the License Server with NVIDIA's Licensing Portal.

-
- Step 1** Access the GRID License Server Management Interface in a browser. See [Accessing the GRID License Server Management Interface, page D-11](#).
- Step 2** In the left-side **License Server** panel, select **Configuration**. The **License Server Configuration** panel opens. Next to **Server host ID**, a pull-down menu lists the possible Ethernet MAC addresses.
- Step 3** Select your License Server's MAC address from the **Server host ID** pull-down.



Note It is important to use the same Ethernet ID consistently to identify the server when generating licenses on NVIDIA's Licensing Portal. NVIDIA recommends that you select one entry for a primary, non-removable Ethernet interface on the platform.

Installing Licenses From the Licensing Portal

-
- Step 1** Access the GRID License Server Management Interface in a browser. See [Accessing the GRID License Server Management Interface, page D-11](#).
- Step 2** In the left-side **License Server** panel, select **Configuration**. The **License Server Configuration** panel opens.
- Step 3** Use the License Server Configuration menu to install the .bin file that you generated earlier.
- a. Click **Choose File**.
 - b. Browse to the license .bin file that you want to install and click **Open**.
 - c. Click **Upload**.

The license file is installed on your License Server. When installation is complete, you see the confirmation message, "Successfully applied license file to license server."

Viewing Available Licenses

Use the following procedure to view which licenses are installed and available, along with their properties.

-
- Step 1** Access the GRID License Server Management Interface in a browser. See [Accessing the GRID License Server Management Interface, page D-11](#).
 - Step 2** In the left-side **License Server** panel, select **Licensed Feature Usage**.
 - Step 3** Click on a feature in the **Feature** column to see detailed information about the current usage of that feature.
-

Viewing Current License Usage

Use the following procedure to view information about which licenses are currently in-use and borrowed from the server.

-
- Step 1** Access the GRID License Server Management Interface in a browser. See [Accessing the GRID License Server Management Interface, page D-11](#).
 - Step 2** In the left-side **License Server** panel, select **Licensed Clients**.
 - Step 3** To view detailed information about a single licensed client, click on its **Client ID** in the list.
-

Managing GRID Licenses

Features that require GRID licensing run at reduced capability until a GRID license is acquired.

Acquiring a GRID License on Windows

To acquire a GRID license on Windows, use the following procedure.

-
- Step 1** Open the NVIDIA Control Panel using one of the following methods:
 - Right-click on the Windows desktop and select NVIDIA Control Panel from the menu.
 - Open Windows Control Panel and double-click the NVIDIA Control Panel icon.
 - Step 2** In the NVIDIA Control Panel left-pane under **Licensing**, select **Manage License**.
The **Manage License** task pane opens and shows the current license edition being used. The GRID software automatically selects the license edition based on the features that you are using. The default is Tesla (unlicensed).
 - Step 3** If you want to acquire a license for GRID Virtual Workstation, under License Edition, select **GRID Virtual Workstation**.
 - Step 4** In the **License Server** field, enter the address of your local GRID License Server.
The address can be a domain name or an IP address.
 - Step 5** In the **Port Number** field, enter your port number or leave it set to the default used by the server, which is 7070.
 - Step 6** Select **Apply**.

The system requests the appropriate license edition from your configured License Server. After a license is successfully acquired, the features of that license edition are enabled.



Note After you configure licensing settings in the NVIDIA Control Panel, the settings persist across reboots.

Acquiring a GRID License on Linux

To acquire a GRID license on Linux, use the following procedure.

Step 1 Edit the configuration file `/etc/nvidia/gridd.conf`:

```
sudo vi /etc/nvidia/gridd.conf
```

Step 2 Edit the `ServerUrl` line with the address of your local GRID License Server.

The address can be a domain name or an IP address. See the example file below.

Step 3 Append the port number (default 7070) to the end of the address with a colon. See the example file below.

Step 4 Edit the `FeatureType` line with the integer for the license type. See the example file below.

- GRID vGPU = 1
- GRID Virtual Workstation = 2

Step 5 Restart the `nvidia-gridd` service.

```
sudo service nvidia-gridd restart
```

The service automatically acquires the license edition that you specified in the `FeatureType` line. You can confirm this in `/var/log/messages`.



Note After you configure licensing settings in `gridd.conf`, the settings persist across reboots.

Sample configuration file:

```
# /etc/nvidia/gridd.conf - Configuration file for NVIDIA Grid Daemon
# Description: Set License Server URL
# Data type: string
# Format: "<address>:<port>"
ServerUrl=10.31.20.45:7070

# Description: Set Feature to be enabled
# Data type: integer
# Possible values:
# 1 => for GRID vGPU
# 2 => for GRID Virtual Workstation
FeatureType=1
```

Switching Between Compute Mode and Graphics Mode

Overview of GPU Modes

The NVIDIA Tesla M60 GPU is shipped in compute mode, which is optimized for high-performance compute (HPC) applications. However, while compute mode is best for HPC usage, it can cause compatibility issues with OS and hypervisors if you use the GPU primarily as a graphics device.

The mode is determined at power-on, from settings stored in the GPU's non-volatile memory. You can use the command-line tool `gpumodeswitch` to toggle the GPU between compute mode and graphics mode. [Table D-4](#) and [Table D-5](#) compare the compute mode and graphic mode default settings.

Table D-4 Compute Mode Default Settings

Setting	Value	Notes
Classcode	3D Controller	This classcode tells the OS that the GPU is not intended for use as the primary display device.
Memory base address register (BAR)	8 GB	A large BAR is exposed for direct access to the frame buffer from the CPU and PCIe devices.
I/O base BAR	Disabled	The GPU does not consume any legacy I/O resources when used as a non-display device.
Error-correcting code (ECC) protection	Enabled	ECC is enabled on the GPU frame buffer to protect against single- and multi-bit memory errors.

Table D-5 Graphic Mode Default Settings

Setting	Value	Notes
Classcode	VGA Controller	This classcode tells the OS that the GPU can function as the primary display device.
Memory base address register (BAR)	256 MB	A smaller BAR is exposed for direct access to the frame buffer from the CPU and PCIe devices.
I/O base BAR	Enabled	The GPU exposes an I/O BAR to claim the resources required to operate as a VGA controller.
Error-correcting code (ECC) protection	Disabled	ECC protection is disabled.

Using gpumodeswitch

The command line utility `gpumodeswitch` can be run in the following environments:

- Windows 64-bit command prompt (requires administrator permissions)
- Linux 32/64-bit shell (including Citrix XenServer dom0) (requires root permissions)

**Note**

Consult NVIDIA product release notes for the latest information on compatibility with compute and graphic modes.

The `gpumodeswitch` utility supports the following commands:

- `--listgpumodes`

This command writes information to a log file named `listgpumodes.txt` in the current working directory.

- `--gpumode graphics`

Switches to graphics mode. Switches mode of all supported GPUs in the server unless you specify otherwise when prompted.

- `--gpumode compute`

Switches to compute mode. Switches mode of all supported GPUs in the server unless you specify otherwise when prompted.

**Note**

After you switch GPU mode, reboot the server to ensure that the modified resources of the GPU are correctly accounted for by any OS or hypervisor running on the server.

Installing Drivers to Support GPU Cards

After you install the hardware, you must update to the correct level of server BIOS and then install GPU drivers and other software in this order:

- 1. [Updating the Server BIOS, page D-16](#)
- 2. [Updating the GPU Drivers, page D-16](#)

1. Updating the Server BIOS

Install the latest server BIOS by using the Host Upgrade Utility for the Cisco UCS C460 M4 server.



Note

You must do this procedure before you update the GPU drivers.

-
- Step 1** Navigate to the following URL: <http://www.cisco.com/cisco/software/navigator.html>.
 - Step 2** Click **Servers–Unified Computing** in the middle column.
 - Step 3** Click **Cisco UCS C-Series Rack-Mount Standalone Server Software** in the right-hand column.
 - Step 4** Click the name of your model of server in the right-hand column.
 - Step 5** Click **Unified Computing System (UCS) Server Firmware**.
 - Step 6** Click the release number.
 - Step 7** Click **Download Now** to download the ucs-server platform-huu-version_number.iso file.
 - Step 8** Verify the information on the next page, and then click **Proceed With Download**.
 - Step 9** Continue through the subsequent screens to accept the license agreement and browse to a location where you want to save the file.
 - Step 10** Use the Host Upgrade Utility to update the server BIOS.
The user guides for the Host Upgrade Utility are at [Utility User Guides](#).
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2. Updating the GPU Drivers

After you update the server BIOS, you can install GPU drivers to your hypervisor virtual machine.

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- Step 1** Install your hypervisor software on a computer. Refer to your hypervisor documentation for the installation instructions.
 - Step 2** Create a virtual machine in your hypervisor. Refer to your hypervisor documentation for instructions.
 - Step 3** Install the GPU drivers to the virtual machine. Download the drivers from either:
 - NVIDIA Enterprise Portal for GRID hypervisor downloads (requires NVIDIA login): <https://nvidia.flexnetoperations.com/>
 - NVIDIA public driver area: <http://www.nvidia.com/Download/index.aspx>
 - AMD: <http://support.amd.com/en-us/download>
 - Step 4** Restart the server.

- Step 5** Check that the virtual machine is able to recognize the GPU card. In Windows, use the Device Manager and look under Display Adapters.
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Installation for Cisco UCS Integration

The Cisco UCS Manager integration instructions have been moved to the integration guides found here:
[Cisco UCS C-Series Server Integration with UCS Manager 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 software for any special considerations regarding integration in your release.

- [Cisco UCS Manager Release Notes](#)
- [Cisco C-Series Software Release Notes](#)

