

Troubleshooting Cisco Data Center Unified Computing

Volume 2

Version 5.0

Student Guide

Text Part Number: 97-3218-01



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Cisco UCS C-Series Troubleshooting

Overview

This module identifies the UCS C-Series server architecture and various aspects of the troubleshooting process for a standalone UCS C-Series server deployment.

Module Objectives

Upon completing this module, you will be able to describe troubleshooting processes on the standalone Cisco UCS C-Series deployments. This ability includes being able to meet these objectives:

- Describe Cisco IMC utilities that enable performance validation and facilitate data-gathering activities for Cisco UCS C-Series troubleshooting purposes
- Describe firmware updates and BIOS recovery procedures
- Define proper procedures to configure LAN and SAN connectivity and to avoid issues with the P81E VIC
- Define RAID controller options and configuration utilities that facilitate the creation of virtual disks that may be used for booting various supported operating systems
- Present detailed steps for installing an operating system on both local disks and a remote Fibre Channel SAN LUN, as well as presenting several troubleshooting scenarios and proposed solutions

Understanding Cisco UCS C-Series Architecture and Configuration

Overview

This lesson recognizes the standalone Cisco Unified Computing System (UCS) C-Series architecture and describes the Cisco Integrated Management Controller (IMC) utilities that enable performance validation and facilitate data-gathering activities for standalone Cisco UCS C-Series troubleshooting purposes.

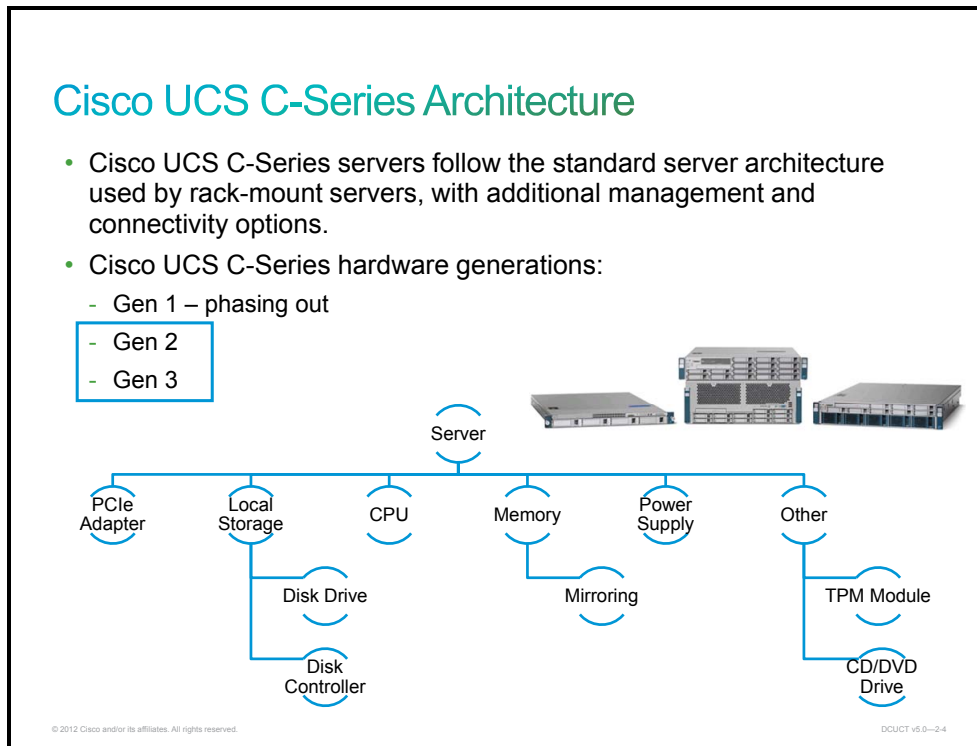
Objectives

Upon completing this lesson, you will be able to understand standalone Cisco UCS C-Series architecture, and to identify and use Cisco IMC utilities that enable performance validation and data-gathering activities for troubleshooting purposes. This ability includes being able to meet these objectives:

- Identify the Cisco UCS C-Series architecture
- Recognize the Cisco UCS C-Series system configuration and normal operation
- Troubleshoot Cisco UCS C-Series initialization
- Recognize the steps necessary to perform Cisco UCS C-Series password recovery

Identify Cisco UCS C-Series Architecture

This topic describes the standalone Cisco UCS C-Series architecture.



Cisco UCS C-Series Rack-Mount Servers extend unified computing innovations to an industry-standard form factor to help reduce total cost of ownership (TCO) and increase business agility. Designed to operate both in standalone environments and as part of Cisco UCS, the servers use Cisco technology to help customers manage the most challenging workloads.

The rack-mount servers incorporate a standards-based unified network fabric, Cisco Virtual Machine Fabric Extender (Cisco VM-FEX) support, and Cisco Extended Memory technology. They support an incremental deployment model and protect customer investment with a possible migration path to unified computing integration with Cisco UCS Manager.

All Cisco UCS C-Series servers have the following characteristics:

- Intel Xeon processors with leading performance, energy efficiency, and reliability
- Industry-standard double-data-rate 3 (DDR3) memory
- Serial Advanced Technology Attachment (SATA) or Serial Attached SCSI (SAS) disk drive types and solid-state drives (SSDs)
- Front-panel connection for physical keyboard, video, and mouse (KVM), USB devices, and serial console (except the Cisco UCS C200 M2 High-Density Rack-Mount Server with DVD drive)
- Access to Cisco IMC
- Agent and agentless management compatible third-party tools through in-band, data plane connections

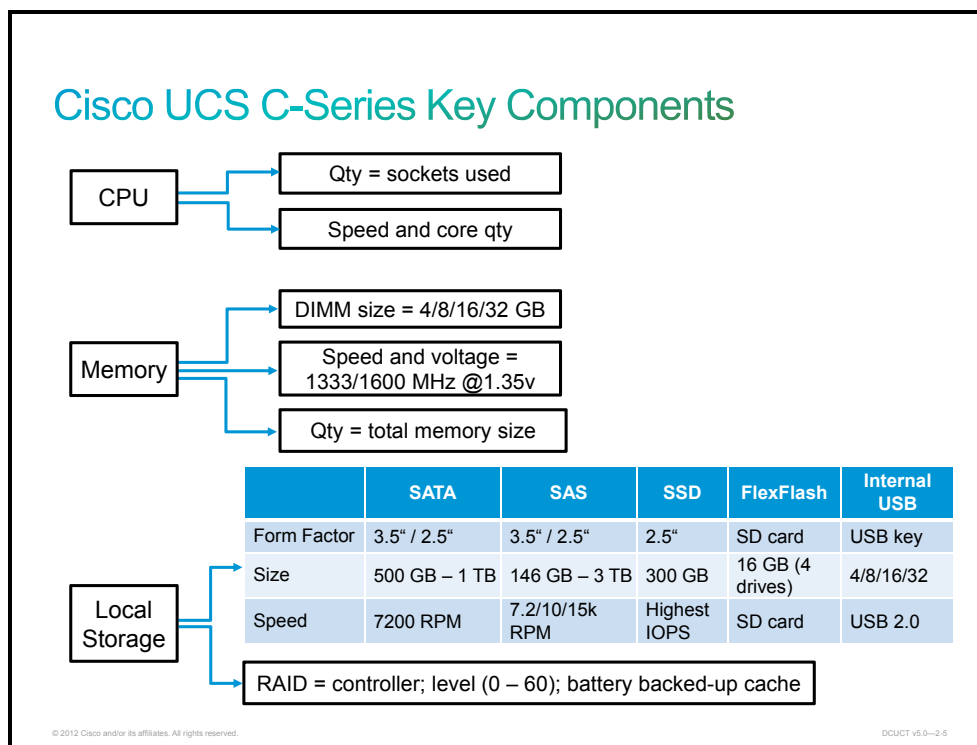
The standalone Cisco UCS C-Series rack-mount servers have evolved through time, largely dependent on the CPU type and quantity.

There are multiple generations of these servers:

- **Generation 1:** Equipped with Intel Xeon 5500 processor support
- **Generation 2:** Equipped with Intel Xeon 5600, Intel Xeon E7-2800, or Intel Xeon E7-4800/8800 processors
- **Generation 3:** Equipped with Intel Xeon E5-2400 or E5-2600 processors

There are also other differences between the types of servers:

- Number and types (length and height) of Peripheral Component Interconnect Express (PCIe) slots
- Supported Redundant Array of Independent Disks (RAID) configurations and controllers
- Number and types of supported local disk drives (hard drives or solid-state drives)
- Number and types (sizes and speeds of access) of DIMM slots
- Form factor
- Onboard network adapters



The Cisco UCS C-Series server has hardware components that are local to the server, namely CPU, memory, RAID controller, and disk drive. Each of the hardware components has its own specific parameters that need to be observed in order to closely match the selected hardware with the requirements.

The CPUs differ in the number of cores per CPU and quantity per server, which governs the overall server performance. Performance can also be affected by the cache size and bus speed, which also governs the type of DIMMs that can be used from the speed and size perspectives.

DIMMs come in various sizes, from 4 GB to 32 GB, and support different speeds and voltages. Not all are supported by individual CPUs or servers. The details about individual servers govern how the server is populated with the adequate number of and sizes of DIMMs.

The local storage configuration with Cisco UCS C-Series servers is governed by the selected server, RAID controller, and disk drive type. It is important to recognize that local storage performance is dependent on the disk drive selected. For example, a 7200 rotations per minute (RPM) SATA disk is slower than a 15,000 RPM SAS disk.

Cisco UCS C-Series M2 Server Comparison



	Cisco UCS C200 M2* (SFF)	Cisco UCS C210 M2*	Cisco UCS C250 M2*
Processor	1/2 x Intel Xeon 5600	1/2 x Intel Xeon 5600	1/2 x Intel Xeon 5600
Form Factor	1 RU	2 RUs	2 RUs
Memory	12 DIMMs, max. 192 GB	12 DIMMs, max. 192 GB	48 DIMMs (Cisco ext.mem.) max. 384 GB
Disks	8x 2.5" or 4x 3.5" SAS/SATA, max. 8 TB, hot-swap.	16x 2.5" SAS/SATA max. 16 TB, hot-swap.	8x 2.5" SAS/SATA max. 8 TB, hot-swap.
Built-In RAID	0, 1 (SATA only)	0, 1 (5 SATA only)	None
Optional RAID	0, 1, 5, 6, 10 – 4 disks 0, 1, 5, 6, 10, 50, 60 – 8 disks	0, 1, 5, 6, 10, 50, 60 4, 8, 16 disks	0, 1, 5, 6, 10, 50, 60 up to 8 disks
LOM	2 GE 10/100 mgmt	2 GE 10/100 mgmt	4 GE 10 GE UF optional
I/O slots	2 half-length x8 PCIe 2.0: • 1 full-height x16 • 1 low-profile x8	5 full-height x8 PCIe 2.0: • 2 full-length x8 • 3 half-length x16	5 half-length PCIe 2.0: • 3 low-profile x8 • 2 full-height x16

* 6 cores/socket; optional CD/DVD drive

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The table compares Cisco UCS C-Series M2 Server maximum hardware configurations.

The Cisco UCS C-Series M2 Servers are second-generation rack-mount servers that can be equipped with up to two Intel Xeon 5500 or 5600 processors. They differ in the total amount of memory that they can be equipped with, the number of local drives that can be installed, and the PCIe slots.

Cisco UCS C200 M2

The Cisco UCS C200 M2 High-Density Rack-Mount Server is a high-density server with balanced compute performance and I/O flexibility. It is an optimized two-socket, one-rack-unit (1-RU) rack-mount server that is designed to balance simplicity, performance, and density for web infrastructure and mainstream data center, small-office, and remote-office applications. The single-rack-unit size makes it useful for service providers offering dedicated or multitenant hosting, and its economical price makes it well suited to the appliance market.

The following features apply to the Cisco UCS C200 M2 Server:

- Up to two Intel Xeon 5500 or 5600 Series multicore processors
- Up to 192 GB of industry-standard double-data-rate 3 (DDR3) main memory
- Up to eight 2.5-inch or four 3.5-inch internal SAS or SATA disk drives—up to 12 terabytes (TB) total
- RAID support:
 - Built-in RAID 0 and 1 support for up to four or eight SATA drives
 - RAID 0 and 1 support for up to four or eight SAS or SATA drives with optional mezzanine card
 - RAID 0, 1, 5, 6, 10 support for four SAS or SATA drives
 - RAID 0, 1, 5, 6, 10, 50, and 60 support for eight SAS or SATA drives with optional LSI MegaRAID card

- Two half-length Generation 2 PCI Express slots (one full-height x16 and one low-profile x8), two integrated Gigabit Ethernet ports, and one 10/100 Mb/s Ethernet management port for accessing the controller
- Front- and back-panel interfaces with video, two USB connections, and serial port connections

The server is most suited for these workloads:

- Horizontally scaled applications, such as web servers, in which both performance and density are important
- Application server workloads, where multiple processor cores contribute directly to higher performance
- Infrastructure applications, including mail and messaging servers, firewalls, file and print servers, and intrusion-detection systems
- Small-office and remote-office applications
- Service provider infrastructure for both shared and dedicated hosting models

Cisco UCS C210 M2

The Cisco UCS C210 M2 General-Purpose Rack-Mount Server is a two-socket, 2-RU rack-mount server housing up to 16 internal small form factor (SFF), SAS, SATA, or SSD drives for a total of up to 16 terabytes (TB) of storage. The server is designed to balance performance, density, and efficiency for workloads requiring economical, high-capacity, and reliable internal storage.

The following features apply to the Cisco UCS C210 M2 Server:

- Up to two Intel Xeon 5500 or 5600 Series multicore processors
- Up to 192 GB of industry-standard DDR3 main memory
- Up to 16 internal SFF, SAS, or SATA disk drives—up to 16 TB total
- RAID support:
 - An onboard SATA RAID 0/1 controller, which is integrated on the motherboard and can control up to four SATA drives
 - LSI 1064E 4-port controller mezzanine card (RAID levels 0, 1, or 1E) for up to 4 internal SAS or SATA drives with the factory default SAS Extender or the optional SAS Expander installed
 - LSI 6G MegaRAID SAS 9280-4i4e controller (RAID levels 0, 1, 5, 6, 10, 50, or 60 support) for up to 4 internal SAS or SATA drives (no mixing) with the factory default SAS Extender, plus external Just a Bunch of Disks (JBOD) expansion
 - LSI 6G MegaRAID SAS 9261-8i controller (RAID levels 0, 1, 5, 6, 10, 50, or 60 support) for up to 8 internal SAS or SATA drives with the factory default SAS Extender, or up to 16 SAS or SATA drives with an SAS Expander installed
- Five full-height PCIe slots: two full-height, full-length x8 PCIe card slots and three full-height, half-length x8 PCI card slots, all with x16 connectors

The server is most suited for these workloads:

- Virtualization, using a single or a large pool of servers. The optional Cisco UCS P81E Virtual Interface Card (VIC) brings the full power of the Cisco UCS to the platform, including the capability to support up to 128 Ethernet or Fibre Channel virtual interfaces that are programmed on-demand to meet the needs of both virtualized and nonvirtualized environments. Intel Virtualization Technology for Direct I/O further speeds virtual machine I/O operations by facilitating direct control over physical interfaces from virtual machines.
- Database management systems can thrive on the abundant internal storage of the server.
- Application servers, where multiple processor cores contribute directly to performance.
- I/O-intensive applications, including data warehousing, medical imaging, video surveillance, document imaging, and content distribution, have up to 16 TB of disk storage for application data.

Cisco UCS C250 M2

The Cisco UCS C250 M2 Extended-Memory Rack-Mount Server is a two-socket, 2-RU rack-mount server featuring patented Cisco Extended Memory technology. It is designed to increase performance and capacity for demanding virtualization and large-data-set workloads. It can also reduce the cost of smaller memory footprints. This server is built for virtualized workloads in enterprise data centers, service provider environments, and virtual desktop hosting. The system also helps increase performance for large-data-set workloads, including database management systems and modeling and simulation applications.

The following features apply to the Cisco UCS C250 M2 server:

- Up to two Intel Xeon 5500 or 5600 Series multicore processors
- 48 DIMM slots and up to 384 GB based on the Samsung 40-nanometer class (DDR3) technology
- Up to eight internal SFF, SAS, or SATA drives—up to 8 TB total
- RAID 0 and 1 support for up to eight SAS or SATA drives through an optional PCIe controller; and RAID 0, 1, 5, 6, 10, 50, and 60 support for up to eight SAS or SATA drives with an optional LSI MegaRAID adapter
- Support for up to five PCIe cards in three low-profile, half-length x8 and two full-height, half-length x16 slots

The server is most suited for the following workloads:

- Large virtualized environments can host more or larger virtual machines with the larger memory footprint of the server, and with higher performance in cases in which existing implementations are memory-bound.
- Database applications will thrive in virtualized and nonvirtualized environments, as the server uses the combination of a large memory footprint and the fastest Intel processors.
- Traditional high-performance computing (HPC) applications can benefit from the performance and memory footprint of the server, including memory-intensive engineering design automation (EDA) and geophysical modeling applications. EDA applications and oil and seismic applications can now expand beyond the 144-GB memory capacity of other two-socket servers, and the applications can be accelerated with a larger (384 GB) or a more economical (192 GB) memory footprint. Other memory-bound HPC applications are likely to see performance acceleration on a Cisco UCS C250 M2 server.
- Enterprise resource planning (ERP) applications can run with improved performance with large data sets in main memory when hosted on the Cisco UCS C250 M2 server.

Cisco UCS C-Series M2 Server Comparison (Cont.)



	Cisco UCS C260 M2	Cisco UCS C460 M2*
Processor	1/2x Intel Xeon E7-2800 (up to 10 cores/socket)	2/4 x Intel Xeon E7-4800/8800 (up to 10 cores/socket)
Form Factor	2 RUs	4 RUs
Max mem.	64 DIMMs (Cisco ext.mem), max. 1 TB	64 DIMMs, max. 1 TB
Disks	16x 2.5" SAS/SATA2/SSD max. 16 TB, hot-swap.	12x 2.5" SAS/SATA2/SSD max. 12 TB, hot-swap.
Built-In RAID	None	None
Optional RAID	0, 1, 5, 6, 10, 50, 60 Up to 16 SAS/SATA2 disks	0, 1, 5, 6, 10, 50, 60 Up to 12 SAS/SATA2 disks
LOM	2 GE 2 10 GE SFP+ 2 10/100 mgmt	2 GE 2 10/100 mgmt
I/O slots	7 PCIe 2.0: • 2 full-height, half-length x16 • 4 low-profile, half-length x8 • 1 low-profile, half-length x4	10 full-height PCIe 2.0: • 2 Gen1 + 8 Gen2 • 4 half-length + 6 3/4-length

* optional CD/DVD drive

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The table compares the Cisco UCS C-Series M2 maximum hardware configurations.

The above M2 Cisco UCS C-Series servers are the second-generation rack-mount servers that can be equipped with up to two Intel Xeon E7-2800 or E7-4800/8800 processors and thus increasing the total number of CPU cores per server as well as maximizing the memory size to 1 TB per server making them perfect fit for memory intensive applications like in-memory databases or large virtualization projects where very high virtualization ratio needs to be achieved.

Cisco UCS C260 M2

The Cisco UCS C260 M2 **rack-mount server** is one of the highest-density two-socket rack-server platforms in the industry and is a critical new building block in the Cisco UCS portfolio, offering compact performance for enterprise-critical applications within the Cisco UCS architecture and patented Cisco Extended Memory technology.

The following features apply to Cisco UCS C260 M2 server:

- A two-socket server that is equipped with Intel Xeon processor E7-2800 product family
- Up to 64 DIMM slots and up to 1 TB, based on DDR3 technology
- 16 internal SFF, SAS, SATA-II, and SSD drives—up to 9.6 TB total
- RAID support:
 - RAID 0 and 1 support for up to 16 SAS, SATA-II drives
 - RAID 0, 1, 5, 6, 50, and 60 support for up to 16 SAS or SATA drives with optional LSI MegaRAID adapter
- Support for up to six PCIe cards in multiple low-profile slots

The server is most suited for these workloads:

- Large virtualized environments can host more or larger virtual machines with the larger memory capacity of the server, resulting in higher performance.
- Database applications can thrive in virtualized and nonvirtualized environments, because the server uses a combination of a large memory footprint, 16 hard-disk drives (HDDs) or SSDs, and the fastest Intel processors.
- Traditional HPC applications can benefit from the server performance and 64 DIMM slots, including memory-intensive EDA and geophysical modeling applications. EDA applications and oil and seismic applications can now expand beyond the 256-GB memory capacity of other two-socket servers.
- ERP applications that are hosted on the Cisco UCS C260 M2 server can run with improved performance with large data sets in main memory.

Cisco UCS C460 M2

The Cisco UCS C460 M2 High-Performance Rack Server is designed with the performance and reliability to power computation-intensive, enterprise-critical standalone applications, and virtualized workloads. The system is a 4-RU server supporting the Intel Xeon processor E7-4800 and E7-8800 product family, up to 2 TB of DDR3 memory in 64 slots, and 12 SFF hot-pluggable SAS, SATA, or SSD drives. Abundant I/O capability is provided by 10 PCIe slots supporting the Cisco UCS C-Series network adapters, with an eleventh PCIe slot reserved for a HDD array controller card. Additional I/O is provided by two Gigabit Ethernet LAN-on-motherboard (LOM) ports, two 10 Gigabit Ethernet ports, and two dedicated out-of-band (OOB) management ports.

The following features apply to Cisco UCS C460 M2 server:

- A 4-RU chassis
- Two or four multicore Intel Xeon processor E7-4800s and E7-8800s, for up to 40 processing cores
- 64 DIMM slots for industry-standard DDR3 memory
- Up to 12 front-accessible, hot-swappable, 2.5-inch SAS, SATA drives, or SSDs
- Ten PCIe slots: eight Generation 2 and two Generation 1, and four half-length and six three-quarter-length
- Remote management through an Integrated Service processor that also implements policy that is established in Cisco UCS Manager
- Local KVM access through front console ports on each server
- OOB access by remote KVM, Secure Shell (SSH) Protocol, and virtual media (vMedia), as well as Intelligent Platform Management Interface (IPMI)
- Two 1/10 Gb Ethernet LOM ports, two 10/100/1000 LOM ports

The server is most suited for these workloads:

- Large virtualized environments
- Database applications
- Java-based workloads
- Traditional HPC applications
- ERP applications

Cisco UCS C-Series M3 Server Comparison



	Cisco UCS C22 M3*	Cisco UCS C220 M3*
Processor	1/2x Intel Xeon E5-2400 (up to 8 cores/socket)	1/2x Intel Xeon E5-2600 (up to 10 cores/socket)
Form Factor	1 RU	1 RU
Max mem.	12 DIMMs, max. 192 GB	16 DIMMs, max. 256 GB
Disks	8x 2.5" SAS/SATA/SSD max. 8 TB, hot-swap.	8x 2.5" SAS/SATA/SSD max. 8 TB, hot-swap.
Built-in RAID	On-board	None
Optional RAID	0,1,5,6,10,50,60	0,1,5,6,10,50,60
LOM	2 GE 1 10/100/1000 mgmt	2 GE 1 10/100/1000 mgmt
I/O slots	2 PCIe 3.0: • 1 full-height, half-length x16 • 1 half-height, half-length x16	2 PCIe 3.0: • 1 half-height, half-length x8 • 1 full-height, 3/4-length x16

* internal USB with 16-GB Cisco FlexFlash (SD card)

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The table compares Cisco UCS C-Series M3 maximum hardware configurations.

The Generation 3 Cisco UCS C-Series M3 servers are the latest addition to the rack-mount server family. They enable customers to use the servers with Intel Xeon E5-2600 processors, optimizing the price while still preserving the high core-per-server count with processors that have up to 8 or even 10 cores.

Cisco UCS C22 M3

The Cisco UCS C22 M3 Rack Server combines outstanding economics and a density-optimized feature that is set over a range of scale-out workloads, from IT and web infrastructure to distributed applications.

The following features apply to the Cisco UCS C22 M3 server:

- Up to two eight-core Intel Xeon processors (E5-2400 product family)
- Up to 192 GB of memory with 12 DIMM slots
- Four or eight SAS, SATA, SSD drives in a 1-RU form factor
- Two PCI Express Generation 3 slots and two 1 Gigabit Ethernet LAN interfaces on the motherboard.

The server is most suited for these workloads:

- Scale-out applications
- Web 2.0 workloads
- Density-constrained applications
- IT infrastructure
- Web infrastructure
- Small and medium-sized business (SMB) applications

Cisco UCS C220 M3

The Cisco UCS C220 M3 Rack Server is designed for performance and density over a wide range of business workloads, from web serving to distributed databases. It is built on the foundation of the Cisco UCS C200 M2 Rack Server. It further extends the capabilities of the Cisco UCS portfolio in a 1-RU form factor with the addition of the Intel Xeon processor E5-2600 product family, which delivers significant performance and efficiency gains.

The following features apply to Cisco UCS C220 M3 server:

- Up to two Intel Xeon E5-2600 processors
- Up to 256 GB of RAM with 16 DIMM slots for memory-intensive applications
- Four or eight SAS, SATA, or SSD drives
- 2 PCI Express Generation 3 slots
- Two 1 Gigabit Ethernet LAN interfaces on the motherboard
- A trusted platform module (TPM) for authentication and storage of appropriate keys for data encryption on storage devices

The server is most suited for these workloads:

- Distributed database clusters
- Middleware
- High-performance virtual desktops
- IT and web infrastructure

Cisco UCS C-Series M3 Server Comparison (Cont.)



	Cisco UCS C24 M3*	Cisco UCS C240 M3*
Processor	1/2x Intel Xeon E5-2400 (up to 8 cores/socket)	1/2 x Intel Xeon E5-2600 (up to 10 cores/socket)
Form Factor	2 RUs	2 RUs
Max mem.	12 DIMMs, max. 256 GB	24 DIMMs, max. 384 GB
Disks	24x 2.5" SAS/SATA/SSD max. 24 TB, hot-swap.	24x 2.5" SAS/SATA2/SSD max. 24 TB, hot-swap.
Built-in RAID	None	None
Optional RAID	0, 1, 5, 6, 10, 50, 60	0, 1, 5, 6, 10, 50, 60
LOM	2 GE 1 10/100/1000 mgmt	4 GE 1 10/100/1000 mgmt
I/O slots	1 PCIe 2.0: • 1 half-height, half-length x4 4 PCIe 3.0: • 1 full-height, full-length x16 • 2 half-height, half-length x8 • 1 half-height, half-length x4	5 PCIe 3.0: • 2 full-height, 1/2 + 3/4 length x16 • 2 full-height, full + half length x8 • 1 half-height, half-length x8

* internal USB; 16-GB Cisco FlexFlash (SD card)

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The table compares Cisco UCS C-Series M3 maximum hardware configurations.

Cisco UCS C24 M3

The Cisco UCS C24 M3 Rack Server is designed for economical internal expandability over a range of storage-intensive infrastructure workloads, from IT and web infrastructure to big data. Building on the success of the Cisco UCS C-Series Rack Servers, this server, along with the Cisco UCS P81E VIC, extends the capabilities of the Cisco UCS portfolio in a 2-RU form factor with the Intel Xeon processor E5-2400 product family, which delivers an optimal combination of performance, flexibility, and efficiency gains.

The following features apply to the Cisco UCS C24 M3 server:

- Up to two Intel Xeon E5-2400 product family processors
- Up to 192 GB of memory with 12 DIMM slots
- 12 or 24 SAS and SATA drives in a 2-RU form factor for workloads demanding large internal storage
- Five PCI Express Generation 3 slots
- Two 1 Gigabit Ethernet LAN interfaces on the motherboard

The server is most suited for these workloads:

- IT infrastructure
- Web infrastructure
- Big data and web 2.0
- Consolidation
- Storage server

Cisco UCS C240 M3

The Cisco UCS C240 M3 Rack Server is designed for both performance and expandability over a wide range of storage-intensive infrastructure workloads, from big data to collaboration. Building on the success of the Cisco UCS C210 M2 Rack Server, this enterprise-class server further extends the capabilities of the Cisco UCS portfolio in a 2-RU form factor with the addition of the Intel Xeon processor E5-2600 product family, which delivers an outstanding combination of performance, flexibility, and efficiency gains.

The following features apply to the Cisco UCS C240 M3 server:

- Up to two Intel Xeon E5-2600 product family processors
- Up to 384 GB of RAM with 24 DIMM slots
- Offers 12 or 24 SAS, SATA, or SSD drives for workloads demanding large internal storage
- Five PCI Express Generation 3 slots
- Four 1 Gigabit Ethernet LAN interfaces on the motherboard
- A TPM for authentication and storage of appropriate keys for data encryption on storage devices.

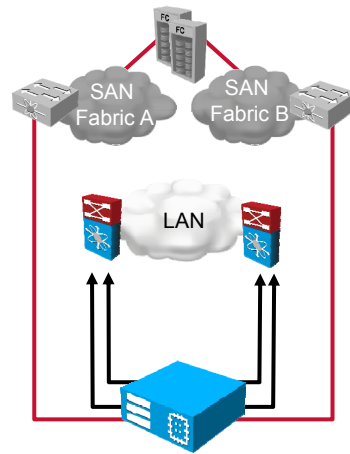
The server is most suited for these workloads:

- Collaboration
- SMB databases
- Big data infrastructure
- Virtualization and consolidation
- Storage servers
- High-performance appliances

Standalone Cisco UCS C-Series Connectivity

Connectivity options: Servers can have multiple network connections of multiple types:

- Cisco IMC for OOB management
- LAN—1 vs. 10 Gigabit Ethernet
- SAN
 - Fibre Channel with HBA
 - iSCSI with TOE/iSCSI offload
 - FCoE with CNA or VIC



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The Cisco UCS C-Series connectivity is primarily influenced by two factors—the required throughput and allowed oversubscription. Both factors are observed from two perspectives:

- LAN connectivity
- SAN connectivity

The Cisco UCS C-Series connectivity architecture can follow a multifabric design. Such a design is used to achieve high availability, more throughput, or a combination of redundancy and higher throughput.

When determining the number of logical adapters that need to be presented to the operating system or hypervisor (for example, VMware ESX/ESXi or Microsoft Hyper-V host), the Cisco UCS P81E VIC adapter can be selected for consolidated LAN and SAN connectivity when up to two host bus adapters (HBAs) and up to 16 network interface cards (NICs) are required. When connectivity consolidation is not required, the server can also be equipped with a multiport Ethernet adapter and a multiport Fibre Channel HBA.

The maximum number of physical adapters is governed by the number of PCIe slots on the server motherboard.

The Cisco UCS supports converged network adapters (CNAs) from a broad set of technology leaders such as Cisco, Emulex, QLogic, Broadcom, and Intel. CNAs obviate the need for multiple NICs and HBAs by converging LAN and SAN traffic in a single interface.

Cisco UCS C-Series VIC Adapter Comparison

- Virtualized interface cards allow dynamic creation of vNICs or vHBAs
- Support for Ethernet-only and FCoE



	VIC 1225	P81E VIC
Vendor	Cisco	Cisco
Total Interfaces	16+2 (128 integrated)	16+2 (128 integrated)
Interface Type	Dynamic	Dynamic
Ethernet NICs	16 (256)	16 (128)
FC HBAs	2 (128)	2 (128)
VM-FEX	Yes	Yes
Adapter-FEX	Yes	Yes
Eth.NIC Teaming	Hardware, no driver needed	Hardware, no driver needed
Physical Ports	2x 10 Gb	2x 10 Gb
Server Compatibility	M2/M3	M1/M2/M3

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The table compares features of Cisco VIC adapters that are available for Cisco UCS C-Series servers. These adapters allow Cisco UCS C-Series servers to be configured with multiple Ethernet NICs as well as with Fibre Channel over Ethernet (FCoE) HBAs.

Cisco UCS VIC 1225

Cisco UCS VIC 1225 is a dual-port enhanced small form-factor pluggable plus (SFP+) 10 Gigabit Ethernet and FCoE-capable PCIe card. The adapter is designed exclusively for Cisco UCS C-Series rack servers. Its form factor is half-height, which preserves full-height slots in servers for third-party adapters that are certified by Cisco.

The adapter incorporates next-generation CNA technology from Cisco, providing investment protection for future feature releases. The card enables a policy-based, stateless, agile server infrastructure that can present up to 256 PCIe standards-compliant interfaces to the host, which can be dynamically configured as either NICs or HBAs.

In addition, the Cisco UCS VIC 1225 supports Cisco Data Center VM-FEX technology, which extends the Cisco UCS fabric interconnect ports to virtual machines, simplifying server virtualization deployment.

The following features apply to the Cisco UCS VIC 1225 adapter:

- **Stateless personality:** The card personality is determined dynamically at boot time, using the service profile that is associated with the server. The number, type (NIC or HBA), identity (MAC address and World Wide Name [WWN]), failover policy, bandwidth, and quality-of-service (QoS) policies of the PCIe interfaces are all determined using the service profile and configuration. The capability to define, create, and use interfaces on-demand provides a stateless and agile server infrastructure.
- **Network interface virtualization:** Each PCIe interface that is created on the VIC is associated with an interface on the Cisco UCS fabric interconnect, providing complete network separation for each virtual cable between a PCIe device on the VIC and the interface on the fabric interconnect.

- **Cisco Data Center VM-FEX Technology:** The VM-FEX technology extends fabric interconnect ports directly to virtual machines, eliminating software-based switching in the hypervisor. The VM-FEX technology collapses virtual and physical networking infrastructure into a single infrastructure that is fully aware of the virtual machine locations and networking policies. Cisco VM-FEX technology is implemented by Cisco VICs with a prestandard implementation of IEEE 802.1Qbh Port Extender. Note that Cisco UCS VIC 1225 hardware is single-root I/O virtualization (SR-IOV)-capable. You can enable SR-IOV if it is supported by the operating system.

Cisco UCS P81E VIC

The Cisco UCS P81E VIC is a virtualization-optimized FCoE PCIe 2.0 x8 10-Gb/s adapter that is designed for use with Cisco UCS C-Series Rack-Mount Servers.

The VIC is a dual-port 10 Gigabit Ethernet PCIe adapter that can support up to 128 PCIe standards-compliant virtual interfaces. It can be dynamically configured so that both their interface type (NIC or HBA) and identity (MAC address and world wide name [WWN]) are established using just-in-time provisioning. Cisco UCS P81E supports network interface virtualization and Cisco VM-FEX technology.

The deployment of applications that require or benefit from multiple Ethernet and Fibre Channel interfaces is no longer constrained by the available physical adapters. The adapter can present up to 128 virtual interfaces on a given server. The 128 virtual interfaces can be dynamically configured by Cisco UCS Manager as either Fibre Channel or Ethernet devices. The adapter supports up to 2 Fibre Channel and 16 Ethernet devices when used in a standalone Cisco UCS C-Series server.

Cisco UCS C-Series CNA Adapter Comparison

- Fixed configuration vNIC and vHBA



	OneConnect	QLE8152	NetXtreme II 57712
Vendor	Emulex	QLogic	Broadcom
Total Interfaces	4	4	4
Interface Type	Fixed	Fixed	SR-IOV, ToE
Ethernet NICs	2	2	2
FC HBAs	2	2	2
VM-FEX	No	No	No
Adapter-FEX	No	No	No
Eth. NIC Teaming	Software, bonding driver	Software, bonding driver	802.3ad
Physical Ports	2x 10 Gb	2x 10 Gb	2x 10 Gb
Server Compatibility	M1/M2	M1/M2	M2/M3

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The table compares features of CNA adapters that are available for Cisco UCS C-Series servers. These adapters allow Cisco UCS C-Series servers to be configured with Ethernet NICs and FCoE HBAs.

Emulex OneConnect

The Emulex OneConnect adapter is a high-performance, 10-Gb/s FCoE adapter that consolidates traffic for networking, Fibre Channel, and FCoE storage for Cisco UCS C-Series rack-mount servers.

The adapter supports a common 10 Gigabit Ethernet infrastructure for unified networking and storage, and extends the Cisco standards-based unified network fabric. It also reduces capital expenses (CapEx) for adapters, switches, and cables, and operational expenses (OpEx) for power, cooling, and IT administration.

The adapter has these features:

- Dual-channel, 10-Gb/s Ethernet link speed
- FCoE offload, TCP/IP stateless offloads, and TCP Chimney offload
- Boots from LAN or SAN
- VLAN insertion and extraction
- Jumbo frames up to 9000 bytes
- FCoE support:
 - Common driver for CNAs and HBAs
 - N-Port ID Virtualization (NPIV)
 - Support for FCoE Initialization Protocol (FIP) and FCoE EtherTypes
 - Support for fabric-provided MAC addressing (FPMA)

QLogic QLE8152

The QLogic QLE8152 is a dual-port 10-Gb/s PCIe CNA with full hardware offload for FCoE protocol processing, designed to eliminate performance bottlenecks in the I/O path with a 10-times data rate improvement over existing 1-Gb/s Ethernet solutions. The full hardware offload for FCoE protocol processing reduces system CPU utilization for I/O operations, which leads to faster application performance and higher levels of consolidation in virtualized systems.

The adapter has these features:

- 10-Gb/s per port maximum throughput for high-bandwidth SAN storage and LAN traffic
- Full hardware offload for FCoE protocol processing 250,000 I/O operations per second (IOPS) per port, to deliver high I/O transfer rates for storage applications
- Full support for TCP/IP and Ethernet performance enhancements, such as priority-based flow control (802.1Qbb), jumbo frames, checksum offloads, and segmentation offloads
- Data center bridging support:
 - Priority-based flow control (802.1Qbb)
 - Enhanced transmission selection (802.1Qaz)
 - Data Center Bridging Exchange (DCBX) protocol (802.1Qaz)

Broadcom NetXtreme BCM57712

The Broadcom NetXtreme II BCM57712 adapter is a high-performance, 10-Gb/s FCoE adapter with added TCP/IP Offload Engine (TOE) and iSCSI support. The CNA features a low-profile PCI Express form factor and can be connected using fiber SFP+ cables or copper twinax cables. The BCM57712 adapter is based on the Broadcom complete suite of 10 Gigabit Ethernet ASICs, featuring the latest-generation, dual-port MAC, coupled with the Broadcom dual-port transceiver, the Broadcom driver stack for mainstream operating systems, and the Broadcom Advanced Control Suite (BACS).

The adapter has these key features:

- SFP+ connectors—can support either optical or copper (twinax) configurations
- PCI Express x8 2.0, 5 gigatransfers per second (GT/s) host interface
- TCP/IP Offload Engine (Microsoft Chimney-compliant)
- iSCSI HBA and boot support
- Ethernet features: Jumbo frame support (9600 bytes), flow-control support (IEEE 802.3x), stateful offload with the TOE, TCP/UDP stateless offloads for IPv4 and IPv6, RX/TX multiqueue, VMware NetQueue and Microsoft virtual machine queue (VMQ), Message Signaled Interrupts (MSI, MSIx) support
- VLAN support

Cisco UCS C-Series Ethernet Adapter Comparison

- Ethernet only, with optimizations for IP-based storage

Adapter	Vendor	Ports	Type	Servers
NetXtreme II 5709*	Broadcom	4	10/100/1000BASE-T, PCIe x4	M1/M2/M3
NetXtreme II 5709	Broadcom	2	10/100/1000BASE-T, PCIe x4	M1/M2
NetXtreme II 57711*	Broadcom	2	10 GbE SFP+, PCIe x8 Optical/Copper direct-attached cable	M1/M2
Gigabit ET dual/quad**	Intel	2/4	10/100/1000BASE-T, PCIe x4	M1/M2/M3
Gigabit EF dual-port**	Intel	2	1000BASE-SX 62.5/50 MMF	
X520-SR1/SR2/LR1/DA1***	Intel	1/2/1/2	10GBASE-SR/SR/LR/CU SFP+	M1/M2/M3

Broadcom

* TCP offload, iSCSI boot, 64 VLANs



Intel

** LinkSec, iSCSI/PXE boot, 4096 VLANs

*** LinkSec, iSCSI/PXE boot, 4096 VLANs, 802.3ad



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The table compares features of Ethernet adapters that are available for Cisco UCS C-Series servers.

Broadcom Ethernet Adapters

The Broadcom NetXtreme II BCM5709 Gigabit Server Adapter is a Gigabit Ethernet adapter that is able to simultaneously perform accelerated and storage networking on standard Ethernet. The NetXtreme II supports teaming and failover to improve network application performance, and it provides server redundancy.

The adapter has these features:

- TOE for Windows, which significantly reduces CPU utilization
- Optimized server efficiency and improved network performance
- Total Ethernet compatibility with standard TCP/IP implementation
- Teaming and failover, to ensure smart load balancing and data availability
- HBA functionality supporting accelerated iSCSI
- Autonegotiation of speed to ensure the highest available throughput
- Receive-side scaling
- TCP, IP, UDP checksum
- TCP segmentation
- 802.1Q VLAN tagging
- IPMI management pass-through capability
- Link aggregation and load balancing
- Heterogeneous teaming
- Jumbo frames
- IPv4 and IPv6 iSCSI offload support

Intel Ethernet Adapters

The Intel family of Ethernet adapters is flexible and scalable adapters for demanding data center environments. They can be used for deployments of servers with multicore processors, and demanding applications such as high-performance computing (HPC), database clusters, and video-on-demand are driving the need for 10 Gigabit connections.

Customers require flexible and scalable I/O solutions to meet the rigorous requirements of running mission-critical applications in virtualized and unified storage environments.

Cisco UCS C-Series HBA Adapter Comparison

- Fibre Channel-only for connection to SAN
- Choice of Emulex or QLogic chipsets for compliance with OSM vendor certifications



Adapter	Vendor	Ports	Type	Features	Servers
LPe 11002	Emulex	2	4-Gb FC 62.5/50 MMF	NPIV FC-SP	M1/M2/M3
LPe 12002	Emulex	2	8-Gb FC 62.5/50 MMF	NPIV FC-SP	M1/M2/M3
QLE2462	Qlogic	2	4-Gb FC 62.5/50 MMF	NPIV VSAN	M1/M2/M3
QLE 2562	QLogic	2	8-Gb FC 62.5/50 MMF	NPIV VSAN	M1/M2/M3

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The table compares features of Fibre Channel HBA adapters that are available for Cisco UCS C-Series servers.

Emulex Fibre Channel Adapters

Emulex HBA adapters feature a highly integrated, single-chip design that minimizes onboard components, while advanced error-checking and correcting methods assure robust data integrity. The Emulex firmware-based architecture enables feature and performance upgrades without costly hardware changes. The service level interface allows use of a common driver across all models of Emulex HBAs. Installation and management applications are designed to minimize reboots and further simplify deployment.

The adapter has these features and functionality:

- Exceptional performance and full-duplex data throughput
- Comprehensive virtualization capabilities with NPIV support
- Simplified installation and configuration using common HBA drivers and AutoPilot Installer
- Efficient administration via Emulex OneCommand Manager for HBAs anywhere in the SAN
- Common driver model for easy management and to enable upgrades independent of HBA firmware

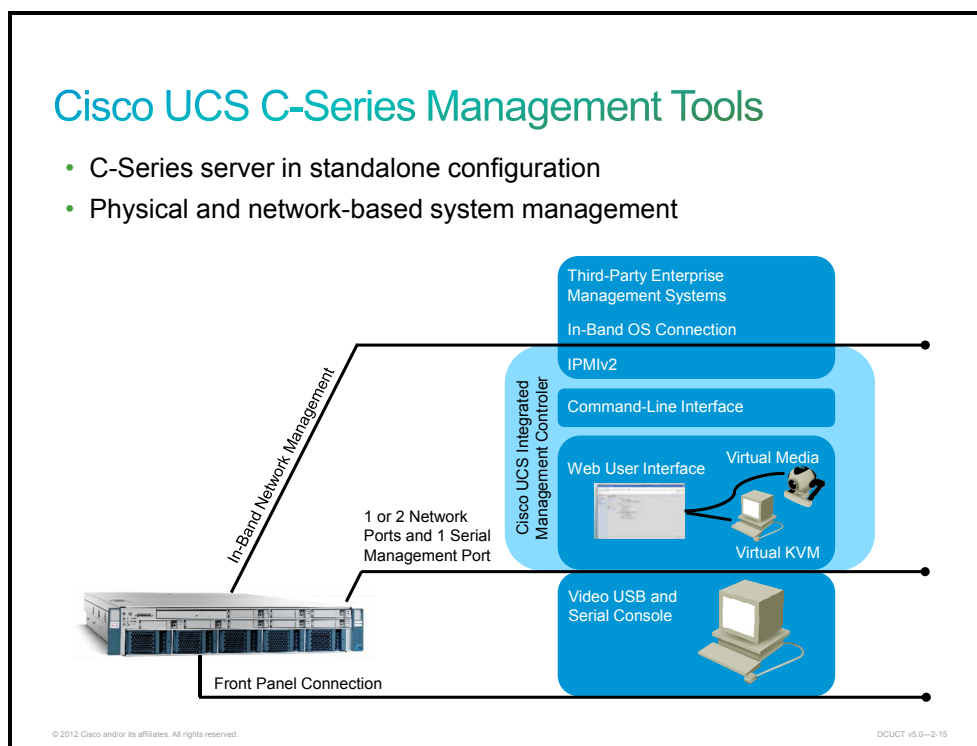
QLogic Fibre Channel Adapters

The QLogic QLE HBA adapters are 4 Gb/s-to-PCI Express x4 adapters that deliver high levels of performance and availability, as well as intelligent networking features specific to enterprise class data centers.

The adapters have these features and functionality:

- 300,000 IOPS to deliver high I/O transfer rates for storage applications
- Intelligent interleaved DMA (iiDMA) to ensure maximum utilization of data links
- Out-of-order frame reassembly (OoOFR) to reduce congestion and retransmissions
- Multi-ID and N_Port virtualization ready to allow physical ports to be part of multiple logical networks
- Cisco VSAN ready to allow physical ports to be part of multiple logical networks
- Comprehensive operating system driver support, including Windows, Linux, Solaris, NetWare, Mac operating system, Citrix, Oracle, and VMware
- Universal boot support to manage multiple hardware platforms and boot options

Note For customers who need to follow the original storage manufacturer (OSM) certified configuration, there is a choice of both Emulex and QLogic chipsets.



The Cisco UCS C-Series Cisco IMC provides the following standalone management features:

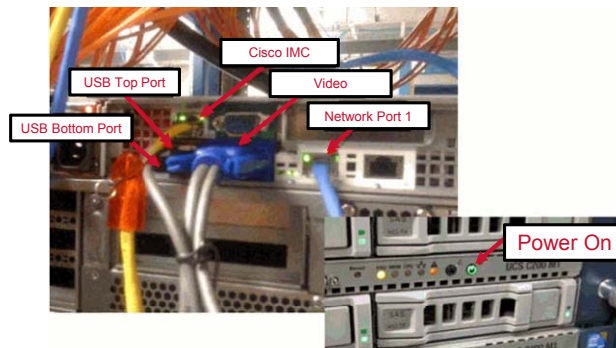
- Web user interface for server management, administration, and virtual media
- Virtual media support for remote KVM and CD/DVD drives as if local
- IPMI 2.0 support for out-of-band management through third-party enterprise management systems
- CLI for server management

Cisco UCS C-Series Configuration

This topic describes the standalone Cisco UCS C-Series system configuration and normal operation.

Keyboard, Monitor, and Network Connections

- Required steps to establish network connectivity for management via Cisco IMC:
 - Connect USB keyboard and VGA monitor to rear ports of the server.
 - Connect cables to Cisco IMC management port and at least one LOM or expansion card.
 - Connect power.



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The initial connection to your Cisco UCS C-Series server must be made with a physical keyboard and monitor to interact with the BIOS setup. The figure illustrates a Cisco UCS C200 server that is viewed from the rear and front. Although not shown, there is a port on the front of the server to connect a KVM dongle that supplies a DB-15 VGA port, a two-port USB, and a DB-9 serial port. It can also be used for initial setup.

The KVM dongle has priority over the rear panel connections.

The rear monitor, USB, and serial ports are disabled when the KVM dongle is attached to the front panel. After the KVM dongle is removed, control reverts to the rear panel KVM connections.

The Cisco IMC management port is a 10/100/1000BASE-Tx port and requires a Category 6 Ethernet cable to operate in a Gigabit switch port. The two LAN on motherboard (LOM) connections on the C200, C210, and C250 servers are also 10/100/1000BASE-Tx and similarly require Category 6 cabling. The number and type of LOM ports vary by Cisco UCS C-Series model.

A network connection to the Cisco IMC port is required to remotely access Cisco IMC management and monitoring services. At least one connection to an LOM or expansion card is necessary for a host operating system or hypervisor to communicate externally. Note that 10 Gigabit Ethernet ports require either copper twin-axial or optical SFP+ connections.

Server Power-On

- BIOS quiet mode displays the Cisco splash screen.
- Press **Escape** to view BIOS messages.
- Press **F8** to enter Cisco IMC configuration screen.



A Cisco UCS C-Series server with a factory default BIOS loads with “Quiet Mode” enabled. You will recognize Quiet Mode by the large Cisco logo banner during power-on self-test (POST).

Quiet Mode suppresses all of the start-up messages and, in the initial setup phase, it can mask configuration issues that you need to address. You may temporarily disable Quiet Mode by pressing **Escape** during POST prior to the software version 1.4.

Cisco IMC Configuration Screen

- Essential step for network reachability of the Cisco IMC
- Allows remote management of server
- Set the IP address in the management network for the Cisco IMC

```

CIMC Configuration Utility  Version 1.5  Cisco Systems, Inc.
=====
NIC Properties
NIC mode:
Dedicated: [X]
Shared LOM: [ ]
Cisco Card: [ ]
IPV4 (Basic)
DHCP enabled: [ ]
CIMC IP: 192.168.10.43
Subnetmask: 255.255.255.0
Gateway: 192.168.10.254
VLAN (Advanced)
VLAN enabled: [ ]
VLAN ID: 1
Priority: 0

NIC redundancy
None: [X]
Active-standby: [ ]
Active-active: [ ]
Factory Defaults
CIMC Factory Default: [ ]
Default User (Basic)
Default password:
Reenter password:

=====
<Up/Down arrow> Select items  <F10> Save  <Space bar> Enable/Disable
<F5> Refresh                  <ESC> Exit

```

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Follow this procedure to access the Cisco IMC BIOS:

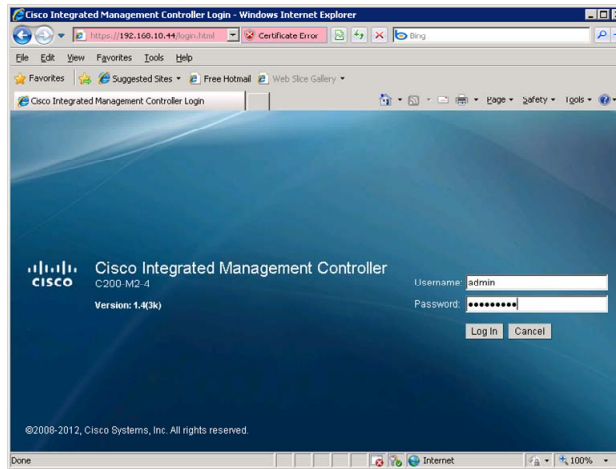
- Step 1** Press **F8** during POST to access the Cisco IMC BIOS. This BIOS is specific to the management processor and is completely isolated from the server BIOS.
- Step 2** This window enables you to configure the necessary TCP/IP information (IP address, subnet mask, and default gateway) to establish remote connectivity to the server. The default configuration is for the Cisco IMC to use DHCP to obtain its IP address. To enter a static IP address, select that item and use the space bar to uncheck the box for DHCP.
- Step 3** The Cisco IMC interface default is to use an access VLAN. If the Cisco IMC interface connects to an 802.1Q trunk port, select the **VLAN Enabled** item and use the space bar to toggle an **X**. Enter the VLAN that is associated with the Cisco IMC IP address.
- Step 4** The default username is “admin” and the default password is “password.” This should be changed immediately, following the guidelines of your organization password policy.

Once you can reach the server Cisco IMC via a browser, the physical connections for keyboard, monitor, and mouse can be unplugged. Any Cisco IMC session can open a KVM-over-IP window as if you were on the physical console.

In Dedicated NIC mode, Cisco IMC is available from the dedicated Cisco IMC 10/100/1000 port on the rear of the server. In Shared LOM mode, the LOM ports are dedicated for access to Cisco IMC. They can be configured for no redundancy (one link active), active/standby (one link active, the other active upon failure), and active/active (two links active). Active/active links require a unique IP address on the same subnet.

Cisco IMC GUI

- Log into the server with the username **admin** and the password that you selected in the Cisco IMC BIOS setup.
- Use the GUI to set up and monitor all server aspects.



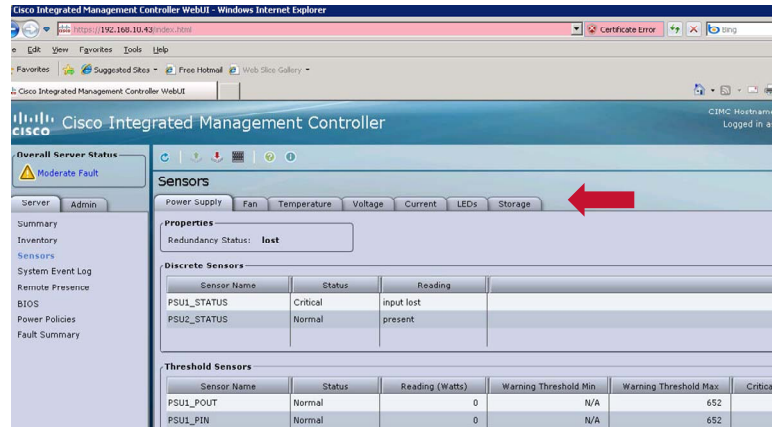
The Cisco IMC GUI allows you to configure all aspects of the C-Series server from a GUI. Use the following procedure to log in to the Cisco IMC:

- Step 1** Point your web browser to the IP address that you configured for the Cisco IMC management by using HTTPS.
- Step 2** Log in with the username “admin” and the password that you specified in the scripted Cisco IMC BIOS setup. If you did not change the password, the default credentials are username: “admin” and password: “password.”

Note If you cannot reach the Cisco IMC login page, reboot the server and press **F8** to validate that your IP address, subnet mask, and default gateway are set correctly.

Monitor Sensor Data in Cisco IMC GUI

- Cisco IMC has extensive monitoring capabilities.
- Sensors that are displayed in Cisco IMC:
 - Power supply sensors, fan sensors, temperature sensors, voltage sensors, current sensors, LEDs, storage-related sensors



As of Cisco IMC version 1.4, there are seven categories of sensors that are monitored while an operating system or hypervisor is running:

Sensor Parameters

Sensor	Description
Power Supply	Monitor the power redundancy state, and input and output wattage of installed power supplies.
Fan	Monitor RPM and operational states of power supply fans and chassis fans. The CPU heat sinks are passive and rely on the chassis fans to route enough cool air to maintain a safe operating temperature.
Temperature	Monitor CPU, I/O Hub, DIMM, and ambient chassis temperatures.
Voltage	Monitor the output voltages of all DC voltage sources.
Current	Monitor CPU voltage regulator and power supply DC current.
LEDs	Monitor the current state of chassis LED colors.
Storage	Monitor the status of hard drives.

Although the Cisco IMC operates when the server is in standby mode (the system has input power, but only the management plane is operational), sensor data is unavailable until the server exits standby mode and boots.

Note Some Cisco UCS C-Series environmental sensors are inactive when the host is powered down.

The Power Supply tab lists these status reports:

- Current state of redundancy
- The input and output wattage of both power supplies
- The factory-configured warning and critical thresholds for those values

Fan speed is a good general metric of the thermal characteristics of a particular installation. In a controlled environment such as a data center, fan speed should vary little unless there is a failure of the HVAC system, an air inlet blockage, or a fan failure. There are factory thresholds that are set for the minimum RPM of a chassis fan.

Temperature sensors are included to monitor the following:

- I/O hub
- DIMM memory channels
- Power supplies
- Ambient chassis temperature

The factory defaults for warning and critical thresholds should be compared against the policies in place for equipment in your data center.

Voltage sensors monitor all DC voltage sources, including the power supplies and NVRAM battery. There are factory voltage thresholds for warnings and critical conditions. Both over- and undervoltage conditions can affect the stability and reliability of a server.

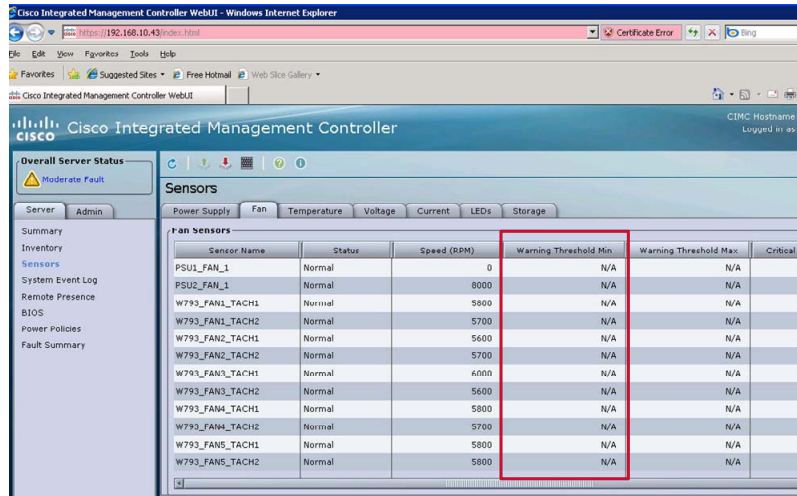
Current sensors monitor all DC current sources, including the power supplies and NVRAM battery. There are factory current thresholds for warnings and critical conditions. Both over- and under-current conditions can affect the stability and reliability of a server.

LED sensors allow for remote monitoring of Cisco UCS C-Series chassis LED states.

Storage sensors allow for remote monitoring of Cisco UCS C-Series hard drive states.

Sensor Thresholds

- Review sensor threshold values in the Sensors tab area of the Server tab.



The screenshot shows the Cisco Integrated Management Controller (CIMC) WebUI. The 'Sensors' tab is selected, and the 'Fan' sub-tab is active. The table below lists various sensors, including PSU fans and chassis fans. A red box highlights the 'Warning Threshold Min' column, which shows 'N/A' for all sensors.

Sensor Name	Status	Speed (RPM)	Warning Threshold Min	Warning Threshold Max	Critical T
PSU1_FAN_1	Normal	0	N/A	N/A	
PSU2_FAN_1	Normal	8000	N/A	N/A	
W793_FAN1_TACH1	Normal	5800	N/A	N/A	
W793_FAN1_TACH2	Normal	5700	N/A	N/A	
W793_FAN2_TACH1	Normal	5600	N/A	N/A	
W793_FAN2_TACH2	Normal	5700	N/A	N/A	
W793_FAN3_TACH1	Normal	6000	N/A	N/A	
W793_FAN3_TACH2	Normal	5600	N/A	N/A	
W793_FAN4_TACH1	Normal	5800	N/A	N/A	
W793_FAN4_TACH2	Normal	5700	N/A	N/A	
W793_FAN5_TACH1	Normal	5800	N/A	N/A	
W793_FAN5_TACH2	Normal	5800	N/A	N/A	

The thresholds for warnings and critical conditions can be viewed in the content window of any sensor category. Thresholds are fixed based on industry-best practices. Future releases of Cisco UCS C-Series BIOS and Cisco IMC firmware may allow user-settable thresholds.

From this window, you can monitor whether any chassis fan falls below 800 RPMs, which is considered a critical event.

Sending Sensor Alerts

- Notification when thresholds are reached or exceeded allows you to react preventively
- Available under: **Admin > Event Management > Trap Settings**



Cisco UCS C-Series servers send alerts via Community-based Simple Network Management Protocol version 2 (SNMPv2c) traps. You must configure an SNMP community string that matches the network management console that is acting as the trap receiver. Up to four trap receiver destinations can be configured for redundancy and event correlation.

Sensor Event Management

- Go to: **Admin > Event Management > Platform Event Filters**



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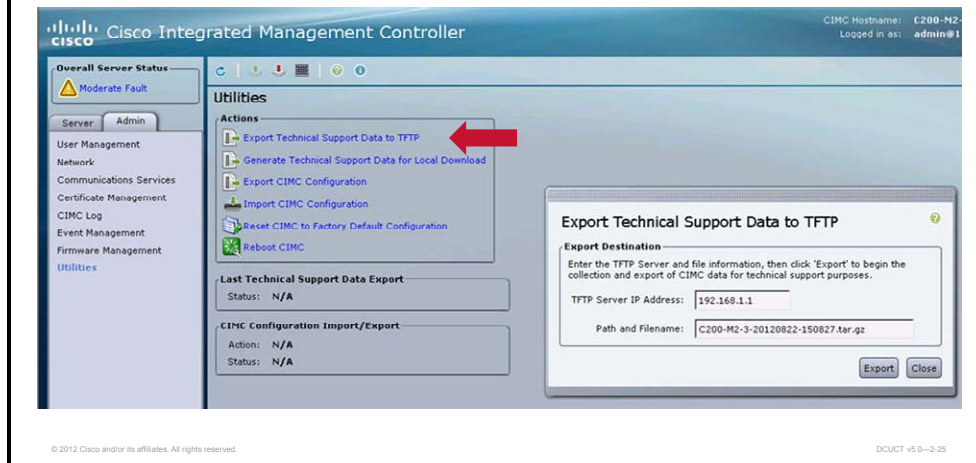
To send SNMP traps, use the following procedure:

- Step 1** Globally enable alerting by checking the **Enable Platform Event Alerts** box.
- Step 2** Select which event classes are of interest to the network monitoring team.
- Step 3** Select the event actions to be performed upon exceeding a particular threshold. These can include None, Reboot, Power Cycle, and Power Off.
- Step 4** When your choices are completed, click **Save Changes** in the lower-right portion of the window.

Note Reboot, Power Cycle, and Power Off only affect the operating system or hypervisor that is running on the Cisco UCS C-Series server. The Cisco IMC remains online.

Export Technical Support Data

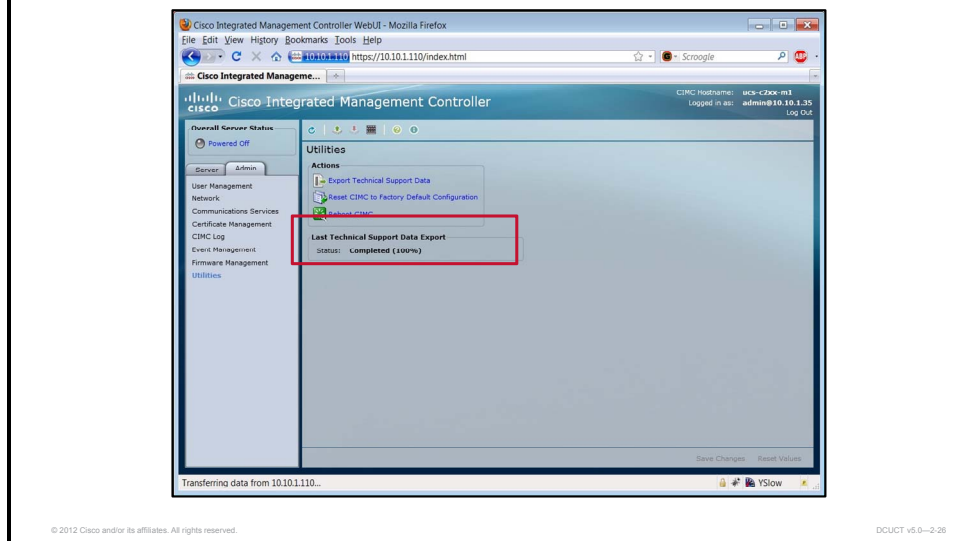
- Collects all relevant information that can be used by support for troubleshooting
- Go to: **Admin > Utilities > Actions > Export Technical Support Data**



If you are actively troubleshooting a tech support issue with Cisco Technical Assistance Center (TAC), you need to know how to collect and export critical tech support data. The Cisco IMC includes an easy-to-use collection system that exports your system support data to a TFTP server. The Cisco IMC will update a progress indicator while it is collecting and sending data to the TFTP server. The resulting file is machine readable by Cisco TAC.

Export Technical Support Data (Cont.)

- TFTP export successful



The status of “Last Technical Support Data Export” should indicate 100 percent.

System Event Log

- Go to: **Server** tab > **System Event Log**



The system event log (SEL) collects information about the host hardware operation. The time stamp for log entries is based on the time and date that are set in the server BIOS.

There are six severity levels:

- Unknown
- Informational
- Normal
- Warning
- Critical
- Non-Recoverable

You can select how many log entries to display per page and the SEL can be cleared by clicking **Clear Log** in the lower-right corner of the Cisco IMC System Event Log page.

Cisco IMC Log

- Go to: **Admin** tab > **CIMC Log**

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The Cisco IMC log collects information only about management processor operations and events, and the log is maintained separately from the SEL. The time stamp for log entries is based on the time and date that are set in the server BIOS. If the server is running in standby mode, the Cisco IMC does not have access to the real-time clock (RTC) on the motherboard. The time stamp will begin with January 1, 1970, at midnight (00:00). When the server is powered on, the Cisco IMC will begin to use the RTC setting for time stamps.

You can select how many log entries to display per page, and the Cisco IMC log can be cleared by clicking **Clear Log** in the lower-right corner of the page.

Troubleshoot the Cisco UCS C-Series Initialization

This topic identifies standalone Cisco UCS C-Series system initialization and the troubleshooting of it.

Guidelines for Cisco USC C-Series Troubleshooting

- General troubleshooting guidelines:
 - Take screenshots of the fault or error message dialog box and other relevant areas.
 - These screenshots provide visual cues about the state of the Cisco UCS C-Series server when the problem occurred.
 - If your computer does not have software to take screenshots, check the documentation for your operating system, which may include this functionality.
- Record the steps that you took directly before the issue occurred.
 - If you have access to screen or keystroke-recording software, repeat the steps you took and record what occurs.
 - If you do not have access to this type of software, repeat the steps that you took and make detailed notes about what happens after each step.
- Gather the state of all server components, using the **show tech-support** command.
 - The information about the current state of the server is helpful to the Cisco TAC and frequently provides the information needed to identify the source of the problem.

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Successful troubleshooting can be challenging and you should have a working knowledge of the Cisco UCS C-Series hardware and software components. You should be able to navigate the Cisco IMC quickly and effectively.

In addition, you should be familiar with the Cisco UCS C-Series components and features, and understand the impact of any troubleshooting procedures or actions.

Screen shots can be an effective tool for determining the circumstances that led up to a failure or configuration event. They form an historical record of the situation and can streamline and facilitate swift problem resolution by providing a reliable knowledge base.

The ability to re-create failures or misconfigurations can contribute valuable results to a knowledge base. Maintaining a detailed log can assist you with troubleshooting efforts by eliminating a haphazard approach to problem resolution.

Issuing the **show tech-support** command from the Cisco UCS C-Series Cisco IMC CLI can provide useful details about an issue and help to determine the source of the problem.

Generate show tech-support Using the Cisco IMC CLI

```
ucs-c200-m2# scope cimc
ucs-c200-m2 /cimc # scope
firmware
log
network
tech-support
ucs-c200-m2 /cimc # scope tech-support
ucs-c200-m2 /cimc/tech-support # set tftp-ip 172.16.1.22
ucs-c200-m2 /cimc/tech-support ## set path
\techsupport\showtech
ucs-c200-m2 /cimc/tech-support ##commit
ucs-c200-m2 /cimc/tech-support ##start
```

The commit command is required to compile the CLI command changes.

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The table describes the key fields within the **show tech-support** command:

show tech-support Parameters

Parameter	Description
var/	Contains detailed logs, and status of all monitored services. It also contains services information files such as the configuration of Serial over LAN (SoL) and IPMI sensor alarms
var/log	Contains the rolling volatile log messages
obfl/	Contains the rolling nonvolatile log messages, nonvolatile configuration, and SEL
tmp/	The show tech-support text files, with BIOS technical support text files
Text files in tmp	Contains all process, network, system, mezzanine, and BIOS state information
mctool	Sends basic information about the state of the Cisco IMC to the USC management API network
obfl	Live On-Board Failure Log
messages	Live /var/log/messages file with real-time log messages
sensors	Current sensor readings from IPMI
power	The current power state of the x86
alarms	Sensors that are included in the alarms

Common Troubleshooting Scenarios: Power-On Related

Problem	Possible Cause	Solution
No standby power	Cable or PSU problem	Check the power connection Check the power supply unit
Server does not power up	PSU problem	Check front I/O board connection Check power sequencer fault LEDs Power supply unit failure (PS Failure LED blinking)
Server powered, no video	Components connection failure	Check that the front I/O dongle is properly seated Check the front I/O cable connection to the motherboard Memory subsystem failure
Cisco IMC does not boot	Corrupt Cisco IMC BIOS	Re-flash the BIOS using the Host Upgrade Utility

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This checklist suggests possible remedies in the event of a power-on problem. In many cases, validating that proper connectivity exists can quickly solve many power-related performance issues.

Common Troubleshooting Scenarios: Cisco IMC-Related

Problem	Cisco IMC booted, but system does not progress to BIOS load
Possible Cause	Power problem Corrupt Cisco IMC or BIOS problem
Solution	Look for Blade Health LED to come on, which indicates that the Cisco IMC has started. Check that the Cisco IMC BIOS is not corrupt. Check that the Cisco IMC clock is okay. Check that standby power is okay and resets are valid.
Problem	Cisco IMC Ethernet cannot communicate
Possible Cause	Cable connections
Solution	Check the flex cable connections to motherboard and rear I/O

Refer to model-specific "Cisco UCS CXXX Server Installation and Service Guide"

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Correct operation of the Cisco IMC is critical for successful setup, configuration, and management operations. Therefore, it is important to validate the power, BIOS, clock, and cable connections of the server.

For more details on the installation and maintenance of a specific server type, refer to the appropriate Cisco UCS Server Installation and Service Guide.

Cisco UCS C-Series Password Recovery

This topic identifies the steps necessary to perform Cisco UCS C-Series server password recovery.

Cisco IMC Admin Password Recovery Procedure

Procedure to clear the Cisco IMC administrator password back to default:

1. Power off the server.
2. Disconnect all power cords from the power supplies.
3. Remove the top cover of the server.
4. Move the shorting jumper to pins 2 and 3 of the J45 header.
5. Reinstall the top cover and reconnect power cords to the server.
6. Allow the entire server to reboot to main power mode to complete the password reset.
7. Press the **Power** button to shut down the server to standby power mode.
8. Remove the top cover from the server.
9. Remove the shorting jumper from the header pins.
10. Replace the top cover, power cords and any other cables, then power on the server by pressing the **Power** button.

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The procedure for clearing the Cisco IMC admin password back to the default in case the user-selected password is lost or forgotten is as follows:

- Step 1** Power off the server.
- 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. You might have to detach cables from the rear panel to provide clearance.

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

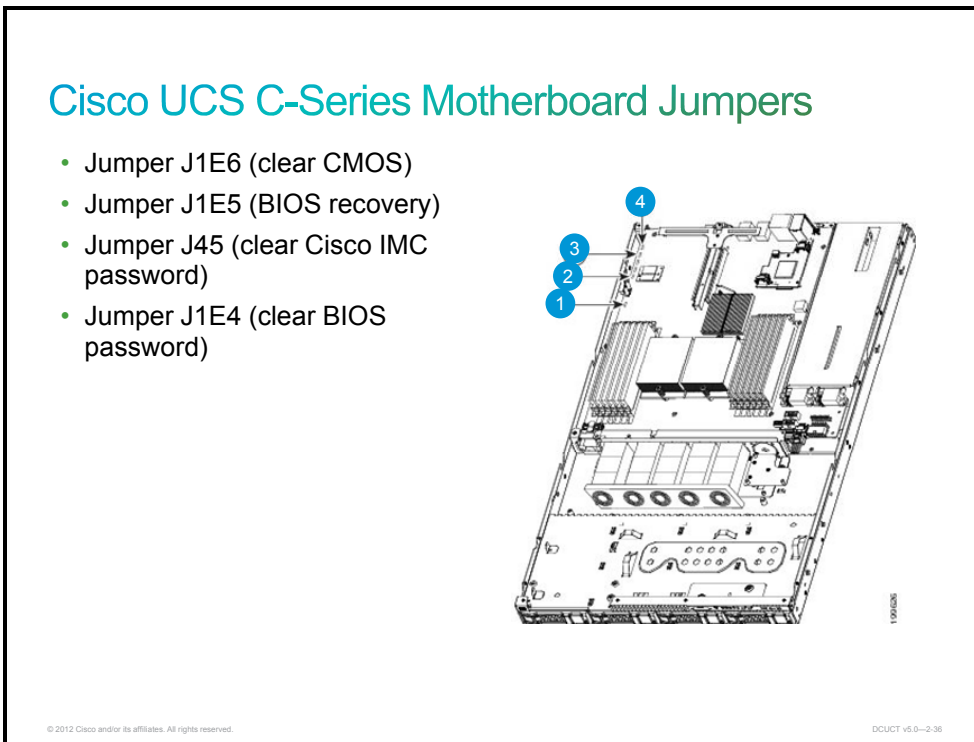
- Step 4** Remove the top cover.
- Step 5** Move the shorting jumper to pins 2 and 3 of the J45 header.
- Step 6** Reinstall the top cover and reconnect the AC power cords to the server. The server powers up to standby power mode, indicated when the Power LED on the front panel is amber.
- Step 7** Return the server to main power mode by pressing the **Power** button on the front panel. The server is in main power mode when the Power LED is green.

Note You must allow the entire server to reboot to main power mode to complete the password reset, because the state of the J45 jumper cannot be determined without the host CPU running. The password is then cleared.

- Step 8** Press the **Power** button to shut down the server to standby power mode, and then remove AC power cords from the server to remove all power.
- Step 9** Remove the top cover from the server.
- Step 10** Remove the shorting jumper from the header pins.

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

- Step 11** Replace the top cover, replace the server in the rack, replace power cords and any other cables, then power on the server by pressing the **Power** button.



These jumpers are adjacent to the CMOS battery, as indicated in the figure. These jumpers can be used as follows:

- Using the BIOS recovery jumper J1E5 to recover a corrupt BIOS
- Clearing the Cisco IMC administrative password, using jumper J45
- Clearing CMOS, using jumper J1E6
- Clearing the BIOS administrative password, using jumper J1E4

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- The Cisco UCS C-Series platform offers a variety of CPU, memory, storage, and networking options, which require proper connectivity, initial setup, configuration, and management.
- Many common problems are avoided by performing proper initial setup, connectivity, configuration, and management.
- The Cisco UCS C-Series troubleshooting methodology relies on a combination of existing hardware and software tools, coupled with a sensible guided approach to trouble resolution.
- Cisco UCS C-Series offers you the options to reset the passwords of the Cisco IMC and BIOS administrator.

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Troubleshooting Cisco UCS C-Series Hardware and Firmware

Overview

This lesson describes the procedures for performing firmware updates and BIOS recovery, as well as skills that will help you to correctly identify memory issues.

Objectives

Upon completing this lesson, you will be able to describe firmware update and BIOS recovery procedures. This ability includes being able to meet these objectives:

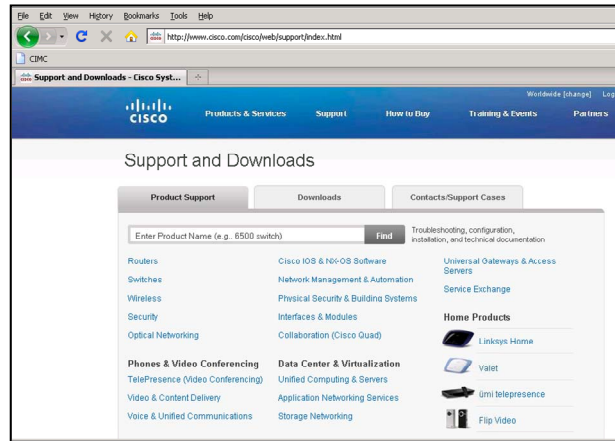
- Distinguish between individual firmware components
- Describe the process to download the latest version of the Cisco Host Upgrade Utility
- Define the general upgrade process for all Cisco UCS C-Series components
- Troubleshoot the Cisco UCS C-Series bootup process
- List tools and techniques that are used to identify memory configuration errors and memory failures, including identification of common failures as identified by Cisco TAC for Cisco UCS C-Series servers

Identify the Cisco UCS C-Series Firmware

This topic identifies the Cisco UCS C-Series firmware.

Locate the Cisco UCS C-Series Firmware on Cisco.com

- Log in to Cisco Connection Online
- Select the Support tab and choose **Unified Computing & Servers**



To download software or firmware from Cisco.com, you must have a Cisco Connection Online account. This account must be associated with a valid service contract for the Cisco UCS C-Series server being updated.

Note If you download software or firmware updates for a device without a service contract, Cisco reserves the right to bill you for the cost of the update.

Use the following procedure to download software:

- Step 1** Log in to Cisco Connection Online.
- Step 2** Click the **Support** tab and then click **Unified Computing & Servers** from the Data Center & Virtualization category.

Locate the Cisco UCS C-Series Firmware on Cisco.com (Cont.)

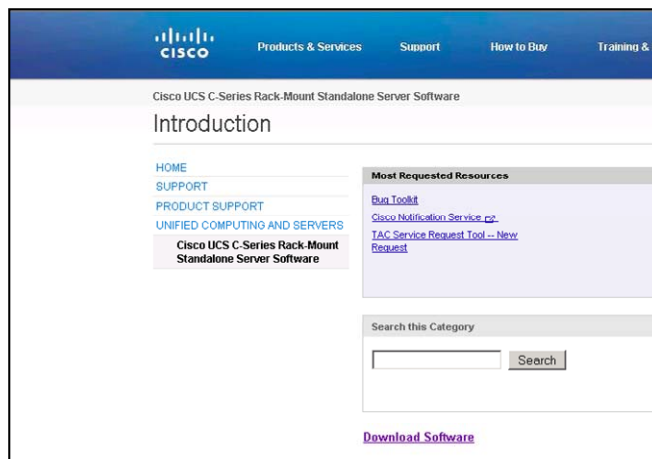
- Choose **C-Series Standalone Server Software**.



- Step 3** Choose **C-Series Standalone Server Software** from the UCS Products and Systems list.

Locate the Cisco UCS C-Series Firmware on Cisco.com (Cont.)

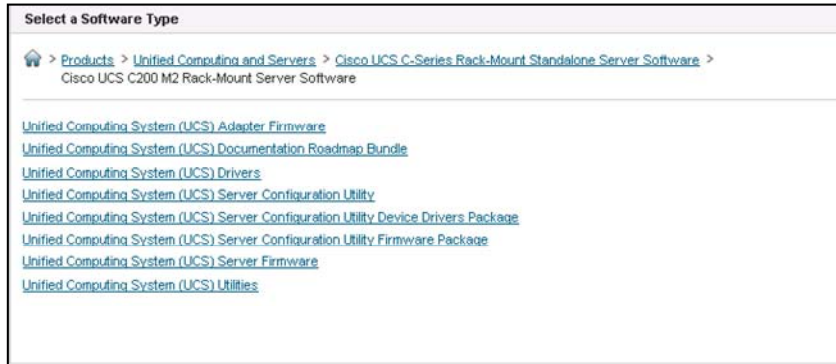
- Click **Download Software**.



- Step 4** Click the **Download Software** link at the bottom of this window to view the available server platforms and firmware packages.

Select the Cisco UCS Server Firmware

- Choose your server model from the list and then choose the **Unified Computing System (UCS) Server Firmware**.



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- Step 5** Choose your particular Cisco UCS C-Series server platform from the list. You can notice many download categories. Choose **Unified Computing System (UCS) Server Firmware**.

Cisco Host Upgrade Utility

This topic describes the process to download the latest version of the Cisco Host Upgrade Utility (Cisco HUU) from Cisco.com.

Cisco UCS C-Series Host Upgrade Utility

- The Cisco Host Upgrade Utility (HUU) is a tool that upgrades the following firmware, either individually or as a group, to maximize compatibility:
 - Cisco IMC
 - System BIOS
 - LOM
 - LSI (RAID storage controllers)
 - Cisco UCS P81E VIC (if present)
- The image file for the firmware is embedded in the ISO.
- The utility displays a menu that allows you to choose which firmware components to upgrade.
- After the upgrade, you can also choose whether to reboot with existing Cisco IMC settings or with the factory default Cisco IMC settings.
- This is the recommended way to upgrade the components—it is all done from one point and also solves the ownership of the separate firmware upgrades.
- HUU is the answer to problems arising from upgrading server components one by one.

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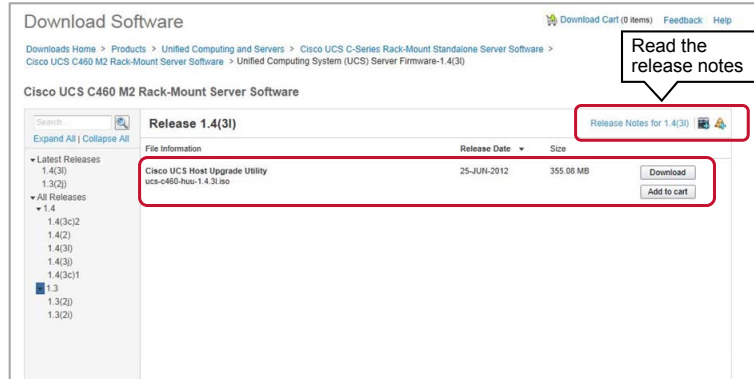
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The Cisco UCS C-Series server firmware can be upgraded to the latest version by using the following procedure in the Cisco HUU:

- Step 1** Download the Cisco HUU from <http://www.cisco.com> by using a Cisco Connection Online account.
- Step 2** After you download the Cisco HUU ISO image, you need to reboot the server. You need to map the ISO image using the Virtual Media option within the remote keyboard, video, mouse (KVM).
- Step 3** The Cisco HUU window will open and offers the option to upgrade the Cisco Integrated Management Controller (IMC), BIOS, LAN on motherboard (LOM), LSI controller, and network adapter, either individually or as a group. The Cisco HUU offers an automated process to ensure that your Cisco UCS C-Series server infrastructure firmware is compatible and updated to the latest versions.

Download the Cisco Host Upgrade Utility

- Choose the latest version from the Latest Releases list and click **Download**.
- Accept the User Agreement.



After you choose the available firmware and the Cisco HUU, add them to the cart and start the download:

- Step 4** Choose the latest available version from the Latest Releases list.
- Step 5** Click **Download**.
- Step 6** Click **Agree** to accept the Download Cart End User License Agreement.

Choose Download Option

- Choose direct download or Java download manager.
- The download should take 5 to 7 minutes to complete.

The screenshot shows a web-based download manager interface. At the top, there is a 'Download To:' field with 'C:\' entered, a 'Browse...' button, and a 'Help' link. Below this is a 'Current Download' section with a blue header. It displays the following information: 'Cisco UCS C460 M2 Rack-Mount Server Software - 1.4(3i)', 'Image Name: ucs-c460-huu-1.4.3.iso, Size: 363592 KB', and 'Transfer Rate: 281.0 kb/sec'. To the right of this information are 'Pause' and 'Cancel' buttons. A progress bar is shown below the transfer rate, with the text 'Download Progress: 5% Complete' underneath it. Below the progress bar is a 'Download Status (1 Items)' section with a table. The table has four columns: 'Description', 'File Name', 'Size', and 'Status'. It contains one row of data: 'Cisco UCS C460 M2 Rack-Mount Server Software - 1.4(3i)', 'ucs-c460-huu-1.4.3.iso', '363592.0 KB', and 'In Progress'. At the bottom of the interface is a 'Cancel All Downloads' button.

Description	File Name	Size	Status
Cisco UCS C460 M2 Rack-Mount Server Software - 1.4(3i)	ucs-c460-huu-1.4.3.iso	363592.0 KB	In Progress

The Download Options include a Java download manager or direct download. The direct download option allows you to save the file to a Downloads folder located on your remote desktop that is used to manage your Cisco UCS C-Series server.

Step 7 Click **Download**.

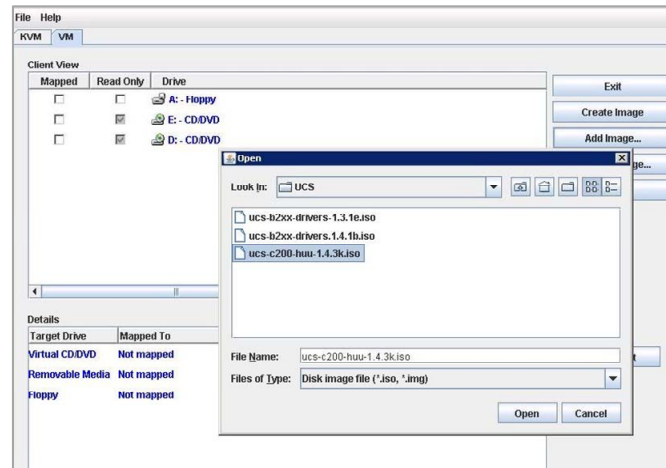
The download process for the Cisco HUU ISO image requires about 5 to 7 minutes.

Perform the Firmware Upgrade Process

This topic describes the firmware upgrade process.

Map the Cisco Host Upgrade Utility ISO Image

- Map the Cisco Host Upgrade Utility ISO image using the Virtual Media option within the remote KVM window.



In order to use the Cisco HUU, the server must be booted with the ISO file.

- Step 1** From the remote KVM window, choose the **VM** tab and map the Cisco HUU ISO file using the Virtual CD/DVD.

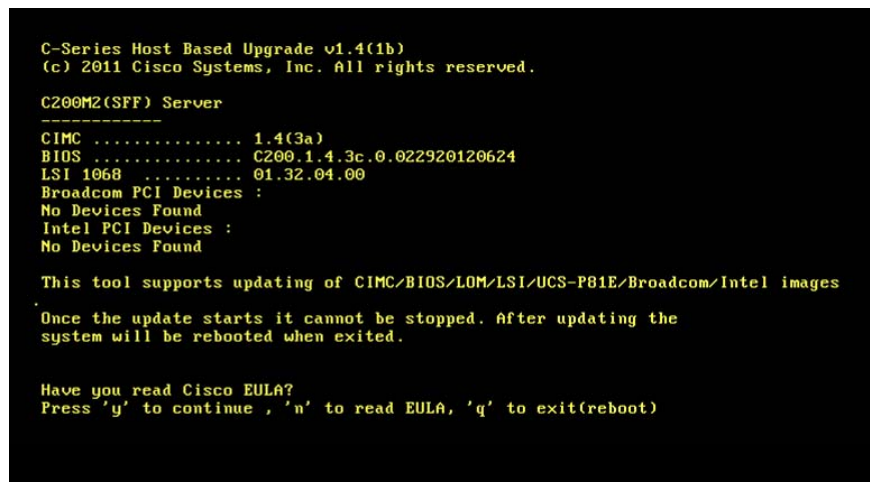
Reboot Server and Select Boot Order

- Reboot the server and press **F6** when the Cisco splash screen appears.
- Choose the **Virtual CD/DVD** drive from the BIOS boot menu.



- Step 2** Reboot the server and press **F6** when the Cisco splash screen appears. After the POST process completes, the BIOS boot menu will appear.
- Step 3** Use the up/down arrows to choose the **Cisco Virtual CD/DVD** drive. This will boot the server from the ISO image.

Accept Cisco Host Upgrade Utility EULA



The Cisco Host Upgrade Utility window will appear.

- Step 4** Press **"y"** to accept the End-User License Agreement (EULA). Press **"n"** if you want to read the EULA. If you want to exit, press **"q"** and the server will reboot.

Choose the Firmware Upgrade Options

```
C-Series Host Based Upgrade v1.4(3k)
(c) 2011 Cisco Systems, Inc. All rights reserved.

C200M1 Server
-----
0) Inventory
1) Update CIMC Firmware - 1.4(3k)
2) Update BIOS - C200.1.4.3f.0
3) Update LOM Firmware - 1.4
4) Update LSI Firmware - No devices found
5) Update UCS VIC FB1E - 2.0(2i) - uboot - 2.0(2i)
6) Update BCM 5709(Dual Port) - No Device
   BCM 5709(Quad Port) - No Device
   BCM 57711(Dual Port) - No Device
   BCM 57712(Dual Port) - No Device
7) Update INTEL 82576(Quad Port) - No Device
8) All the above
9) Save logs into USB
10) Reboot (Retains current settings of CIMC)
11) Reboot (Restore factory default settings)

Enter Choice : _
```

Current configuration of the system—Shows all current endpoint versions

The platform that is being updated

The versions to which you can update

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The Cisco HUU offers options to update the Cisco IMC, BIOS, LOM, LSI controller, and network adapter separately. If you choose “**All the above**,” all five firmware packages are updated together.

Cisco Host Upgrade Utility: Cisco IMC Update

```
Updating CIMC firmware from 1.4(1k) to 1.4(3k)
-----
[Approx Time : 13-15 min]

Firmware Update Utility v1.1 Build 6
Copyright (c) 2010 Cisco Systems Inc.
All rights reserved.

Locked the front panel.

Current Firmware Version
-----
Running Version : 1.4(1k)
Backup Version : 1.4(1a)

Transferring Image
-----
Host to CIMC FileSystem... 5%
```

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If you enter “1”, the Cisco IMC is updated. The update takes approximately 15 minutes.

Cisco Host Upgrade Utility: BIOS Update

```
Updating BIOS from C200.1.4.1f.0.032920122244 to C200.1.4.3f.0
```

```
iFlash32 Ver 1.3 Build 2  
Copyright (C) 2009 - 2010 Cisco Systems Inc.
```

```
Updating the system BIOS...100% Done
```

```
The system BIOS has been updated successfully!  
A system reset is required for the update to take effect.
```

```
Success in updating the BIOS
```

```
Press any key to get update options..._
```

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If you enter “2”, the BIOS is updated. The update takes approximately 1 minute.

Cisco Host Upgrade Utility: LOM Update

```
NOTE: Please do A/C power cycle of the server after HUU completes all the chosen  
updates.
```

```
MAC : 8843E138971C  
EEPROM version : 1.4  
Vendor : Intel Corporation  
Device : 82576 Gigabit Network Connection  
Subsystem : Cisco Systems Inc [0x0065]
```

```
Updating EEP Image for NIC 1 (Bus:0x16 Dev:00 Fun:00) ... Success
```

```
MAC : 8843E138971D  
EEPROM version : 1.4  
Vendor : Intel Corporation  
Device : 82576 Gigabit Network Connection  
Subsystem : Cisco Systems Inc [0x0065]
```

```
Updating EEP Image for NIC 2 (Bus:0x16 Dev:00 Fun:01) ... Success
```

```
Press any key to get update options..._
```

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If you enter “3”, the LOM is updated. The update takes approximately 1 minute.

Cisco Host Upgrade Utility: LSI Update

```
Controller Number : 1
Controller Name   : 1068E(B3)

Firmware Version : 01.30.00.00
BIOS Version     : 06.30.00.00

Updating the Firmware and Boot (Approx time : 1 min) ..... Success

Press any key to continue...
```

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If you enter “4”, the LSI controllers are found and the required update is performed. The update takes approximately 1 minute.

Cisco Host Upgrade Utility: Update All Components

```
C-Series Host Based Upgrade v1.4(3k)
(c) 2011 Cisco Systems, Inc. All rights reserved.

C200M1 Server
-----

0) Inventory
1) Update CIMC Firmware - 1.4(3k)
2) Update BIOS - C200.1.4.3f.0
3) Update LOM Firmware - 1.4
4) Update LSI Firmware - No devices found
5) Update UCS VIC P81E - 2.0(2i) - uboot - 2.0(2i)
6) Update BCM 5709(Dual Port) - No Device
   BCM 5709(Quad Port) - No Device
   BCM 57711(Dual Port) - No Device
   BCM 57712(Dual Port) - No Device
7) Update INTEL 82576(Quad Port) - No Device
8) All the above
9) Save logs into USB
10) Reboot (Retains current settings of CIMC)
11) Reboot (Restore factory default settings)

Enter Choice : _
```

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If you enter “8”, all the components are updated and the main screen displays the status.

The process of updating the five firmware packages requires about 20 minutes to complete.

Step 5 When the process is complete, enter “11” to reboot the server and save the Cisco IMC properties.

Some Possible Issues with HUU

- HUU does not upgrade the hard disk firmware:
 - Go to the vendor website (for example, Toshiba, Seagate)
 - Download the hard disk firmware
 - Perform the upgrade
- An error message is displayed when the HUU ISO is not supported by the server.

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Some possible issues with the Cisco HUU exist. The Cisco HUU does not upgrade the hard disk firmware. You have to go to the vendor website, download the appropriate hard disk firmware from there, and perform the upgrade.

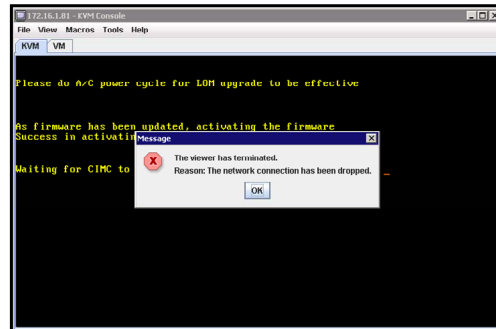
You might also see the following error message:

PID, Board Part Number, Product Part Number <PID, Board Part Number, Product Part Number> is not supported by this HUU image. HUU will not boot on this machine. Press any key to reboot the server.

This error message is displayed when the Cisco HUU ISO is not supported by the server. Use the Cisco HUU ISO that is supported by the server.

Issue: Lost Connectivity

- Symptom:
 - Connection to Cisco IMC is lost after an update and reboot and the KVM session ends.



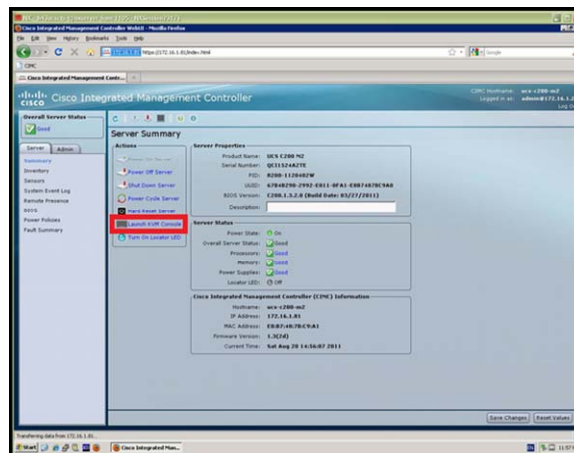
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The issue in this scenario is that, after a firmware update, you lose connectivity to Cisco IMC. Your KVM session ends as well.

Resolution

- This is expected behavior after a firmware update.
- Log back in to the Cisco IMC and reestablish your KVM session.



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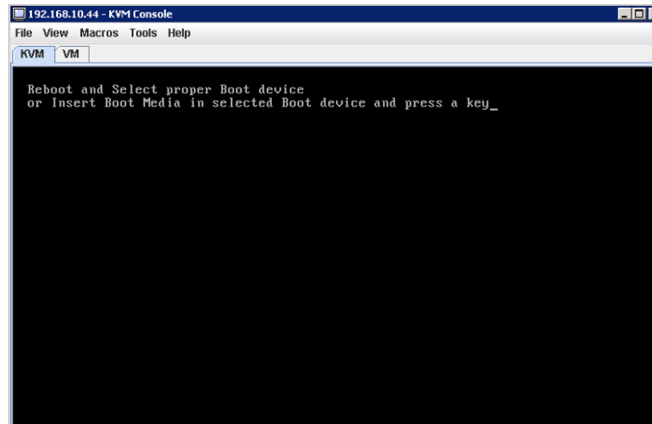
Cisco IMC will reboot after a firmware update. That is the reason for lost connectivity to Cisco IMC and the KVM console. This is expected behavior. Wait for a certain amount of time for Cisco IMC to reboot and then log in again. Reestablish your KVM session.

Troubleshoot the Cisco UCS C-Series Bootup

This topic describes the Cisco UCS C-Series boot process and troubleshooting techniques.

Issue: Problems with Operating System Bootup

- Symptom:
 - Operating system does not boot
 - Unable to see hard disk drives in the boot device menu on C200



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There is an issue with booting the operating system, when it is not possible to see hard disk drives in the boot device menu in the server BIOS on the Cisco UCS C200 server.

Data Gathering: RAID Configuration

- Check the RAID configuration by entering RAID controller BIOS
 - Disks are connected to the RAID controller
 - Boot device menu only shows the RAID controller that points to the virtual drive

```
LSI Corporation MPT SAS BIOS
MPTBIOS-6.24.00.00 (2008.07.01)
Copyright 2000-2008 LSI Corporation.

Press Ctrl-C to start LSI Corp Configuration Utility...
```

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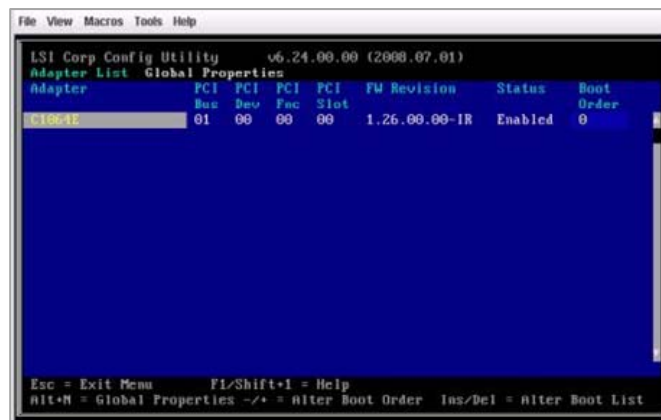
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There can be a misconfiguration of the RAID configuration. You can enter the RAID Controller BIOS to verify or correct the configuration.

If disks are connected to the RAID controller on the Cisco UCS C200 server, they will not be seen in the boot device menu. Only the RAID controller that points to the virtual drive that is set as the boot virtual disk will be seen.

Resolution: RAID Controller Configuration

- Disks are connected to the RAID controller
- Boot device menu only shows RAID controller that points to the virtual drive

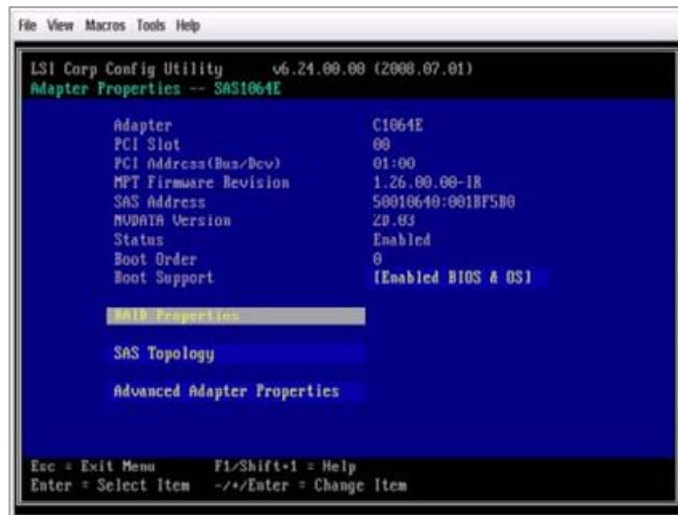


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Check and correct the RAID configuration. Choose the controller and press **Enter**.

Resolution: RAID Controller Configuration (Cont.)



On the Adapter Properties screen, choose RAID Properties. Check and correct the configuration. Make sure to configure the virtual drives to ensure that the RAID controller is seen in the boot device menu of the BIOS setup.

Troubleshoot Memory

This topic lists tools and techniques that are used to identify memory configuration errors and memory failures for Cisco UCS C-Series servers.

Tools for Troubleshooting

To troubleshoot DIMM errors, use these tools:

- UCSM tech support files
- UCSM management log
- BIOS setup menu
- UCSM GUI
- Real-time log files

All DIMM errors can be corrected by one or more of these actions:

- Software upgrade
- DIMM reseating or replacement
- CPU reseating or replacement
- New motherboard

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There are various memory troubleshooting tools. Technical support files and management logs are commonly used.

You must choose the right corrective action to fix the problem because DIMM errors are not always straightforward and not necessarily solved by replacing the DIMMs.

Correctable errors do not always indicate a bad DIMM. In other cases, it might be prudent to monitor the errors for a while to see if any more are logged. If the number of errors increases, it might indicate that it is time to replace the DIMM.

Cisco UCS Memory Error Reporting Cycle

The sequence for error reporting, from bootup to run time:

- Hardware completes power sequence.
- DIMM Serial Presence Detection (SPD) data is acquired for BIOS and Cisco IMC.
- BIOS and Cisco IMC configure the correct voltage level for DIMM modules, based on DIMM inventory and user settings in the BIOS setup menu.
- BIOS enters Memory Reference Code (MRC) stage for memory training and executing MEMBIST.
- BIOS maps out bad DIMMs and reports DIMM errors by sending System Event Log (SEL) events to Cisco IMC.

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Cisco UCS Memory Error Reporting Cycle (Cont.)

- BIOS steps through the rest of BIOS initialization code and provides effective memory inventory for operating system.
- Cisco IMC deasserts DIMM-related sensors and LEDs if the stick bit is cleared and DIMMs pass the MEMBIST test.
- Cisco IMC asserts DIMM-related sensors and LEDs, based on SEL events.
- BIOS POST is completed and system is booting from a specified boot device from boot order.
- BIOS reports DIMM Error-Correcting Code (ECC) errors based on Machine Check Architecture (MCA) and sends SEL events to Cisco IMC during run time.

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Identifying at which stage a memory error is reported often helps to diagnose the problem.

Issue: BSOD or PSOD

Symptoms:

- Blue screen of death (BSOD) for Microsoft Windows operating system
- Purple screen of death (PSOD) for VMware ESXi

[illegible]

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The issue in this scenario happens when a user gets the Blue Screen of Death (BSOD) for Microsoft Windows operating system or the Purple Screen of Death (PSOD) for VMware ESXi.

Data Gathering: DIMM Error

The screenshot displays the Cisco Integrated Management Controller (CIMC) web interface. At the top, the Cisco logo and the title 'Cisco Integrated Management Controller' are visible. The top right corner shows the CIMC Hostname as 'ucs-c2xx-m2', the user logged in as 'root@172.18.36.146', and the local time as 'Log On: 17:00:12 2012-04-18'.

The left sidebar contains navigation links: 'Overall Server Status' (with a red 'Severe Fault' indicator), 'Server' (selected), 'Admin', 'Summary', 'Inventory', 'Sensors', 'System Event Log', 'Remote Presence', 'BIOS', 'Power Policies', and 'Fault Summary'.

The main content area is divided into two sections. The top section, 'Fault Sensors', is further divided into 'Discrete Sensors' and 'Threshold Sensors'. The 'Discrete Sensors' table has columns for 'Sensor Name', 'Status', and 'Reading'. The 'Threshold Sensors' table has columns for 'Sensor Name', 'Status', 'Reading', and 'Units'. A single entry is shown in the 'Threshold Sensors' table: 'DDR3_P2_F1_ECC' with a 'Critical' status, a '240' reading, and 'error' units.

The bottom section, 'Server Properties', provides detailed information about the server. It includes the Product Name ('UCS C200 M2'), Serial Number ('QC1612A66C'), PID ('R200-1120402W'), UUID ('0E1FA707-926E-E111-46A1-5057ABAF4372'), and BIOS Version ('C200.1.4.1.0 (Build Date: 07/13/2011)').

The 'Server Status' section shows the overall status of various components: Power State (On), Overall Server Status (Severe Fault), Processors (Good), Memory (Severe Fault, highlighted with a red box), Power Supplies (Good), and Locator LED (Off).

The bottom section, 'Cisco Integrated Management Controller (CIMC) Information', displays the Hostname ('ucs-c2xx-m2'), IP Address ('172.17.248.121'), MAC Address ('50:57:AB:AF43:72'), Firmware Version ('1.4(2)'), and Current Time ('Wed Apr 18 18:08:17 2012').

At the bottom right, there are buttons for 'Save Changes' and 'Reset Values'.

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You can check the Fault Summary in the Cisco IMC to gather information about possible errors.

Also observe the Summary in the Server tab to quickly find out if there is a problem regarding memory, as shown in the figure.

Data Gathering: Log File

```
02/24/2012 06:42:36 | CIMC | Memory DDR3_P1_C1_ECC #0x2d | Upper Non-
recoverable - going high | Asserted | UNCORRECTABLE ECC ERROR
02/24/2012 06:43:41 | CIMC | Entity presence BIOS_POST_CMPLT #0x53 | Device
Absent | Asserted
02/20/2012 22:51:43 | CIMC | Memory DDR3_P1_B1_ECC #0x2b | Upper Non-
recoverable - going high | Asserted | UNCORRECTABLE ECC ERROR
02/20/2012 22:52:42 | CIMC | Entity presence BIOS_POST_CMPLT #0x53 | Device
Absent | Asserted

10/16/2011 04:18:48 | BIOS | Memory #0x02 | Uncorrectable ECC/other
uncorrectable memory error | RUN, Rank: 0, DIMM Socket: 0, Channel: B,
Socket: 0, DIMM: B0 | Asserted
10/21/2011 19:17:26 | BIOS | Memory #0x02 | Uncorrectable ECC/other
uncorrectable memory error | RUN, Rank: 0, DIMM Socket: 0, Channel: A,
Socket: 0, DIMM: A0 | Asserted
10/22/2011 18:14:07 | BIOS | Memory #0x02 | Uncorrectable ECC/other
uncorrectable memory error | RUN, Rank: 0, DIMM Socket: 0, Channel: C,
Socket: 0, DIMM: C0 | Asserted
```

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The BIOS setup menu often provides the most accurate report of DIMMs in use and those that have failed to pass the BIOS memory initialization. However, it may not be possible to bring a server down in order to check the BIOS. Therefore, examining management logs and technical support output may be the only available option.

Resolution

- Reseat or replace the DIMM.
- After that, the memory error is gone.



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To remedy the issue, try reseating the DIMM. If that does not help, replace the DIMM. After replacing, you can observe in the Cisco IMC GUI that the memory error is now gone.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- To download software or firmware from Cisco.com, you must have a Cisco.com login associated with a valid service contract for the Cisco UCS C-Series server being updated.
- Cisco UCS C-Series firmware upgrades can be performed by using the Host Upgrade Utility, which can be downloaded from Cisco.com, with a Cisco Connection Online account.
- There are three techniques to update the BIOS on Cisco UCS C-Series servers.
- By default, the Cisco C-Series server comes with quiet boot enabled in the BIOS.
- BIOS will usually give an accurate account of healthy and unhealthy DIMMs.

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Troubleshooting Cisco UCS C-Series LAN and SAN Connectivity

Overview

This module describes the symptoms of connectivity problems that are related to converged network adapters (CNAs) and Cisco Unified Computing System (UCS) P81E Virtual Interface Card (VIC) configuration.

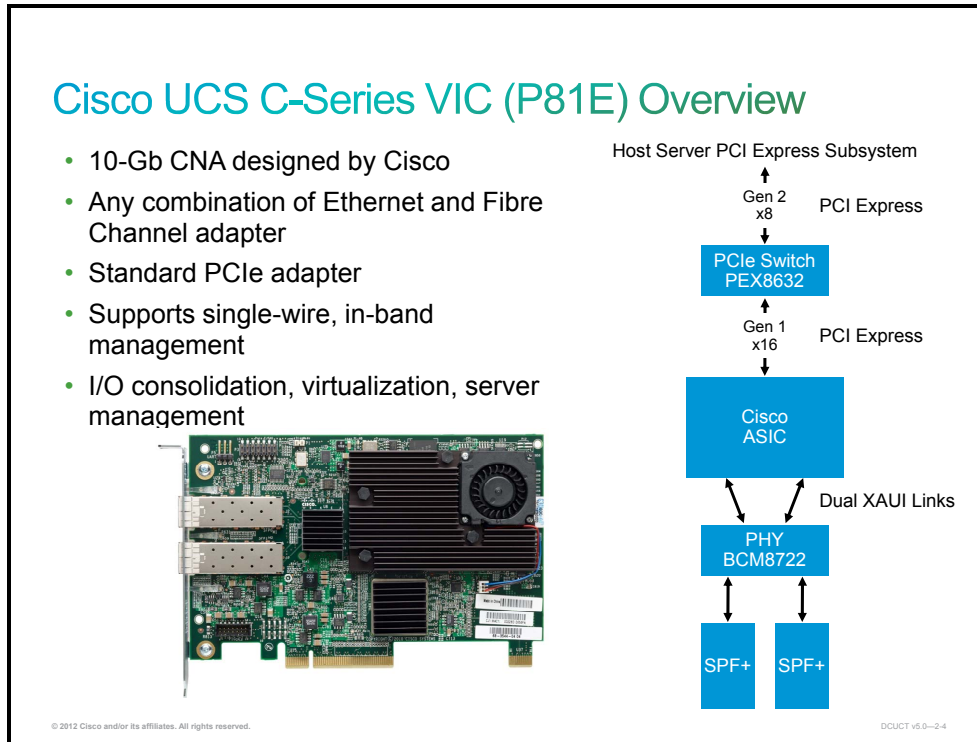
Objectives

Upon completing this lesson, you will be able to define correct procedures to configure LAN and SAN connectivity and avoid issues with the Cisco UCS P81E VIC. This ability includes being able to meet these objectives:

- Troubleshoot Cisco UCS C-Series server LAN connectivity
- Troubleshoot Cisco UCS C-Series server SAN connectivity
- Troubleshoot Cisco UCS C-Series SAN bootup

Troubleshoot Cisco UCS C-Series LAN Connectivity

This topic describes how to troubleshoot Cisco UCS C-Series server LAN connectivity.



A Cisco innovation, the Cisco UCS P81E VIC, is a virtualization-optimized Fibre Channel over Ethernet (FCoE) PCI Express (PCIe) 2.0 x8 10-Gb/s adapter that is designed for use with Cisco UCS C-Series Rack-Mount Servers.

The virtual interface card is a dual-port 10 Gigabit Ethernet PCIe adapter that can support up to 128 PCIe standards-compliant virtual interfaces, which can be dynamically configured so that both their interface type (network interface card [NIC] or host bus adapter [HBA]) and identity (MAC address and world wide name [WWN]) are established using just-in-time provisioning. In addition, the Cisco UCS P81E supports network interface virtualization (Cisco Adapter Fabric Extender [Adapter-FEX]) and Cisco Virtual Machine Fabric Extender (VM-FEX) technology, from firmware version 1.3.

Cisco IMC Link Usage

The Cisco IMC link to the adapter is used for management operations from the Cisco IMC CLI or GUI.

- vNIC configuration
- Firmware update
- Boot from SAN configuration

You can access the debug shell from the Cisco IMC CLI.

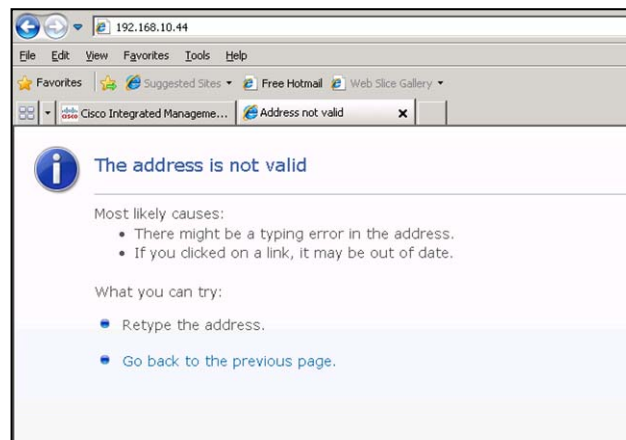
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The adapter Cisco Integrated Management Controller (IMC) link is used for server management operations to and from the Cisco IMC GUI and CLI, as well as access to the Cisco IMC CLI debug shell.

Issue: Cisco IMC Link Is Not Accessible

- Symptom:
 - Cannot connect to the Cisco IMC IP address



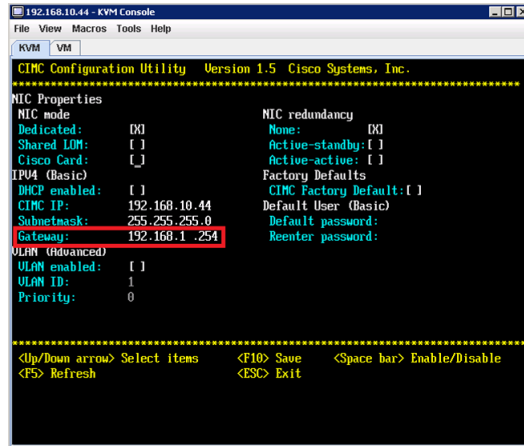
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One possible issue occurs when the Cisco IMC link is not accessible by the web user interface. The symptom is easy to recognize: when you type in the IP address of the Cisco IMC, you do not see the start web page.

Data Gathering: Cisco IMC Configuration

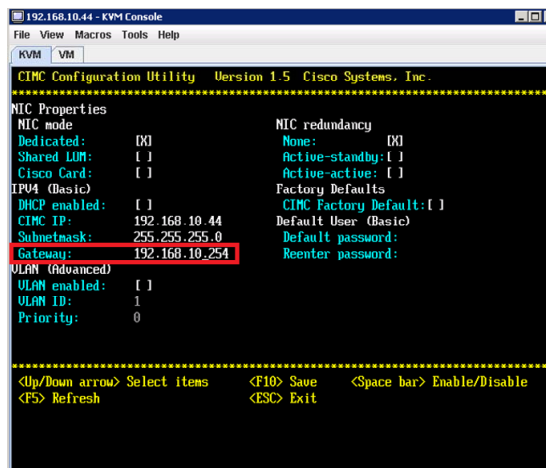
- During the bootup, press **F8** to enter Cisco IMC configuration menu
- Problem isolation:
 - Gateway is not configured correctly



In addition to the hardware issues with the controller, there is likely some misconfiguration on the Cisco IMC. During the bootup, press **F8** and enter Cisco IMC configuration menu. Examine the configuration of Cisco IMC. In the example above, the gateway IP address is misconfigured.

Resolution: Correct the Cisco IMC Configuration

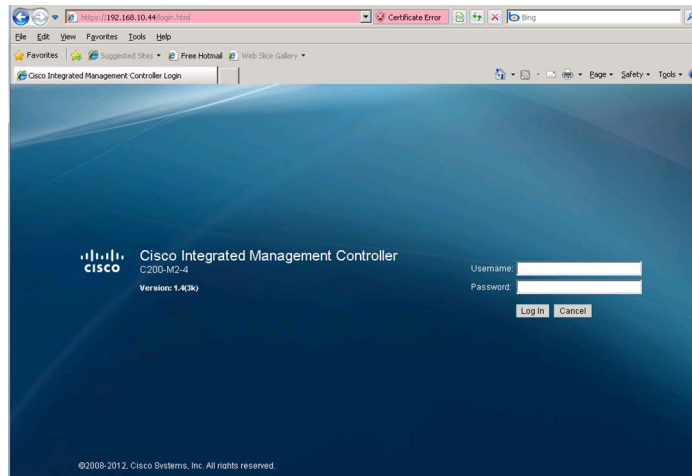
- Correct the Gateway IP address
- Press **F10** to save new configuration and **Esc** to exit



Change the configuration of the gateway IP address and save the new configuration. Ensure that all devices in the path will enable the traffic to go through.

Solution Verification

- Successfully connect to the Cisco IMC IP address



When the configuration is corrected, you will be able to connect to the Cisco IMC IP address by web user interface.

Issues with Uplink Connectivity

- Symptom:
 - No connectivity to and from the server
- Issues reported:
 - Packets are not received from or sent to the connected interface on the uplink device

```
N5548-4 (config)# show interface eth1/3 counters
```

Port	InOctets	InUcastPkts
Eth1/3	0	0

Port	InMcastPkts	InBcastPkts
Eth1/3	0	0

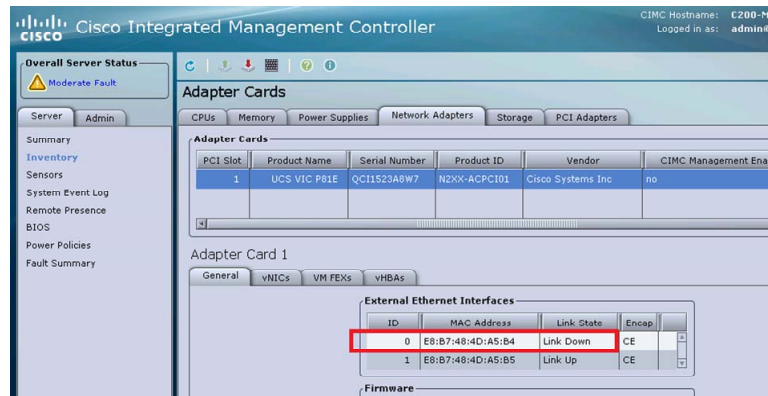
Port	OutOctets	OutUcastPkts
Eth1/3	0	0

Port	OutMcastPkts	OutBcastPkts
Eth1/3	0	0

If there is no connectivity to and from the server, there is some problem with the uplink connectivity. Reset and observe the counters on the interface on the uplink device connected to the server. You can see in the output shown in the figure that no packets were received or sent.

Data Gathering: Link States

- Examine the adapter link states
- Server > Inventory > Network Adapters > General



The Cisco UCS P81E uplink status may be determined from the Cisco IMC GUI, as shown in the figure.

To view the status within the Cisco IMC CLI, use the **show ext-eth-if** command. In this example, one interface shows a Link Down status.

```
C200-M2-4# scope chassis
```

```
C200-M2-4 /chassis # scope adapter 1
```

```
C200-M2-4 /chassis/adapter # show ext-eth-if
```

Port	ID	Uplink port	MAC address	Link State	Encapsulation Mode
0			E8:B7:48:4D:A5:B4	Link Down	CE
1			E8:B7:48:4D:A5:B5	Link Up	CE

The possible states of the adapter vNIC include the following:

- **Link Up:** Link is up.
- **Link Down:** Link is down.
- **Unsupported Transceiver:** Installed small form-factor pluggable plus (SFP+) is not valid. An SFP+ module must be of type 10GBASE-LR, -SR, -USR or -CX1. Additionally, for 10GBASE-LR, -SR, and -USR, the SFP+ module must pass the security check (anticounterfeiting).
- **Fault:** This indicates a low-level MAC fault (for example, failure to initialize). Consider this fatal.

Resolution: Enable the Link

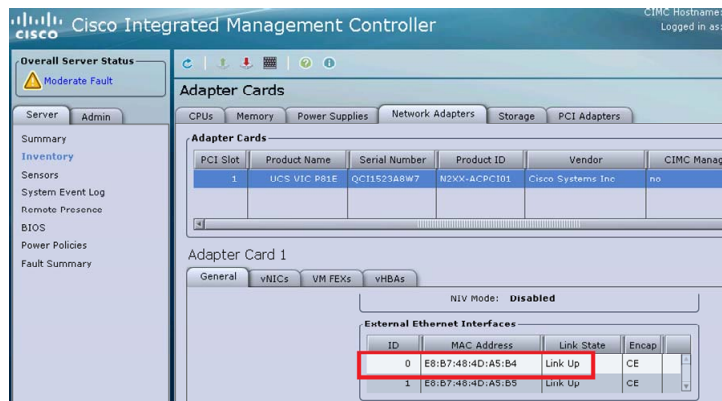
- Use the valid SFP+.
- Make sure that the connected port on the uplink device is enabled.

```
N5548-4# conf t
Enter configuration commands, one per line. End with CNTL/Z.
N5548-4(config)# interface ethernet 1/3
N5548-4(config-if)# no shutdown
N5548-4(config-if)# show interface ethernet 1/3
Ethernet1/3 is up
  Hardware: 1000/10000 Ethernet, address: 547f.ee82.9eca (bia
  547f.ee82.9eca)
  MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec
  reliability 255/255, txload 1/255, rxload 1/255
<...>
```

Ensure that the port on the uplink device connected to the server is enabled. If you received an error about SFP+, make sure that you use a valid SFP+ transceiver.

Solution Verification (1): Link State

- Examine the adapter link state on the server.



The Cisco UCS P81E uplink interface status is now Link Up.

```
C200-M2-4# scope chassis
```

```
C200-M2-4 /chassis # scope adapter 1
```

```
C200-M2-4 /chassis/adapter # show ext-eth-if
```

Port ID	Uplink port	MAC address	Link State	Encapsulation Mode
0		E8:B7:48:4D:A5:B4	Link Up	CE
1		E8:B7:48:4D:A5:B5	Link Up	CE

Solution Verification (2): Counters

- Check the counters on the connected interface on the uplink device.

```
N5548-4# show interface eth1/3 counters
```

Port	InOctets	InUcastPkts
Eth1/3	8350944	91820
Port	InMcastPkts	InBcastPkts
Eth1/3	22493	0
Port	OutOctets	OutUcastPkts
Eth1/3	183081853	14
Port	OutMcastPkts	OutBcastPkts
Eth1/3	2478325	2

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Again, check the counters on the interface on the uplink device that is connected to the server. You can now see that the numbers of received and sent packets are increasing.

Troubleshoot Cisco UCS C-Series SAN Connectivity

This topic describes how to troubleshoot Cisco UCS C-Series server SAN connectivity.

FIP Overview

- The Fibre Channel over Ethernet Initialization Protocol (FIP) is used to perform the functions of FC-BB_E device discovery, initialization, and maintenance.
- FIP Ethernet type (0x8914) is different than the FCoE Ethernet type.
- FIP frames are used to perform the following protocols:
 - FIP VLAN discovery
 - FIP discovery
 - FCoE virtual link instantiation
 - FCoE virtual link maintenance

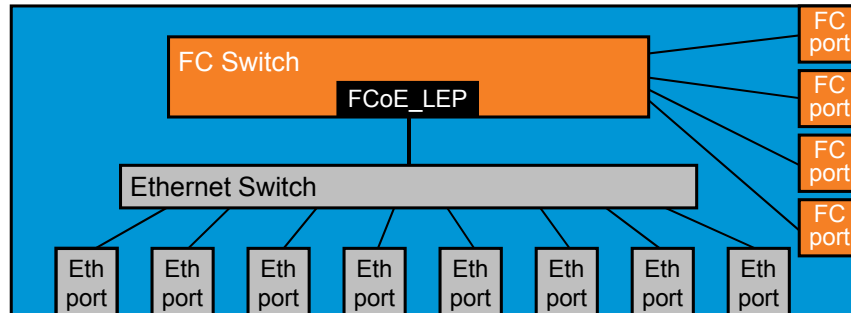
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The Fibre Channel over Ethernet Initialization Protocol (FIP) allows the switch to discover and initialize FCoE-capable entities that are connected to an Ethernet LAN. The Converged Enhanced Ethernet Data Center Bridging Exchange (CEE-DCBX) protocol supports T11-compliant Generation-2 CNAs.

FCoE Forwarder

FCoE Forwarder (FCF) is a switch that contains both a Fibre Channel switch and an Ethernet switch.

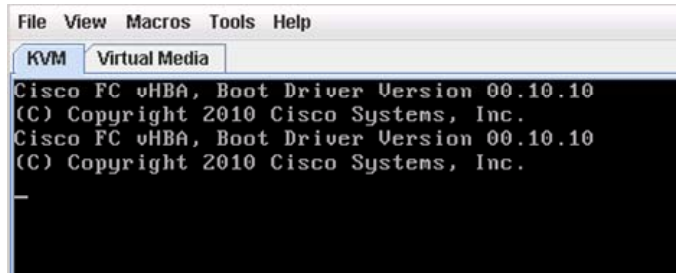


An FCoE forwarder (FCF) is a switch that contains both a Fibre Channel switch and an Ethernet switch. One or more FCoE link endpoints are used to attach the Fibre Channel switch to the Ethernet switch.

There is one Universal MAC address per FCoE_LEP. The FCoE_LEP is responsible for encapsulating and de-encapsulating Fibre Channel frames for FCoE transport. Fibre Channel traffic flows in to one end of the LEP, while FCoE flows in to the other end.

Issue: Unable to Connect to SAN (Scenario 1)

- Symptom:
 - Observing POST reveals that you cannot see the boot target on either fabric.



If a server cannot connect to the SAN environment, it may be caused by a configuration error, requiring troubleshooting of the configuration. The next step is to gather appropriate information.

Data Gathering: FIP Mode Not Enabled

- Server > Inventory > Network Adapters > General > Modify Adapter Properties



The figure shows how you can determine the FIP status from the Cisco IMC GUI. Choose the **Server** tab and click on **Inventory**. Then, in the content pane, choose the **Network Adapters** tab. Click on the appropriate adapter and choose the **General** tab. Click on **Modify Adapter Settings**. You can see that the FIP mode is not enabled.

You can also determine the status of FIP by using the Cisco IMC CLI. The figure shows a screen capture of the Cisco IMC CLI, which shows the FIP mode status. The **show detail** command from within the adapter context can indicate that FIP is currently disabled.

```
ucs-c210-m2 /chassis/adapter # show detail
```

```
PCI Slot 1:
```

```
Product Name: UCS VIC P81E
```

```
Serial Number: QCI1450A170
```

```
Product ID: N2XX-ACPCI01
```

```
Adapter Hardware Revision: 4
```

```
Current FW Version: 1.5(1)
```

```
NIV: Disabled
```

```
FIP: Disabled
```

```
Configuration Pending: yes
```

```
CIMC Management Enabled : yes
```

Data Gathering: FLOGI Database

- There is missing input in FLOGI database on the uplink Nexus 5500

```
cae-sj-n5k-3(config-if)# show interface ethernet 1/9
Ethernet1/9 is up
Hardware: 10000 Ethernet, address: 000d.ecda.6e10 (bia 000d.ecda.6e10)
MTU 1500 bytes, BW 10000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA
Port mode is trunk

cae-sj-n5k-3(config-if)# show interface ethernet 1/9 fcoe
Ethernet1/9 is FCoE UP
vfc9 is Up

cae-sj-n5k-3(config-if)# show interface vfc 9
vfc9 is trunking
Bound interface is Ethernet1/9
Hardware is Virtual Fibre Channel
Port WWN is 20:08:00:0d:ec:da:6e:3f
Admin port mode is F, trunk mode is on

cae-sj-n5k-3(config-if)# show flogi database ← NO vfc 9 flogi!!!
-----
INTERFACE          VSAN    FCID          PORT NAME          NODE NAME
-----
vfc18               100     0x5a0000      21:00:00:c0:dd:11:03:31  20:00:00:c0:dd:11:03:31
vfc19               100     0x5a0001      21:00:00:c0:dd:14:52:61  20:00:00:c0:dd:14:52:61
Total number of flogi = 2.
```

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The **show** commands that are shown in the figure provide information that the physical interface is active and that the virtual Fibre Channel (VFC) to physical 10 Gigabit Ethernet binding is correct and that the VFC interface is up and active.

The **show flogi database** command, which is issued on the Nexus 5500 Series Switches, lists the devices that have successfully completed the fabric login process. The correct VFC interface is not listed in the command output. This is another indicator that there is a problem with connectivity to the SAN.

Resolution: Enable FIP Mode



The figure shows how the FIP status can be changed from the Cisco IMC GUI. Choose the **Server** tab and click on **Inventory**. Then, in the content pane, choose the **Network Adapters** tab. Click on the appropriate adapter and choose the **General** tab. Click **Modify Adapter Settings** and check the **Enable FIP Mode** check box to enable FIP.

The procedure in CLI is as follows:

```
ucs-c210-m2 /chassis/adapter # set fip-mode enabled
```

```
ucs-c210-m2 /chassis/adapter *# commit
```

New VNIC adapter settings will take effect upon the next server reset

```
ucs-c210-m2 /chassis/adapter # show detail
```

PCI Slot 1:

Product Name: UCS VIC P81E

Serial Number: QCI1450A170

Product ID: N2XX-ACPCI01

Adapter Hardware Revision: 4

Current FW Version: 1.5(1)

NIV: Disabled

FIP: Enabled

Configuration Pending: yes

CIMC Management Enabled : yes

Solution Verification: FLOGI Database

- The proper VFC interface now appears in the FLOGI database.

```
cae-sj-n5k-3(config-if)# show flogi database
```

INTERFACE	VSAN	FCID	PORT NAME	NODE NAME
vfc9	100	0x5a0004	20:00:58:8d:09:0f:0c:37	10:00:58:8d:09:0f:0c:37
vfc18	100	0x5a0000	21:00:00:c0:dd:11:03:31	20:00:00:c0:dd:11:03:31
vfc19	100	0x5a0001	21:00:00:c0:dd:14:52:61	20:00:00:c0:dd:14:52:61

```
cae-sj-n5k-3# show interface ethernet 1/9 fcoe
Ethernet1/9 is FCoE UP
  vfc9 is Up
    FCID is 0x5a0004
    PWWN is 20:00:58:8d:09:0f:0c:37
    MAC addr is 58:8d:09:0f:0c:37

cae-sj-n5k-4(config-if)# show flogi database
```

INTERFACE	VSAN	FCID	PORT NAME	NODE NAME
vfc9	200	0xdb0002	20:00:58:8d:09:0f:0c:38	10:00:58:8d:09:0f:0c:38
vfc18	200	0xdb0000	21:00:00:c0:dd:11:03:33	20:00:00:c0:dd:11:03:33
vfc19	200	0xdb0001	21:00:00:c0:dd:14:52:63	20:00:00:c0:dd:14:52:63

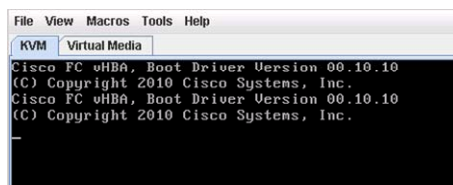
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By issuing the **show flogi database** command from the Nexus 5500 Series CLI, the command output now shows that the VFC interface has successfully completed the fabric login process. The physical 10 Gigabit Ethernet and VFC interfaces are up and active.

Issue: Unable to Connect to SAN (Scenario 2)

- Symptom:
 - Observing POST reveals that you cannot see the boot target on either fabric



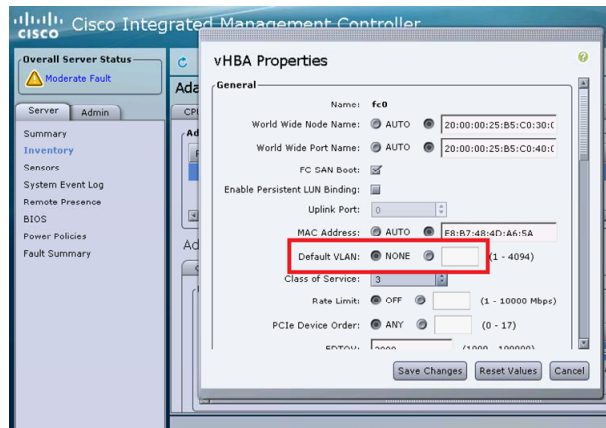
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There are other possible reasons for not being able to connect to the SAN environment.

Data Gathering: FCoE VLAN ID Missing

- Server > Inventory > Network Adapters > vHBAs > Properties



The figure shows an example of observing the FCoE VLAN by using the Cisco IMC GUI. In this output, you can see how to use the CLI to observe that the FCoE VLAN has not been correctly set.

```
C200-M2-3# scope chassis
C200-M2-3 /chassis # scope adapter 1
C200-M2-3 /chassis/adapter # scope host-fc-if fc0
C200-M2-3 /chassis/adapter # set vlan 1011
C200-M2-3 /chassis/adapter/host-fc-if # show detail

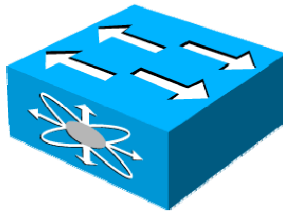
Name fc0:

World Wide Node Name: 20:00:00:25:B5:C0:30:03
World Wide Port Name: 20:00:00:25:B5:C0:40:03
FC SAN Boot: enabled
Persistent LUN Binding: disabled
Uplink Port: 0
MAC Address: E8:B7:48:4D:A6:5A
CoS: 3
VLAN: None
Rate Limiting: OFF
PCIe Device Order: ANY
EDTOV: 2000
RATOV: 10000
Maximum Data Field Size: 2112
Channel Number: N/A
Port Profile: N/A
```

Data Gathering: FLOGI Database

- There is missing input in FLOGI database on the uplink Nexus 5500

```
N5548-3# show flogi database  
No flogi sessions found.  
N5548-3#
```



Cisco Nexus 5548

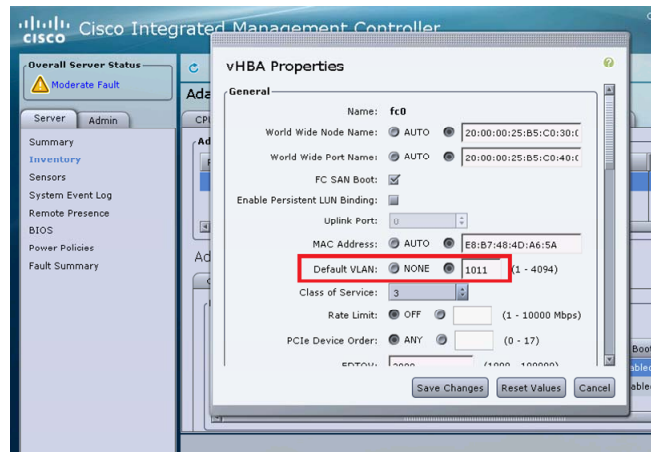
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The **show flogi database** command, which is used on the Nexus 5500 Series Switch, lists the devices that have successfully completed the fabric login process. There is no entry in the database that indicates a problem.

Resolution: FCoE VLAN ID

- Server > Inventory > Network Adapters > vHBAs > Properties



To remediate the issue, change the FCoE VLAN by using the Cisco IMC GUI, as shown in the figure. In the following example, you can use the CLI to set the FCoE VLAN ID to 1011 to match the FCoE VLAN ID on the uplink Nexus 5500.

```
C200-M2-3# scope chassis
C200-M2-3 /chassis # scope adapter 1
C200-M2-3 /chassis/adapter # scope host-fc-if fc0
C200-M2-3 /chassis/adapter # set vlan 1011
C200-M2-3 /chassis/adapter/host-fc-if # show detail

Name fc0:
  World Wide Node Name: 20:00:00:25:B5:C0:30:03
  World Wide Port Name: 20:00:00:25:B5:C0:40:03
  FC SAN Boot: enabled
  Persistent LUN Binding: disabled
  Uplink Port: 0
  MAC Address: E8:B7:48:4D:A6:5A
  CoS: 3
  VLAN: 1011
  Rate Limiting: OFF
  PCIe Device Order: ANY
  EDTOV: 2000
  RATOV: 10000
  Maximum Data Field Size: 2112
  Channel Number: N/A
  Port Profile: N/A
```

Solution Verification: FLOGI Database

- The correct VFC interface now appears in the FLOGI database.

```
N5548-3# show flogi database
-----
INTERFACE  VSAN    FCID      PORT NAME      NODE NAME
-----
vfc3        11      0xe40000  20:00:00:25:b5:c0:40:03  20:00:00:25:b5:c0:30:03

Total number of flogi = 1.

N5548-3#
```

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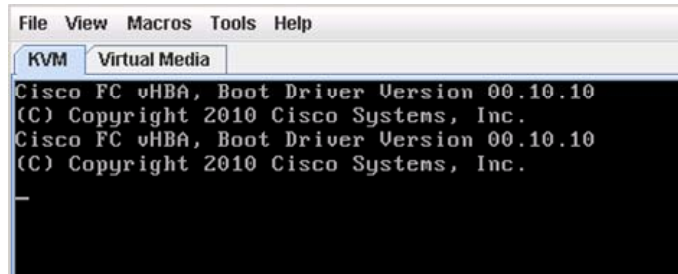
By issuing the **show flogi database** command from the Nexus 5500 Series CLI, the command output now shows that the VFC interface has successfully completed the fabric login process. The physical 10 Gigabit Ethernet and VFC interfaces are up and active.

Troubleshoot Cisco UCS C-Series SAN Bootup

This topic describes how to troubleshoot the Cisco UCS C-Series SAN bootup.

Issue: Cisco VIC Does Not Initialize

- Symptom:
 - Observing POST reveals that you cannot see the boot target on either fabric.



- During POST, if the Cisco VIC does not initialize, there is a **configuration error**.

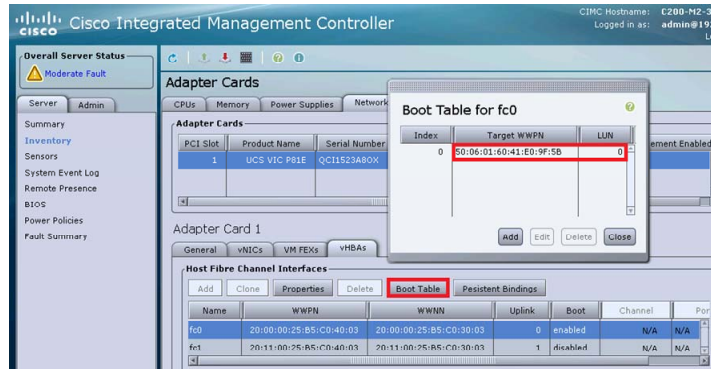
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If the Cisco VIC does not initialize during the power-on self-test (POST), this may be caused by a configuration error, which requires troubleshooting of the configuration.

Data Gathering: Boot Table

- Problem isolation:
 - Misconfigured boot target
- Inventory > Network Adapters > vHBAs > Boot Table



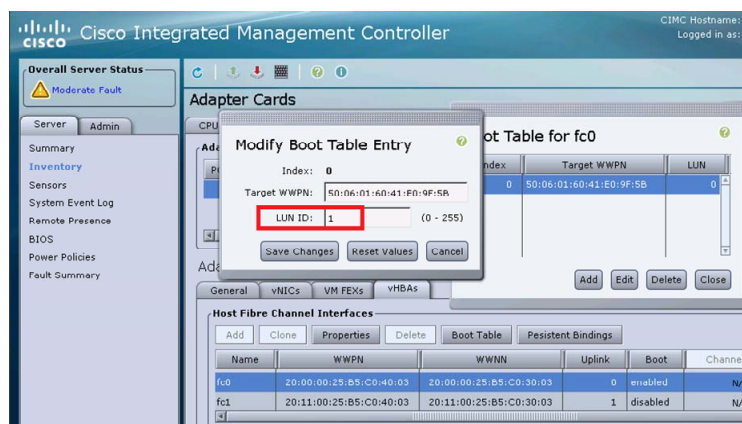
In this example, when you observe the configuration in the Cisco IMC GUI, you can find an incorrect configuration of the boot target.

The equivalent to the output from the GUI in the figure is the following output in the CLI:

```
C200-M2-3# scope chassis
C200-M2-3 /chassis # scope adapter 1
C200-M2-3 /chassis/adapter # scope host-fc-if fc0
C200-M2-3 /chassis/adapter/host-fc-if # show boot
Boot Table Entry  Boot Target WWPN          Boot LUN ID
-----
0                  50:06:01:60:41:E0:9F:5B    0
```

Resolution: Correcting Boot Table

- Inventory > Network Adapters > vHBAs > Boot Table > Edit



Resolve the issue by correcting the Boot target LUN ID. The equivalent to the output from GUI in the slide is the following output in CLI:

```
C200-M2-3# scope chassis
```

```
C200-M2-3 /chassis # scope adapter 1
```

```
C200-M2-3 /chassis/adapter # scope host-fc-if fc0
```

```
C200-M2-3 /chassis/adapter/host-fc-if # show boot
```

```
Boot Table Entry  Boot Target WWPN          Boot LUN ID
```

```
-----  
0                  50:06:01:60:41:E0:9F:5B      0
```

```
C200-M2-3 /chassis/adapter # delete boot 0
```

```
C200-M2-3 /chassis/adapter # create-boot-entry 50:06:01:60:41:E0:9F:5B 1
```

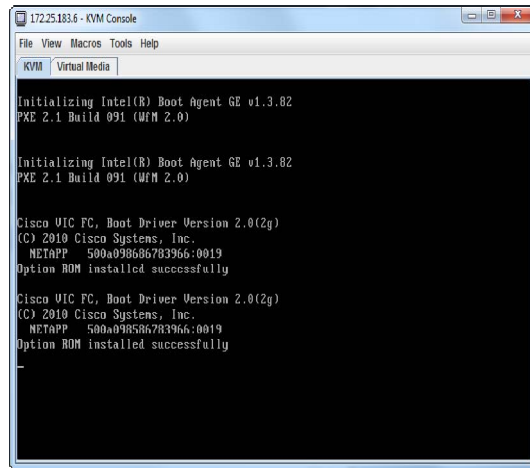
```
C200-M2-3 /chassis/adapter/host-fc-if # show boot
```

```
Boot Table Entry  Boot Target WWPN          Boot LUN ID
```

```
-----  
0                  50:06:01:60:41:E0:9F:5B      1
```

Solution Verification: Successful Initialization of Cisco VIC

- POST displays a successful initialization of the Cisco VIC.



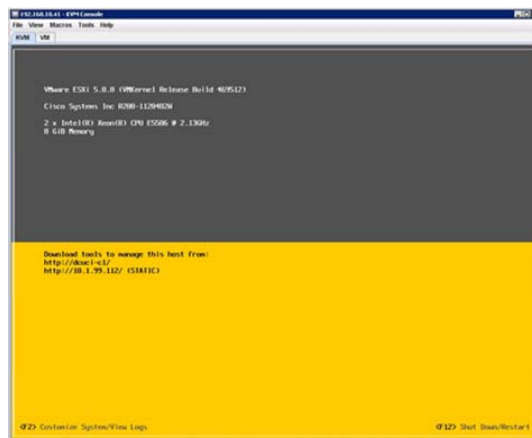
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After remediation, the interface has the correct logical unit number (LUN) ID configured and POST will display the successful initialization of the Cisco VIC.

Solution Verification

- Server successfully boots from SAN



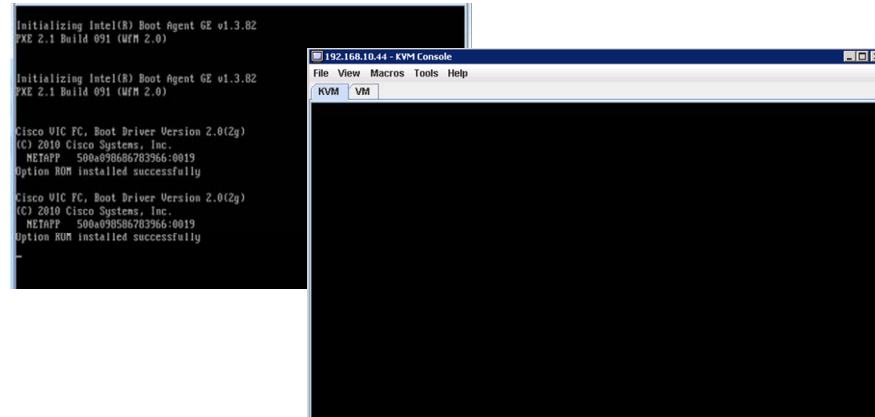
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After the successful Cisco VIC initialization, the server successfully boots from the SAN.

Issue: Local Disk and SAN Bootup

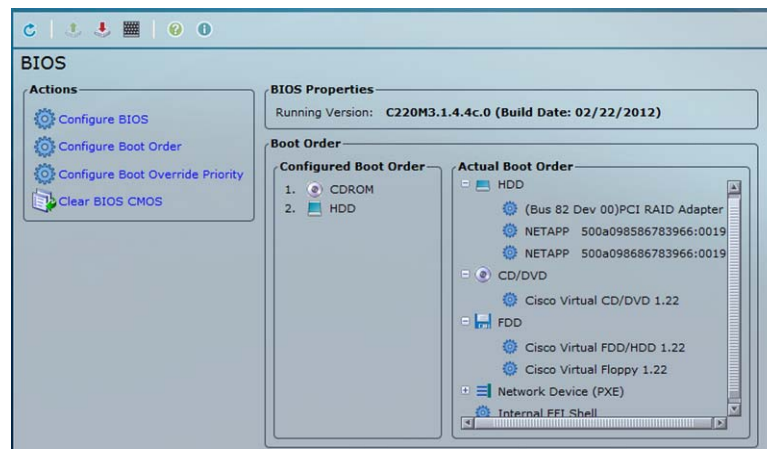
- Symptom:
 - Cisco VIC is successfully initialized.
 - Server still does not boot successfully from SAN (tries to boot from local disk).



Another example is that, even though the Cisco VIC was successfully initialized, the server still does not boot from the SAN. Instead, it tries to boot from the local disk.

Data Gathering: Boot Order

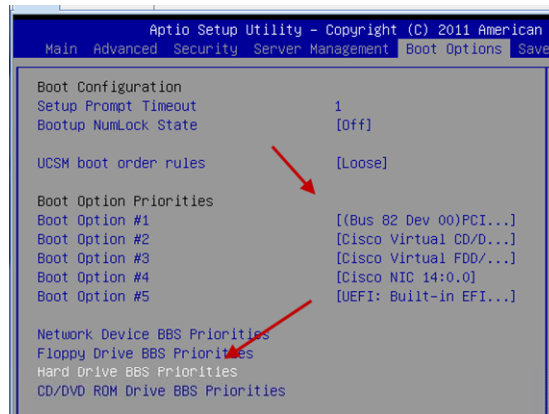
- Default HDD boot order, even when SAN LUNs are present
- Cannot change the HDD boot order from Cisco IMC



During data gathering, you can see that there is a default boot order configured for the hard disk drive (HDD), even if the SAN LUNs are present. You cannot change the default HDD boot order.

Resolution: Change Boot Order

- Enter server BIOS
- Reorder secondary boot



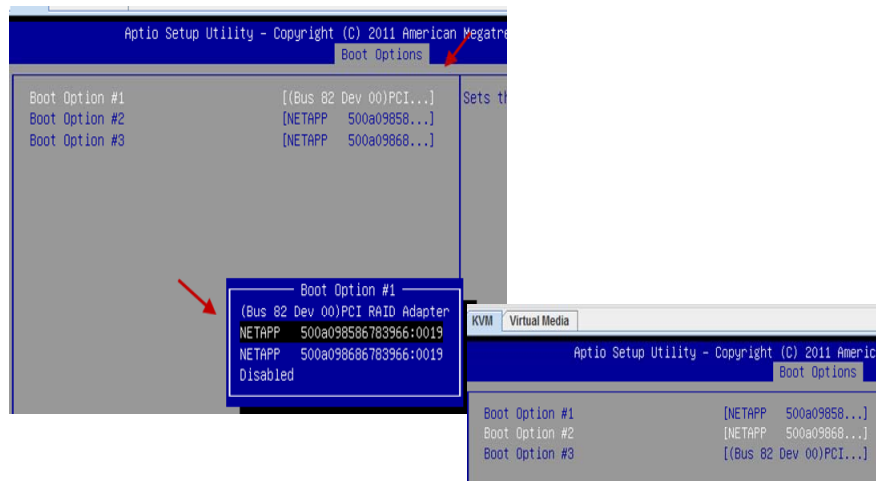
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The solution is to enter the server BIOS and modify the secondary boot order in BIOS to force the SAN disk ahead of the hard disk, or remove the local disks.

Resolution: Change Boot Order (Cont.)

- Move the SAN LUNs to the top.



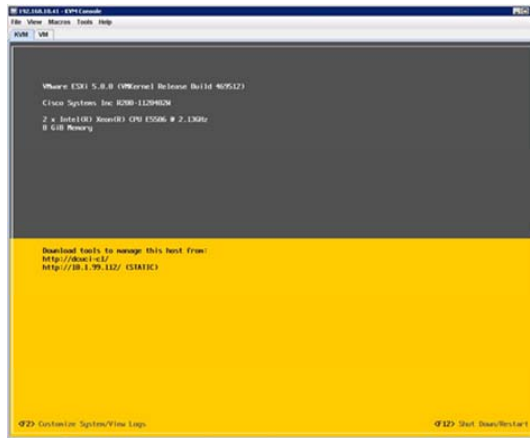
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Now the SAN LUNs are listed as the first boot options. The server will boot from the SAN before trying to boot from the local disk.

Solution Verification

- Server successfully boots from SAN



The server now successfully boots from the SAN.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- Several troubleshooting methods that utilize Cisco Integrated Management Controller tools are presented for LAN connectivity problems.
- In order to troubleshoot SAN connectivity problems, verify FIP, vHBA, and FCoE configuration.
- SAN bootup troubleshooting requires in-depth knowledge of the configurations for the server, Fabric Interconnect, Fibre Channel switch, and storage subsystem.

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Troubleshooting Locally Attached Storage

Overview

This lesson describes the symptoms and recovery procedures that are used to manage local disk-related problems.

Objectives

Upon completing this lesson, you will be able to define Redundant Array of Independent Disks (RAID) controller options and configuration utilities that facilitate the creation of virtual disks that may be used for booting various supported operating systems. This ability includes being able to meet these objectives:

- Recognize Cisco UCS C-Series server RAID options
- Configure LSI MegaRAID controller
- Troubleshoot Cisco UCS C-Series server local storage

Identify Cisco UCS C-Series Server RAID Options

This topic describes Cisco UCS C-Series server RAID options.

RAID Controller

- A RAID controller is a hardware device that is responsible for managing physical drives in a system and presenting them to the computer as logical units.
- RAID delivers resiliency and redundancy to local storage.
- Options for RAID depend on physical capacity of server and the RAID controller specifications.

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The figure describes a RAID controller. In order to divide and replicate data across multiple physical disks, the disks are configured in logical units called RAID arrays.

The purpose of a RAID controller is to provide resiliency against disk failure and redundancy so that the system will automatically recover.

Disk Performance: Impacts and Problems

Drive performance varies between the different speeds and types of disk drives.

	Transfer Rate Mb/s (Read/Write)	Avg. Latency (ms)	IOPS (Read/Write)
5400 RPM HDD	123	15	67
7200 RPM	155	13.7	75
10K RPM HDD	168	7.1	140
15K RPM HDD	202	5.1	196
Micron SATA MLC SSD	350/140	0.5/3.5	50000/750
Micron PCIe SLC SSD	3200/1900	.009	785000/205000

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The choice of disk drives has direct impact on the performance of the server when using local storage. Each drive type has a different performance profile according to the speed of the mechanical drive and head assembly inside the hard disk drive.

Using faster drives can address performance problems and limits in the server. SSD drives are not readily available for the Cisco C-Series (or any servers) as SSD have problematic performance with writing causing wear on the flash memory.

SSD reliability is suitable for the desktop but not yet solved for the server where high duty cycles for writing cause unacceptable reliability problems.

Cisco UCS C-Series RAID Controller Options

Description	PID	BIOS Support	C200 M2	C200 SFF	C210 M2	C250 M2	C460 M1
LSI 1064E Mezzanine	R2X0-ML002	Option ROM	Yes	No	Yes	No	No
LSI 1068E Mezzanine	UCSC-RAID-SFF-C200	Option ROM	No	Yes	No	No	No
LSI MegaRAID 9260-4i	R200-PL004	WebBIOS	Yes	No	No	No	No
LSI MegaRAID 9261-8i	R2XX-PL003	WebBIOS	Yes	No	Yes	Yes	No
LSI SAS30813E-R	R250-PL003	Option ROM	No	No	No	Yes	No
LSI MegaRAID 9240-8i No RAID 5	RC460-PL002	WebBIOS	No	No	No	No	Yes
LSI MegaRAID 9260-8i		WebBIOS	No	Yes	No	No	Yes
LSI MegaRAID 9280-4i4e (4 ports internal/4 ports external)	UCSC-RAID-C-4i4e	WebBIOS	Yes	Yes	Yes	No	No
ICH10R Software RAID (No ESX/ESXi)	ICH10R	Server BIOS	Yes	Yes	Yes	No	No

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The table in the figure summarizes the UCS C-Series RAID controller options, arranged according to server type. The C200 M2 server offers the greatest flexibility for RAID controller support.

Cisco UCS C-Series RAID Controller Options (Cont.)

Description	RAID Support	Battery Backup	SAS/SATA	Form Factor
LSI 1064E Mezzanine	0, 1	No	4 SAS or SATA	Mezzanine
LSI 1068E Mezzanine	0, 1	No	8 SAS or SATA	Mezzanine
LSI MegaRAID 9260-4i	0, 1, 5, 6, 10, 50, 60	Yes, Direct or Remote Attached	4 SAS and/or SATA	x8 PCIe 2.0
LSI MegaRAID 9261-8i	0, 1, 5, 6, 10, 50, 60	Yes, Direct or Remote Attached	8 SAS and SATA	x8 PCIe 2.0
LSI SAS30813E-R	0, 1	No	8 SAS or SATA	x8 PCIe 2.0
LSI MegaRAID 9240-8i	0, 1, 5, 10, 50 and JBOD mode	No	8 SAS and SATA	x8 PCIe 2.0
LSI MegaRAID 9260-8i	0, 1, 5, 6, 10, 50, 60	Yes	8 SAS and SATA	x8 PCIe 2.0
LSI MegaRAID 9280-4i4e (4 ports internal/4 ports external)	0, 1, 5, 6, 10, 50, 60	Yes, Direct or Remote Attached	8 SAS and SATA	x8 PCIe 2.0
ICH10R	0, 1	No	4 SATA	Integrated

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The table in the figure summarizes the UCS C-Series RAID controller options, arranged according to RAID support, battery backup support, serial attached SCSI (SAS)/ Serial Advanced Technology Attachment (SATA) drive support, and form factor.

LSI Controller Battery Backup Considerations

- With no battery backup installed or if a controller does not support it, write cache is not enabled, resulting in lower performance.
- The battery used for this feature has a limited shelf life, typically 1–2 years.
 - Requires a replacement procedure and cycle to be written into the organizational maintenance plan

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If you use an LSI RAID controller that supports the battery backup feature, there are some considerations that should be addressed.

If the controller either does not support the battery backup feature or it is not installed, then the write cache will not be enabled, which results in lowered performance. The battery that is used for the battery backup feature has a shorter shelf life than the rated useful life of the server, which is typically 1 to 2 years. Therefore, the organization should create a replacement cycle and procedure and include it as part of an overall maintenance plan.

SAS Expander

- SAS Expander allows a single initiator to communicate with more SAS or SATA targets.
- Similar functionality to a network switch that allows multiple hosts connecting to an uplink.
- Exists to allow more complex interconnect topologies:
 - Fewer cables
 - Multiple drives connected to a RAID card via a single cable
 - Drives connect to the Expander
 - Cable connects the Expander to RAID card

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The SAS expander works with certain LSI RAID controllers to enable a single initiator to communicate with more SAS or SATA storage targets. It functions in the same way as a network switch, allowing multiple dedicated SCSI sessions to be supported.

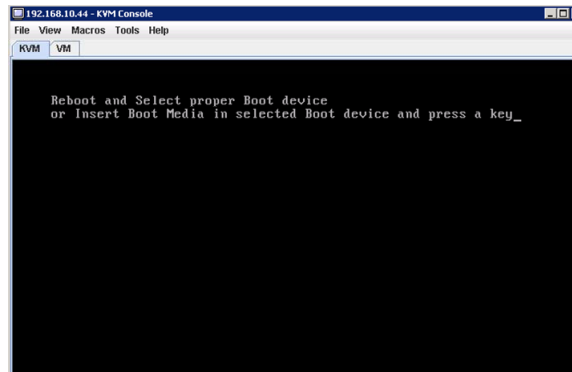
The SAS expander installs between the LSI RAID controller and the physical hard drives with two cables: one cable connects the drives to the expander and the other connects the expander to the controller.

Cisco UCS C-Series RAID Troubleshooting

This topic describes how to troubleshoot issues in UCS C-Series RAID storage.

Issue: Problems with Operating System Bootup

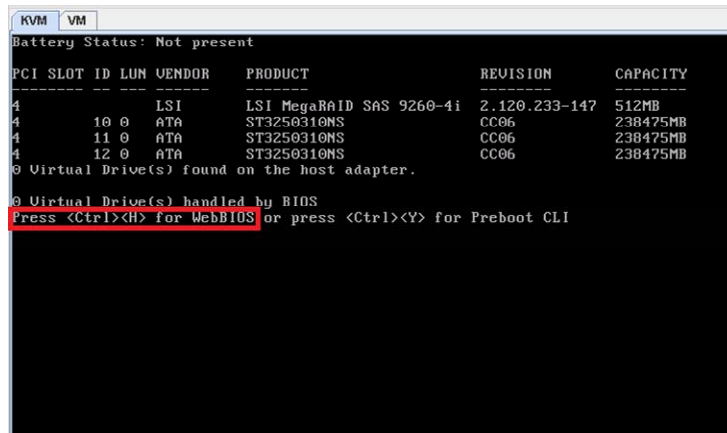
- Symptom:
 - The operating system does not boot from local disk



Example symptom: The operating system does not boot from the local disk drive.

Data Gathering: Access LSI MegaRAID Controller

- Invoke the LSI WebBIOS Configuration Utility by pressing **Ctrl-H** during the POST of the server.



The screenshot shows the LSI WebBIOS Configuration Utility interface. At the top, it says 'Battery Status: Not present'. Below that is a table of hardware information:

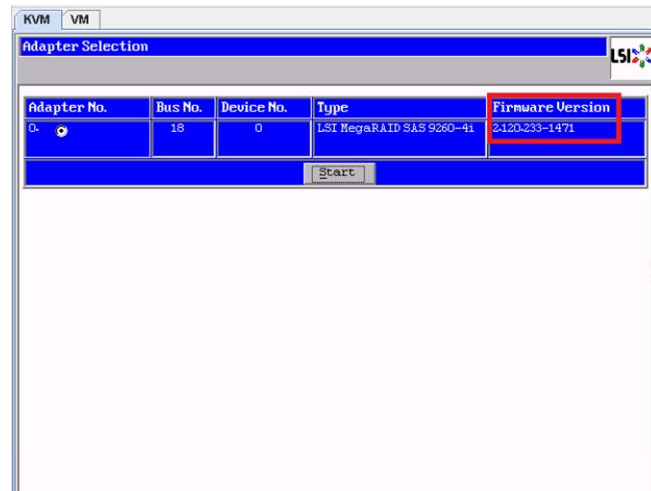
PCI	SLOT	ID	LUN	VENDOR	PRODUCT	REVISION	CAPACITY
4				LSI	LSI MegaRAID SAS 9260-4i	2.120.233-147	512MB
4	10	0		ATA	ST3250310NS	CC06	238475MB
4	11	0		ATA	ST3250310NS	CC06	238475MB
4	12	0		ATA	ST3250310NS	CC06	238475MB

Below the table, it says '0 Virtual Drive(s) found on the host adapter.' and '0 Virtual Drive(s) handled by BIOS'. At the bottom, it says 'Press <Ctrl><H> for WebBIOS or press <Ctrl><Y> for Preboot CLI'. The text 'Press <Ctrl><H> for WebBIOS' is highlighted with a red box.

In case of problems with the LSI RAID controller, use the following procedure to access the configuration and check the status of the drives, RAID pack, and adapter status.

Access the LSI WebBIOS Configuration Utility by pressing Ctrl-H during the BIOS power-on, self-test (POST) sequence.

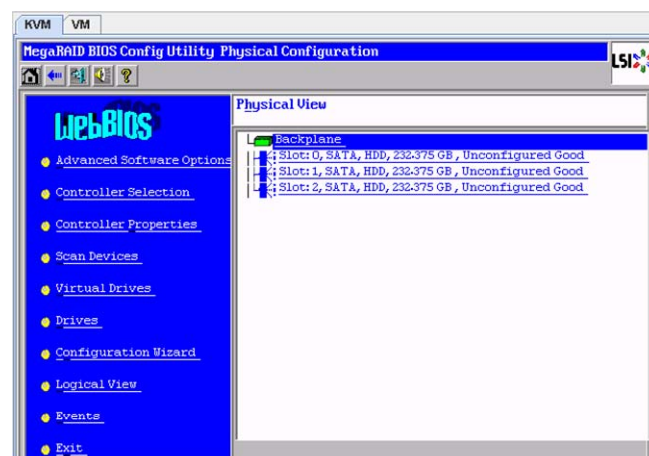
LSI MegaRAID Controller: Check Firmware



The LSI WebBIOS Configuration Utility displays all available adapters with their type and firmware version. For intermittent or unusual problems, you should check the Cisco website for firmware updates and any known bugs.

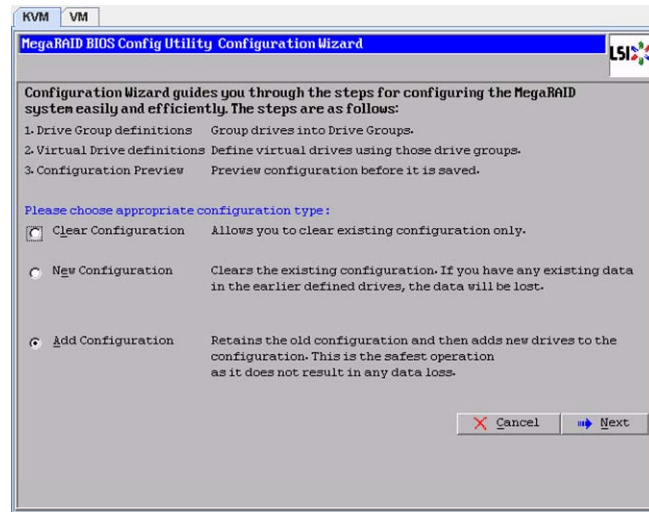
Enter the Configuration Utility by choosing the specific adapter and pressing **Start**.

LSI MegaRAID Controller: Check the Drives



The RAID topology is shown in the figure with all Direct Attach Devices listed, including physical disks and configured arrays. The example shows that there are three unconfigured SATA drives.

Resolution: LSI MegaRAID Controller Configuration Wizard



Click on **Configuration Wizard** to begin configuring the MegaRAID system. Choose **New configuration** or **Add configuration** to add drives to the existing configuration.

During the Configuration Wizard, you first have to put appropriate drives into drive groups and define virtual drives, using those drive groups.

LSI MegaCLI Configuration Utility

The MegaCLI Configuration Utility is a CLI application that you can use to manage MegaRAID SAS RAID controllers, to perform these tasks:

- Configure MegaRAID SAS RAID storage adapters and attached devices.
- Display information about logical and physical drives for the adapter and other storage components.
- Display ongoing progress for operations on physical and logical drives.
- Change properties for the logical and physical drives for the adapter and other storage components.
- Change the firmware on the adapters.
- Monitor the RAID storage systems.

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The MegaRAID Command Tool is a CLI application for SAS. You can use this utility to configure, monitor, and maintain MegaRAID SAS RAID storage adapters and the devices that are connected to them.

Using the CLI can be faster than using the ASCII menu, and the CLI can be more useful for repetitive actions or when working on large numbers of servers. Using the CLI, you can make regular checks and common troubleshooting faster by using predetermined cut and paste checking on server status. For example, helpdesk staff can use the CLI to automate data collection for dispatch to a higher-level operator.

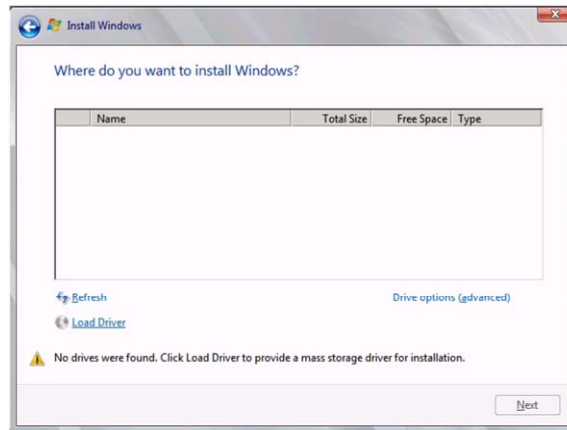
Note The MegaRAID Command Tool supports only LSI Logic SAS RAID storage adapters. It does not support other types of MegaRAID adapters, such as U320, SATA, or IDE.

Troubleshooting Cisco UCS C-Series Server Local Storage

This topic describes how to troubleshoot Cisco UCS C-Series server local storage.

Issue: Windows Operating System Does Not Detect Hard Drives

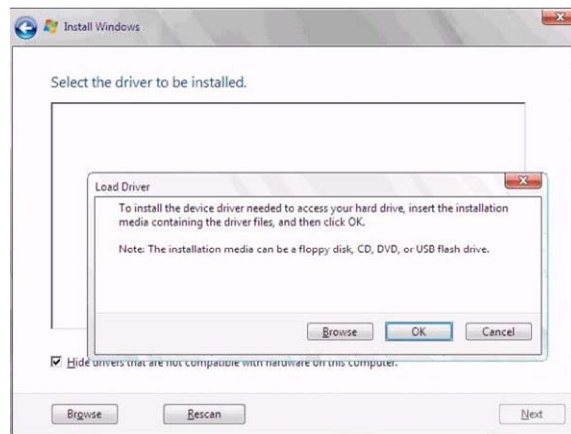
- Symptom:
 - During the installation process, the hard drives are not detected.



As an example issue, during the installation of an operating system on a server, the hard drives fail to be detected. The reason is often because the proper LSI drives have not been bundled with the operating system version that is being installed.

Data Gathering: LSI Drivers

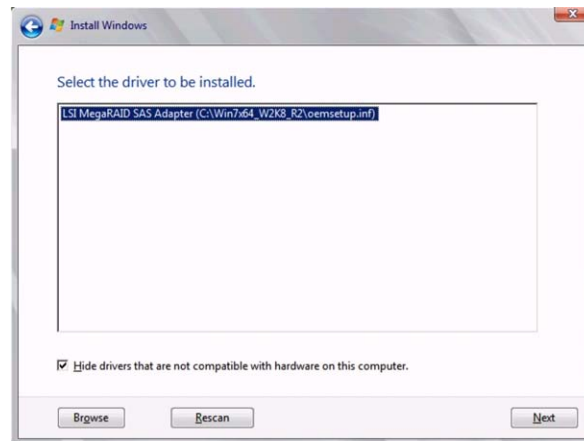
- LSI drivers may not be bundled with the Windows version being installed.
- These drivers must be installed during the installation process.



It is important that the drivers are loaded during the installation process. After clicking **Load Driver** in the Install Windows window, you are prompted in a Load Driver dialog to choose the driver to be installed. You first define a virtual device with your driver ISO image.

Resolution: Load Valid Drivers

- Use the load driver option to point the drives to the correct drivers for the LSI controller in the system.



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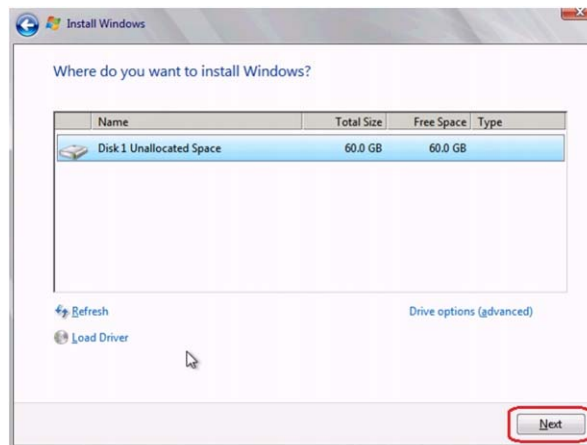
After finding the valid drivers, Windows loads the drivers and the driver is listed under the prompt “Select the driver to be installed.” The driver path is CD-ROM
Drive:\\Windows\\Storage\\LSI\\2008M\\W2K8R2\\x64

After Windows loads the drivers, choose the driver for your device from the list in the Install Windows window and click **Next**. Wait while the drivers for your mass storage device are installed, as indicated by the progress bar.

After the driver installation finishes, unmap the driver ISO and map the Windows installation image. Wait for the mapping to complete. Observe the progress in the Details pane.

Solution Verification

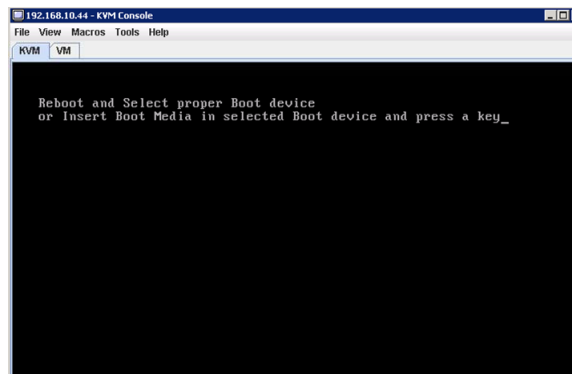
- When loaded, the hard drives are displayed and the hard drive for the operating system can be selected.



In the Install Windows window, you will now be able to see the hard disk drive partition. Choose the disk or partition where you want to install Windows from the list, and then click **Next** to continue with installation.

Issue: Problems with Operating System Bootup

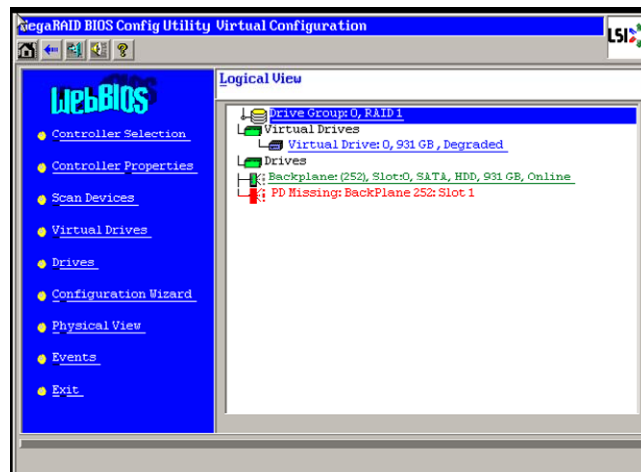
- Symptom:
 - The operating system does not boot from local disk.



As an example of another issue, the operating system does not boot from the local disk drive.

Data Gathering: Disk Failure

- There is a disk failure seen from the LSI MegaRAID Controller



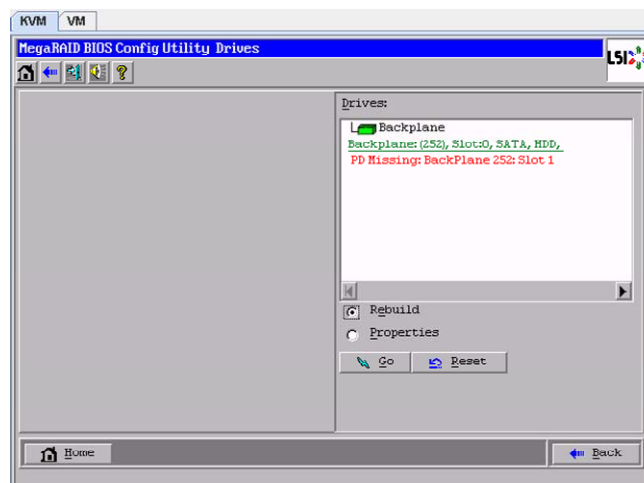
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Check the disks from the MegaRAID controller during the POST sequence. Press **Ctrl-H** during the sequence to enter the LSI option ROM. From there, you can observe that there is a problem with one physical disk.

Resolution: Rebuild the Disk

- Drives > Click on the faulty disk > Choose **Rebuild** > Click **Go**



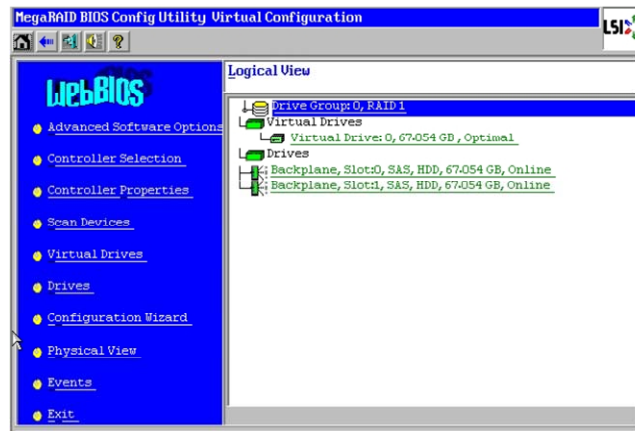
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Rebuild the disk. Click on **Drives** and choose the disk with a problem. Click **Rebuild** and click **Go** to start with the process of disk rebuilding.

Solution Verification

- There are two hard disk drives now online in this drive group.



When the disk is successfully rebuilt, you can click on Logical View to see that both disks in this drive group are now online.

Troubleshooting Local Drives During the VMware ESXi Installation

Unable to install ESXi on server with only the onboard controller:

- The LSI hardware RAID controller is required.
- It is possible to utilize single drives with the ICH10R Software controller.

VMware does not show the local drive during installation:

- VMware supports a maximum of 2 TB on partition sizes.
- Resize the partition to not exceed the 2-TB partition size limitation.

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If the VMware ESX/ESXi bare metal hypervisor is being installed in order to virtualize the server, the LSI RAID controller option is required.

Note ESX/ESXi installations are not supported with the ICH10R onboard controller.

VMware vSphere imposes a limitation of 2 TB on drive partition sizes. If this limit is exceeded, the local drive may not be visible during installation. If this happens, the recommended solution is to resize the drive partition so that it does not exceed 2 TB.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- The Cisco UCS C-Series servers support a variety of RAID controllers in addition to the onboard controller.
- RAID controller configuration example was presented to illustrate proper setup.
- Several common RAID adapter and disk drive performance issues were examined and their recommended solutions were presented.

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Troubleshooting Operating System-Related Issues

Overview

This lesson describes a structured approach to the installation and troubleshooting of operating system issues.

Objectives

Upon completing this lesson, you will be able to list detailed steps for installing an operating system on local disks and on a remote Fibre Channel SAN logical unit number (LUN), and to present several troubleshooting scenarios and proposed solutions. This ability includes being able to meet these objectives:

- Describe Cisco UCS C-Series server operating system specifics
- Troubleshoot Cisco UCS C-Series server with operating system installed

Cisco UCS C-Series Server Operating System Specifics

This topic describes Cisco UCS C-Series server operating system specifics.

Operating System Installation

- Use the Cisco UCS C-Series SCU for local disk installation.
- Out-of-the-box experience:
 - KVM attach via cable provided
 - Operating system on CD/DVD in the SATA drive
 - Local USB floppy (if installing Windows 2003)
- Virtual media settings are disabled by default (thus virtual install must always be configured for new servers).
- To install using the virtual media mapping (virtual ISOs, virtual IMG files), it must be enabled in the Cisco IMC GUI (Remote Presence menu)
- Launch Virtual KVM from Cisco IMC (Remote Presence menu)
- Quiet Boot is enabled by default

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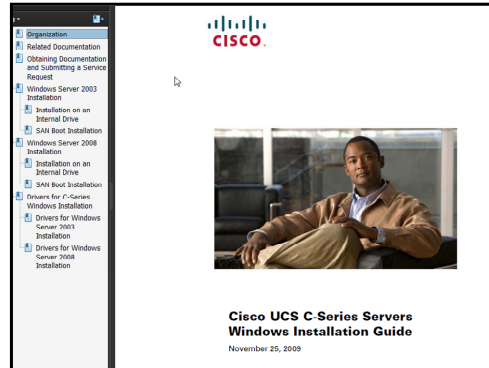
The Cisco UCS Server Configuration Utility (SCU) installs the operating system with all of the appropriate drivers. Before you perform a local disk installation of the operating system, you must complete these activities:

- Prepare a configured IP address for the management port of the server and verify that you can connect to it.
- Connect to the Cisco Integrated Management Controller utility.
- Obtain the Cisco UCS C-Series drivers CD, or the ISO image of this CD from Cisco.com.
- If you are installing to a bootable SAN device, configure a LUN on the SAN, then connect to the SAN and verify that one (and only one) path exists from the SAN host bus adapter (HBA) to the LUN.
- If your server has an LSI MegaRAID controller, configure the Redundant Array of Independent Disks (RAID) settings for the drives in your server.
- If you do not configure your LSI MegaRAID LUNs before installing the operating system, disk discovery failures might occur during the installation and you could see error messages such as “No Device Found.”
- Refer to the Cisco UCS C-Series Servers Windows Installation Guide, available at the Cisco product support website, for the latest information on Windows installation and practices.
- Obtain the Windows installation media, either on CD/DVD or as an ISO image.
- Obtain the activation keys for this software installation.
- As devices are initialized, information about them is displayed in messages. However, Quiet Boot must be disabled in the server BIOS. You can determine which devices are installed in the servers by reading the output from the server boot process.

Windows Installation Guide on Cisco Connection Online

http://www.cisco.com/en/US/docs/unified_computing/ucs/c/sw/os/install/CSERIES-WINDOWS.html

Cisco experts provide this guide to assist customers with operating system installs.



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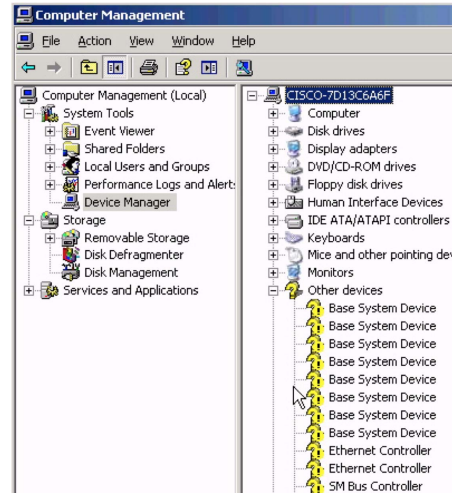
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Cisco published a comprehensive guide to installing Windows to UCS C-Series servers. It describes the detailed steps for installing Windows Server 2003 and Windows Server 2008. It also provides extensive advice on installing and troubleshooting drivers and RAID controllers. This guide will be updated on a regular basis.

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

Operating System Installation: Key Points

- Ensure that the operating system is loaded in the DVD drive and BIOS has correct boot order. You can also use a virtual DVD.
- Have the RAID device driver as virtual floppy on your workstations (Cisco recommended).
- If using RAID controller, plan your RAID layout and configuration before operating system installation.
- Know your LUNs before starting.
- Remember to update the Windows hardware drivers using the DVD or online as soon as possible.



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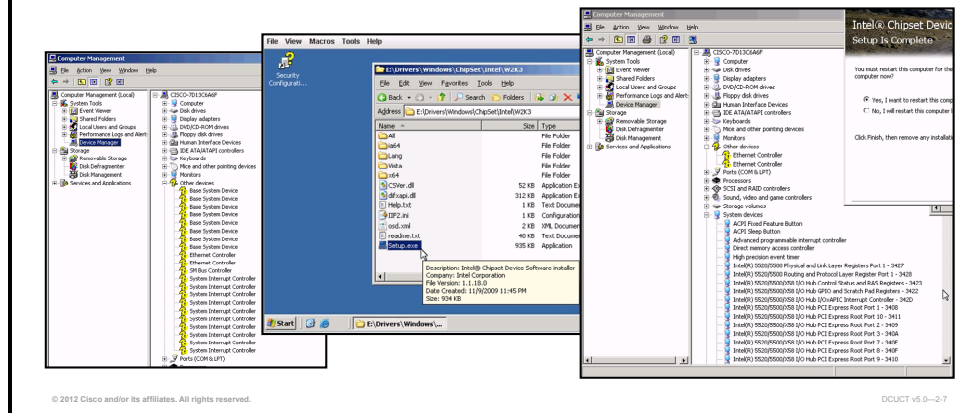
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When installing software to your UCS C-Series server, read the documentation and make sure that you have the latest Cisco device drivers.

Then plan for what you will need to prepare for the installation. Check the BIOS settings and the RAID configuration that you want to use—there are many different choices.

Operating System Drivers After Installation (Windows Server)

- Intel Chipset drivers—Do this first and reboot (will install most drivers)
- LOM drivers
 - C200/C210 Intel 82576
 - C250 Broadcom 5709
- Third-party adapters (CNA/HBA/10G-NIC)



It is recommended that you install operating system drivers in the following order:

1. Intel chipset drivers (reboot before installing more drivers)
2. LAN on motherboard (LOM) drivers
3. Any third-party adapter driver

In the Windows Server 2003 Device Manager, devices that still need drivers are marked with yellow flags, as shown in the figure.

You can see the Windows Server 2003 drivers that are included on the Cisco UCS C-Series Drivers DVD at this URL:

- <http://www.cisco.com/cisco/software/type.html?mdfid=283860950&flowid=25801>

You can get the drivers that are included on the Cisco UCS C-Series Drivers DVD by following this URL (You will need your CCO account.):

- <http://www.cisco.com/cisco/software/type.html?mdfid=283860950&flowid=25801>

Installation Using SAN Boot

This subtopic reviews troubleshooting drivers on a bootable SAN LUN.

Operating System SAN Boot Installation

Preparation: Windows 2003/2008 SAN install is complex

- Configure the SAN, zoning, VSANs (if applicable).
- Configure LUN masking on the array.
- Configure the HBA/CNA option ROM (disabled by default).
- Configure the boot order.
- Map the appropriate HBA/CNA driver.
- Microsoft best practice is to enable one path during install.
- After MPIO/DMP is loaded, then enable the second path.
- If possible, only present a single LUN for install, preferably a different size from a typical data LUN.

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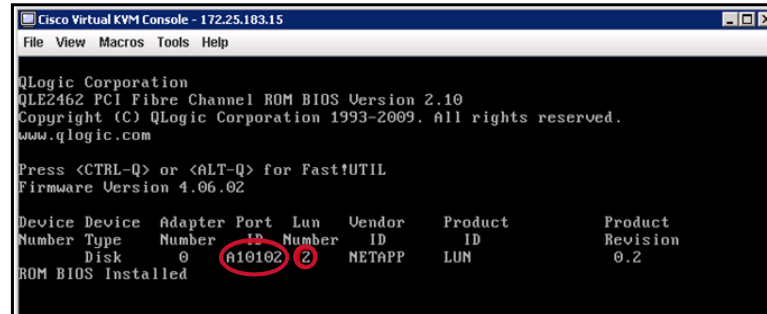
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Before you perform a SAN boot of the operating system, you must complete these activities:

- Obtain a configured IP address for the management port of the server—verify that you can connect to it and the Cisco Integrated Management Controller utility.
- Obtain the Cisco UCS C-Series driver CD, or the ISO image of this CD from Cisco.com.
- If installing to a bootable SAN device, configure a LUN on the SAN, then connect to the SAN and verify that one (and only one) path exists from the SAN HBA to the LUN.
- The host adapter BIOS must be enabled and the worldwide port name (WWPN) must be obtained in order to configure LUN masking on the storage array and zoning on the upstream SAN switches.
- Obtain the Windows installation media, either on a CD/DVD or as an ISO image.
- Obtain the activation keys for this software installation.
- Disable quiet mode for visibility into boot screens for installed devices.
- Check the boot order in the BIOS settings (new devices always appear last). Check Cisco IOS mapping in the BIOS Boot Manager.
- Map your device drivers as virtual media emulation, also known as “floppy emulation.”

Operating System SAN Boot Installation (Cont.)

- Initially, no LUNs are masked.
- Option ROM boot settings are disabled.
- Even if the option ROM is boot-enabled, the absence of target LUNs will result in “ROM BIOS Not Installed.”
- The system BIOS will not display a SAN LUN to boot from in this case.
- Option ROM shows a SAN LUN.



```
Cisco Virtual KVM Console - 172.25.183.15
File View Macros Tools Help

QLogic Corporation
QLE2462 PCI Fibre Channel ROM BIOS Version 2.10
Copyright (C) QLogic Corporation 1993-2009. All rights reserved.
www.qlogic.com

Press <CTRL-Q> or <ALT-Q> for Fast!UTIL
Firmware Version 4.06.02

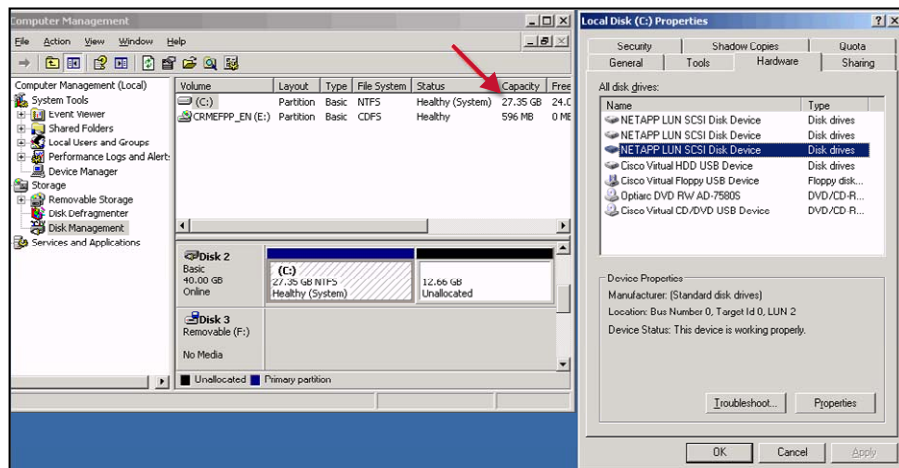
Device Device Adapter Port LUN Vendor Product Product
Number Type Number ID Number ID ID Revision
Disk 0 a10102 2 NETAPP LUN 0.2
ROM BIOS Installed
```

The Option ROM now displays a SAN LUN. If the SAN array and SAN network are correctly configured, Fibre Channel HBA Option ROM will show the LUN as available.

If you do not know which devices are installed in your target server, you can use the boot process after quiet mode is disabled and watch the messages on the display at boot time. This may be useful in determining the device drivers that you will need.

You will need to validate the storage array configuration before the LUN will appear. Be sure that you know how to troubleshoot the LUN and check its availability—it is not always the server that is misconfigured.

Operating System SAN Boot Installation (Cont.)



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From the Windows desktop Start menu, navigate to Computer Management > Disk Management to view the local disk properties.

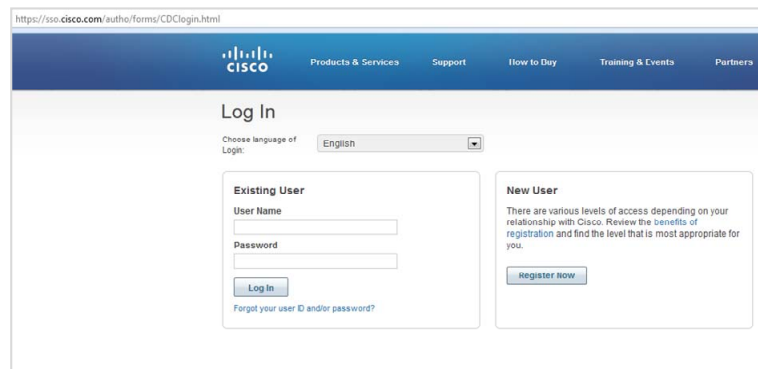
In this example, Windows is showing that three NetApp LUNs are visible in the Windows server, with the configured Disk 2 showing two partition sizes: the 28-GB LUN created during Windows setup and the unallocated 12-GB partition.

Troubleshoot Operating System Deployment on Cisco UCS C-Series Servers

This topic describes the procedure after installing operating system device drivers and how to troubleshoot a Cisco UCS C-Series server with the operating system installed.

Cisco Connection Online Tools

- Cisco Connection Online Tools: an online resource for Cisco customers
- You need a username and password to use these tools.

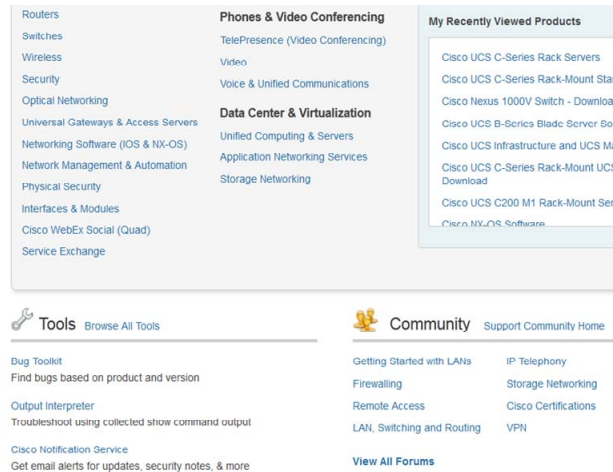


The screenshot shows the Cisco Connection Online Tools login page. The URL in the browser address bar is <https://sso.cisco.com/auth/forms/CDLogin.html>. The page features a blue header with the Cisco logo and navigation links: Products & Services, Support, How to Buy, Training & Events, and Partners. Below the header, the main content area is titled "Log In". It includes a language selection dropdown set to "English". There are two main sections: "Existing User" and "New User". The "Existing User" section has input fields for "User Name" and "Password", a "Log In" button, and a link for "Forgot your user ID and/or password?". The "New User" section contains a message about access levels and a "Register Now" button.

You need a Cisco Connection Online username and password to use the tools. Technical tips, troubleshooting information, a bug toolkit, open forum, and Technical Assistance Center (TAC) access are among the available Cisco Connection Online tools.

Cisco Connection Online Tools (Cont.)

- Click on **Support** and scroll down to Tools and Community support

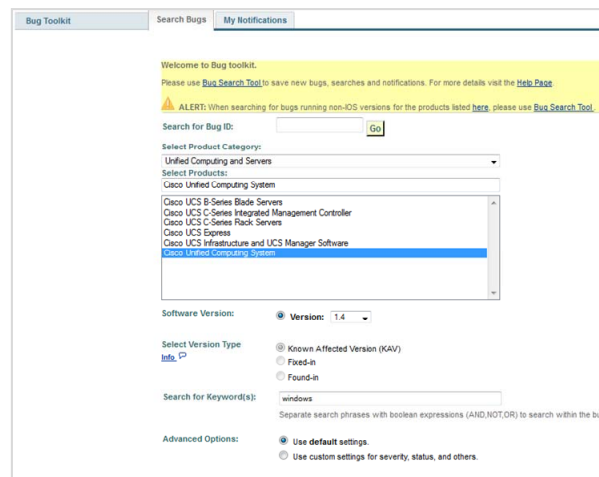


Log in to Cisco.com and click **Support**. Scroll down to see Tools and Community.

Consider, for example, that you have a problem with an installation of the Windows operating system on your C-Series server. You are searching for any known issues with this and the Bug Toolkit is the appropriate tool.

Bug Toolkit: Example Search

- Search for known issues – example for Windows operating system



Click on the Bug Toolkit and choose **Unified Computing and Servers**. Then click on **Cisco Unified Computing System**. Choose your software version and put in any possible keywords (“Windows” in the example). Then click **Search**.

Bug Toolkit: Example Result

- Issue in the example can be solved by upgrading the firmware

The screenshot shows the Cisco Bug Toolkit interface. At the top, there's a search bar and a 'My Notifications' tab. Below the search bar, there's a message: 'Please use Bug Search Tool to manage existing notifications and setup new ones. Testing'. The main section is titled 'Filter Options: (Bug Total: 3)'. It includes a 'Filter by Technology' section with radio buttons for 'Across any technology' (selected) and 'Across specific technologies such as P-Router, Voice Quality, or WLAN Security'. There's a 'Submit' button. Below the filters, there's a table of search results. The table has columns for 'Bug ID', 'Status', and 'Severity'. The results are:

Bug ID	Status	Severity
CSCwv8193	Fixed	2
CSCwv8199	Open	3
CSCwv8202	Open	6

Each row has a link to 'Info' and a link to 'Workaround'. The 'Info' link for the first bug is highlighted. To the right of the table, there's a 'Bug Details' section for the selected bug (CSCwv8193). It includes a 'Problem Description' and a 'Workaround'.

In this example, your search results show that three issues are found. Click **Bug ID** to obtain more information about the bug. Roll your mouse over **Info** and you will see the bug details, workarounds, and, possibly, software versions where this was fixed.

Cisco Support Community

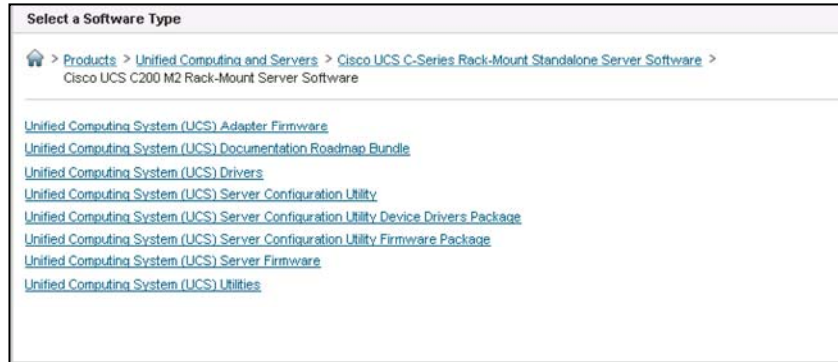
- <https://supportforums.cisco.com/index.jspa>
- Data Center > Unified Computing

The screenshot shows the Cisco Support Community web page. The header includes the Cisco logo and the text 'Cisco Support Community'. Below the header, there's a search bar and a navigation menu with links to 'Home', 'Top Contributors', and 'Expert Corner'. The main section is titled 'Unified Computing' and includes a sub-menu with links to 'Overview', 'All Content', 'Discussions', 'Documents', 'Blog', 'Polls', and 'Videos'. Below the sub-menu, there's an announcement: 'ANNOUNCEMENT: Create Service Request from CSC Discussions!'. The main content area is divided into three columns. The left column is titled 'Data Center Communities' and lists various topics. The middle column is titled 'Recent Activity' and shows a list of recent discussions. The right column is titled 'Actions' and includes links to 'Register / Login for more Actions', 'Notifications', and 'Popular Discussions'.

You can also find valuable information on Cisco Support Community web page (<https://supportforums.cisco.com/index.jspa>). You can narrow down your search results by choosing **Unified Computing**. Only results related to Unified Computing will be shown.

Searching for Valid Drivers

- Support > Unified Computing & Servers > C-Series Standalone Server Software > Download Software
- Choose your server model from the list and then choose **Unified Computing System (UCS) Utilities**



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After searching for known issues, you can download a newer software version, which already has the bug from the example solved, and upgrade the server software.

Go to Support and choose **Unified Computing & Servers**. Then select **C-Series Standalone Server Software** and click on **Download Software**. Choose your server model from the list and then select the last option: **Unified Computing System (UCS) Utilities**.

Searching for Valid Drivers (Cont.)

- Select a Platform (Windows, in this example).
- It is recommended to choose the latest release.

The screenshot shows the Cisco Download Software page for Cisco UCS C210 M2 Rack-Mount Server Software. The page has a breadcrumb trail: Downloads Home > Products > Unified Computing and Servers > Cisco UCS C-Series Rack-Mount Standalone Server Software > Cisco UCS C210 M2 Rack-Mount Server Software > Unified Computing System (UCS) Utilities > Windows-1.4(6d). The main heading is "Cisco UCS C210 M2 Rack-Mount Server Software". Below this, there is a search bar and a "Release 1.4(6d)" section. The "Release 1.4(6d)" section contains a table with the following data:

File Information	Release Date	Size	
ISO image of Windows utils for C-series UCS ucs-csxx-utils-windows.1.4.6d.iso	10-SEP-2012	1096.68 MB	Download Add to cart

On the left side of the "Release 1.4(6d)" section, there is a list of releases under "Latest Releases": 1.4(6d), 1.3(2), 1.2(2a), 1.1(1d). Below this, there is a section for "All Releases" with a list of releases: 1.4, 1.3, 1.2, 1.1.

Then select your operating system platform. There are four available options:

- VMware
- EFI
- Linux
- Windows

After choosing **Windows** in the example, you can select the appropriate software release. It is recommended that you choose the latest release. You can then download the drivers and use them during the operating system installation, or upgrade the drivers after the operating system is installed.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- Using SAN boot for operating system installation is common. A correct configuration is required to ensure a trouble-free SAN boot.
- The process includes searching for operating system drivers and any known issues.

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Module Summary

This topic summarizes the key points that were discussed in this module.

Module Summary

- Gathering data from sensor and LED information, event logs, and the **show tech-support** command provides a valuable baseline for effective troubleshooting.
- Cisco UCS C-Series firmware upgrades can be performed by using the Host Upgrade Utility, which can be downloaded from Cisco.com and a Cisco Connection Online account.
- To troubleshoot SAN connectivity problems, verify FIP, vHBA, and FCoE configuration.
- If a problem arises during RAID configuration, press **Ctrl-H** during the system boot process and follow the on-screen instructions that are provided by the WebBIOS Configuration Wizard.
- Technical tips, troubleshooting information, a bug toolkit, Cisco Support Community, and Cisco TAC access are among the available Cisco Connection Online tools.

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References

For additional information, refer to these resources:

- *Cisco UCS C-Series Servers Troubleshooting Guide* at http://www.cisco.com/en/US/docs/unified_computing/ucs/c/ts/guide/TS_C-Series.html
- *Cisco UCS C-Series Servers Documentation Roadmap* at http://www.cisco.com/en/US/docs/unified_computing/ucs/overview/guide/UCS_rack_roadmap.html

Module Self-Check

Use the questions here to review what you learned in this module. The correct answers and solutions are found in the Module Self-Check Answer Key.

- Q1) Which one of these adapters can be used to deploy more than two Ethernet NICs and Fibre Channel HBAs? (Source: Understanding Cisco UCS C-Series Architecture and Configuration)
- A) Emulex OneConnect adapter
 - B) Cisco UCS VIC 1225
 - C) Broadcom 5079 II adapter
 - D) Intel
- Q2) Which one of these conditions might cause a Cisco UCS C-Series issue in which the host does not boot? (Source: Understanding Cisco UCS C-Series Architecture and Configuration)
- A) LOM not connected to upstream switch
 - B) incorrectly seated DIMM
 - C) operating system installed on SAN-attached LUN
 - D) server console disconnected
- Q3) What do you need to have in order to download software or firmware from Cisco.com? (Source: Troubleshooting Cisco UCS C-Series Hardware and Firmware)
- A) valid Cisco.com account
 - B) valid service contract
 - C) valid Cisco.com account associated with a valid service contract
 - D) valid CEC account
- Q4) The Host Update Utility offers the option to upgrade the Cisco IMC, BIOS, LOM, LSI controller, and network adapter either individually or as a group. (Source: Troubleshooting Cisco UCS C-Series Hardware and Firmware)
- A) true
 - B) false
- Q5) When can you update the BIOS on Cisco UCS C-Series servers? (Source: Troubleshooting Cisco UCS C-Series Hardware and Firmware)
- A) after the operating system is installed and running on the server
 - B) before an operating system is deployed
 - C) at any time
 - D) after each upgrade of the operating system
- Q6) Which of these boot modes is the default boot mode for Cisco UCS C-Series servers? (Source: Troubleshooting Cisco UCS C-Series Hardware and Firmware)
- A) stealth boot
 - B) quiet boot
 - C) quick boot
 - D) automated boot

- Q7) The BIOS setup menu provides the report of DIMMs in use and those that have failed to pass the BIOS memory initialization.(Source: Troubleshooting Cisco UCS C-Series Hardware and Firmware)
- A) true
 - B) false
- Q8) What prevents a server from booting from a SAN-attached LUN? (Source: Troubleshooting Cisco UCS C-Series LAN and SAN Connectivity)
- A) insufficient Fibre Channel bandwidth
 - B) dual Fibre Channel HBAs
 - C) incorrect SAN boot target LUN ID
 - D) disabled memory mirroring
- Q9) How many PCIe standards-compliant virtual interfaces can Cisco UCS P81E VIC support? (Source: Troubleshooting Cisco UCS C-Series LAN and SAN Connectivity)
- A) 4
 - B) 8
 - C) 16
 - D) 32
- Q10) Which command is used to show the firmware state of the Cisco IMC? (Source: Troubleshooting Cisco UCS C-Series LAN and SAN Connectivity)
- A) **show cimc**
 - B) **dcem-port**
 - C) **attach-mcp**
 - D) **bcm_env**
- Q11) What is the default first boot device on Cisco UCS C-Series server? (Source: Troubleshooting Cisco UCS C-Series LAN and SAN Connectivity)
- A) hard disk
 - B) CD-ROM
 - C) SAN boot
 - D) LAN boot
- Q12) Which of these RAID levels does not provide any redundancy? (Source: Troubleshooting Locally Attached Storage)
- A) 0
 - B) 1
 - C) 5
 - D) 10
- Q13) Which keystroke shortcut can be used to access the LSI option ROM during the BIOS power-on? (Source: Troubleshooting Locally Attached Storage)
- A) Ctrl-H
 - B) Ctrl-C
 - C) Ctrl-A
 - D) F6

- Q14) What is the maximum size of partitions supported by VMware? (Source: Troubleshooting Locally Attached Storage)
- A) 2 TB
 - B) 4 TB
 - C) 8 TB
 - D) 16 TB
- Q15) How do you install an operating system to an undetected RAID volume? (Source: Troubleshooting Locally Attached Storage)
- A) using the original operating system installation media
 - B) by adding the driver for the RAID controller during the operating system installation process
 - C) by removing all drives from the RAID array except one, and install the operating system on that drive
 - D) by cloning an operating system installation from another system
- Q16) What is the default username and password combination for the Cisco IMC login? (Source: Troubleshooting Operating System-Related Issues)
- A) admin/admin
 - B) admin/password
 - C) admin/cisco
 - D) cisco/cisco
- Q17) What do you need to do in order to use the Virtual Media feature, which enables the server to mount virtual drives? (Source: Troubleshooting Operating System-Related Issues)
- A) CIMC Manager Server tab > Remote Presence > check the **Enable Virtual Media** check box
 - B) CIMC Manager Server tab > Virtual Media tab > check the **Enable Virtual Media** check box
 - C) CIMC Manager Server tab > Remote Presence > Virtual Media tab > check the **Enable Virtual Media** check box
 - D) CIMC Manager Server tab > Virtual Media tab > Remote Presence > check the **Enable Virtual Media** check box
- Q18) What are the operating system drivers that you need to install first after the operating system installation? (Source: Troubleshooting Operating System-Related Issues)
- A) Intel chipset drivers
 - B) LAN on motherboard drivers
 - C) SAN drivers
 - D) any third-party adapter driver
- Q19) What is the use of the SAS Expander technology? (Source: Troubleshooting Locally Attached Storage)
- A) allow a single initiator to communicate with several SAS or SATA targets
 - B) allow several initiators to communicate with one SATA target
 - C) scale bandwidth from the RAID controller to the hard drives
 - D) increase redundancy from RAID 5 to RAID 6

Module Self-Check Answer Key

Q1)	B
Q2)	B
Q3)	C
Q4)	A
Q5)	C
Q6)	B
Q7)	A
Q8)	C
Q9)	C
Q10)	D
Q11)	A
Q12)	A
Q13)	B
Q14)	A
Q15)	B
Q16)	B
Q17)	C
Q18)	A
Q19)	A

Cisco UCS C-Series Integration Troubleshooting

Overview

This module describes the C-Series integrated architecture and troubleshooting related to the integration of Cisco UCS C-Series servers with Cisco UCS Manager.

Module Objectives

Upon completing this module, you will be able to describe the valid Cisco UCS C-Series integrated architecture and troubleshooting related to the integration of Cisco UCS C-Series servers with Cisco UCS Manager. This ability includes being able to meet these objectives:

- Recognize the architecture and components required and configure Cisco UCS C-Series integration with Cisco UCS Manager
- Troubleshoot the Cisco UCS C-Series server integration with Cisco UCS Manager

Integrating Cisco UCS C-Series Servers and Cisco UCS Manager

Overview

Cisco Unified Computing System (UCS) Manager provides comprehensive management of all software and hardware components of Cisco UCS C-Series servers.

Cisco UCS Manager enables data center administrators to scale in their server operations process while reducing complexity and risk.

Objectives

Upon completing this lesson, you will be able to recognize the architecture and components required for Cisco UCS C-Series server integration into Cisco UCS Manager. This ability includes being able to meet these objectives:

- Describe the architecture of Cisco UCS when integrating Cisco UCS C-Series servers into Cisco UCS Manager
- Identify the required components, configuration steps, and discovery process when adding Cisco UCS C-Series servers to Cisco UCS Manager
- Verify correct operation of Cisco UCS C-Series server integration

Cisco UCS C-Series Integration Architecture

This topic describes the architecture of Cisco UCS when integrating Cisco UCS C-Series servers into Cisco UCS Manager.

Cisco UCS C-Series Integration Architecture

UCS Manager integration allows a single, consistent interface for Cisco UCS B- and C-Series servers.

Supports these activities:

- Fast and error-free configuration
- Role and policy-based management
- Automatic discovery
- Consistent firmware upgrades
- Change of BIOS and boot settings
- Monitoring and troubleshooting of all servers from a single GUI
- XML design to support higher-level management tools

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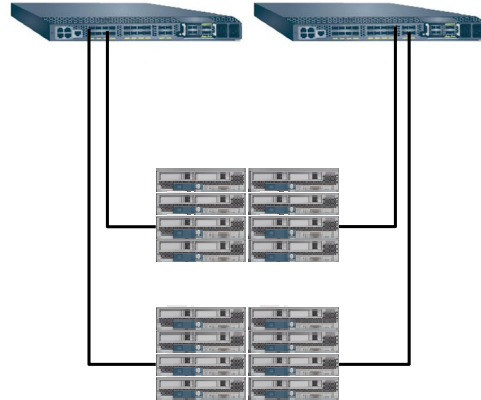
Cisco UCS C-Series rack mount servers can be integrated into Cisco UCS Manager in order to provide a centralized, embedded, and secure management platform. Cisco UCS Manager provides management of all network components as a unified whole.

These are some of the features of Cisco UCS Manager:

- **Fast and error free configuration:** Cisco UCS Manager uses service profiles and templates for configuration of each element in the system.
- **Role and policy-based management:** Cisco UCS Manager preserves traditional roles of network components such as server storage and network equipment in order to automate application of service profiles and templates.
- **Automatic discovery:** Cisco UCS Manager enables you to automatically detect and store components discovered in the device inventory.
- **Consistent firmware update:** By forcing the tested and approved firmware version configuration of all components, downtime is reduced.
- **Single interface for configuration:** All components can be managed and troubleshot from the same GUI.
- **XML design:** This enables an interface with higher-level management tools.

Design Goal and Philosophy

- Integration brings the benefits of Cisco UCS Manager to a rack-mount environment.
- Logically, it treats the rack-mount environment the same as a blade environment.



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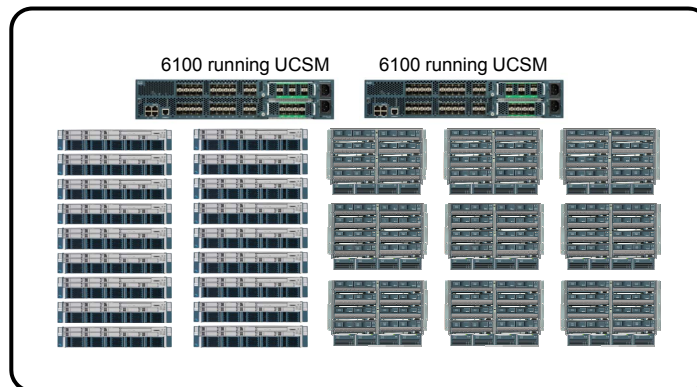
The design goal of integrating the Cisco UCS C-Series server into Cisco UCS Manager was to bring all of the benefits of Cisco UCS Manager into the C-Series rack-mount environment. This allows the Cisco UCS C-Series servers to take advantage of these features:

- Service profiles
- Firmware management
- BIOS policies
- Server mobility

Cisco UCS C-Series server integration into Cisco UCS Manager version 2.0(2) requires different Cisco Integrated Management Controller (IMC) versions, as listed here:

- Cisco UCS C22 M3 Server: Cisco IMC version 1.4.5d
- Cisco UCS C24 M3 Server: Cisco IMC version 1.4.5d
- Cisco UCS C200 M2 Server: Cisco IMC version 1.4.3c
- Cisco UCS C210 M2 Server: Cisco IMC version 1.4.3c
- Cisco UCS C220 M3 Server: Cisco IMC version 1.4.4a
- Cisco UCS C240 M3 Server: Cisco IMC version 1.4.4a
- Cisco UCS C250 M2 Server: Cisco IMC version 1.4.3c
- Cisco UCS C260 M2 Server: Cisco IMC version 1.4.3c
- Cisco UCS C460 M2 Server: Cisco IMC version 1.4.3c

Goal: Form Factor Independence

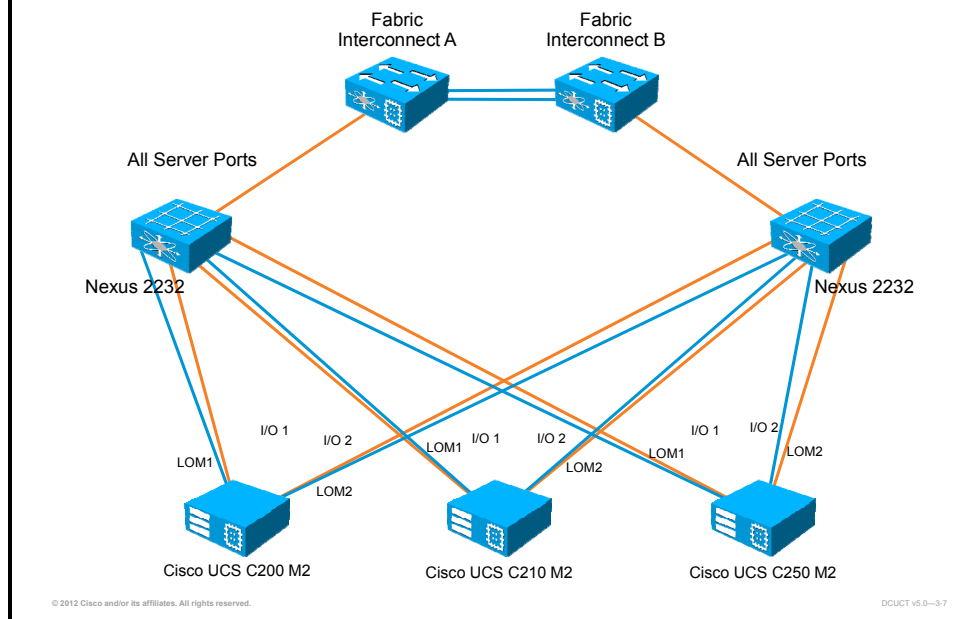


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By integrating Cisco UCS B-Series and C-Series servers into the same management interface, the hardware becomes one large compute space, which enables customers to gain form factor independence in their data centers. Server administrators no longer have to be concerned about the actual hardware but rather the availability of a compute node for operating system deployment. By simply consuming an available compute node, administrators can focus more on the relevant business applications that will run on top of the hardware.

Cisco UCS C-Series with Cisco UCS Manager Architecture



The integration of the Cisco UCS C-Series server into Cisco UCS Manager requires the introduction of new hardware into the architecture. As of firmware release 2.0(2), the Cisco Nexus 2232 Fabric Extender is a required part of the topology.

The Cisco Nexus 2232 aggregates the management and data connectivity from the Cisco UCS C-Series server. Although only one Fabric Interconnect and Cisco Nexus 2232 is required, two are recommended for redundancy of both the management and data planes.

If you were using Cisco Nexus 2248 Fabric Extenders and upgraded Cisco UCS Manager to version 2.0(2), the rack servers are no longer managed by UCS Manager until the newer Cisco Nexus 2232 Fabric Extenders are installed.

Use Cases for Cisco UCS C-Series Servers with Cisco UCS Manager

- One management point for 39 servers
- Integrated QoS with guarantees and caps
- Stateless servers and service profiles
 - Simplified firmware management and configuration for BIOS, HBA, bootup, RAID, LAN, and SAN access layers
 - Servers self-populate to appropriate SLA tier, ready for use
- Stateless I/O for rack mounts
- VN-Link in hardware
- Fabric failover and centralized adapter management
- Bladed value propositions, without requiring blades

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Several cases can be made for integrating the Cisco UCS C-Series server into Cisco UCS Manager. Typical examples are shown in the figure.

Note	In order to manage 39 servers, as stated in the first bulleted item, you will need to select the Cisco UCS 6140 Fabric Interconnect in your design.
-------------	---

Cisco UCS C-Series Server-to-Cisco UCS Manager Integration

This topic describes the configuration steps and discovery process when adding Cisco UCS C-Series servers to Cisco UCS Manager.

Required Components for Integration

Fabric Interconnects
(one or two)



Cisco Nexus 2232



Cisco UCS C-Series (C200, C210, and C250)



Qualified Adapter Card (10-Gb only)

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The figure shows the major components that are required in the overall architecture. Current release notes should be checked prior to installation to determine the exact specifications of the products that you plan to integrate.

Cisco UCS C-Series Servers and Cisco UCS Manager Integration

- Cisco UCS B-Series are managed through the UCS Manager residing on the Fabric Interconnect switches:
 - Manage and migrate service profiles
 - Manage LAN and SAN connectivity
 - Use policies for various aspects of UCS operation
- Cisco UCS C-Series are managed on the Cisco IMC:
 - Server physical aspect
 - LAN and SAN connectivity
 - Boot policy, RAID configuration, etc.
- Per-system (UCS Manager) vs. per-server (Cisco IMC) approach
- Cisco UCS C-Series and UCS Manager integration gives you the ability to make the C-Series server part of the UCS, providing all the benefits of management.

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The Cisco UCS B-Series servers have management through the UCS Manager residing on the cluster of Fabric Interconnect switches, allowing you to manage and migrate service profiles, manage LAN and SAN connectivity, and use various policies for several aspects of UCS operation, including boot, quality of service (QoS), Redundant Array of Independent Disks (RAID), firmware, and so on.

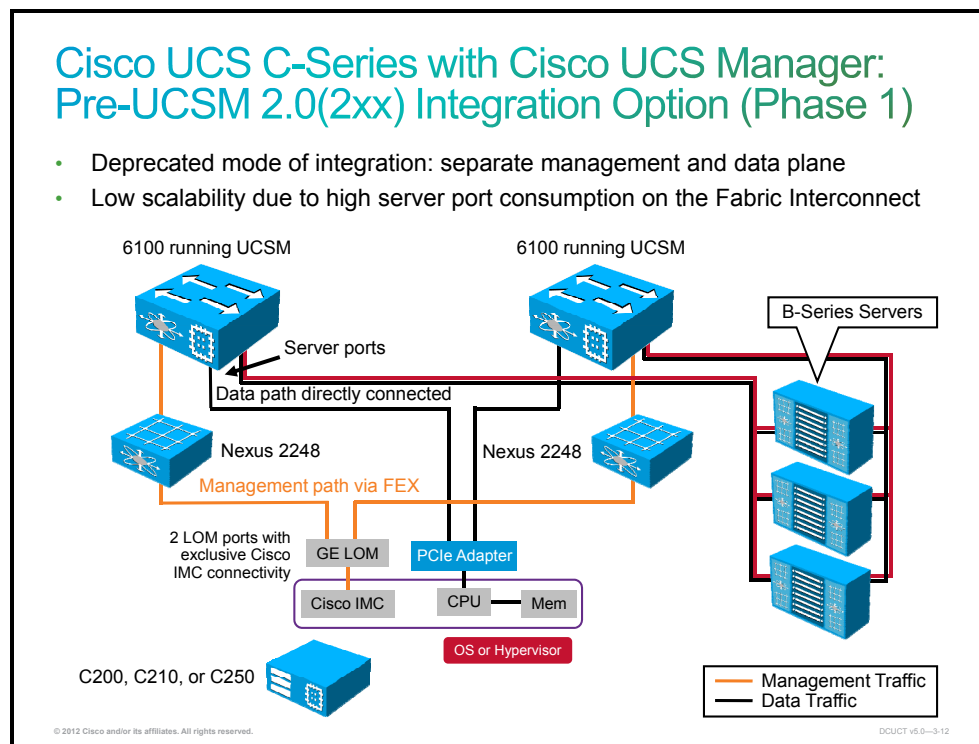
On the other hand, the Cisco UCS C-Series has management implemented on the Cisco IMC, where you can manage the server physical aspect, LAN and SAN connectivity, boot policy, RAID configuration, and so on, on a *per-server* basis.

The key difference between management of Cisco UCS B-Series and C-Series servers is the “per-system” versus “per-server” approach.

The integration of the Cisco UCS C-Series server and Cisco UCS Manager gives you the ability to make the C-Series server part of the Unified Computing System, giving you the benefit of management from a single point.

The Cisco C-Series server is managed through service profiles, and uses a common MAC address, world wide name (WWN), universal unique identifier (UUID) pools, centrally configurable boot policies, and so on. All this provides you with easier management and better utilization of your IT resources.

Integration of Cisco UCS C-Series Servers with Cisco UCS Manager Before Version 2.0



The initial mode of Cisco UCS C-Series integration with Cisco UCS Manager is by using a set of Cisco Nexus 2248 Fabric Extenders that interconnect the Fabric Interconnects and management ports on the server. The data plane is wired directly to the Fabric Interconnects, to the server ports.

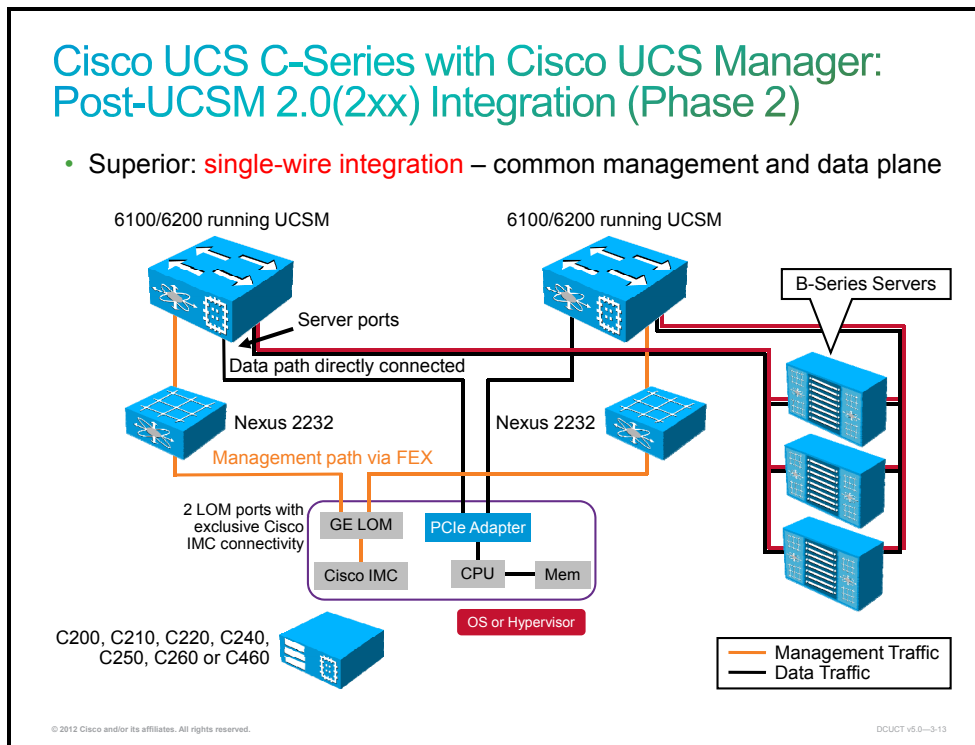
Note This approach has problems because of low scalability—every server would consume at least one server port on the Fabric Interconnect, so you would quickly run out of ports that could be used for strengthening the downlinks to blade chassis. You may also need additional port activation licenses for the Fabric Interconnect, which makes the integration less economical.

As of firmware release 1.4, the Cisco Nexus 2248 will be integrated into the Cisco UCS Manager architecture to provide aggregation of the management ports, and LAN on Motherboard (LOM) of the Cisco UCS C-Series server.

During the preparation for the integration of the Cisco UCS C-Series server with Cisco UCS Manager, the management capabilities of the Cisco IMC will be moved from the Cisco IMC ports to the LOM ports. The adapter ports will connect directly to the Fabric Interconnect for data plane connectivity.

Although many customers run a mix of Cisco UCS B-Series and C-Series servers, a Cisco UCS B-Series server is not required. Customers can simply run only the Cisco UCS C-Series server that is managed by Cisco UCS Manager, if desired.

Integration of Cisco UCS C-Series Servers with Cisco UCS Manager after Version 2.0



The post-UCS Manager 2.0(2x) integration mode uses a Nexus 2232 as the Fabric Extender. The benefit is that the connection between the Fabric Interconnect and the Fabric Extender is single-wire, meaning that both management and data traffic flows across the links in a manner similar to the Fabric Interconnects and the Cisco UCS chassis I/O module (IOM).

Note This provides much better economics in terms of the Fabric Interconnect port consumption, and you can scale the links between the Fabric Interconnect and the Fabric Extender as required.

For firmware release 2.0(2x) and upwards, the Cisco Nexus 2232 is integrated into the Cisco UCS Manager architecture to provide aggregation of the management and data ports.

Firmware Requirements for Cisco UCS C-Series Server and Cisco UCS Manager Integration

- Cisco UCS C-Series components that may require an update:
 - LOM
 - NIC or VIC adapter (Cisco P81E)
 - BIOS
 - Cisco IMC
- Infrastructure components
 - Cisco UCS C-Series server IMC must be of version 1.4(3x) or later
 - If Cisco UCS Manager (running version 2.0(2x) or later)
 - Cisco UCS C-Series server IMC must be of version 1.2
 - If Cisco UCS Manager (running version 1.4)
- Check release notes and configuration guide for the required firmware, and upgrade components

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Note The best way to determine the required firmware versions on all components is to consult the relevant Release Notes, and Cisco UCS C-Series Installation and Service Guides for the relevant C-Series server type.

The components that need upgrading are the LOM adapter on the server, and possibly network interface card (NIC) or voice interface card (VIC) adapters, BIOS, and Cisco IMC.

The Cisco IMC firmware in particular is replaced with the appropriate firmware that enables the Cisco UCS Manager to manage the server.

On the Fabric Interconnects and Cisco UCS Manager, a minimum of version 2.0(2x) or greater must be deployed in your environment.

The required firmware images can be downloaded using your Cisco.com account.

For additional reference, see the publication “Cisco UCS C-Series Server Integration with Cisco UCS Manager 2.0(2) and 2.0(3)” at this location:

http://www.cisco.com/en/US/customer/docs/unified_computing/ucs/c-series_integration/ucsm2.0.2/b_UCSM_202_C-Integration_chapter_01.html

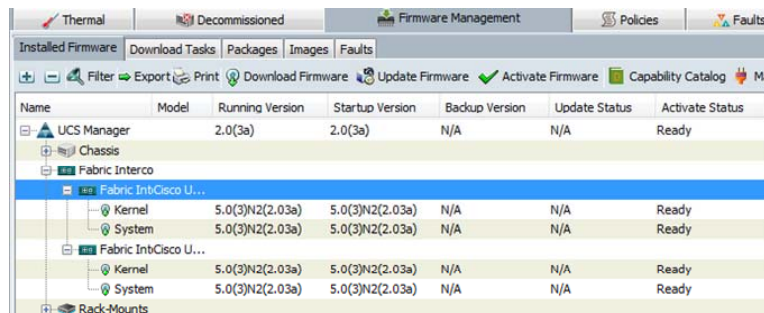
Configure the Fabric Interconnect

The Fabric Interconnect must be configured for the Cisco UCS C-Series server integration.

Configure and Verify the Fabric Interconnect

Check the UCS infrastructure firmware versions

- Fabric Interconnects (running version 5.0(3)N2(2.0xx) or later)
- Cisco UCS Manager (running version 2.0(2xx) or later)



Name	Model	Running Version	Startup Version	Backup Version	Update Status	Activate Status
UCS Manager		2.0(3a)	2.0(3a)	N/A	N/A	Ready
Chassis						
Fabric Interco						
Fabric IntCisco U...						
Kernel		5.0(3)N2(2.03a)	5.0(3)N2(2.03a)	N/A	N/A	Ready
System		5.0(3)N2(2.03a)	5.0(3)N2(2.03a)	N/A	N/A	Ready
Fabric IntCisco U...						
Kernel		5.0(3)N2(2.03a)	5.0(3)N2(2.03a)	N/A	N/A	Ready
System		5.0(3)N2(2.03a)	5.0(3)N2(2.03a)	N/A	N/A	Ready
Rack-Mounts						

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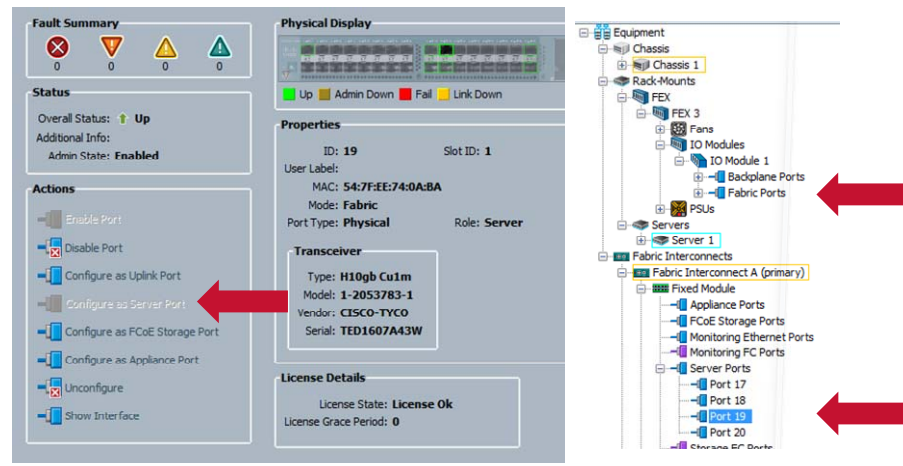
You can start the implementation by verifying the correct firmware and software versions on all components.

The Fabric Interconnect must run the appropriate version that ships with the Cisco UCS Manager version 2.0(2xx) or later.

Configure and Verify Ports on Fabric Interconnect

Configure ports on the Fabric Interconnect as server ports

- Ports connected to Fabric Interconnect from Nexus 2232



Ports that connect to the Cisco UCS C-Series servers and the Cisco Nexus 2232 will be configured as server ports. No other port type will be used.

The UCS Manager will discover the Fabric Extender that is connected to those ports and initialize it.

The Fabric Extender has two types of ports: fabric ports, which connect to the Fabric Interconnect, and backplane ports, which connect to the servers.

Configure and Verify Cisco UCS C-Series Servers

- As required, use the Host Update Utility:
 - Upgrade LOM, Cisco IMC, BIOS, controller, and adapter firmware
- Upgrade other Host Update functions (specific to Cisco UCS Manager Integration):
 - Configure Cisco IMC to UCS Manager Mode
 - Enable DHCP for management of C-Series servers
 - Move management from Cisco IMC port to LOM ports
 - Configure active/active on adapters
 - Any static IPs are disabled and connectivity is lost to Cisco IMC GUI

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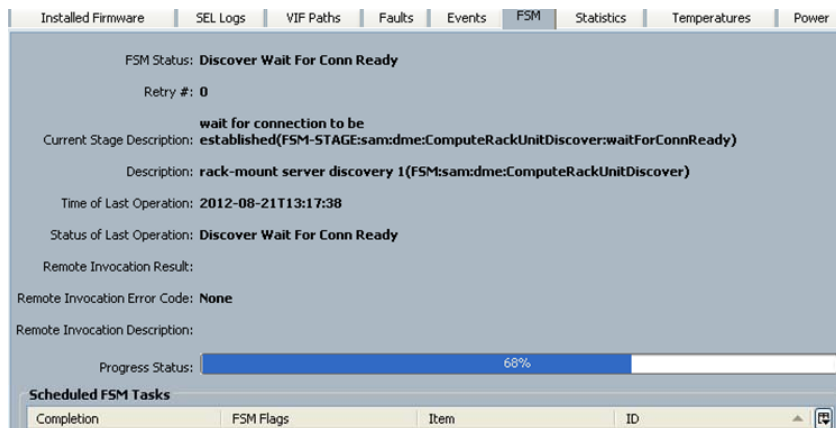
If you determine that your C-Series server components require a firmware upgrade, you can download and use the Cisco Host Upgrade Utility to perform this function. This utility can be downloaded from Cisco.com and mounted as an ISO during boot.

In addition to upgrading your firmware, the Cisco Host Upgrade Utility can also be used to convert your Cisco UCS C-Series server to Cisco UCS Manager mode.

After integrating your Cisco UCS C-Series server, Cisco UCS Manager will be used for all future firmware updates.

FSM Output: Discovery

- Discovery progress can be observed in FSM



The figure shows finite state machine (FSM) output of a server during the discovery process. The manual rediscovery process can be started by following these steps:

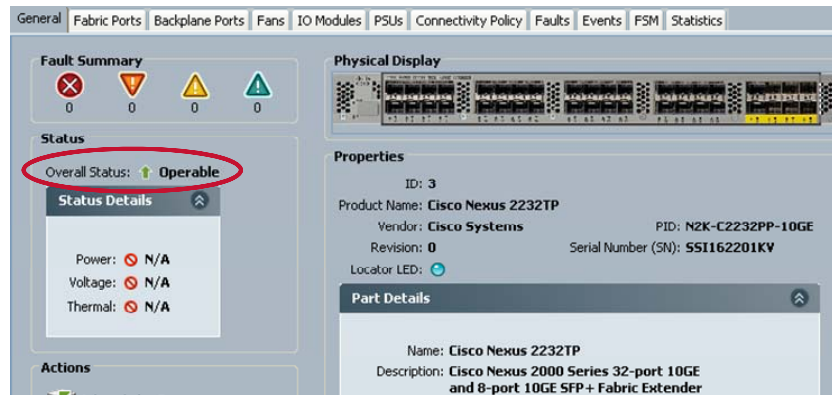
- Step 1** Point to the Cisco UCS C-Series server in Cisco UCS Manager.
- Step 2** Click on the **General** tab.
- Step 3** In the Maintenance frame, click on **Reacknowledge**.

Verify Cisco UCS C-Series Integration

This topic describes how to verify proper integration of the Cisco UCS C-Series server to Cisco UCS Manager.

Verify Nexus 2232 FEX

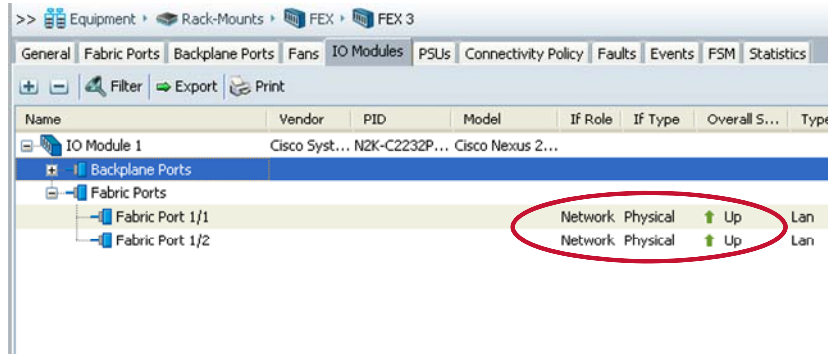
- Browse through the GUI and verify that the Cisco Nexus 2232/2248 is operable.



The Cisco UCS Manager GUI can be used to verify that the Cisco Nexus 2232 or 2248 Fabric Extender is functioning.

Verify Nexus 2232 FEX (Cont.)

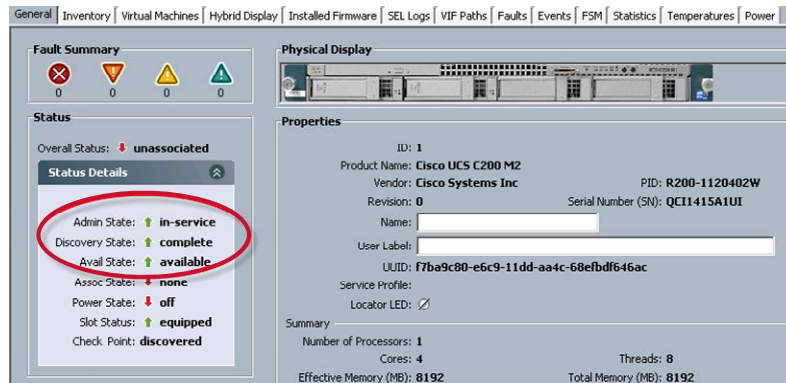
- Browse through the GUI and verify that, in the Cisco Nexus 2232/2248 Fabric Extender, all interfaces are in an Up state.



The Cisco UCS Manager GUI can be used to verify that all interfaces are in an “up” state in the Cisco Nexus 2232 Fabric Extender.

Configure and Verify Cisco UCS C-Series Servers

- Verify that the Cisco UCS C-Series server is in Cisco UCS Manager inventory and is operational.

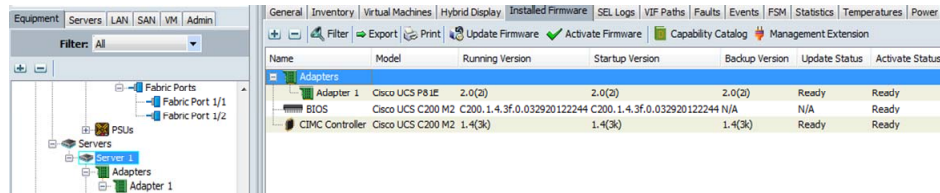


The Cisco UCS Manager GUI can be used to verify that the Cisco UCS C-Series server has been discovered and appears within the inventory. To do so, follow these steps:

- Step 1** Select the main Equipment tab within the navigation pane. The C-Series server should appear under the Rack Servers subtab.
- Step 2** Select the C-Series server from the inventory list.
- Step 3** Select the General tab within the right-hand content pane to view the server operational state and functional parameters.

Configure and Verify Cisco UCS C-Series Server (Cont.)

- Verify Cisco UCS C-Series firmware



Name	Model	Running Version	Startup Version	Backup Version	Update Status	Activate Status
Adapters						
Adapter 1	Cisco UCS P81E	2.0(2)	2.0(2)	2.0(2)	Ready	Ready
BIOS	Cisco UCS C200 M2	C200.1.4.3F.0.032920122244	C200.1.4.3F.0.032920122244	N/A	N/A	Ready
CIMC Controller	Cisco UCS C200 M2	1.4(3k)	1.4(3k)	1.4(3k)	Ready	Ready

You can also verify the C-Series server firmware. The figure lists the required firmware versions for BIOS, Cisco IMC, and the Cisco P81E Virtualized Interface Card.

Cisco UCS C-Series with Cisco UCS Manager Installation Guides

Cisco UCS Manager 1.4 and 2.0(1): require 2248 FEX:

- Cisco UCS C-Series Server Integration with Cisco UCS Manager 1.4 and 2.0(1) at http://www.cisco.com/en/US/customer/docs/unified_computing/ucs/c-series_integration/ucsm1.4-2.0.1/b_UCSM1-4_2-0-1_C-Integration_chapter_01.html

Cisco UCS Manager 2.0(2) and 2.0(3): require 2232 FEX:

- Cisco UCS C-Series Server Integration with Cisco UCS Manager 2.0(2) and 2.0(3) at http://www.cisco.com/en/US/customer/docs/unified_computing/ucs/c-series_integration/ucsm2.0.2/b_UCSM_202_C-Integration_chapter_01.html

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Depending on the version of Cisco UCS Manager, use these links to access the installation guides for the corresponding products:

Cisco UCS Manager 1.4 and 2.0(1):

- http://www.cisco.com/en/US/customer/docs/unified_computing/ucs/c-series_integration/ucsm1.4-2.0.1/b_UCSM1-4_2-0-1_C-Integration_chapter_01.html

Cisco UCS Manager 2.0(2) and 2.0(3):

- http://www.cisco.com/en/US/customer/docs/unified_computing/ucs/c-series_integration/ucsm2.0.2/b_UCSM_202_C-Integration_chapter_01.html

Cisco UCS C-Series Servers Upgrade Procedures:

- http://www.cisco.com/en/US/partner/docs/unified_computing/ucs/c-series_integration/ucsm1.4-2.0.1/b_UCSM1-4_2-0-1_C-Integration_chapter_010.html

For Cisco UCS Manager 1.4 and 2.0(1) integration, UCS 2248 FEX is a required component, while for the Cisco UCS Manager 2.0(2) and 2.0(3), UCS 2232 FEX is a required component.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- Cisco UCS Manager brings many benefits for UCS C-Series rack mount servers, such as scalability and agility of configuration.
- The Cisco UCS C-Series server integration with Cisco UCS Manager requires connectivity to both 2232/2248 FEX and Fabric Interconnect in order to provide management and data path.
- Cisco UCS C-Series integration with Cisco UCS Manager is successful when both FEX and rack-mount Cisco UCS C-Series servers are visible and operable in Cisco UCS Manager.

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Troubleshooting Cisco UCS C-Series Server and Cisco UCS Manager Integration

Overview

In this lesson, you will learn about Cisco Unified Computing System (Cisco UCS) C-Series server operation and troubleshooting of related issues.

Objectives

Upon completing this lesson, you will be able to troubleshoot the Cisco UCS C-Series server integration with Cisco UCS Manager. This ability includes being able to meet these objectives:

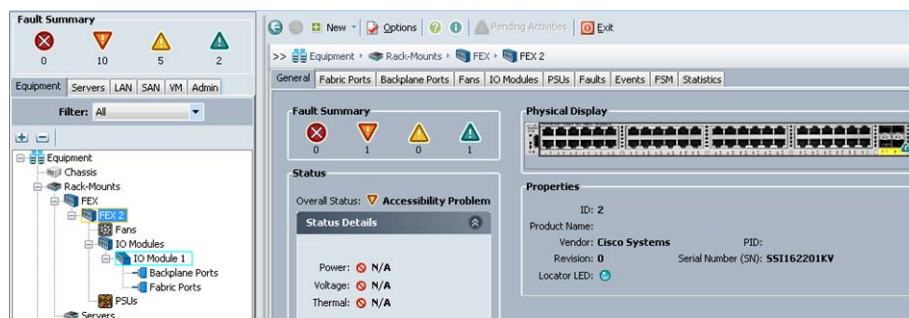
- Troubleshoot Cisco FEX deployment for integrated Cisco UCS C-Series servers
- Troubleshoot integrated Cisco UCS C-Series servers

Troubleshoot Cisco FEX Deployment for Integrated Cisco UCS C-Series Server

This topic describes how to troubleshoot FEX deployment for the integrated Cisco UCS C-Series server.

Issue: Fex Accessibility Problem

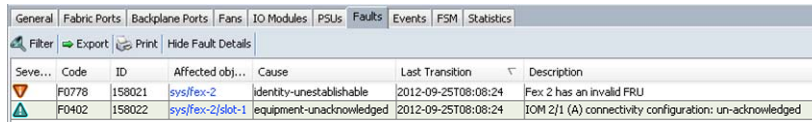
- Symptom:
 - Attempting to discover the Cisco FEX module produces a warning
- Issues reported:
 - Accessibility Problem



This example scenario guides you through the process of troubleshooting a situation in which a new Cisco Fabric Extender (FEX) is connected to the Fabric Interconnect. The new Cisco FEX is visible in the figure but the overall status shows an accessibility problem.

Data Gathering (1): Faults Tab

- Fault reports “FEX has invalid FRU”



The screenshot shows the 'Faults' tab in the Cisco UCS Manager interface. The top navigation bar includes tabs for General, Fabric Ports, Backplane Ports, Fans, IO Modules, PSUs, Faults (selected), Events, FSM, and Statistics. Below the navigation bar is a toolbar with icons for Filter, Export, Print, and Hide Fault Details. The main area displays a table of faults with columns: Severity, Code, ID, Affected obj..., Cause, Last Transition, and Description. Two faults are listed: one with Code F0778, ID 158021, Cause 'identity-unestablishable', and Description 'Fex 2 has an invalid FRU'; the other with Code F0402, ID 158022, Cause 'equipment-unacknowledged', and Description 'IOM 2/1 (A) connectivity configuration: un-acknowledged'.

Seve...	Code	ID	Affected obj...	Cause	Last Transition	Description
	F0778	158021	sys/fex-2	identity-unestablishable	2012-09-25T08:08:24	Fex 2 has an invalid FRU
	F0402	158022	sys/fex-2/slot-1	equipment-unacknowledged	2012-09-25T08:08:24	IOM 2/1 (A) connectivity configuration: un-acknowledged

You start to gather data about the problem. The Faults tab explains the problem. The fault reads “Identity-unestablishable. This leads you to suspect that FEX is not supported in the current Cisco UCS Manager (Cisco UCSM) version

Data Gathering (2): UCSM Version

- Check the UCSM manager

Name	Model	Running Version	Startup Version	Backup Version
UCS Manager		2.0(1s)	2.0(1s)	N/A

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Next, you verify the Cisco UCSM version with this command:

```
FI-A# show version
System version: 2.0(1a)
FI-A#
```

Resolution: Upgrade the Cisco UCS

- Cisco Nexus 2232 Fabric Extender is supported after release 2.0(2m).
- Upgrade the Cisco UCS to at least release 2.0(2m).

Name	Model	Running Version	Startup Version	Backup Version
UCS Manager		2.0(3a)	2.0(3a)	N/A

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Cisco Nexus 2232 Fabric Extender is supported from the Cisco UCS Manager 2.0(2m) release. In the example scenario, the version is 2.0(3a). You need to upgrade the Cisco UCSM.

Solution Verification

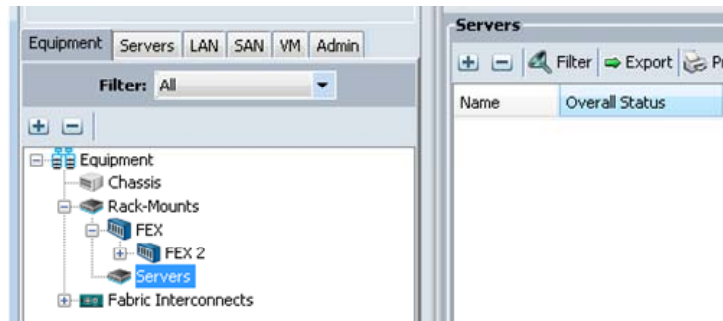


Finally, you will verify the effectiveness of the solution. You can check the overall status information, which must be Operable.

Troubleshoot Integrated Cisco UCS C-Series Server

This topic describes how to troubleshoot the integrated Cisco UCS C-Series server.

Issue: C-Series Server Is Not Seen in the UCSM

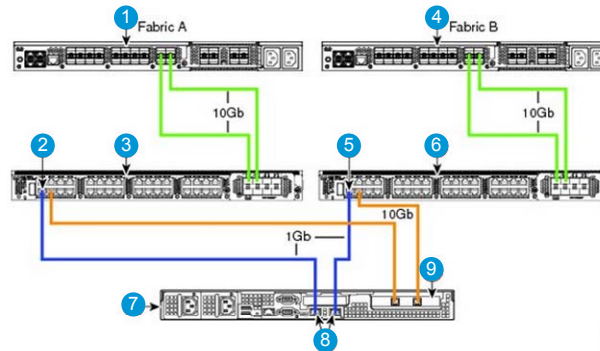


This example scenario guides you through the process of troubleshooting a situation in which a Cisco UCS C-Series server was connected to the FEX but the server is not seen in the Rack-Mount Servers part of the Cisco UCSM, under the Equipment tab.

There are no issues—you just do not see the Cisco UCS C-Series server in the inventory.

Resolution (1): Verify Physical Connectivity

- Verify that you have correctly connected the C-Series server to the FEX
 - LOM to FEX
 - P81 card to the FEX



If you do not see the Cisco UCS C-Series server in the inventory of the Cisco UCSM, the most common issue is that the server is not connected correctly to the FEX or Fabric Interconnect. You will not see the integrated C-Series server in the inventory in these instances:

- LAN on motherboard (LOM) ports are not connected to the FEX.
- The management port is connected to the FEX instead of to LOM ports.
- LOM ports are directly connected to the Fabric Interconnect.

It is important that the LOM ports are connected to the FEX.

Resolution (2): Verify Cisco IMC Configuration

Verify Cisco IMC configuration:

- NIC mode:
 - Shared LOM
- DHCP enabled:
 - Yes
- NIC redundancy:
 - Active-active

```
CIMC Configuration Utility  Version 1.5  Cisco Systems, Inc.
*****
NIC Properties
NIC mode
Dedicated:      [ ]
Shared LOM:     [X]
Cisco Card:     [ ]
IPV4 (Basic)
DHCP enabled:   [X]
CIMC IP:        192.168.10.41
Subnetmask:     255.255.255.0
Gateway:        192.168.10.254
ULAN (Advanced)
ULAN enabled:   [ ]
ULAN ID:        1
Priority:        0
NIC redundancy
None:           [ ]
Active-standby: [ ]
Active-active:  [X]
Factory Defaults
CIMC Factory Default:[ ]
Default User (Basic)
Default password:
Reenter password:

*****
<Up/Down arrow> Select items  <F10> Save  <Space bar> Enable/Disable
<F5> Refresh                  <ESC> Exit
```

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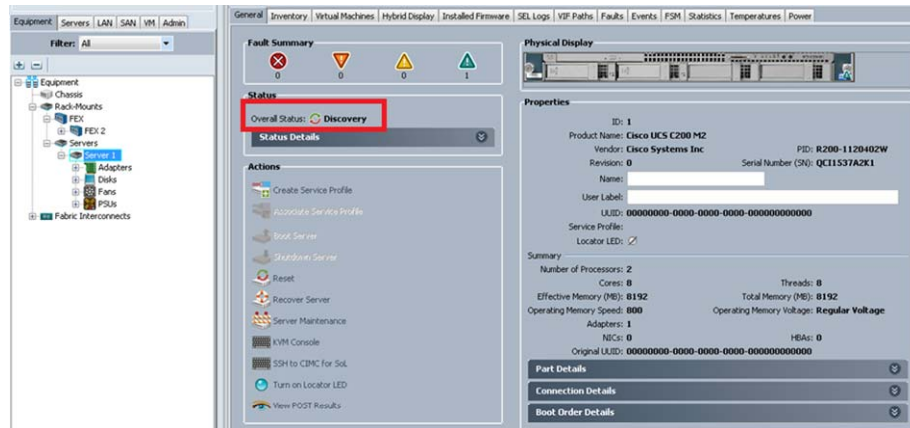
DCUCT v5.0--3-12

If the physical connectivity is OK, the next step is to check the Cisco Integrated Management Controller (IMC) configuration. The Cisco IMC must be configured in this way:

- **Network interface card (NIC) mode:** Shared LOM
- **DHCP enabled:** Yes
- **NIC redundancy:** Active-Active

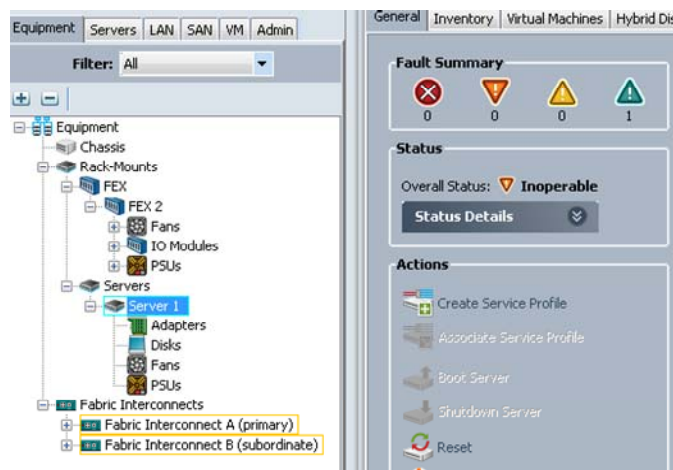
If the Cisco IMC shows that the NIC mode is configured to Dedicated, you will not see the server in the Cisco UCSM, because dedicated means that the server is configured for the management interface of 10/100 Mb/s. For the integration of a Cisco UCS C-Series server, you need to use LOM interfaces and not management interfaces on the server.

Solution Verification



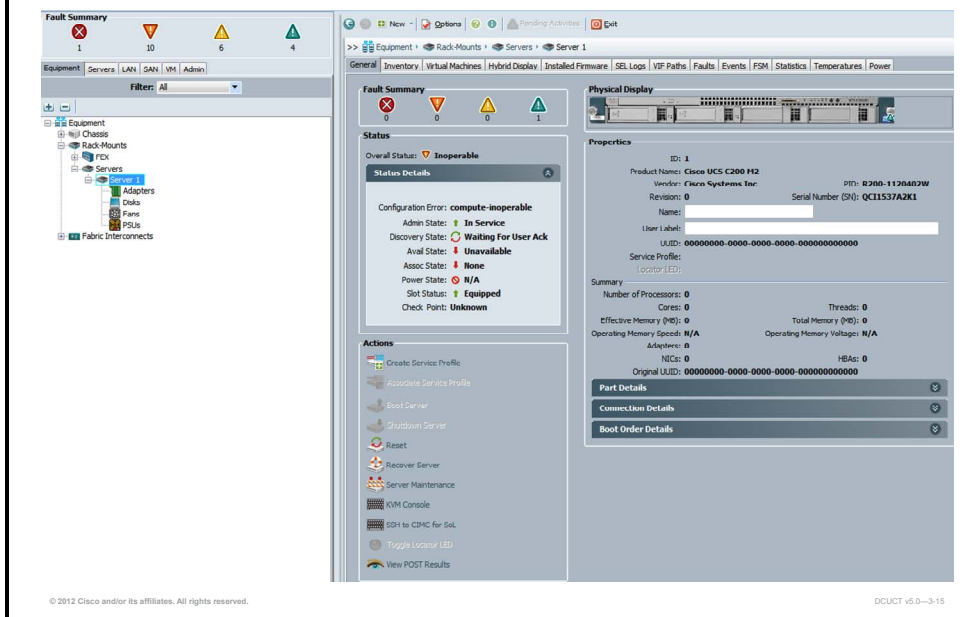
Finally, you can verify the solution. The overall status is now Discovery. When it finishes successfully, you will be able to see the Cisco UCS C-Series server in the Cisco UCS Manager.

Issue: C-Series Server Is Inoperable



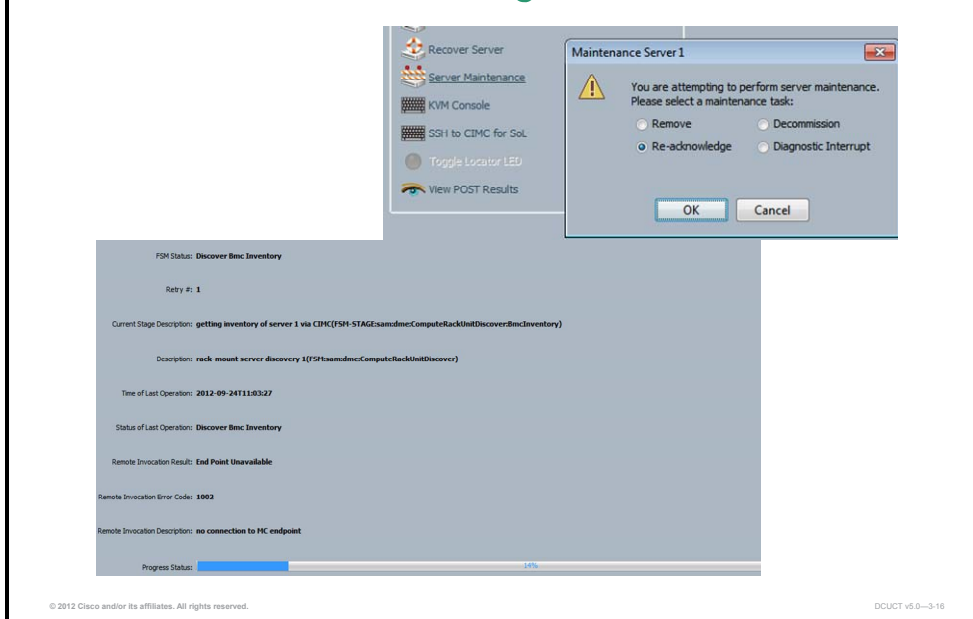
Consider another case: This example scenario guides you through the process of troubleshooting a situation in which the integrated Cisco UCS C-Series server is shown in the inventory with the state Inoperable.

Data Gathering: Expand Status Detail



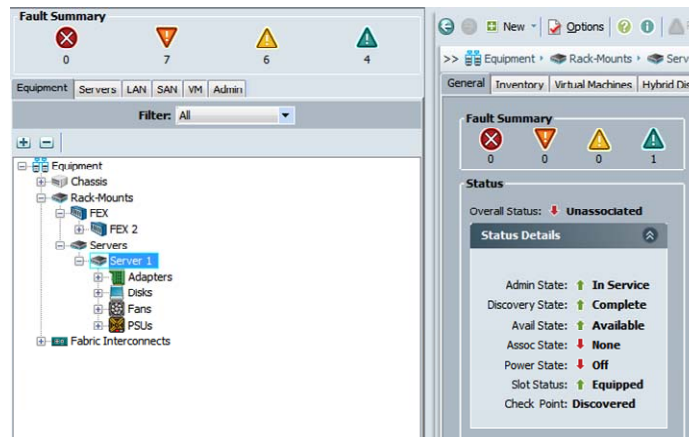
The first step in resolving the issue is to expand the Status pane, where you see that the Discovery State shows “Waiting for user Ack.” This leads you to suspect that you will have to re-acknowledge the server.

Resolution: Re-acknowledge Server



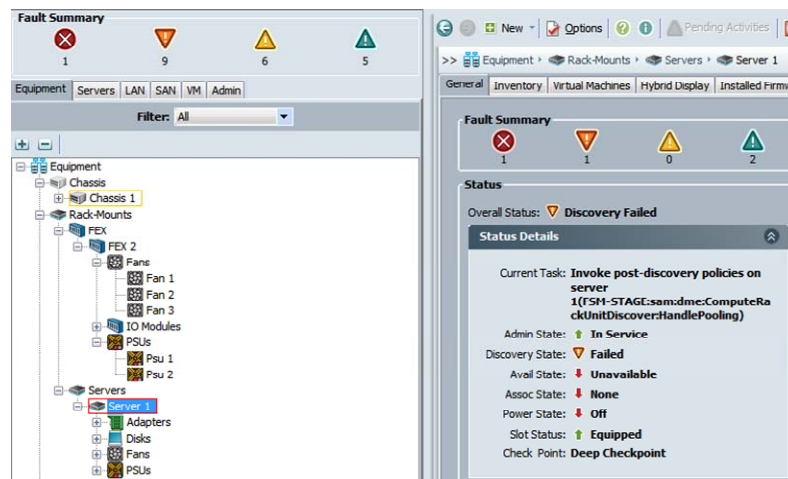
To resolve the issue, select **Server Maintenance** and click the **Re-acknowledge** radio button. You can then check the FSM states. If the discovery process reaches 100 percent, the problem is resolved.

Solution Verification



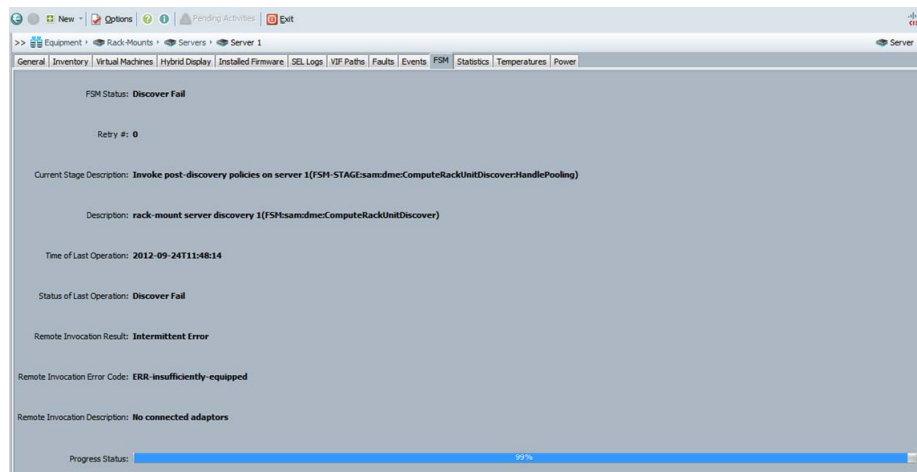
Finally, you can verify the server state, which should be in the Unassociated state, which means that the server is ready to apply the service profile. From here on, the process of applying the service profiles is the same as for a Cisco UCS B-Series server.

Issue: C-Series Server Discovery Failed



Another example scenario guides you through the process of troubleshooting a situation in which the integrated Cisco UCS C-Series server discovery fails.

- Check the FSM tab
 - No connected adapters

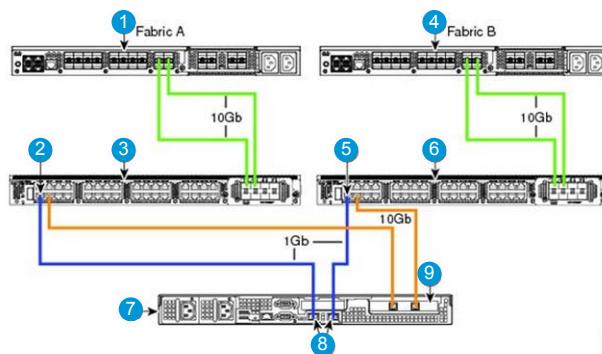


The first step in resolving the issue is to check the FSM tab, where you can see that the discovery process has stopped at 99 percent with the detail description, “No connected adaptors.”

This leads you to suspect that the server does not have any working 10 Gigabit Ethernet data link.

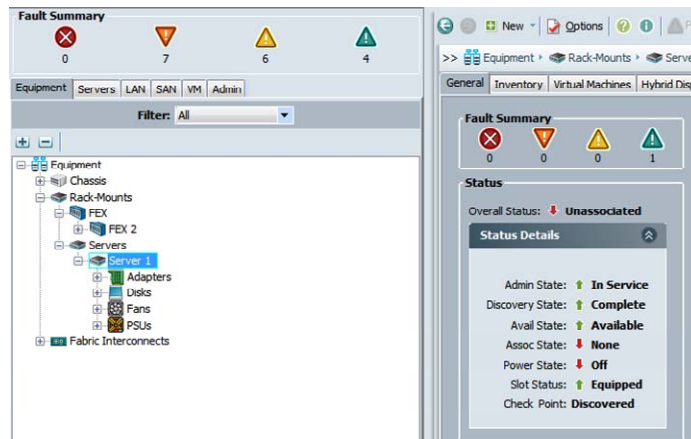
Resolution: Connect P81E to FEX

- Verify that you have connected the P81 VIC in the server to the FEX
 - Connect P81E to FEX



To resolve the issue, verify and connect the Cisco P81E Virtual Interface Card (VIC) to the FEX.

Solution Verification



Finally, you can verify the server overall state, which should be in the Unassociated state, which means that the server is ready to apply the service profile.

Summary

This topic summarizes the key points that were discussed in this lesson.

Summary

- For Cisco UCS C-Series integration into the UCSM, you need Cisco FEX, which must be connected to the Fabric Interconnect.
- Integrated Cisco UCS C-Series server is connected to the FEX. 1 Gigabit Ethernet interfaces on LOM are used for the management, 10 Gigabit Ethernet interfaces on the Cisco card P81E are used for data traffic.

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Module Summary

This topic summarizes the key points that were discussed in this module.

Module Summary

- For Cisco UCS Manager firmware release 2.0(2x) upwards, the Cisco Nexus 2232 is integrated into the Cisco UCS Manager architecture to provide aggregation of the management and data ports.
- A proper connectivity from the server to the Cisco FEX and Fabric Interconnect can solve many issues with integrating the Cisco UCS C-Series server into Cisco UCS Manager.

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Module Self-Check

Use the questions here to review what you learned in this module. The correct answers and solutions are found in the Module Self-Check Answer Key.

- Q1) What are the four required components when adding Cisco UCS C-Series servers to Cisco UCS Manager? (Choose four.) (Source: Integrating Cisco UCS C-Series Servers and Cisco UCS Manager)
- A) chassis
 - B) Fabric Interconnect
 - C) qualified adapter card
 - D) C-Series server
 - E) B-Series server
 - F) Fabric Extender
- Q2) Which FEX should be used when integrating a Cisco UCS C-Series server with Cisco UCS Manager 1.4 and 2.0(1)? (Source: Integrating Cisco UCS C-Series Servers and Cisco UCS Manager)
- A) Cisco Nexus 2148
 - B) Cisco Nexus 2224
 - C) Cisco Nexus 2232
 - D) Cisco Nexus 2248
- Q3) Which FEX should be used when integrating a Cisco UCS C-Series server with Cisco UCS Manager 2.0(2) or later? (Source: Integrating Cisco UCS C-Series Servers and Cisco UCS Manager)
- A) Cisco Nexus 2148
 - B) Cisco Nexus 2224
 - C) Cisco Nexus 2232
 - D) Cisco Nexus 2248
- Q4) How are the data and management paths connected when integrating a Cisco UCS C-Series server with Cisco UCS Manager 1.4 and 2.0(1)? (Source: Integrating Cisco UCS C-Series Servers and Cisco UCS Manager)
- A) data path directly connected, management path directly connected
 - B) data path directly connected, management path via FEX
 - C) data path via FEX, management path directly connected
 - D) data path via FEX, management path via FEX
- Q5) How are the data and management paths connected when integrating a Cisco UCS C-Series server with Cisco UCS Manager 2.0(2) or later? (Source: Integrating Cisco UCS C-Series Servers and Cisco UCS Manager)
- A) data path directly connected, management path directly connected
 - B) data path directly connected, management path via FEX
 - C) data path via FEX, management path directly connected
 - D) data path via FEX, management path via FEX
- Q6) When a Cisco UCS C-Series server is successfully integrated in the Cisco UCS Manager, it is seen under “Rack-Mounts” in the Equipment tab. (Source: Troubleshooting Cisco UCS C-Series Server and Cisco UCS Manager Integration)
- A) true
 - B) false

- Q7) Which NIC mode should be chosen in the Cisco IMC Configuration Utility on a Cisco C-Series server when integrating it with the Cisco UCS Manager? (Source: Troubleshooting Cisco UCS C-Series Server and Cisco UCS Manager Integration)
- A) dedicated
 - B) shared LOM
 - C) Cisco card
 - D) not important
- Q8) If the server is Inoperable and the Discovery status of the server in the Cisco UCS Manager is showing “Waiting for User Ack,” what should the user do? (Source: Troubleshooting Cisco UCS C-Series Server and Cisco UCS Manager Integration)
- A) remove the server
 - B) decommission the server
 - C) re-acknowledge the server
 - D) contact the IT administrator

Module Self-Check Answer Key

Q1)	B, C, D, F
Q2)	D
Q3)	C
Q4)	B
Q5)	D
Q6)	A
Q7)	B
Q8)	C

