



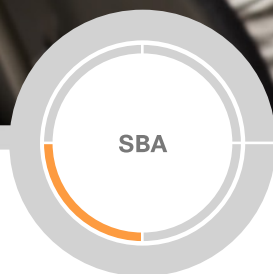
Newer Design Guide Available

Cisco Smart Business Architecture has become part of the Cisco Validated Designs program.

For up-to-date guidance on the designs described in this guide, see <http://cvddocs.com/fw/Aug13-545>

For information about the Cisco Validated Design program, go to <http://www.cisco.com/go/cvd>





Unified Computing System Deployment Guide

● ● ● SMART BUSINESS ARCHITECTURE

February 2013 Series

Preface

Who Should Read This Guide

This Cisco® Smart Business Architecture (SBA) guide is for people who fill a variety of roles:

- Systems engineers who need standard procedures for implementing solutions
- Project managers who create statements of work for Cisco SBA implementations
- Sales partners who sell new technology or who create implementation documentation
- Trainers who need material for classroom instruction or on-the-job training

In general, you can also use Cisco SBA guides to improve consistency among engineers and deployments, as well as to improve scoping and costing of deployment jobs.

Release Series

Cisco strives to update and enhance SBA guides on a regular basis. As we develop a series of SBA guides, we test them together, as a complete system. To ensure the mutual compatibility of designs in Cisco SBA guides, you should use guides that belong to the same series.

The Release Notes for a series provides a summary of additions and changes made in the series.

All Cisco SBA guides include the series name on the cover and at the bottom left of each page. We name the series for the month and year that we release them, as follows:

month year Series

For example, the series of guides that we released in February 2013 is the “February Series”.

You can find the most recent series of SBA guides at the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>

How to Read Commands

Many Cisco SBA guides provide specific details about how to configure Cisco network devices that run Cisco IOS, Cisco NX-OS, or other operating systems that you configure at a command-line interface (CLI). This section describes the conventions used to specify commands that you must enter.

Commands to enter at a CLI appear as follows:

```
configure terminal
```

Commands that specify a value for a variable appear as follows:

```
ntp server 10.10.48.17
```

Commands with variables that you must define appear as follows:

```
class-map [highest class name]
```

Commands shown in an interactive example, such as a script or when the command prompt is included, appear as follows:

```
Router# enable
```

Long commands that line wrap are underlined. Enter them as one command:

```
wrr-queue random-detect max-threshold 1 100 100 100 100 100  
100 100 100
```

Noteworthy parts of system output or device configuration files appear highlighted, as follows:

```
interface Vlan64  
ip address 10.5.204.5 255.255.255.0
```

Comments and Questions

If you would like to comment on a guide or ask questions, please use the [SBA feedback form](#).

If you would like to be notified when new comments are posted, an RSS feed is available from the SBA customer and partner pages.

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What's In This SBA Guide

Cisco SBA Data Center

Cisco SBA helps you design and quickly deploy a full-service business network. A Cisco SBA deployment is prescriptive, out-of-the-box, scalable, and flexible.

Cisco SBA incorporates LAN, WAN, wireless, security, data center, application optimization, and unified communication technologies—tested together as a complete system. This component-level approach simplifies system integration of multiple technologies, allowing you to select solutions that solve your organization's problems—without worrying about the technical complexity.

Cisco SBA Data Center is a comprehensive design that scales from a server room to a data center for networks with up to 10,000 connected users. This design incorporates compute resources, security, application resiliency, and virtualization.

Route to Success

To ensure your success when implementing the designs in this guide, you should first read any guides that this guide depends upon—shown to the left of this guide on the route below. As you read this guide, specific prerequisites are cited where they are applicable.

About This Guide

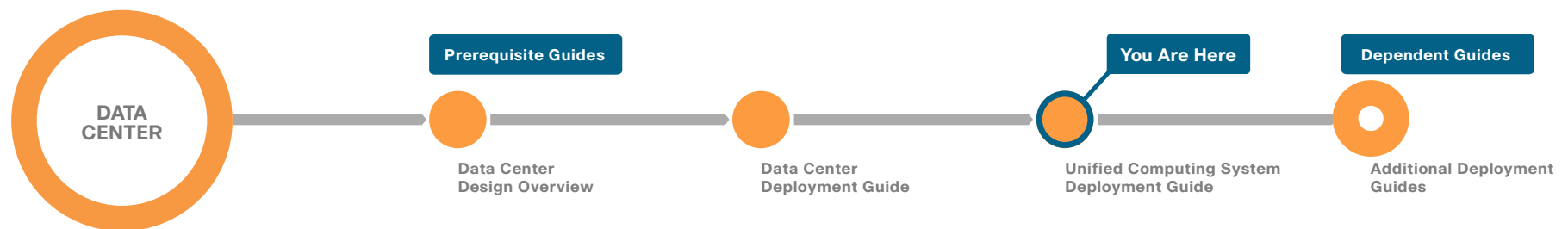
This *deployment guide* contains one or more deployment chapters, which each include the following sections:

- **Business Overview**—Describes the business use case for the design. Business decision makers may find this section especially useful.
- **Technology Overview**—Describes the technical design for the business use case, including an introduction to the Cisco products that make up the design. Technical decision makers can use this section to understand how the design works.
- **Deployment Details**—Provides step-by-step instructions for deploying and configuring the design. Systems engineers can use this section to get the design up and running quickly and reliably.

You can find the most recent series of Cisco SBA guides at the following sites:

Customer access: <http://www.cisco.com/go/sba>

Partner access: <http://www.cisco.com/go/sbachannel>



Introduction

This *Unified Computing System Deployment Guide* builds upon the foundation laid out in the *Cisco SBA—Data Center Deployment Guide*.

This guide includes the following modules:

- The first module explains how to program the foundation data center for connectivity to the Cisco UCS B-Series Blade Server system for maximum throughput and resiliency. This module covers Ethernet, Fibre Channel, and Fibre Channel over Ethernet connections between the UCS B-Series Blade Server system and the data center core network deployed in the *Data Center Deployment Guide*.
- The Cisco UCS B-Series Blade Server system module shows how the system is programmed from the ground up to a point where the “bare metal” server is ready for an operating system or hypervisor software installation. This module shows how the Cisco Unified Computing System Manager (UCS Manager) is used to program all elements of the system—from connectivity to the data center core, to building profiles to assign the various aspects of the server boot, communications, and storage to the physical blade server hardware.
- The Cisco UCS C-Series Rack-Mount Server module shows how to use the Cisco Integrated Management Controller (CIMC) to remotely configure and prepare a server to a point where it is ready to load an operating system or hypervisor software. Similar to the Cisco UCS B-Series Blade Server system module, this section shows how to establish connectivity to the data center core to support Ethernet and Fibre Channel communications by using converged network adapters that add flexibility to server connectivity and reduce cabling and complexity. This module also includes guidance on managing the UCS C-Series server with the same Cisco UCS Manager that controls the B-Series servers for a single method of managing both server types.
- The appendices provide the complete list of products used in the lab testing of this architecture, as well as the software revisions used on the products and a list of major changes since the last edition of this guide.

Business Overview

As an organization begins to grow, the number of servers required to handle the information-processing tasks of the organization grows as well. Using the full capabilities of the investment in server resources can help an organization add new applications while controlling costs as they move from a small server room environment to a more scalable data center design. Server virtualization has become a common approach to allow an organization to access the untapped processing capacity available in processor technology. Streamlining the management of server hardware and its interaction with networking and storage equipment is another important component of using this investment in an efficient manner.

Scaling a data center with conventional servers, networking equipment, and storage resources can pose a significant challenge to a growing organization. Multiple hardware platforms and technologies must be integrated to deliver the expected levels of performance and availability to application end users. These components in the data center also need to be managed and maintained, typically with a diverse set of management tools that have different interfaces and approaches. In larger organizations, often multiple teams of people are involved in managing applications, servers, storage, and networking. In many smaller organizations, the lines between these tasks are blurred, and often a single, smaller team—or even one individual—may need to handle many of these tasks in a day.

Business agility in the data center is a growing concern for organizations. The ability to reduce the time necessary to deploy new applications or expand existing applications to a larger footprint to handle increasing workloads contributes to the success of a project. The compute environment needs to be consistent to reduce operational requirements, yet flexible to accommodate the different requirements of applications and the operating system.

Application availability is key to an organization. Users depend on reaching the systems and information that are required to run the business just as much as they depend on having lights in the office or a power outlet to plug in a PC.

Technical Overview

Consistent with the Cisco Smart Business Architecture (SBA) approach, Cisco offers a simplified reference model for managing a small server room as it grows into a full-fledged data center. This model benefits from the ease of use offered by the Cisco Unified Computing System. This guide has been lab-tested in conjunction with the architecture defined in the *Cisco SBA—Data Center Deployment Guide*, available at: www.cisco.com/go/sba.

This guide addresses many of the same business issues encountered by growing organizations, issues that are identified in the *Cisco SBA—Data Center Deployment Guide*, but it focuses on the server resources themselves and their interaction with network and storage systems.

Application Growth

The Cisco SBA Unified Computing System model provides for using a simple GUI for rapid deployment of additional physical servers that share common attributes. Using the Cisco UCS Manager service profiles, you can define the “personality” of an individual server—including boot characteristics, interface addresses, and even firmware versions—separately from any physical hardware. You can also generate service profiles from a template and keep them linked to the template to facilitate updates across multiple servers in the future. This gives you the ability to create a new server by cloning an existing service profile or using a template. It also means that it only takes a few minutes to deploy a new server, and you can limit physical server hardware to a flexible and common pool of spare parts as your data center grows.

Increasing Storage Requirements

The most efficient way to manage the investment in additional storage capacity is to move to a centralized storage model. The Cisco SBA Unified Computing System model decouples the computing functions of the server farm from the storage systems, which provides greater flexibility for system growth and migration. System storage and boot disk are accessible from either the local disk that is available on each server or through access to centralized storage located on the Ethernet IP network or Fibre Channel or Fibre Channel over Ethernet storage area network (SAN).

Managing Processing Resources

Some applications require enough processing and memory that you might decide to dedicate an entire server or even a cluster of servers to support the workload. Other applications may start out on a single server where the

processor and memory are underutilized, resulting in excess or wasted resources. In the case where applications need a separate operating environment but not an entire server for processing and memory resources, server virtualization is the key to combining applications and optimizing resources. Server virtualization technologies insert a hypervisor layer between the server operating systems and the hardware, allowing a single physical server to run multiple instances of different “guest” operating systems such as Microsoft Windows or Linux. This increases the utilization of the processors on the physical servers, which helps to optimize this costly resource.

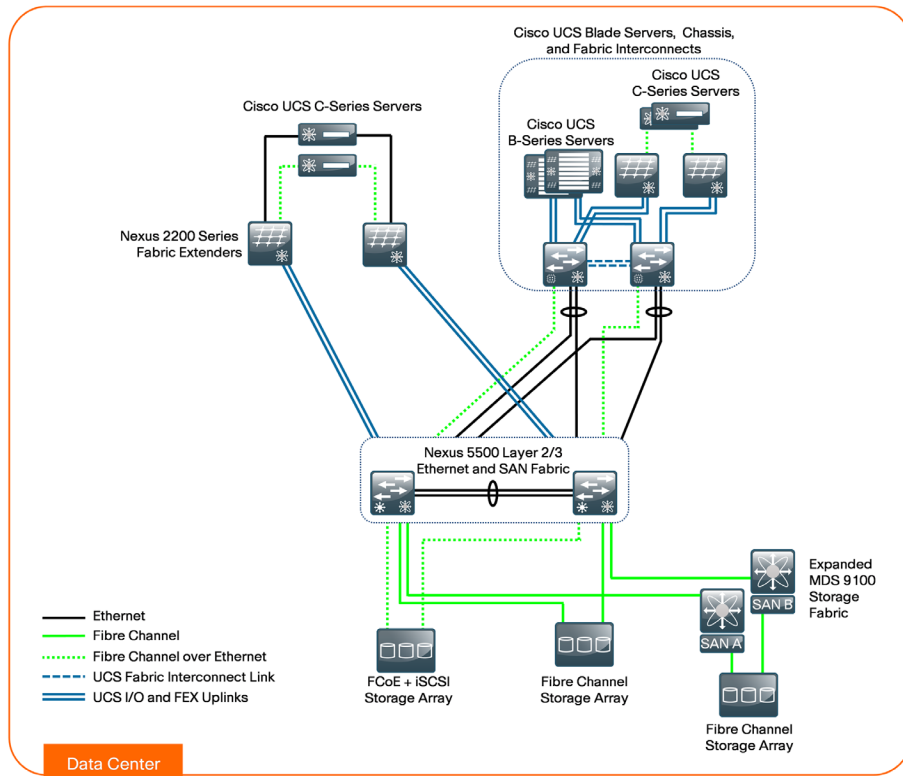
The architecture of the Cisco SBA Unified Computing System model is optimized to support the use of hypervisor-based systems or the direct installation of a base operating system such as Windows or Linux. The service profile structure of Cisco UCS, along with a centralized storage model, allows you the portability of server definitions to different hardware with or without a hypervisor system in place. Built on the data center infrastructure foundation defined in *Cisco SBA—Data Center Deployment Guide*, the Cisco SBA Unified Computing System model provides scalable connectivity options for not only Cisco UCS Series 5100 Blade Server Chassis but also Cisco UCS C-Series Rack-Mount Servers, as well as connectivity options to support third-party servers.

Availability and Business Continuation

The Cisco SBA data center foundation has been designed to ensure availability with the use of resilient network devices, links, and service models. The Cisco SBA Unified Computing System model extends this resiliency to the servers themselves through the capabilities of Cisco Unified Computing System.

Cisco Unified Computing System uses service profiles to provide a consistent interface for managing all server resource requirements as a logical entity, independent of the specific hardware module that is used to provide the processing capacity. This service profile approach is applied consistently on both virtualized servers and “bare metal” servers, which do not run a hypervisor. This capability allows the entire personality of a given logical server to be ported easily to a different physical server module independent of any virtualization software when LAN or SAN boot are in use. This approach increases overall availability and dramatically reduces the time required to replace the function of an individual server module that has failed.

Figure 1 - Cisco SBA Unified Computing System architecture



This architecture is designed to allow your existing server farm to migrate into a scalable Ethernet and storage transport based on the Cisco SBA reference design. Figure 1 shows the data center components of this architecture and their interaction with the Cisco SBA headquarters LAN core.

Ethernet Foundation

The *Cisco SBA—Unified Computing System Deployment Guide* is designed as an extension of the *Cisco SBA—Data Center Deployment Guide*. The basis of the Cisco SBA Unified Computing System architecture is an Ethernet switch fabric that consists of two Cisco Nexus 5500UP switches, as shown in Figure 1. This data center switching fabric provides Layer 2 and Layer 3 Ethernet switching services to attached devices and, in turn, communicates with the Cisco SBA LAN Ethernet core by using redundant Layer 3 links.

The two Cisco Nexus 5500UP switches form the Ethernet switch fabric using Virtual Port Channel (vPC) technology. This feature provides loop-prevention services and allows the two switches to appear as one logical

Layer-2 switching instance to attached devices. In this way, the Spanning Tree Protocol, which is a standard component of Layer-2 bridging, does not need to block any of the links in the topology to prevent bridging loops. Additional Gigabit Ethernet and 10-Gigabit Ethernet switch port density may be added to the switch fabric by using Cisco Nexus 2000 Series Fabric Extenders. The vPC and fabric extender technologies provide the flexibility for extending VLANs across the data center for a resilient, virtualized computing environment.

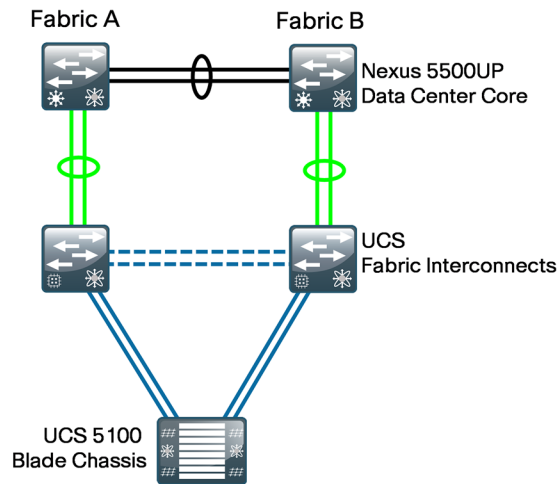
Storage Networking

The Cisco SBA Unified Computing System model is also adaptable to multiple ways of accessing centralized storage. Two alternatives for storage access are included in the overall architecture. One approach uses a pure Ethernet IP network to connect the servers to both their user community and the shared storage array. Communication between the servers and storage over IP can be accomplished by using an Internet Small Computer System Interface (iSCSI), which is a block-oriented protocol encapsulated over IP, or traditional network-attached storage (NAS) protocols such as Common Internet File System (CIFS) or network file server (NFS). LAN-based storage access follows the path through the Cisco Nexus 5500 Series Switching Fabric shown in Figure 1.

A more traditional but advanced alternative for providing shared storage access is using a Fibre Channel SAN built using the data center core Cisco Nexus 5500UP switches or the Cisco MDS 9100 Series for larger SAN environments. Fibre Channel over Ethernet (FCoE) builds on the lossless Ethernet infrastructure to provide a converged network infrastructure. For resilient access, SANs are normally built with two distinct fabric switches that are not cross-connected. Currently, Fibre Channel offers the widest support for various disk-array platforms and also support for boot-from-SAN.

The Cisco UCS 6200 Series Fabric Interconnects also maintain separate Fibre Channel fabrics, so each fabric is attached to one of the data center core switches running either SAN A or SAN B as shown in Figure 2. When Fibre Channel is used for storage access from Cisco UCS B-Series Blade Servers, the system provides virtual host bus adapters (vHBAs) to the service profiles to be presented to the host operating system. The Cisco UCS fabric interconnect can now connect to the data center core switches with FCoE uplinks as of Cisco UCS Manager release 2.1(1a). This guide will show how you can use Fibre Channel or FCoE uplinks from the Cisco UCS fabric interconnect to the data center core switches.

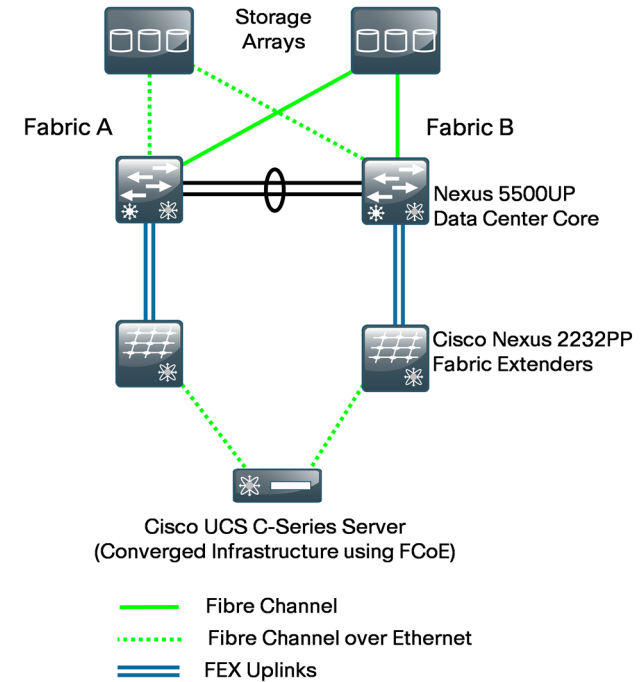
Figure 2 - Cisco UCS 6200 fabric interconnect to SAN core



On the Cisco UCS fabric interconnect, the Fibre Channel ports that connect to the data center core SAN operate in N-port Virtualization mode. All Fibre Channel switching happens upstream at the data center core switches running N-Port Identifier Virtualization (NPIV). NPIV allows multiple Fibre Channel port IDs to share a common physical port. Though there are multiple Fibre Channel ports on the fabric interconnects, local Fibre Channel switching between these ports is not covered in this guide.

You can connect the Cisco UCS C-Series Rack-Mount Servers to the Fibre Channel SAN by using dedicated host bus adapters (HBAs) that attach directly to the SAN switches. Alternately, you can use a converged network adapter, which allows Ethernet data and Fibre Channel over Ethernet (FCoE) storage traffic to share the same physical set of cabling. This Unified Wire approach allows these servers to connect directly to the Cisco Nexus 5500UP Series switches or a Cisco Nexus Fabric Extender for data traffic, as well as SAN A and SAN B highly available storage access, shown in Figure 3. The Cisco Nexus 5500UP switch fabric is responsible for splitting FCoE traffic off to the Fibre Channel attached storage array. Many storage arrays now include FCoE connectivity as an option and can be directly connected to the data center core.

Figure 3 - Cisco UCS C-Series server to SAN core using FCoE



Many available shared storage systems offer multi-protocol access to the system, including iSCSI, Fibre Channel, FCoE, CIFS, and NFS. Multiple methods can be combined on the same storage system to meet the access requirements of a variety of server implementations. This flexibility also helps facilitate migration from legacy third-party server implementations onto Cisco UCS.

Computing Systems

The primary computing platforms targeted for the Cisco SBA Unified Computing System reference architecture are Cisco UCS B-Series Blade Servers and Cisco UCS C-Series Rack-Mount Servers.

The Cisco UCS 5100 Series Blade Server Chassis is a blade-server style enclosure supporting compact, slide-in server modules, but architecturally it is a significantly different approach from traditional blade-server systems on the market. Most blade server systems essentially take the components that would have been in a standalone data center rack, such as a number of standardized rack-mount servers with a pair of redundant top-of-rack switches, and attempt to condense them into a single sheet-metal box. Some of these implementations even include localized storage arrays within the chassis. That approach achieves higher system density but retains most of the complexity of traditional rack systems in a smaller form factor. Also, the number of management interfaces and switching devices multiplies with each new chassis.

By extending a single low-latency network fabric directly into multiple enclosures, Cisco has removed the management complexity and cable-management issues associated with blade switching or pass-through module implementations common to blade servers. By consolidating storage traffic along this same fabric using lossless FCoE technology, Cisco UCS even further simplifies the topology by using the fabric interconnects as a common aggregation point for Ethernet data traffic and storage-specific Fibre Channel traffic. On top of this vastly simplified physical architecture, Cisco UCS Manager extends a single management interface across the physical blade servers and all of their associated data and storage networking requirements. The Cisco UCS Manager can also extend the single management interface to Cisco UCS C-Series servers when those servers are interconnected to the UCS Fabric Interconnects.

Cisco Unified Computing System Components

The Cisco Unified Computing System has a unique architecture that integrates compute, data network access, and storage network access into a common set of components under a single-pane-of-glass management interface. The primary components included within this architecture are as follows:

- **Cisco UCS Fabric Interconnect**—The Cisco UCS 6200 Series fabric interconnects provide both network connectivity and management capabilities to the other components in the system. It is recommended that the fabric interconnects are clustered together as a pair, providing

resilient management access—as well as 10-Gb Ethernet, Fibre Channel, and FCoE capabilities—to the system. The Cisco UCS 6200 fabric interconnect provides the flexibility of unified ports, enabling a port to run Ethernet or Fibre Channel.

- **Cisco UCS Fabric Extender**—The Cisco UCS 2200 Series Fabric Extenders, also referred to as *I/O modules*, are installed directly within the Cisco UCS 5100 Series Blade Server Chassis enclosure. These modules logically extend the fabric from the fabric interconnects into each of the enclosures for Ethernet, FCoE, and management purposes. The fabric extenders simplify cabling requirements from the blade servers installed within the system chassis.
- **Cisco UCS 5100 Series Blade Server Chassis**—The Cisco UCS 5100 Series Blade Server Chassis provides an enclosure to house up to eight half-width or four full-width blade servers, their associated fabric extenders, and four power supplies for system resiliency.



Tech Tip

As of Cisco UCS release 2.1(1a), a single pair of fabric interconnects may connect to and manage up to twenty Cisco UCS 5100 Series Blade Server Chassis.

- **Cisco UCS B-Series Blade Servers**—Cisco B-Series Blade Servers implement Intel Xeon Series processors and are available in both a half-width or full-width format. The Cisco UCS B22, B200, and B230 blade servers require a half-slot within the enclosure, providing high-density, high-performance computing resources in an easily managed system. The Cisco UCS B250, B420, and B440 blade servers require a full slot and offer extended memory, increased processing power, increased local storage, and higher I/O throughput.
- **Cisco UCS B-Series Network Adapters**—The Cisco UCS B-Series Blade Servers accept a variety of mezzanine adapter cards that allow the switching fabric to provide multiple interfaces to a server. These adapter cards fall into three categories:
 - **Ethernet adapters**—The baseline 10-Gigabit Ethernet adapters can present up to two Ethernet interfaces to a server.
 - **Converged network adapters**—Cisco converged network adapters are available in multiple models, with chip sets from multiple

manufacturers to meet specific needs. These adapters can present up to two 10-Gigabit Ethernet interfaces to a server, along with two Fibre Channel interfaces.

- **Virtual interface cards**—The Cisco virtual interface cards (VICs) feature new technology from Cisco, allowing additional network interfaces to be dynamically presented to the server. This adapter supports Cisco VN-Link technology in hardware, which allows each virtual adapter to appear as a separate virtual interface on the fabric interconnects. The architecture of the VIC is capable of supporting up to 256 total virtual interfaces split between virtual network interface cards (vNICs) and vHBAs. The number of virtual interfaces currently supported depends on the UCS infrastructure, including the fabric interconnect, I/O module, VIC model, and version of Cisco UCS Manager.

Cisco UCS Manager

Cisco UCS Manager is embedded software that resides on the fabric interconnects, providing complete configuration and management capabilities for all of the components in the Cisco UCS system. This configuration information is replicated between the two fabric interconnects, providing a highly available solution for this critical function. The most common way to access UCS Manager for simple tasks is to use a Web browser to open the Java-based GUI. For command-line or programmatic operations against the system, a command-line interface (CLI) and an XML API are also included with the system.

The Cisco UCS Manager GUI provides role-based access control (RBAC) to allow multiple levels of users granular administrative rights to system objects. Users can be restricted to certain portions of the system based on locale, which corresponds to an optional organizational structure that can be created within the system. Users can also be classified based on their access levels or areas of expertise, such as “Storage Administrator,” “Server Equipment Administrator,” or “Read-Only”. RBAC allows the comprehensive capabilities of the Cisco UCS Manager GUI to be properly shared across multiple individuals or teams within your organization in a flexible, secure manner.

Cisco UCS Manager provides unified, embedded management of all software and hardware components. Every instance of Cisco UCS Manager and all of the components managed by it form a *domain*. For organizations that deploy multiple Cisco UCS domains, Cisco UCS Central software provides a centralized user interface that allows you to manage multiple, globally distributed Cisco UCS domains with thousands of servers. Cisco UCS Central integrates with Cisco UCS Manager and utilizes it to provide global configuration capabilities for pools, policies, and firmware.

Cisco UCS C-Series Rack-Mount Servers

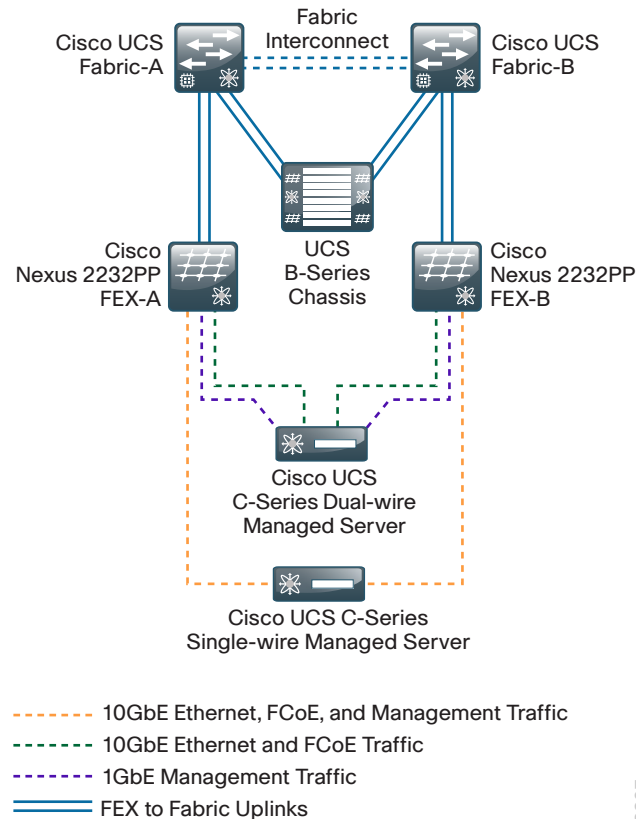
Cisco UCS C-Series servers extend Cisco Unified Computing System innovations and benefits to the rack-mount server form factor. Designed to operate in a standalone environment or as part of the Cisco Unified Computing System, Cisco UCS C-Series servers can be used to satisfy smaller regional or remote office requirements, or they can be used as an approach to deploy rack-mounted servers on an incremental basis. The Cisco UCS C-Series servers also implement Intel Xeon processor technology and are available in multiple models with options for processing power, local storage size, and I/O throughput requirements. They offer Cisco innovations such as extended memory and network-aware VN-Link technologies.

The Cisco Integrated Management Controller (CIMC) is the management service for Cisco C-Series servers. CIMC runs within the server and allows you to use a web-based GUI or Secure Shell (SSH) Protocol-based CLI to access, configure, administer, and monitor the server. Almost all tasks can be performed in either interface, and the results of tasks performed in one interface are displayed in the other. You can use CIMC to perform the following server management tasks, including (but not limited to):

- Power on, power off, power cycle, reset, and shut down the server
- Configure the server boot order
- View server properties and sensors
- Configure network-related settings, including network interface card (NIC) properties and network security
- Configure communication services, including HTTP, SSH, SNMP, and Intelligent Platform Management Interface (IPMI) over LAN
- Update CIMC firmware
- Monitor faults, alarms, and server status

The Cisco UCS C-Series servers can be managed by the Cisco UCS Manager if they are deployed connected to the fabric interconnects via Cisco 2232PP fabric extenders as shown in Figure 4. This type of deployment enables the flexibility of both rack-mounted and blade servers with a single-pane-of-glass management of all Cisco UCS servers in the data center. The newer Cisco UCS C-Series M3 model servers can be managed with a single wire connected to the Cisco 2232PP fabric extenders when the server is using the new Cisco UCS VIC 1225 virtual interface card.

Figure 4 - Cisco UCS C-Series servers connected to UCS fabric interconnects



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Third-Party Computing Systems

Third-party rack server and blade server systems may also be connected to the Cisco SBA data center topology with the available 10-Gigabit Ethernet interfaces on the Cisco Nexus 5500 Series switches, or interfaces on the Cisco Nexus 2000 Series Fabric Extenders that support Gigabit Ethernet and 10-Gigabit Ethernet connectivity, depending on the model selected. To support existing applications and facilitate smooth migration to servers that support the Cisco Unified Computing System features, you can easily integrate a previously installed base of running servers into the Cisco SBA data center architecture.

Server Virtualization and Cisco UCS

Server virtualization technologies allow a single physical server to run multiple virtual instances of a guest operating system, creating virtual machines. Running multiple virtual machines on server hardware helps to increase processor utilization levels, while still allowing each virtual machine to be viewed as independent from a security, configuration, and troubleshooting perspective.

Cisco Unified Computing System server platforms provide unique advantages that complement the implementation of server virtualization technologies. The Cisco UCS servers with Cisco UCS Manager allow the personality of a server instance to be easily ported to different physical hardware, similar to porting a virtual machine to a different host. Cisco UCS Manager provides the capability to directly integrate network interfaces to the hypervisor system for dynamic network interface allocation to virtual machines. This is currently supported with VMware ESX 4.0 Update 1 and above. Cisco Extended Memory Technology allows individual servers to scale to large numbers of virtual machines, reducing support and licensing costs.

Cisco UCS servers have been certified with multiple hypervisor systems, including VMware ESX, Microsoft Hyper-V, and Citrix Xen. Please contact your Cisco Systems or authorized partner sales representative to verify the specifics of your implementation requirements with current hardware and software versions.

Deployment Details

The following sections provide detailed, step-by-step instructions to configure the basic elements of the Cisco SBA Unified Computing System model. If you are a new user, you can use these common best-practice configurations to quickly configure a new system for basic operations. This is a flexible configuration, so additional information is provided, including pointers to more detailed documentation that you can use for more advanced system configurations.

Data Center Core Network Infrastructure

The Cisco SBA foundation data center core network infrastructure for the Cisco SBA Unified Computing System topology is based on the *Cisco SBA—Data Center Deployment Guide*. The following Ethernet, Fibre Channel, and FCoE network setup processes prepare the data center core for connecting to a Cisco UCS B-Series Blade Server system.

Cisco UCS C-Series Rack-Mount Servers may be connected to the Cisco SBA data center infrastructure, using available interfaces on the Cisco Nexus 5500UP switches or through the Cisco Nexus 2000 Series Fabric Extenders. You can configure switching access or trunk port modes according to the settings appropriate for the installed operating system. The Cisco UCS C-Series servers may also be connected to the fabric interconnects that provide connectivity for the Cisco UCS B-Series servers for a single control point provided by Cisco UCS Manager.

Process

Configuring the Ethernet Network Infrastructure

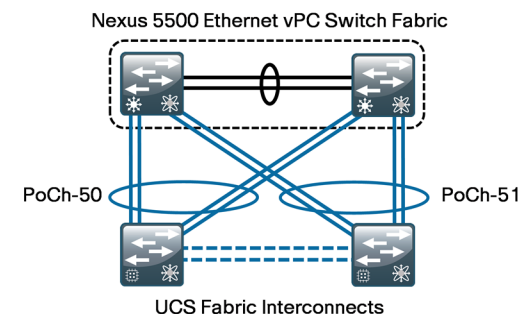
1. Configure Nexus 5500 port channels

The Cisco UCS B-Series Blade Servers and Cisco UCS 5100 Series Blade Server Chassis operate in conjunction with the Cisco UCS 6200 Series Fabric Interconnects to appear as a group of end-node servers to the

data center Ethernet switching fabric. In the Cisco SBA Unified Computing System architecture, the fabric interconnects for Ethernet traffic are connected directly to the Cisco Nexus 5500UP Series Ethernet switching fabric running vPC for the best combination of throughput and resiliency.

Configuration examples in this guide show the use of a port channel with four physical 10-Gigabit Ethernet ports from each Cisco UCS Fabric Interconnect to the Cisco Nexus 5500 vPC pair. These interfaces are numbered Ethernet 1/9 through 1/12 on each Cisco Nexus 5500 Series switch, and ports 17 through 20 on each fabric interconnect in the example configurations. The port channel from each fabric interconnect spans the two physical Cisco Nexus 5500 switches for resilient connectivity, as shown in the figure below. You can use interface numbers specific to your implementation to achieve the same cabling structure.

Figure 5 - Data center core to fabric interconnect Ethernet cabling





Tech Tip

This illustration shows the use of integrated ports on the Cisco UCS fabric interconnects in the validation network for Ethernet uplink connections. Expansion module Ethernet ports may also be used as uplink ports.

Procedure 1

Configure Nexus 5500 port channels

Step 1: Ensure that the LACP feature is enabled for EtherChannel operation.

```
feature lacp
```

Step 2: Configure the physical interfaces to the port channels on the data center core Cisco Nexus 5500UP-A switch.

```
interface Ethernet1/9
  description Link to FI-A eth1/17
  channel-group 50 mode active
  no shutdown
!
interface Ethernet1/10
  description Link to FI-A eth1/18
  channel-group 50 mode active
  no shutdown
!
interface Ethernet1/11
  description Link to FI-B eth1/17
  channel-group 51 mode active
  no shutdown
!
interface Ethernet1/12
  description Link to FI-B eth1/18
  channel-group 51 mode active
  no shutdown
```

When you assign the channel group to a physical interface, the switch's operating system creates the logical EtherChannel (port-channel) interface. Next, you configure the logical port-channel interfaces, and the physical interfaces tied to the port channel will inherit the settings.

Step 3: Configure the port channels on the data center core Cisco Nexus 5500UP-A switch.

The port channels are created as vPC port channels, because the fabric interconnects are dual-homed EtherChannels to both data center core switches.

```
interface port-channel50
  switchport mode trunk
  switchport trunk allowed vlan 148-163
  spanning-tree port type edge trunk
  service-policy type qos input DC-FCOE+1P4Q_INTERFACE-DSCP-
  QOS
  vpc 50

interface port-channel51
  switchport mode trunk
  switchport trunk allowed vlan 148-163
  spanning-tree port type edge trunk
  service-policy type qos input DC-FCOE+1P4Q_INTERFACE-DSCP-
  QOS
  vpc 51
```



Tech Tip

Setting the spanning-tree port type to "edge trunk" is appropriate for the recommended default fabric interconnect configuration of End Host Mode. If the fabric interconnect is configured in switched mode, leave the Cisco Nexus 5500 port type set to "normal" for standard Spanning Tree Protocol loop prevention.

The port-channel interfaces do not become active until you complete the corresponding configuration on the Cisco UCS fabric interconnects, which is covered in Procedure 2, "Define Ethernet uplink ports."

Step 4: Configure the physical interfaces for the port channels, and the port channels on data center core Cisco Nexus 5500UP-B switch.

```
interface Ethernet1/9
  description Link to FI-A eth1/19
  channel-group 50 mode active
  no shutdown
!
interface Ethernet1/10
  description Link to FI-A eth1/20
  channel-group 50 mode active
  no shutdown
!
interface Ethernet1/11
  description Link to FI-B eth1/19
  channel-group 51 mode active
  no shutdown
!
interface Ethernet1/12
  description Link to FI-B eth1/20
  channel-group 51 mode active
  no shutdown
!
interface port-channel50
  switchport mode trunk
  switchport trunk allowed vlan 148-163
  spanning-tree port type edge trunk
  service-policy type qos input DC-FCOE+1P4Q_INTERFACE-DSCP-
QOS
  vpc 50
!
interface port-channel51
  switchport mode trunk
  switchport trunk allowed vlan 148-163
  spanning-tree port type edge trunk
  service-policy type qos input DC-FCOE+1P4Q_INTERFACE-DSCP-
QOS
  vpc 51
```

Process

Configuring the Fibre Channel or FCoE Network Infrastructure

1. Configure SAN port channels

If you will access all of your storage strictly over Ethernet by using iSCSI or NAS protocols, it is not necessary to define or attach Fibre Channel uplinks; you can skip this process.

Complete the following process to prepare the data center core Cisco Nexus 5500UP switches to support a Fibre Channel or FCoE SAN connection to the Cisco UCS Fabric Interconnects. As of Cisco UCS Release 2.1(1a), the Cisco UCS 6200 Series Fabric Interconnects support either a Fibre Channel or FCoE SAN connection to the data center core switching fabric. Configuration instructions and Fibre Channel SAN numbering provided in this guide are based on the foundation of the Fibre Channel infrastructure in the *Cisco SBA—Data Center Deployment Guide* topology.

Table 1 - Fibre Channel VSAN to FCoE VLAN mapping

Data center core switch	VSAN	FCoE VLAN
Cisco Nexus 5500UP-A	4	304
Cisco Nexus 5500UP-B	5	305

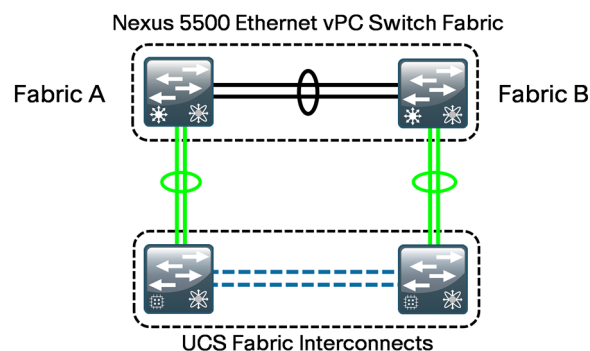
The following procedure options provide guidance for Fibre Channel (FC) or FCoE connectivity from the data center core to the Cisco UCS Fabric Interconnect. Both procedures configure the SAN extension for operation where the Cisco UCS Fabric Interconnects are operating in the default SAN FC and Ethernet LAN switching End-Host mode.

Procedure 1 Configure SAN port channels

If you want to use native Fibre Channel to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, complete Option 1. If you want to use FCoE to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, complete Option 2.

Option 1. Configure Fibre Channel SAN port channels

Figure 6 - Fibre Channel connection between the data center core and fabric interconnects



To prepare the data center core Cisco Nexus 5500UP switches for Fibre Channel connectivity to the fabric interconnect, you must enable NPIV. This may have already been done during programming according to the *Cisco SBA—Data Center Deployment Guide*.

Step 1: On the data center core Cisco Nexus 5500UP-A switch, enable NPIV, Fibre Channel port channel trunking, and Fibre Channel or FCoE switching operation.

```
feature npiv
feature fport-channel-trunk
feature fcoe
```

The **feature fcoe** command is required to enable both Fibre Channel and FCoE on the Cisco Nexus 5500UP switches.

Step 2: Create a SAN port channel to connect the fabric interconnect to the data center core Cisco Nexus 5500UP-A switch.

With NPIV enabled, you must assign a virtual SAN (VSAN) to the SAN port channels that connect to the fabric interconnects. You use the same VSAN numbering established in the *Cisco SBA—Data Center Deployment Guide*.

```
interface san-port-channel 29
  channel mode active
  switchport trunk mode on
  switchport trunk allowed vsan 1
  switchport trunk allowed vsan add 4
```

Step 3: Add the SAN port channel to an existing VSAN database on the data center core Cisco Nexus 5500UP-A switch.

```
vsan database
  vsan 4 interface san-port-channel 29
```

Step 4: On the data center core Cisco Nexus 5500UP-A switch, configure the SAN port channel on physical interfaces.

The Fibre Channel ports on the Cisco Nexus 5500UP switches are set to negotiate speed by default.

```
interface fc1/29
  switchport trunk mode on
  channel-group 29 force
!
interface fc1/30
  switchport trunk mode on
  channel-group 29 force
```

Step 5: Apply the following configuration to the data center core Cisco Nexus 5500UP-B switch. Note the different VSAN number value used for the Cisco Nexus 5500UP-B switch.

```
feature npiv
feature fport-channel-trunk
feature fcoe
!
interface san-port-channel 29
  channel mode active
  switchport trunk mode on
  switchport trunk allowed vsan 1
```

```

switchport trunk allowed vsan add 5
!
vsan database
  vsan 5 interface san-port-channel 29
!
interface fc1/29
  switchport trunk mode on
  channel-group 29 force
!
interface fc1/30
  switchport trunk mode on
  channel-group 29 force

```



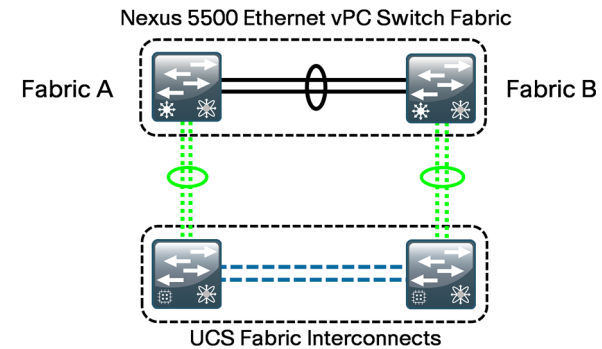
Tech Tip

The Fibre Channel SAN port channel interfaces configured in these steps will not show a status of “up” until you complete the upcoming configuration of the fabric interconnects for Fibre Channel operation in Procedure 2, “Define Ethernet uplink ports” in the “Configuring Communications Connections using UCS Manager” process.

Option 2. Configure FCoE SAN port channels

If you want to use FCoE in order to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, use this procedure. The EtherChannel links for FCoE are different than the EtherChannel links for only Ethernet traffic, created in the previous “Configuring the Ethernet Network Infrastructure” process.

Figure 7 - FCoE connection between the data center core and fabric interconnects



If you have already configured your Cisco Nexus 5500UP switches for FCoE operation by following the Configuring the Data Center Core procedure in the *Cisco SBA—Data Center Deployment Guide* you may skip to Step 5.

Step 1: On the data center core Cisco Nexus 5500UP-A switch, enable NPIV and Fibre Channel or FCoE switching operation, and then ensure that LACP is enabled.

```

feature lacp
feature npiv
feature fcoe

```

The **feature fcoe** command is required to enable both Fibre Channel and FCoE on the Cisco Nexus 5500UP switches.

Step 2: If you have not already configured your Cisco Nexus 5500UP switches for QoS by following the Configuring the Data Center Core procedure in the *Cisco SBA—Data Center Deployment Guide*, you must enable quality of service (QoS) for FCoE operation on the Cisco Nexus 5500UP.

Four lines of QoS statements map the baseline system QoS policies for FCoE. Without these commands, the virtual FC interface will not function when activated. If you followed the *Cisco SBA—Data Center Deployment Guide* to deploy your network, you should have already executed a more comprehensive QoS policy, which includes FCoE traffic classification, so you can skip this step. If you use the commands below for the baseline FCoE QoS operation, you will overwrite your existing QoS policy.

```

system qos
service-policy type qos input fcoe-default-in-policy
service-policy type queuing input fcoe-default-in-policy
service-policy type queuing output fcoe-default-out-policy
service-policy type network-qos fcoe-default-nq-policy
end

```



Tech Tip

All FC and FCoE control and data traffic is automatically classified into the FCoE system class, which provides a no-drop service. On the Cisco Nexus 5010 and Cisco Nexus 5020, this class is created automatically when the system starts up. The class is named class-fcoe in the CLI.

Step 3: On the data center core Cisco Nexus 5500UP-A switch, ensure that an FCoE VLAN has been created. This VLAN that will carry FCoE traffic to the fabric interconnects.

```

vlan 304
 name FCoE-VLAN_304
exit

```

Step 4: On the data center core Cisco Nexus 5500UP-A switch, ensure that VSAN 4 has been created and map VLAN 304 to VSAN 4. VLAN 304 carries all VSAN 4 traffic over the trunk.

```

vsan database
 vsan 4
 vsan 4 name General-Storage
exit
!
vlan 304
 fcoe vsan 4
exit

```

Step 5: Configure a new port channel on the physical interfaces on the Cisco Nexus 5500UP-A switch, connecting FCoE transport to the fabric interconnects. Cisco Nexus Operating System automatically creates the port channel associated with the channel group.

```

interface ethernet2/1
 description FCoE Link to FI-A eth1/33
 channel-group 33 mode active
 no shutdown
!
interface ethernet2/2
 description FCoE Link to FI-A eth1/34
 channel-group 33 mode active
 no shutdown

```

Step 6: Configure the port channel created by the previous step to trunk, and allow the FCoE VLAN (304).

```

interface port-channel 33
 description FCoE EtherChannel Link to FI-A
 switchport mode trunk
 switchport trunk allowed vlan 304
 spanning-tree port type edge trunk

```



Caution

Only use **spanning-tree port type edge trunk** when the Cisco UCS Fabric Interconnects are operating in the default Ethernet LAN switching End-Host mode.

Step 7: On the data center core Cisco Nexus 5500UP-A switch, create a virtual Fibre Channel (vfc) interface, bind it to the port channel created in the previous step, and then configure the interface to trunk VSAN 4.

```

interface vfc 33
 bind interface port-channel33
 switchport trunk allowed vsan 4
 switchport mode F
 no shutdown

```


Step 8: Apply the following configuration to the data center core Cisco Nexus 5500UP-B switch, and ensure that QoS is enabled for FCoE operation as done in Step 2 above. Note the different VSAN number value used for the Cisco Nexus 5500UP-B switch.

```
feature lacp
feature npiv
feature fcoe
!
vlan 305
  name FCoE-VLAN_305
  exit
!
vsan database
  vsan 5
  vsan 5 name General-Storage
  exit
!
vlan 305
  fcoe vsan 5
  exit
!
interface ethernet2/1
  description FCoE Link to FI-B eth1/33
  channel-group 33 mode active
  no shutdown
!
interface ethernet2/2
  description FCoE Link to FI-B eth1/34
  channel-group 33 mode active
  no shutdown
!
interface port-channel 33
  description FCoE EtherChannel Link to FI-B
  switchport mode trunk
  switchport trunk allowed vlan 305
  spanning-tree port type edge trunk
!
interface vfc 33
```

```
bind interface port-channel33
switchport trunk allowed vsan 5
switchport mode F
no shutdown
```

Cisco UCS B-Series Blade Server System

The Cisco UCS B-Series Blade Server system is the heart of the Cisco SBA Unified Computing System architecture. This section provides information on initial system setup and basic service profile configuration to prepare your first running server to boot on one of the blade server modules. Additional information is provided for setting up service profiles with multiple interfaces and boot-from-SAN configurations.

Process

Completing the Initial System Setup

1. Complete cabling and ensure connectivity
2. Configure management switch ports
3. Complete initial fabric interconnect setup

Procedure 1

Complete cabling and ensure connectivity

The Cisco UCS fabric interconnects act as the concentration point for all cabling to and from the UCS 5100 Series Blade Server Chassis.

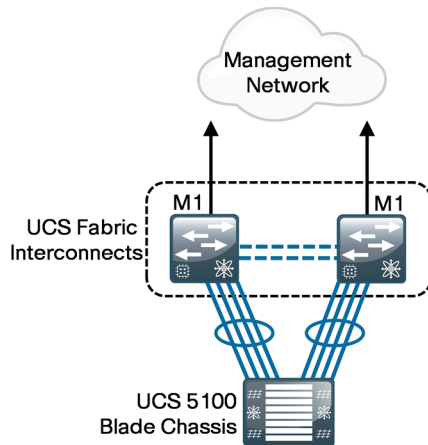
Step 1: Connect the two fabric interconnects together using the integrated ports labeled L1/L2. These ports are used for replication of cluster information between the two fabric interconnects, not the forwarding of data traffic.

Step 2: Attach the management Ethernet ports from each fabric interconnect to the out-of-band Ethernet management network created in the *Cisco SBA—Data Center Deployment Guide* (or appropriate Ethernet segment) where they can be accessed for overall administration of the system.

Step 3: Populate each blade chassis with two fabric extenders (I/O modules) to provide connectivity back to the fabric interconnects.

Step 4: From the Cisco UCS 5100 Blade Server Chassis, connect one I/O module to the first fabric interconnect. Connect the second I/O module to the second fabric interconnect. After you have configured the fabric interconnects, they will be designated as “A” and “B” fabric interconnects.

You can connect the I/O modules to the fabric interconnects by using one, two, four, or eight cables per module. For system resiliency and throughput, it is recommended that you use a minimum of two connections per I/O module.



Tech Tip

Ports 1 through 4 on the fabric interconnects are shown as an example. Additional blade chassis may be connected via their integrated I/O modules into any of the baseboard ports on the fabric interconnect. It is recommended that for maximum virtual NIC scalability, connect the I/O module to the fabric interconnect with all I/O module ports included in a group of 8 fabric interconnect ports; that is all I/O module ports connect to fabric interconnect ports 1-8, or 9-16, or 17-24, etc.

Procedure 2

Configure management switch ports

In the *Cisco SBA—Data Center Deployment Guide*, an Ethernet out-of-band management network was created. The management ports for the Cisco UCS fabric interconnects should connect to this switch and use IP addressing from the management VLAN. The ports on the management switch should be configured for connecting to the fabric interconnect management ports, as described in this procedure.

Step 1: Configure the ports connected to Cisco UCS.

```
interface GigabitEthernet1/0/7
  switchport access vlan 163
  switchport mode access
!
interface GigabitEthernet1/0/8
  switchport access vlan 163
  switchport mode access
```

With this configuration, when both the fabric interconnects are up and configured with the management IP addresses, they are able to ping the Cisco Nexus 5500 switches.

Procedure 3 Complete initial fabric interconnect setup

You can easily accomplish the initial configuration of the fabric interconnects through the Basic System Configuration dialog that launches when you power on a new or unconfigured fabric interconnect.



Tech Tip

This guide assumes you are configuring a new or unconfigured unit. If you want to erase the configuration of a Cisco UCS Fabric Interconnect, access the local management CLI and use the erase configuration command:

```
UCS-A# connect local-mgmt
UCS-A(local-mgmt)# erase configuration
```

Step 1: Connect a terminal to the console port of the first fabric interconnect to be configured, and then press **Enter**.

Step 2: In the Basic System Configuration Dialog, enter information as shown below, and then establish a password for the admin account.

```
---- Basic System Configuration Dialog ----
This setup utility will guide you through the basic
configuration of the system. Only minimal configuration
including IP connectivity to the Fabric interconnect and its
clustering mode is performed through these steps.
Type Ctrl-C at any time to abort configuration and reboot
system. To back track or make modifications to already entered
values, complete input till end of section and answer no when
prompted to apply configuration.
Enter the configuration method. (console/gui) ? console
Enter the setup mode; setup newly or restore from backup.
(setup/restore) ? setup
You have chosen to setup a new Fabric interconnect. Continue?
(y/n):y
```

```
Enforce strong password? (y/n) [y]: y
Enter the password for "admin": [xxxxx]
Confirm the password for "admin": [xxxxx]
```

Next, you are prompted to confirm whether the fabric interconnect is part of a cluster. The Cisco UCS cluster consists of two fabric interconnects, and all associated configuration is replicated between the two for all devices in the system.

Step 3: Create a new cluster.

```
Is this Fabric interconnect part of a cluster(select 'no' for
standalone)? (yes/no) [n]: yes
```

Each fabric interconnect has a unique physical IP address. A shared cluster IP address is used to access Cisco UCS Manager after the system initialization is completed. The fabric interconnects are assigned one of two unique fabric IDs for both Ethernet and Fibre Channel networking.

Step 4: Choose fabric A for the first fabric interconnect that you are setting up.

```
Enter the switch fabric (A/B) []: A
```

The system name is shared across both fabrics, so “-a” or “-b” is automatically appended to the name that you specify in the Basic System Configuration Dialog when you set up one of the fabric interconnects.

Step 5: Name the Cisco UCS system.

```
Enter the system name: sba-ucs
```

Step 6: Apply the following example configuration as you respond to the prompts.

```
Physical Switch Mgmt0 IPv4 address : 10.4.63.29
Physical Switch Mgmt0 IPv4 netmask : 255.255.255.0
IPv4 address of the default gateway : 10.4.63.1
Cluster IPv4 address : 10.4.63.31
Configure the DNS Server IPv4 address? (yes/no) [n]: n
Configure the default domain name? (yes/no) [n]: n
Join centralized management environment (UCS Central)? (yes/
no) [n]: n
```

Step 7: The Basic System Configuration Dialog displays a summary of the configuration options that you chose. Verify the accuracy of the settings. Unless the settings require correction, enter **yes** to apply the configuration. The system assumes the new identity that you configured.

Following configurations will be applied:

```
Switch Fabric=A
System Name=sba-ucs
Enforced Strong Password=yes
Physical Switch Mgmt0 IP Address=10.4.63.29
Physical Switch Mgmt0 IP Netmask=255.255.255.0
Default Gateway=10.4.63.1
```

```
Cluster Enabled=yes
Cluster IP Address=10.4.63.31
```

NOTE: Cluster IP will be configured only after both Fabric Interconnects are initialized

```
Apply and save the configuration (select 'no' if you want to
re-enter)? (yes/no) :yes
Applying configuration. Please wait.
Configuration file - Ok
```

After the system has booted, you can add the second fabric interconnect to the cluster. Because you have already defined the cluster, you only need to acknowledge the prompts to add the second fabric interconnect to the cluster and set a unique IP address.

Step 8: Connect a terminal to the console port of the second fabric interconnect to be configured, and then press **Enter**.

Step 9: In the Basic System Configuration Dialog that follows, enter the information as shown below, enter the admin password you configured on the first fabric interconnect to establish a connection to the peer, enter the management IP address for the second fabric interconnect, and then save the configuration.

```
Enter the configuration method. (console/gui) ? console
Installer has detected the presence of a peer Fabric
interconnect. This Fabric interconnect will be added to the
```

```
cluster. Continue (y/n) ? y
Enter the admin password of the peer Fabric interconnect:
[xxxxxx]
Connecting to peer Fabric interconnect... done
Retrieving config from peer Fabric interconnect...done
Peer Fabric interconnect Mgmt0 IP Address: 10.4.63.29
Peer Fabric interconnect Mgmt0 IP Netmask: 255.255.255.128
Cluster IP address: 10.4.63.31
Physical Switch Mgmt0 IPv4 address : 10.4.63.30
Apply and save the configuration (select 'no' if you want to
re-enter)? (yes/no): yes
Applying configuration. Please wait.
Configuration file - Ok
```



Tech Tip

From this point forward, this guide primarily shows the use of the Cisco UCS Manager GUI for management of the system; however, you should become familiar with the console in case you need very low-bandwidth remote access or a separate mode of access for administrative tasks such as code upgrades or system troubleshooting.

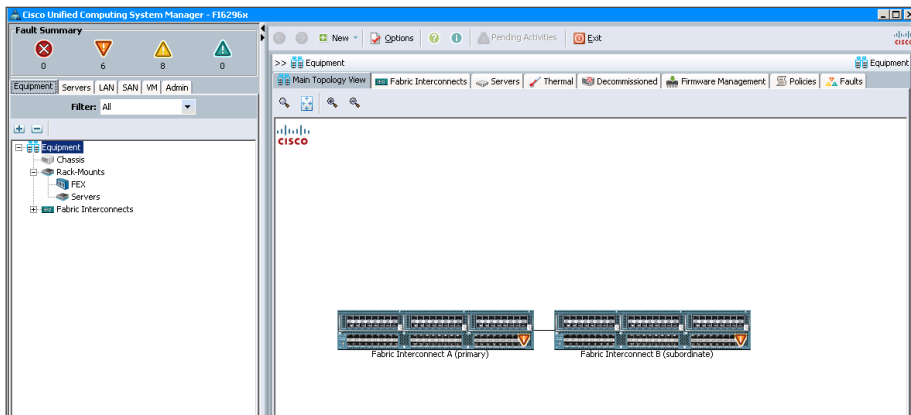
Process

Configuring Communications Connections Using UCS Manager

1. Configure fabric-to-I/O-module links
2. Define Ethernet uplink ports
3. Configure SAN uplinks

Cisco UCS Manager is the management service for all of the components in a Cisco UCS instance. Cisco UCS Manager runs on the fabric interconnects and keeps configuration data synchronized between the resilient pair. The primary access method covered here for using Cisco UCS Manager is the Java-based GUI client, which you launch from a web browser.

Figure 8 - Cisco UCS Manager GUI



The Cisco UCS Manager GUI consists of a navigation pane on the left side of the screen and a work pane on the right side of the screen. The navigation pane allows you to browse through containers and objects and to drill down easily through layers of system management. In addition, the following tabs appear across the top of the navigation pane:

- **Equipment**—Inventory of hardware components and hardware-specific configuration
- **Servers**—Service profile configuration and related components such as policies and pools

- **LAN**—LAN-specific configuration for Ethernet and IP networking capabilities
- **SAN**—SAN-specific configuration for Fibre Channel networking capabilities
- **VM**—Configuration specific to linking to external server virtualization software, currently supported for VMware
- **Admin**—User management tasks, fault management, and troubleshooting

The tabs displayed in the navigation pane are always present as you move through the system and in conjunction with the tree structure shown within the pane itself. They are the primary mechanisms for navigating the system.

After you choose a section of the Cisco UCS Manager GUI in the navigation pane, information and configuration options appear in the work pane on the right side of the screen. In the work pane, tabs divide information into categories. The work pane tabs that appear vary according to the context chosen in the navigation pane.

Any computer that you want to use to run the Cisco UCS Manager client must meet or exceed the minimum system requirements listed in the “Release Notes for Cisco UCS Software,” which can be found on www.cisco.com.

Procedure 1 Configure fabric-to-I/O-module links

On a newly installed system, one of your first tasks is to define which ports on the fabric interconnects are attached to the I/O modules in each chassis (these are referred to as *server ports*). This allows Cisco UCS Manager to discover the attached system components and build a view of the entire system.

Step 1: Using a browser, access the cluster IP address that you assigned during initial setup in Procedure 3 “Complete initial fabric interconnect setup” of the “Completing the Initial System Setup” process.

This example configuration uses **10.4.63.31** from the setup script. Authenticate by using the configured username and password, and view the initial screen.

Step 2: Choose **Launch**. The Cisco UCS Manager Java application downloads.

Step 3: In the navigation pane, click the **Equipment** tab, and then click the **Policies** tab in the work pane. On the **Policies** tab, another set of tabs appears. By default, the **Global Policies** tab displays the Chassis Discovery Policy.



Tech Tip

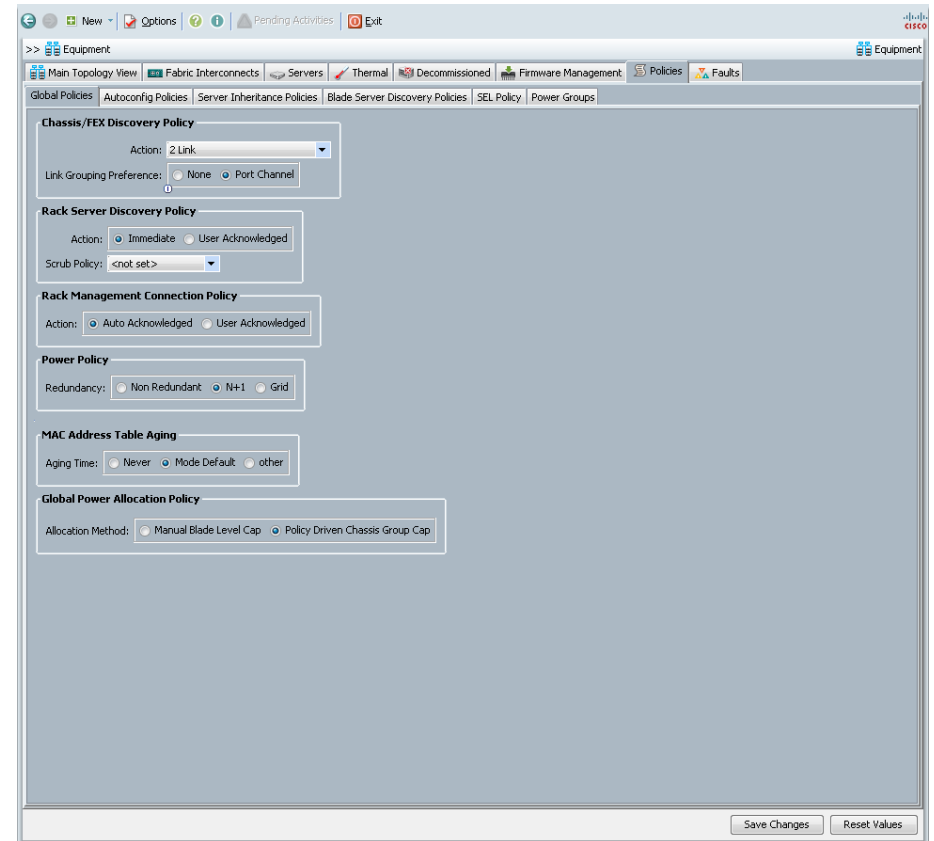
Link Grouping Preference of Port Channel is only supported on Cisco UCS 2200 Series Fabric Extenders and is recommended for most applications when using this model.

Step 4: In the **Action** list, choose the appropriate number of links for your configuration, and then click **Save Changes** at the bottom of the work pane.



Tech Tip

The chassis discovery policy may be set at 1, 2, 4, or max, which is 8 links per fabric; the default value is one. This design sets the value to two. You can add more links; this only defines the minimum number of I/O module links that must be active to discover a chassis.

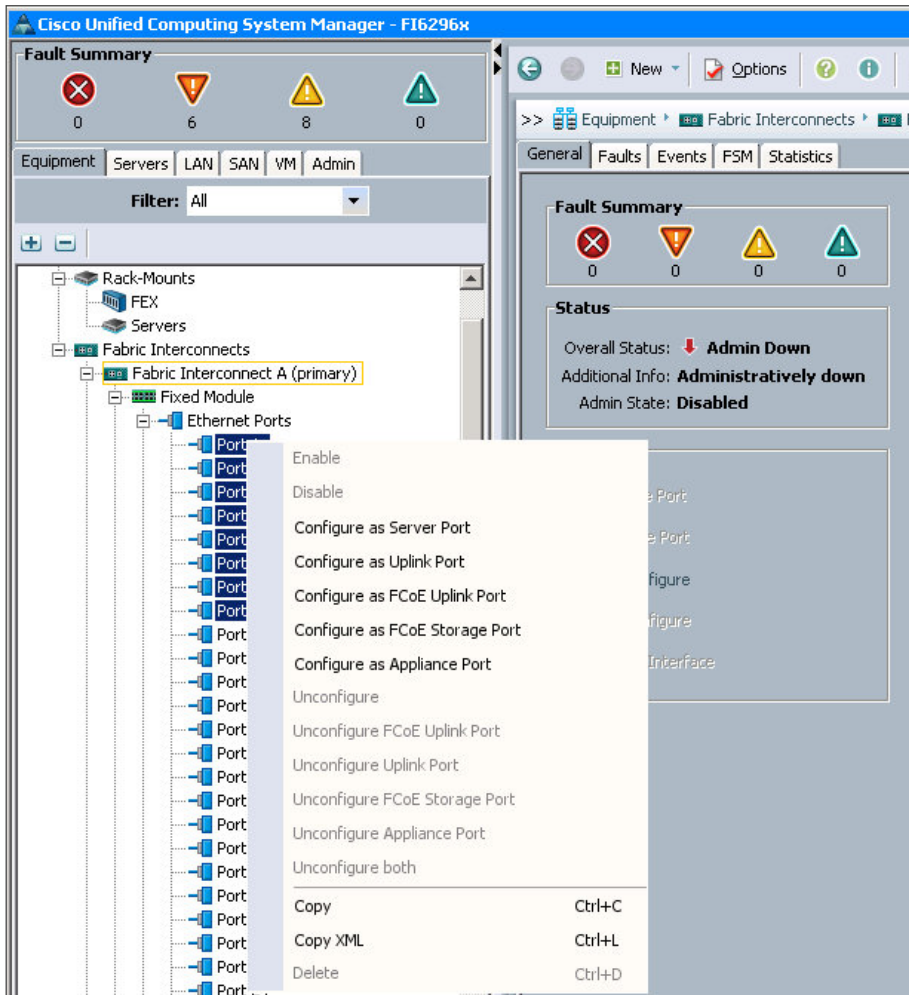


Step 5: In the navigation pane, click the **Equipment** tab, and then expand **Fabric Interconnects > Fabric Interconnect A > Fixed Module > Ethernet Ports**.

Objects are displayed representing each of the physical ports on the base fabric interconnect system.

Step 6: Choose the desired port by clicking the port object, or choose several sequential ports by clicking additional ports while pressing the **Shift** key.

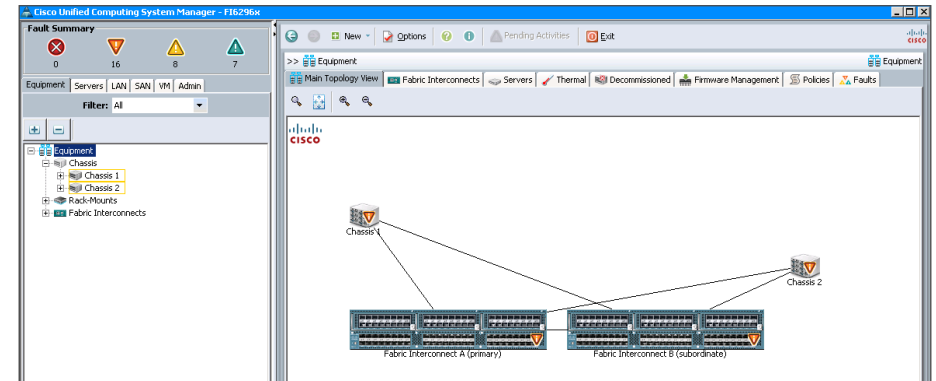
Step 7: Right-click the selected port or group of ports, and then choose **Configure as Server Port**.



Step 8: On the “Successfully configured...” message, click OK.

Step 9: In the navigation pane, expand the tree to **Fabric Interconnect B**, and then follow Step 5 through Step 8 to configure the resilient links from Fabric B.

After Cisco UCS Manager has discovered each of the chassis attached to your system, you can use the Equipment tab in the navigation pane to verify that each chassis, I/O module, and server is properly reflected. If they do not show up, or they indicate an error condition, right-click the chassis number, choose **Acknowledge Chassis**, and in the pop-up window, click **OK**. After the discovery process is done, you can see the result on the Main Topology View tab in the work pane.



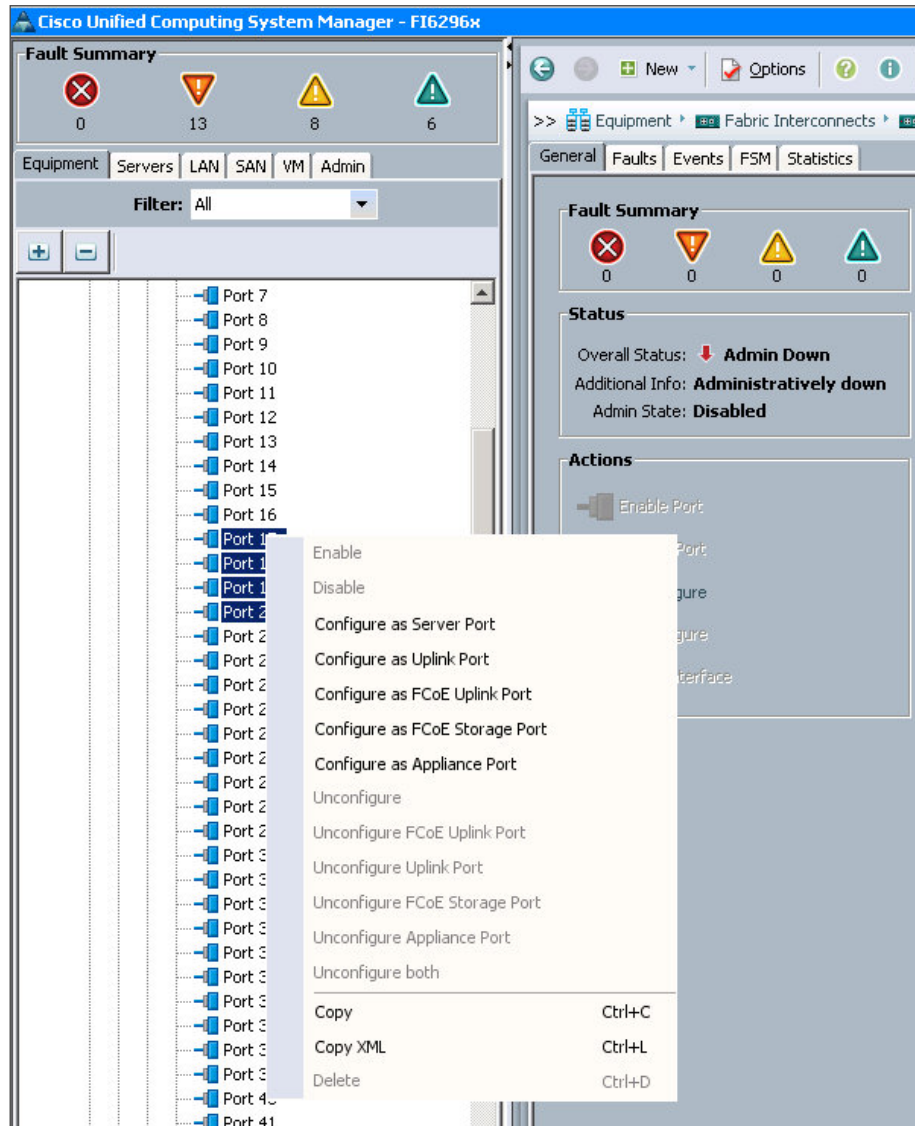
Procedure 2

Define Ethernet uplink ports

In the Cisco SBA Unified Computing System reference design, Ethernet uplink ports connect the fabric interconnects to the Cisco Nexus 5500UP switches via 10-Gigabit Ethernet links. These links carry IP-based client and server traffic, server-to-server traffic between IP subnets, and Ethernet-based storage access such as iSCSI or NAS traffic. You may use ports from either the base fabric interconnects or expansion modules as uplink ports.

Step 1: On the **Equipment** tab in the navigation pane, locate the ports that are physically connected to the upstream switches.

Step 2: Choose each port that you selected for your implementation (or choose sequential ports by clicking additional ports while pressing the **Shift** key), right-click, and then choose **Configure as Uplink Port**.

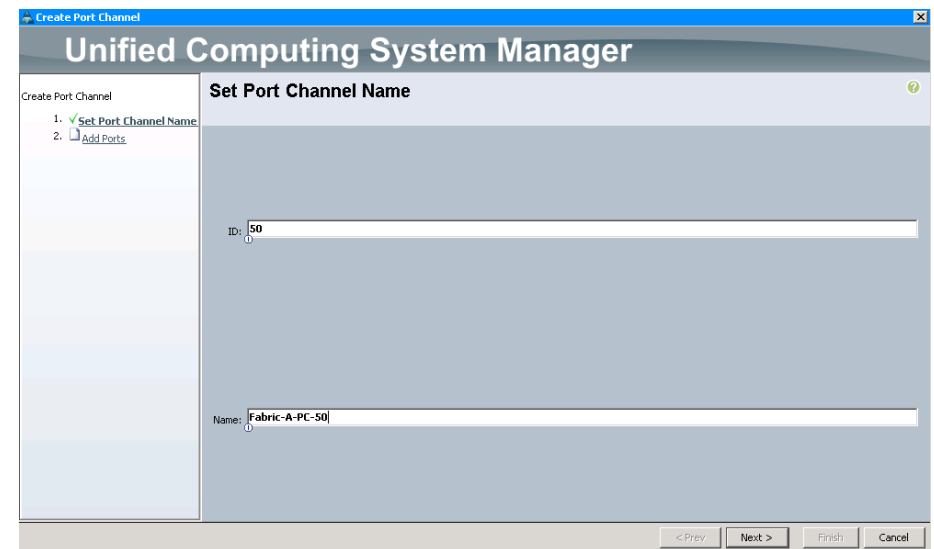


The Cisco SBA design implemented a port-channel configuration on the upstream Cisco Nexus 5500UP Series switches as described in the Procedure 1 “Configure Nexus 5500 port channels” earlier in this guide. You must perform similar port-channel configuration for the Ethernet uplink ports for the fabric interconnects.

Step 3: In the navigation pane, click the **LAN** tab, expand **LAN > LAN Cloud > Fabric A**, and then select the **Port Channels** container.

Step 4: Click **Add** (green plus sign).

Step 5: Enter an ID and **Name** for the new port channel, and then click **Next**. For example, enter an ID **50** and a name of **Fabric-A-PC-50**.



Step 6: In the **Ports** list, select the Ethernet ports to use as uplinks.

Step 7: Click the right arrows (>>) button. This adds the ports to the **Ports** in the port channel list on the right. This design uses ports Slot-1, ports 17 through 20.

Pay close attention to the Slot ID column when you select the ports to be added to the port channel. Integrated ports are listed with a slot ID of 1. If you are using an expansion module, scroll down to find ports listed with a slot ID of 2.

Step 8: Click **Finish**. This completes the creation of the Ethernet uplink port channel for Fabric A.

Step 9: Create a port channel for Fabric B by repeating Step 1 through Step 8. In Step 5, use a unique port-channel ID (for example, **51**) and name (for example **Fabric-B-PC-51**).

Port channel IDs are locally significant to each device; therefore, as shown, the ID used to identify a port channel to the fabric interconnect does not have to match the ID used for the channels on the Cisco Nexus 5500 switch configuration. In some cases, it may be beneficial for operational support to use consistent numbering for representation of these channels.

Procedure 3 Configure SAN uplinks

If you will access all of your storage strictly over Ethernet by using iSCSI or NAS protocols, it is not necessary to define or attach Fibre Channel uplinks, and you can skip the Fibre Channel and FCoE uplink procedures.

If you want to use native Fibre Channel to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, Option 1: complete Option 1 of this procedure. If you want to use FCoE to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, complete Option 2 of this procedure.

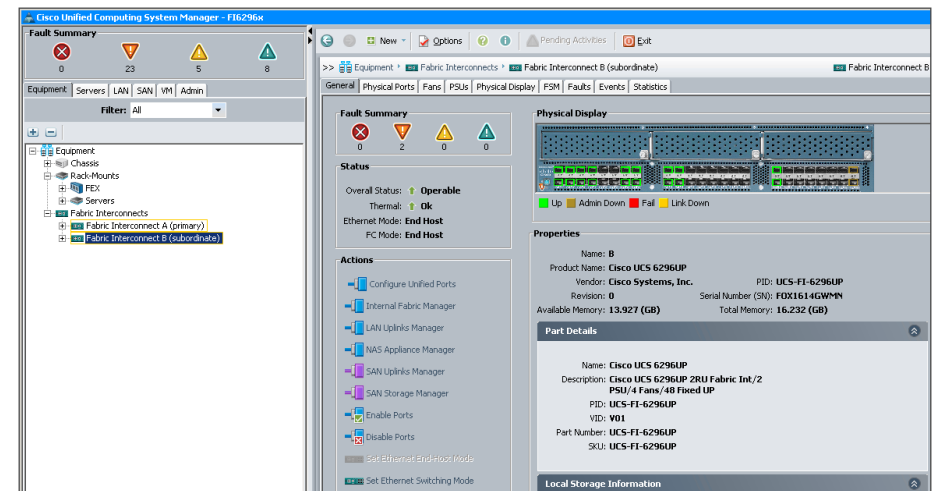
Option 1. Configure Fibre Channel SAN uplinks

On a Cisco UCS 6200 fabric interconnect, the baseboard ports are universal ports that can run in the default Ethernet interface mode or can be changed to operate in Fibre Channel mode. If you will be using Fibre Channel SAN connectivity from your Cisco UCS 6200 fabric interconnect, the following steps configure ports for Fibre Channel mode.

Tech Tip

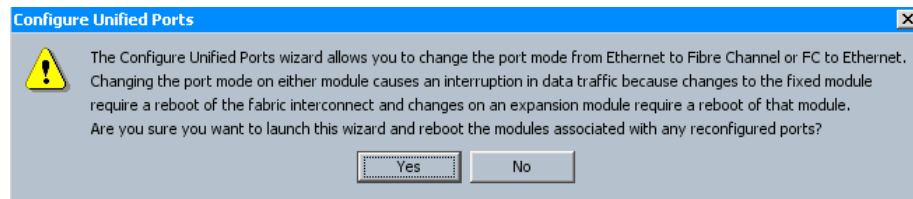
Changing the universal port mode operation from Ethernet to Fibre Channel operation causes the fabric interconnect to reboot. The remaining fabric interconnect remains active and able to pass traffic. If this is a new system, this should not pose a risk; if this is an existing system with active servers dual-homed, servers continue to communicate via the remaining active fabric interconnect.

Step 1: In the navigation pane, click the **Equipment** tab, expand **Fabric Interconnect**, and then select the subordinate fabric interconnect, which in this case is **Fabric Interconnect B**.



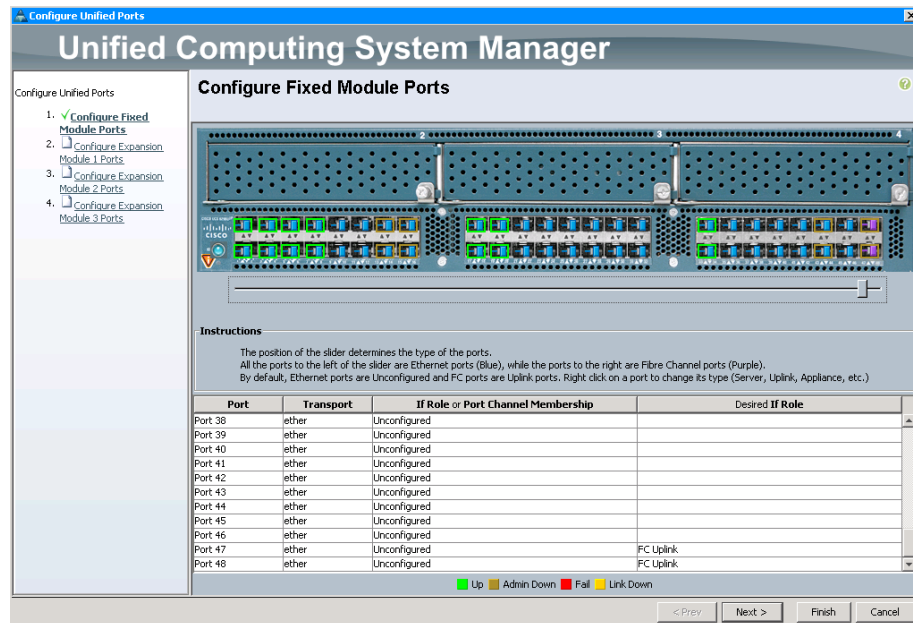
This deployment uses the subordinate fabric interconnect first to avoid losing GUI access to the fabric. Then it switches fabric interconnect roles and configures Fabric Interconnect A.

Step 2: In the work pane, click **Configure Unified Ports**. A popup warning message appears.



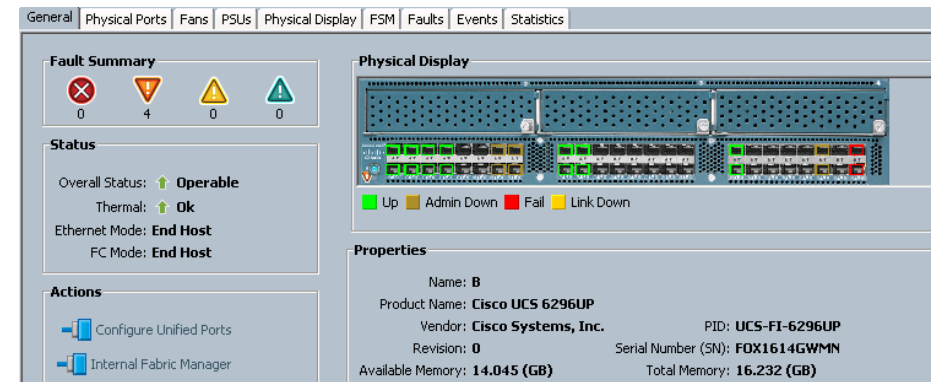
Step 3: Click **Yes**. This acknowledges the operation.

Step 4: On the Configure Fixed Module Ports screen, beneath the graphic of the Fixed Module Ports, move the slider from right to left so that it includes the two right-most ports (ports 47 and 48) for Fibre Channel operation, and then click **Finish**. This design uses two ports and the default Fibre Channel port mode operation of uplink.



The Successfully Configured Ports box appears.

Step 5: Click **OK**. The Fabric Interconnect-B reboots. While Fabric Interconnect-B is rebooting the Overall Status shows inoperable until it has completed the reboot and returns to operational state. Once Fabric Interconnect-B returns to an Operable status, proceed to the next step.



Step 6: Log in to the Fabric Interconnect Cluster with an SSH CLI session to the IP address **10.4.63.31**, as defined in Step 6 of the "Complete initial fabric interconnect setup" procedure.

Step 7: To avoid a long GUI access timeout when configuring Fabric Interconnect-A Fibre Channel port mode, configure Fabric Interconnect-B to be the primary.

login as: **admin**

Cisco UCS 6200 Series Fabric Interconnect

Using keyboard-interactive authentication.

Password: **XXXX**

Cisco Nexus Operating System (NX-OS) Software

TAC support: <http://www.cisco.com/tac>

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each such license is available at
<http://www.opensource.org/licenses/gpl-2.0.php> and
<http://www.opensource.org/licenses/lgpl-2.1.php>

Step 8: Verify that Fabric Interconnect-A is now the primary.

```
sba-ucs-A# show cluster state
Cluster Id: 0x99fd3a5684de11e1-0xa340547fee243524
```

A: UP, PRIMARY

B: UP, SUBORDINATE

HA READY

Step 9: Connect to the local management control process.

```
sba-ucs-A# connect local-mgmt
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2012, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed
under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of
each such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
http://www.opensource.org/licenses/lgpl-2.1.php
```

Step 10: Switch the primary role to fabric interconnect-B.

```
sba-ucs-A(local-mgmt)# cluster lead b
Cluster Id: 0x99fd3a5684de11e1-0xa340547fee243524
sba-ucs-A(local-mgmt)#
```

This causes your SSH CLI session to disconnect and your Cisco UCS Manager GUI console access to lose connection.

Step 11: Click **Re-Login** on the GUI console access popup message, and then log in to Cisco UCS Manager again.

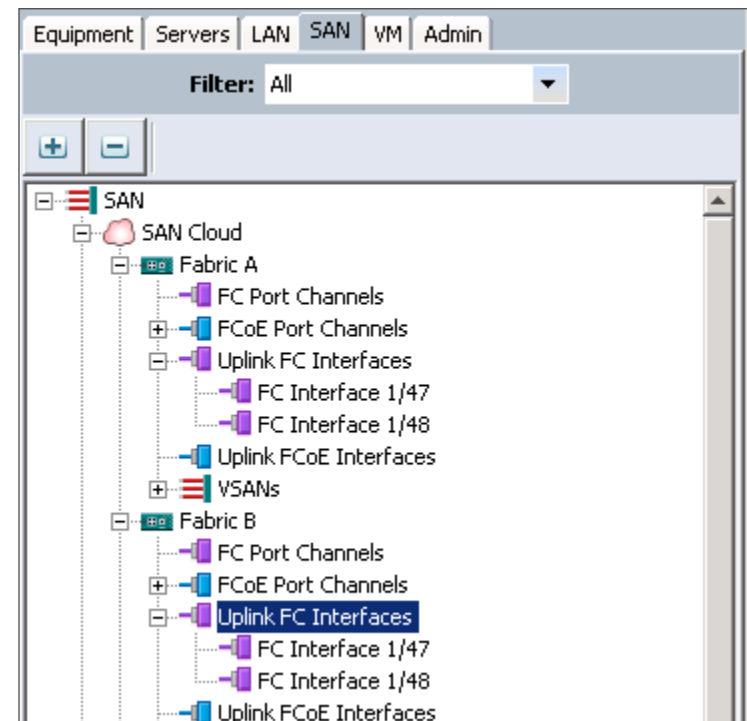
Step 12: In the navigation pane, click the **Equipment** tab, and then expand **Fabric Interconnect**. Note that Fabric Interconnect B is now the primary.

Step 13: Select the subordinate fabric interconnect, which in this case is Fabric Interconnect A.

Step 14: Follow Step 2 and Step 4 above to configure Fibre Channel ports on Fabric Interconnect A.

Next, after you have completed the tasks and the Fabric Interconnect A has returned to operable state, you verify that you now have Fibre Channel uplink ports available to configure.

Step 15: On the **SAN** tab, expand **SAN Cloud > Fabric A > Uplink FC Interfaces**, and then expand **Fabric B > Uplink FC Interfaces**. You should see the Fibre Channel uplinks listed in the display.



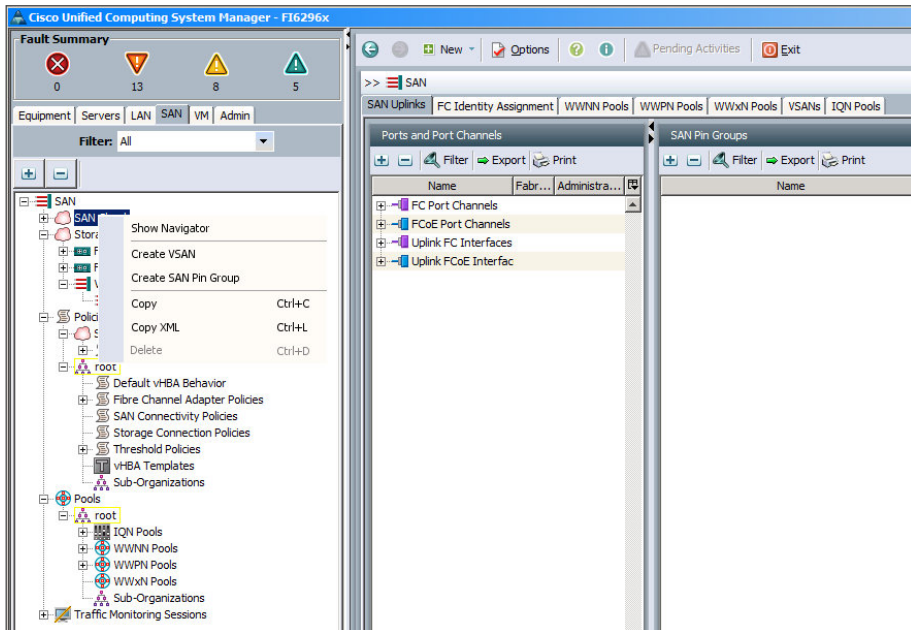
Step 16: Connect the Fibre Channel configured ports on the Cisco UCS 6200 Fabric Interconnect to the data center core Cisco Nexus 5500 switch SAN.

Step 17: Disable unused ports by right-clicking the port name in the navigation pane, and then choosing **Disable**. When you disable unused ports, you clear any system alerts tied to the unused ports in both fabric interconnects A and B.

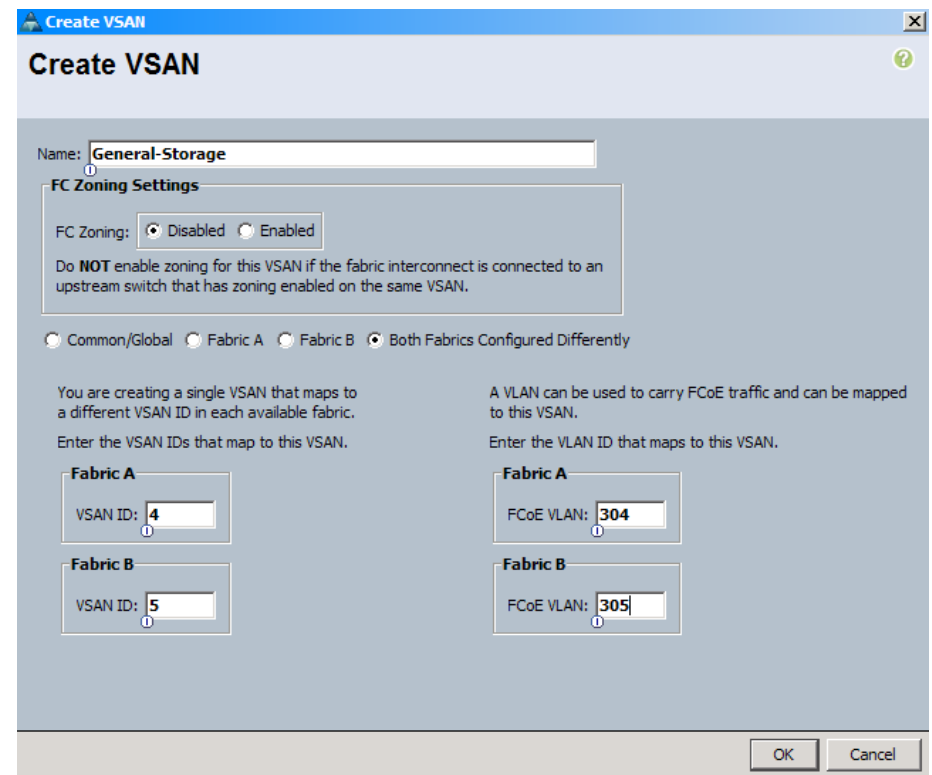
Next, you must create a VSAN and assign it to the Fibre Channel port to activate the port and transmit traffic. This VSAN should match the VSAN configured on the corresponding SAN fabric, as referred to in Table 1 “Fibre Channel VSAN to FCoE VLAN mapping.”

Step 18: In the navigation pane, click the **SAN** tab, and then expand **SAN > SAN Cloud > VSANs**.

Step 19: Right-click the **SAN Cloud** container, and then choose **Create VSAN**.



Step 20: Enter a **Name** for the VSAN, leave the default value selected for **FC Zoning** as **Disabled**, and then select **Both Fabrics Configured Differently**.



Step 21: Enter the VSAN IDs corresponding to the SAN-A and SAN-B VSANs configured in your SAN fabrics. In the *Cisco SBA—Data Center Deployment Guide*, VSAN 4 is assigned to SAN-A, and VSAN 5 is assigned to SAN-B.

Step 22: For each fabric, enter the VLAN that the Fibre Channel traffic should use from the chassis to the fabric interconnects. **VSAN ID 4** on **Fabric A** corresponds to **FCoE VLAN 304** on the fabric interconnect, and **VSAN ID 5** on **Fabric B** corresponds to **FCoE VLAN 305** on the fabric interconnect.

Step 23: When you have configured the VSAN IDs in this section, click **OK**. A window shows the successful creation of the VSAN.

Now that you have created the VSAN, you can create a SAN port-channel to connect to the data center core Cisco Nexus 5500UP switches.

Step 24: In the navigation pane on the SAN tab, expand **SAN Cloud**, expand **Fabric A**, right-click **FC Port Channels**, and then choose **Create Port Channel**.

Step 25: Enter an ID and name for the port channel, and then click **Next**.

Step 26: In the **Ports** list, select the ports, and then click the right arrows (>>) button to move them to the **Ports in the port channel** list. Click **Finish** when you have added the physical uplink ports to the port channel.

Step 27: On the “Successfully created...” message, click **OK**.

Step 28: Expand **FC Port Channels**. You can see the newly created port channel.

Step 29: In the main window, double-click the new port channel. The next step is to configure the VSAN assignment.

Step 30: In the work pane, on the **General** tab, inside the **Properties** box, in the **VSAN** list, choose the VSAN for SAN Fabric A on Fabric Interconnect A operation, and then click **Save Changes**.

i

Tech Tip

If the port channel fails to come up, you may have to reset the corresponding ports on the data center core Cisco Nexus 5500UP switches. To do so via CLI, enter interface configuration mode for the SAN port channel 29, enter the **shutdown** command, and then enter the **no shutdown** command.

Step 31: Repeat Step 24 through Step 30 for the VSAN for SAN Fabric B on Fabric Interconnect B.

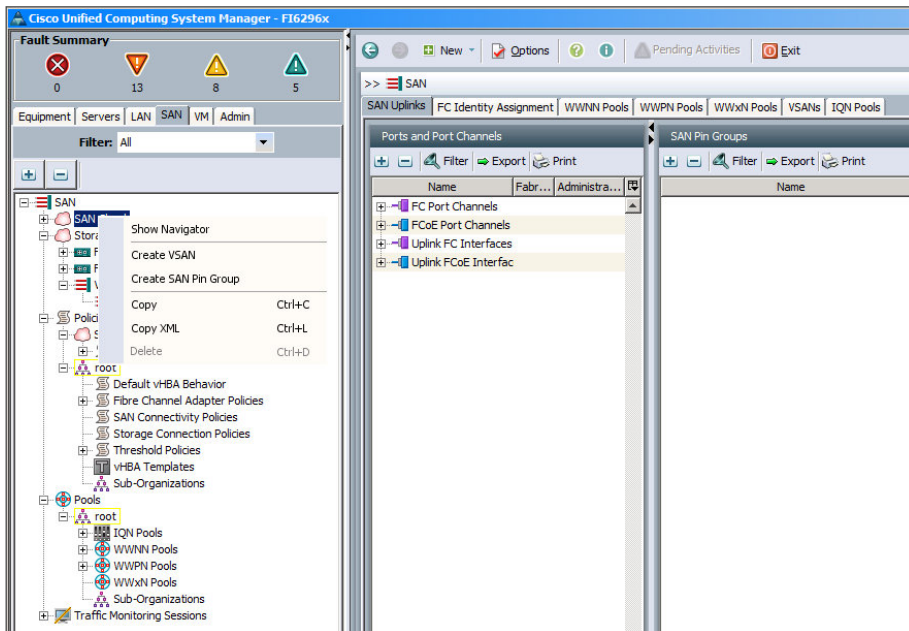
Option 2. Configure FCoE SAN uplinks

If you want to use FCoE to extend the SAN from the data center core to the Cisco UCS Fabric Interconnect, as configured in Option 2: “Configure FCoE SAN port channels” earlier in this guide, use this procedure.

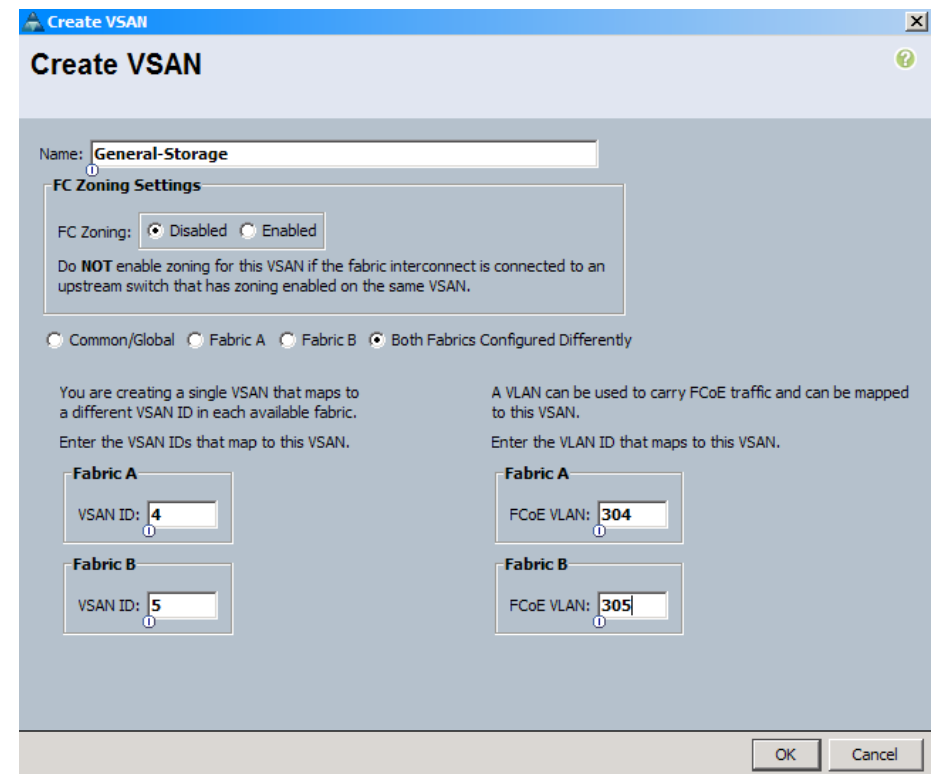
First you must create a VSAN and assign it to the FCoE port channel. This VSAN should match the VSAN configured on the corresponding SAN fabric as referred to in Table 1 “Fibre Channel VSAN to FCoE VLAN mapping.”

Step 1: In the navigation pane, click the **SAN** tab, and then expand **SAN > SAN Cloud > VSANs**.

Step 2: Right-click the **SAN Cloud** container, and then choose **Create VSAN**.



Step 3: Enter a **Name** for the VSAN, leave the default value selected for **FC Zoning** as **Disabled**, and then select **Both Fabrics Configured Differently**.



Step 4: Enter the VSAN IDs corresponding to the SAN-A and SAN-B VSANs configured in your SAN fabrics. In the *Cisco SBA—Data Center Deployment Guide*, VSAN 4 is assigned to SAN-A, and VSAN 5 is assigned to SAN-B.

Step 5: For each fabric, enter the VLAN that the Fibre Channel traffic should use from the chassis to the fabric interconnects. **VSAN ID 4** on **Fabric A** corresponds to **FCoE VLAN 304** on the fabric interconnect, and **VSAN ID 5** on **Fabric B** corresponds to **FCoE VLAN 305** on the fabric interconnect.

Step 6: When you have configured the VSAN IDs in this section, click **OK**. A window shows the successful creation of the VSAN.

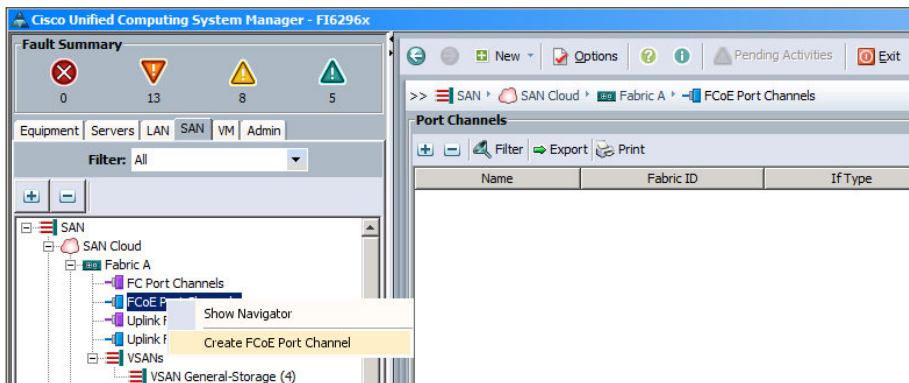
Now that you have created the VSAN, you can create an FCoE SAN port-channel to connect to the data center core Cisco Nexus 5500UP switches.

Step 7: In the navigation pane, on the Equipment tab, locate the ports on Fabric A that are physically connected to the data center core Cisco Nexus 5500 switches for FCoE SAN traffic. These ports were configured on the data center core in Option 2: “Configure FCoE SAN port channels.”

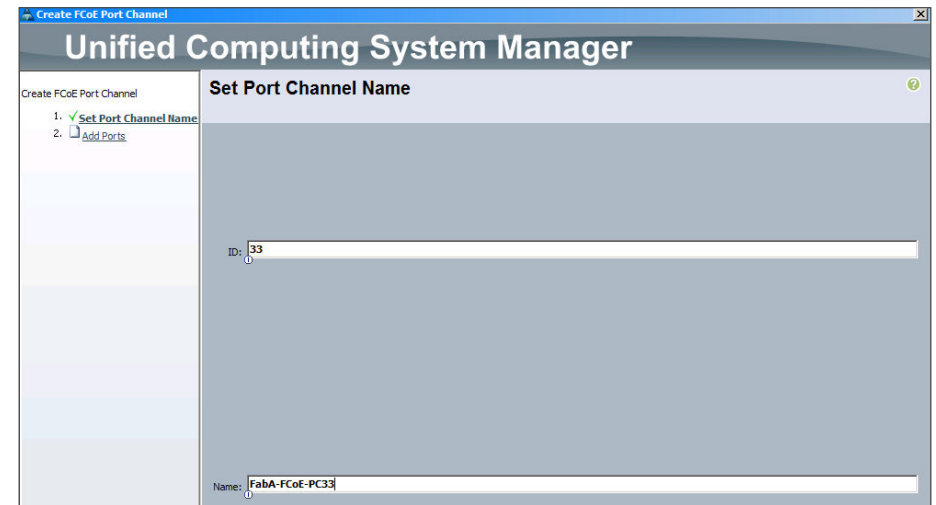
Step 8: Choose each port that you selected for your implementation (or choose sequential ports by clicking additional ports while pressing the Shift key), right-click, and then choose **Configure as FCoE Uplink Port**.

Step 9: In the confirmation message, click **Yes** to configure the port as FCoE Uplink Port.

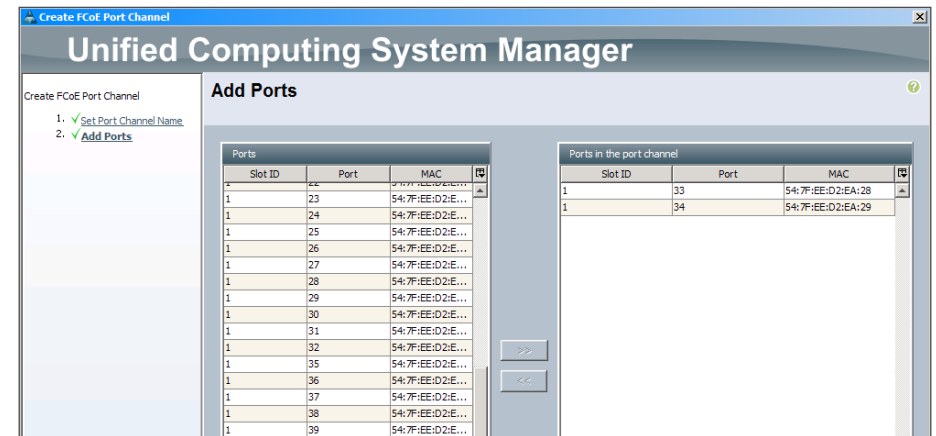
Step 10: In the navigation pane, on the SAN tab, expand **SAN Cloud**, expand **Fabric A**, right-click **FCoE Port Channels**, and then choose **Create FCoE Port Channel**.



Step 11: Enter an ID and name for the port channel, and then click **Next**.



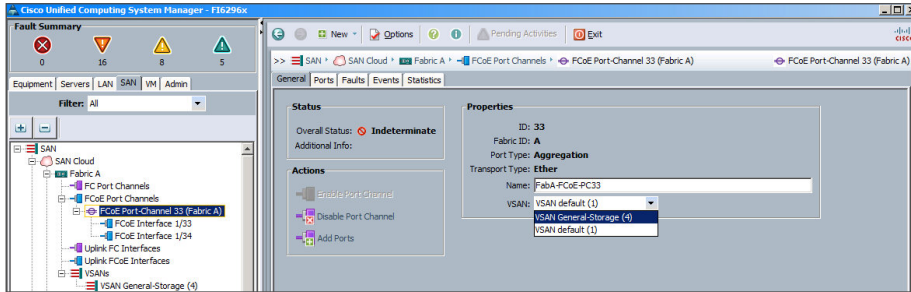
Step 12: In the Ports list, select the ports, and then click the right arrows (>>) button to move them to the Ports in the port channel list. Click **Finish** when you have added the physical uplink ports to the port channel.



Step 13: On the “Successfully created...” message, click **OK**.

Step 14: In the main window, double-click the new port channel. The next step is to configure the VSAN assignment.

Step 15: In the work pane, on the General tab, inside the Properties box, in the VSAN list, choose the VSAN for the SAN Fabric A on Fabric Interconnect A operation, and then click **Save Changes**.



Step 16: Repeat Step 7 through Step 15 for Fabric Interconnect B FCoE uplink ports and SAN port-channel creation.

Process

Configuring Common System Address Pools and VLANs

1. Add a management IP address pool
2. Create UUID pool
3. Create WWNN pool
4. Create WWPN pools
5. Create MAC pool
6. Create VLANs

When configuring the Cisco UCS Management address pools for a fabric interconnect pair, it is advised to customize some addressing to your environment so that you can more easily configure and identify addresses related to a fabric interconnect or UCS Manager domain. However it is recommended to preserve the IEEE assigned organizationally unique identifier (OUI) addressing when possible in order to avoid conflicts and operational issues. This design will use a hex pair of "FF" as the UCS Manager domain identifier for this fabric interconnect pair in the following fields:

- Universally unique identifier (UUID) suffix pool

- Fibre Channel World Wide Node Name (WWNN) and World Wide Port Name (WWPN) pools
- MAC address pool

In addition to the Cisco UCS Manager domain identifier, some pools will contain a UCS Fabric Interconnect identifier of 0A or 0B for Fabric Interconnect A and B respectively.

Table 2 - Cisco UCS Manager Fibre Channel WW Names pools

WW Name field	Address	Comments
WW Node Name	20:FF:00:25:B5:00:00:01	Preserve NAA=2 format prefix (20:)
WW Port Name FI-A	20:FF:00:25:B5:0A:00:01	Fabric Interconnect-A WWPN range
WW Port Name FI-B	20:FF:00:25:B5:0B:00:01	Fabric Interconnect-B WWPN range

The VLAN and IP address assignment in this process aligns to the addressing used in the *Cisco SBA—Data Center Deployment Guide* as well as VLAN 160, which is used in the *Cisco SBA—Data Center Virtualization with Cisco UCS, Nexus 1000V, and VMware Deployment Guide*. Actual VLANs and IP address assignment may vary based on your deployment requirements.

Table 3 - Cisco SBA data center VLANs and IP address ranges

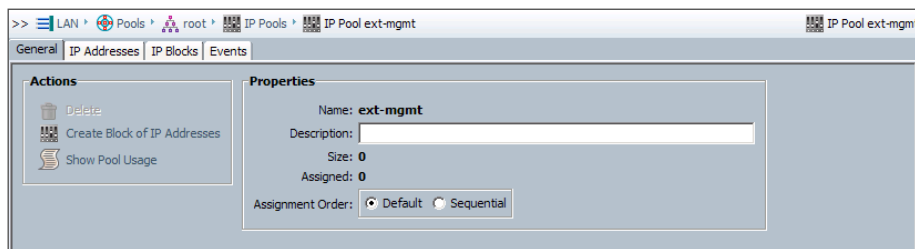
VLAN	VLAN name	IP address	Comments
148	Servers_1	10.4.48.0/24	General network server use
149	Servers_2	10.4.49.0/24	General server use
150	Servers_3	10.4.50.0/24	General server use
154	FW_Inside_1	10.4.54.0/24	Firewall-protected servers
155	FW_Inside_2	10.4.55.0/24	Firewall and IPS protected servers
160	1kv-Control	10.4.60.0/24	Cisco Nexus 1000V Control
161	vMotion	10.4.61.0/24	Reserved for VMware vMotion traffic future use
162	iSCSI	10.4.62.0/24	Reserved for iSCSI storage traffic
163	DC-Management	10.4.63.0/24	Out-of-band data center management VLAN

Procedure 1 Add a management IP address pool

The Cisco UCS Manager GUI provides a launching point to direct keyboard-video-mouse (KVM) access to control each of the blade servers within the system. To facilitate this remote management access, you must allocate a pool of IP addresses to the blade servers within the system. These addresses are used by the Cisco UCS KVM Console application to communicate with the individual blade servers. You must allocate this pool of addresses from the same IP subnet as the addresses assigned to the management interfaces of the fabric interconnects, because a common default gateway is used for their communication.

This procedure assigns an IP address pool from the DC-Management IP address range listed in Table 3.

Step 1: In the navigation pane, click the **LAN** tab, expand **LAN > Pools > root > IP Pools**, and then choose **IP Pool ext-mgmt**.



Step 2: In the work pane, on the General tab, click **Create Block of IP Addresses**.

Step 3: Allocate a contiguous block of IP addresses by specifying the starting address in the **From** box, the **Size of the block**, the **Subnet Mask**, and the **Default Gateway**, and then click **OK**. The size of the block needs to be large enough to assign one address to each server connected to the fabric. In this example, you can use **32** addresses for the size of the block.

The screenshot shows a dialog box titled 'Create Block of IP Addresses'. It contains several input fields: 'From' with the value '10.4.63.32', 'Size' with the value '32', 'Subnet Mask' with the value '255.255.255.0', 'Default Gateway' with the value '10.4.63.1', 'Primary DNS' with the value '10.4.48.10', and 'Secondary DNS' with the value '0.0.0.0'. There are 'OK' and 'Cancel' buttons at the bottom right.

Step 4: After you complete the initial setup, ensure that the system firmware is updated to the most current version or to the version recommended for your installation.



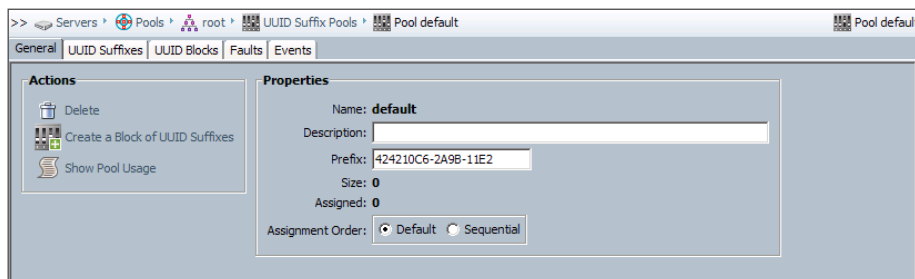
Reader Tip

Detailed information on upgrading firmware is available at:
http://www.cisco.com/en/US/products/ps10281/prod_installation_guides_list.html

Procedure 2

Create UUID pool

Step 1: In the navigation pane, click the **Servers** tab, expand **Servers > Pools > root > UUID Suffix Pools**, and then choose **Pool default**.

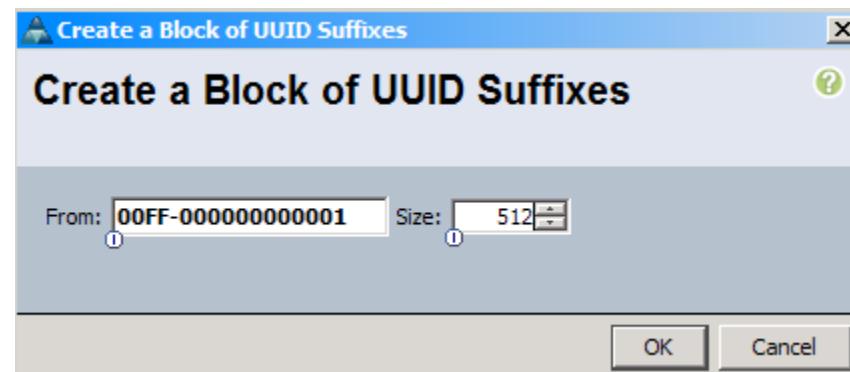


Tech Tip

A universally unique identifier (UUID) suffix pool is a collection of SMBIOS UUIDs that are available to be assigned to servers. The first number of digits that constitute the prefix of the UUID are fixed. The remaining digits, the UUID suffix, are variable. A UUID suffix pool avoids conflicts by ensuring that these variable values are unique for each server associated with a service profile that uses that particular pool. It is recommended that you do not alter the UUID prefix, and only customize the UUID suffix for your identification requirements.

Step 2: On the **General** tab, under the Actions pane, select **Create a Block of UUID Suffixes**.

Step 3: In the Create a Block of UUID Suffixes window, in the **From** box, enter a unique, randomized base value as a starting point. This guide assigns the Cisco UCS Manager domain an identifier of “FF” in the suffix field.



Reader Tip

You can find UUID generation tools that are compliant with RFC 4122 on the Internet. For an example, see: <http://www.famkruihof.net/uuid/uuidgen>

Step 4: In the **Size** box, enter a number larger than the number of servers or service profiles that you require to use the same pool. If future expansion is required, you can add multiple UUID suffix blocks to the same pool. For a base system startup, a simple, small pool is sufficient. This example uses 512.

Step 5: Click **OK**.

Procedure 3

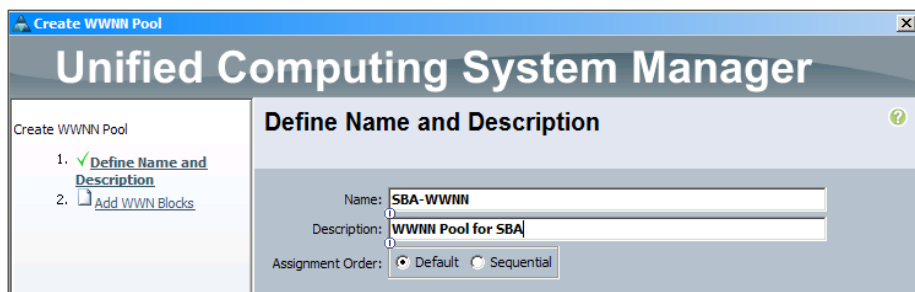
Create WWNN pool

A World Wide Names (WWN) pool is a collection of WWNs for use by the Fibre Channel vHBAs in a Cisco UCS domain. You must provision a pool of World Wide Node Names (WWNNs) in the system, and you must assign the WWNNs in the pool to servers that need to access the Fibre Channel SAN. You assign one WWNN from the pool to each server. Each WWNN corresponds to the identity of a Fibre Channel end-node. World Wide Port Names (WWPNs) are assigned to the vHBA

Step 1: In the Cisco UCM Manager navigation pane, click the **SAN** tab, and then expand **SAN > Pools > Root > WWNN Pools**.

Step 2: Right-click **WWNN Pools**, and then select **Create WWNN Pool**.

Step 3: Enter a **Name** and **Description** for the new pool, and then click **Next**.



Next, create a block of WWNN addresses by defining a starting point and the quantity of addresses in the block.

Step 4: In the Add WWN Blocks work pane click **Add**.

Step 5: In the Create WWNN Block window, in the **From** box, enter a WWN prefix. The system provides a prefix to help ensure uniqueness of the WWNN values on the SAN. Assign the last three segments of the base WWNN value in colon-delimited notation, as needed for your system. This guide assigns the Cisco UCS Manager domain an identifier of "FF" in the second hex pair of the WWN block, thereby preserving the required "20" hex pair in the first block, and the OUI identifier of "00:25:B5" in hex pairs 3 through 5.



Reader Tip

For more information on WWN, WWNN, and WWPNN, see the *Cisco UCS Manager GUI Configuration Guide*:
http://www.cisco.com/en/US/docs/unified_computing/ucs/sw/gui/config/guide/2.0/b_UCSM_GUI_Configuration_Guide_2_0_chapter_011000.html

Step 6: In the **Size** box, specify the number of node names required, and then click **OK**.



Step 7: Click **Finish**. This completes the creation of the new WWNN pool. If you include a pool of WWNNs in a service profile, the associated server is assigned a WWNN from that pool.

Procedure 4 Create WWPN pools

Both Fibre Channel port and node addressing assignments are required in order for Cisco UCS to provide access through the SAN fabric to the disk array. Using WWPNs and WWNNs that are independent from the physical hardware allows you to assign the service profile to any server in the Cisco UCS system. This allows the server to assume the correct server identity and SAN access privileges. Similar to the WWNN pool that you created in Procedure 3, you must provision a pool of WWPNs for the system to assign port addresses consistently when you add new service profiles to the system. A given device can have only one WWNN but many WWPN's. We will create two pools for WWPNs, one for Fabric A and other for Fabric B.

Step 1: In the Cisco UCM Manager navigation pane, click the **SAN** tab, and then expand **SAN > Pools > Root > WWPN Pools**.

Step 2: Right-click **WWPN Pools**, and then select **Create WWPN Pool**.

Step 3: Enter a **Name** and **Description** for the pool, and then click **Next**.

Step 4: On the WWN Blocks page, click **Add**. This creates a new WWPN block.

Step 5: In the Create WWN Block window, in the **From** box, assign a unique WWPN value that identifies that the WWPN pool belongs to Fabric A, according to Table 2.

Step 6: In the **Size** box, specify the number of port names required in the pool, and then click **OK**.

Step 7: Click **Finish**.

Step 8: Repeat the above steps to create WWPN pool for Fabric B, following the addressing assigned in Table 2.

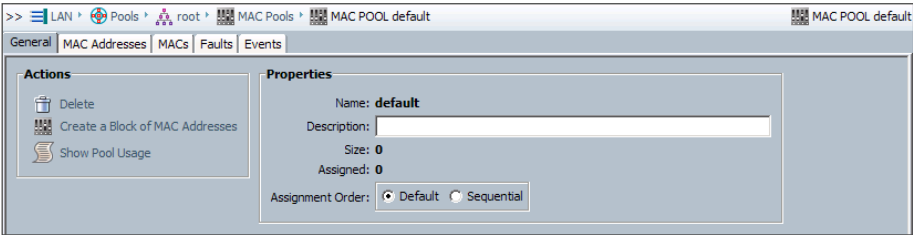
Procedure 5 Create MAC pool

A MAC pool is collection of MAC addresses that are unique in their Layer 2 environment and are assigned to the vNICs on a server. This pool of MAC addresses is used by vNIC interfaces in service profiles. Using a pool of MAC addresses instead of hardware-based MAC addresses allows a service profile to retain the same MAC address for its network interfaces, even when it is assigned to a new blade server in the system.

Similar to the Cisco UCS domain addressing used in the previous procedures in this process, you assign a domain identifier of "FF" for this UCS domain. It is recommended that you retain the OUI value in the MAC address field (00:25:B5) and assign any unique identifiers to the right of this portion of the address field.

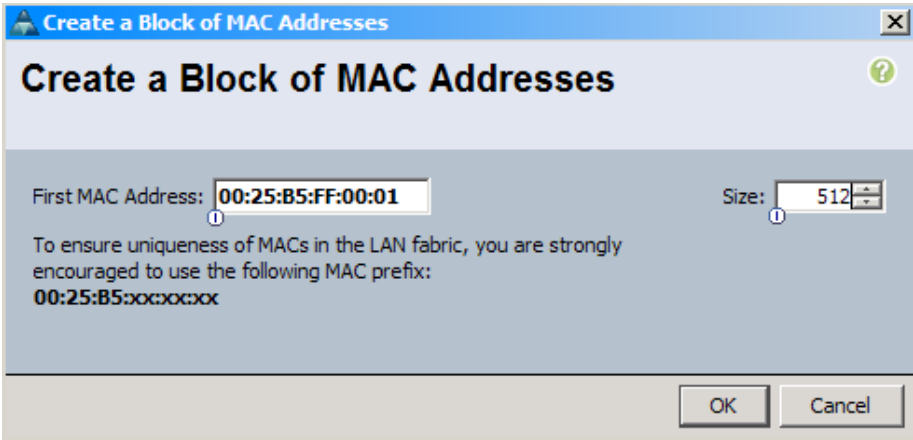
Step 1: In the Cisco UCM Manager navigation pane, click the **LAN** tab, and then expand **LAN > Pools > Root > MAC Pools**.

Step 2: Under **MAC Pools** section, select **MAC POOL default**.



Step 3: Right-click **MAC POOL default**, and then select **Create a Block of MAC Addresses**. The Create a Block of MAC Addresses window allows you to define the starting address and the number of addresses to include in the block. Next, you create a block of addresses large enough to allocate one address to each vNIC that will exist in the system.

Step 4: In the **First MAC Address** box, add the starting address for the MAC address block, and then in the **Size** box, enter the number of addresses to allocate.



Step 5: Click **OK**, and then click **OK** to acknowledge creation of the pool.

Procedure 6 Create VLANs

The VLANs created for the Cisco SBA data center are replicated here for your reference. Actual VLANs and IP address assignment may vary based on your deployment requirements.

Table 4 - Cisco SBA data center VLANs and IP address ranges

VLAN	VLAN name	IP address	Comments
148	Servers_1	10.4.48.0/24	General network server use
149	Servers_2	10.4.49.0/24	General server use
150	Servers_3	10.4.50.0/24	General server use
154	FW_Inside_1	10.4.54.0/24	Firewall-protected servers
155	FW_Inside_2	10.4.55.0/24	Firewall and IPS protected servers
160	1kv-Control	10.4.60.0/24	Cisco Nexus 1000V Control
161	vMotion	10.4.61.0/24	Reserved for VMware vMotion traffic future use
162	iSCSI	10.4.62.0/24	Reserved for iSCSI storage traffic
163	DC-Management	10.4.63.0/24	Out-of-band data center management VLAN

Step 1: In the Cisco UCM Manager navigation pane, click the **LAN** tab, and then select **LAN Cloud**.

Step 2: Right-click **LAN Cloud**, and then select **Create VLANs**.

Step 3: Enter a **VLAN Name**, select **Common/Global**, options for scope of VLAN and enter the **VLAN ID**, and then click **OK**.

Create VLANs

VLAN Name/Prefix:

Multicast Policy Name: [+ Create Multicast Policy](#)

☒ Common/Global ☐ Fabric A ☐ Fabric B ☐ Both Fabrics Configured Differently

You are creating global VLANs that map to the same VLAN IDs in all available fabrics.

Enter the range of VLAN IDs.(e.g. "2009-2019", "29,35,40-45", "23", "23,34-45")

VLAN IDs:

Sharing Type: ☒ None ☐ Primary ☐ Isolated

Step 4: In the Create VLANs dialog box that pops up, you will note that VLAN was successfully created. Click **OK**.

Step 5: Create the remaining VLANs by following Step 1 through Step 4.

Tech Tip

Most single operating systems that have been installed directly on a server use a single VLAN for server-to-network operation. In hypervisor installations where multiple applications or servers will be hosted, trunking multiple VLANs is more likely.

Process

Configuring Virtual Adapter Templates

1. Create Network Control Policy
2. Create vNIC templates
3. Create vHBA templates

This process will configure a basic Network Control Policy, an Ethernet vNIC template, and a Fibre Channel SAN vHBA template.

Procedure 1

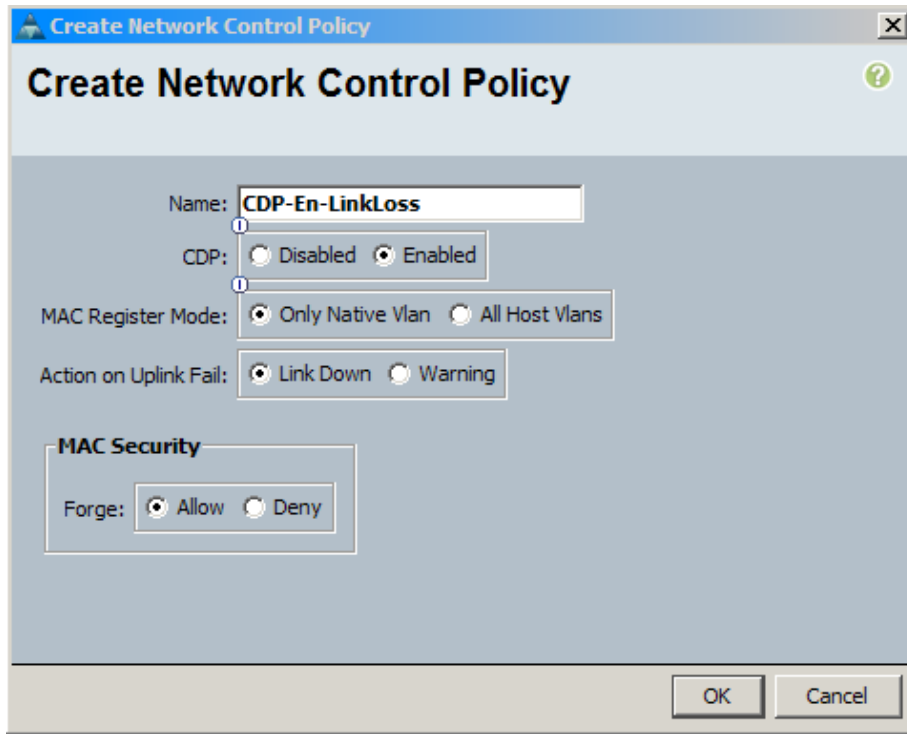
Create Network Control Policy

Cisco Discovery Protocol (CDP) should be enabled in order to help troubleshoot any connectivity problems on both physical and virtual adapters. Create a policy to enable CDP.

Step 1: In the navigation pane, click the **LAN** tab, and then expand **LAN > Policies > root > Network Control Policies**.

Step 2: Right-click **Network Control Policies**, and then choose **Create Network Control Policy**.

Step 3: In the Create Network Control Policy dialog box, enter a name for the policy, select **Enabled** for CDP, and then click **OK**.



Create Network Control Policy

Name:

CDP: ☐ Disabled ☒ Enabled

MAC Register Mode: ☒ Only Native Vlan ☐ All Host Vlans

Action on Uplink Fail: ☒ Link Down ☐ Warning

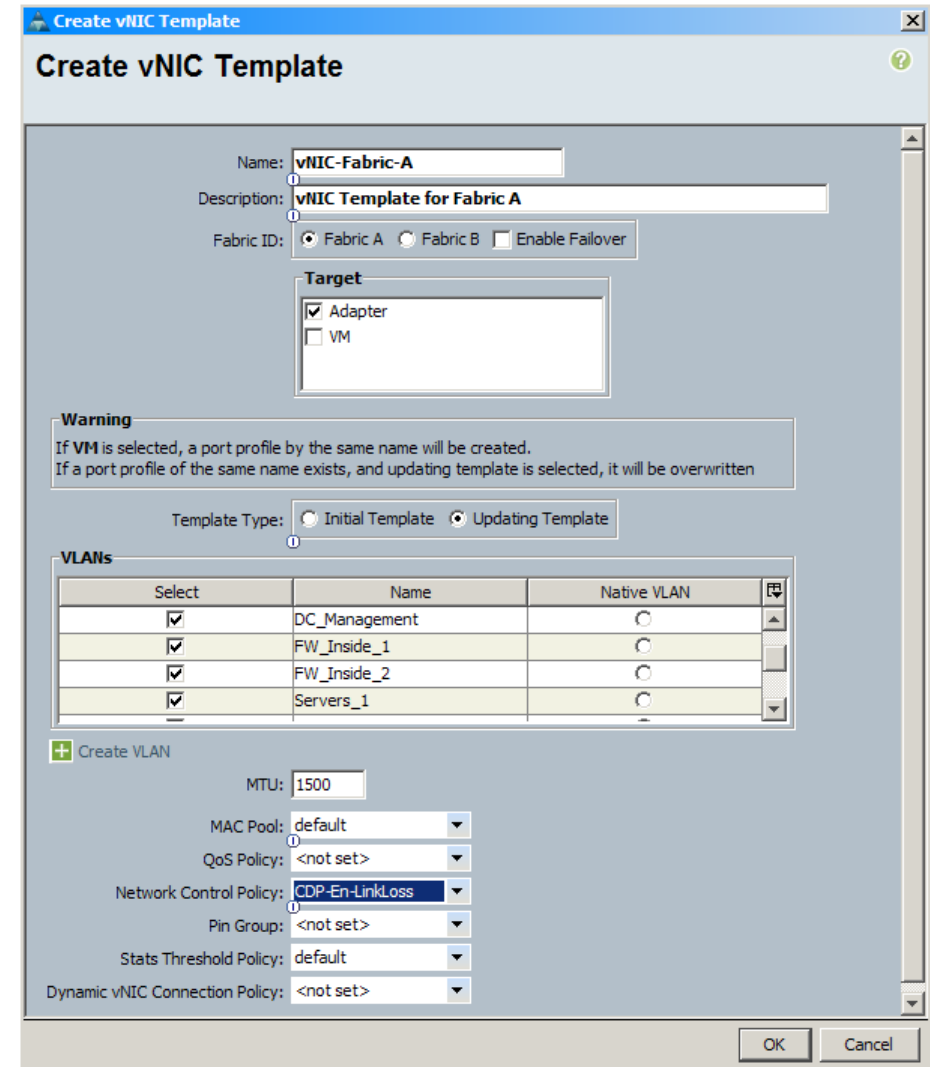
MAC Security

Forge: ☒ Allow ☐ Deny

OK Cancel

Step 4: Under Target, ensure only **Adapter** is selected, select **Updating Template** as the Template Type, and then select all VLANs that needs to be assigned to the vNIC.

Step 5: In the **Network Control Policy** list, select the policy created in Procedure 1. This template will be added to the Service Profiles in the later sections. By selecting **Updating Template** as the Template type, vNICs created from this template are updated if the template changes.



Create vNIC Template

Name:

Description:

Fabric ID: ☒ Fabric A ☐ Fabric B ☐ Enable Failover

Target

☒ Adapter ☐ VM

Warning

If VM is selected, a port profile by the same name will be created.
If a port profile of the same name exists, and updating template is selected, it will be overwritten

Template Type: ☐ Initial Template ☒ Updating Template

VLANs

Select	Name	Native VLAN
<input checked="" type="checkbox"/>	DC_Management	<input type="radio"/>
<input checked="" type="checkbox"/>	FW_Inside_1	<input type="radio"/>
<input checked="" type="checkbox"/>	FW_Inside_2	<input type="radio"/>
<input checked="" type="checkbox"/>	Servers_1	<input type="radio"/>

[+ Create VLAN](#)

MTU:

MAC Pool:

QoS Policy:

Network Control Policy:

Pin Group:

Stats Threshold Policy:

Dynamic vNIC Connection Policy:

OK Cancel

Procedure 2 Create vNIC templates

A vNIC template defines how a vNIC on a server connects to the LAN. You create two vNIC templates, one associated to Fabric A and other associated to Fabric B.

Step 1: In the navigation pane, click the **LAN** tab, and then expand **LAN > Policies > root > vNIC Templates**.

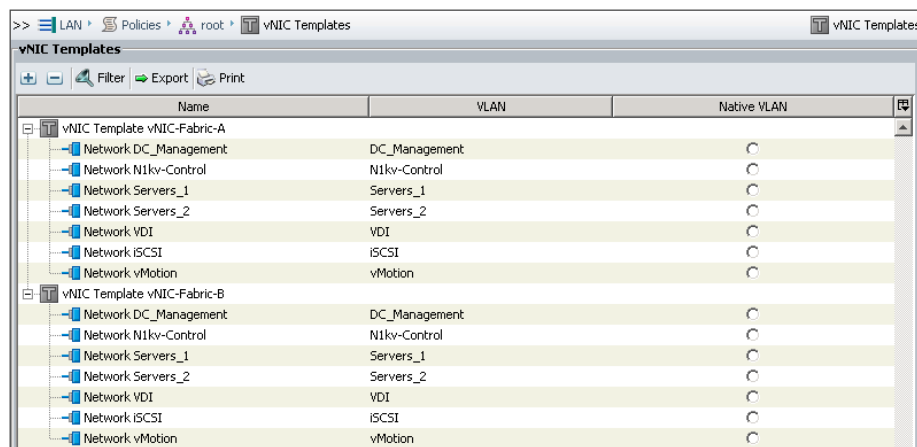
Step 2: Right-click **vNIC Templates**, and then choose **Create vNIC Template**.

Step 3: Enter a name for vNIC template, and then for Fabric ID, select **Fabric A**.

Fabric failover is appropriate for configurations with a single host operating system installed directly on the blade server. For a virtualized environment, it is recommended instead that you disable fabric failover, present multiple vNICs to the hypervisor, and allow the hypervisor system to manage the failover of traffic in the event of a loss of connection to one of the fabric interconnects. See the *Cisco SBA—Data Center Virtualization with UCS, Nexus 1000V and VMware Deployment Guide* for more information on presenting multiple vNICs to a hypervisor explanation.

Step 6: Click OK.

Step 7: Repeat Step 1 through Step 6 in order to create a vNIC template for vNICs that connect to Fabric B.



Name	VLAN	Native VLAN
vNIC Template vNIC-Fabric-A		
Network DC_Management	DC_Management	<input type="radio"/>
Network N1kv-Control	N1kv-Control	<input type="radio"/>
Network Servers_1	Servers_1	<input type="radio"/>
Network Servers_2	Servers_2	<input type="radio"/>
Network VDI	VDI	<input type="radio"/>
Network iSCSI	iSCSI	<input type="radio"/>
Network vMotion	vMotion	<input type="radio"/>
vNIC Template vNIC-Fabric-B		
Network DC_Management	DC_Management	<input type="radio"/>
Network N1kv-Control	N1kv-Control	<input type="radio"/>
Network Servers_1	Servers_1	<input type="radio"/>
Network Servers_2	Servers_2	<input type="radio"/>
Network VDI	VDI	<input type="radio"/>
Network iSCSI	iSCSI	<input type="radio"/>
Network vMotion	vMotion	<input type="radio"/>

Procedure 3

Create vHBA templates

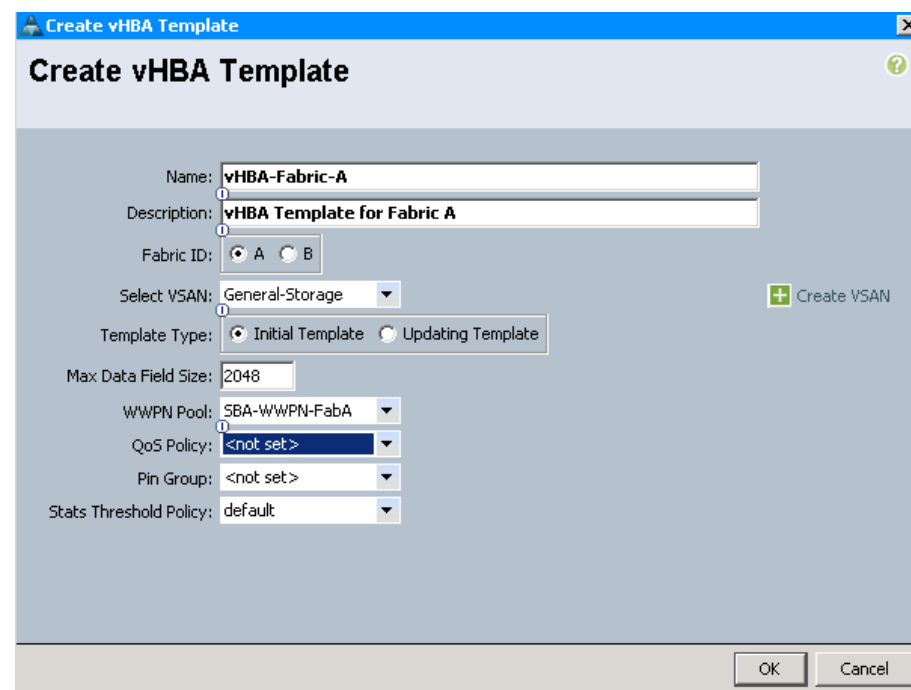
The vHBA template defines how a vHBA on a server connects to the Fibre Channel SAN.

Step 1: In the navigation pane, click the **SAN** tab, and then expand **SAN > Policies > root > vHBA Templates**.

Step 2: Right-click **vHBA Templates**, and then choose **Create vHBA Template**.

Step 3: Enter the following information and then click **OK**:

- Name—**vHBA-Fabric-A**
- Fabric ID—**A**
- Select VSAN—**General Storage**, which was created in Procedure 3 “Configure SAN uplinks.”
- Template Type—**Initial Template**
- WWPN Pool—**SBA-WWPN-FabA**, which was created in Procedure 4 “Create WWPN pools.”



Create vHBA Template

Name:

Description:

Fabric ID: ☐ A ☐ B

Select VSAN: [+ Create VSAN](#)

Template Type: ☒ Initial Template ☐ Updating Template

Max Data Field Size:

WWPN Pool:

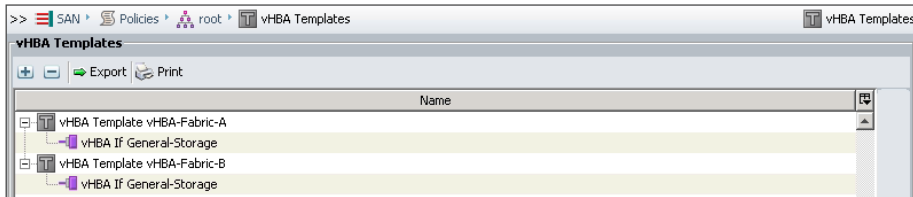
QoS Policy:

Pin Group:

Stats Threshold Policy:

Step 4: Repeat Step 2 through Step 3 in order to create a vHBA template for vHBAs that connect to Fabric B, using the following information:

- Name—**vHBA-Fabric-B**
- Fabric ID—**B**
- Select VSAN—**General Storage** which was created in Procedure 3 “Configure SAN uplinks.”
- Template Type—**Initial Template**
- WWPN Pool—**SBA-WWPN-FabB** which was created in Procedure 4 “Create WWPN pools.”



Process

Configuring Server Boot Policy

1. Create local disk configuration policy
2. Create a local boot policy
3. Create a SAN boot policy

In this process, you will create:

- A Local Disk policy for servers that have physically local hard drives.
- A No Local Disk policy for servers that have no physically local hard drives and will utilize SAN boot.
- A Local Boot policy for servers that will boot from removable media such as Compact Disks (CD) or a local hard drive.
- A SAN Boot policy for servers that will boot from removable media such as CDs or a SAN boot target LUN.

Building multiple policies will provide flexibility for different hardware environments in your Cisco UCS domain.

Procedure 1

Create local disk configuration policy

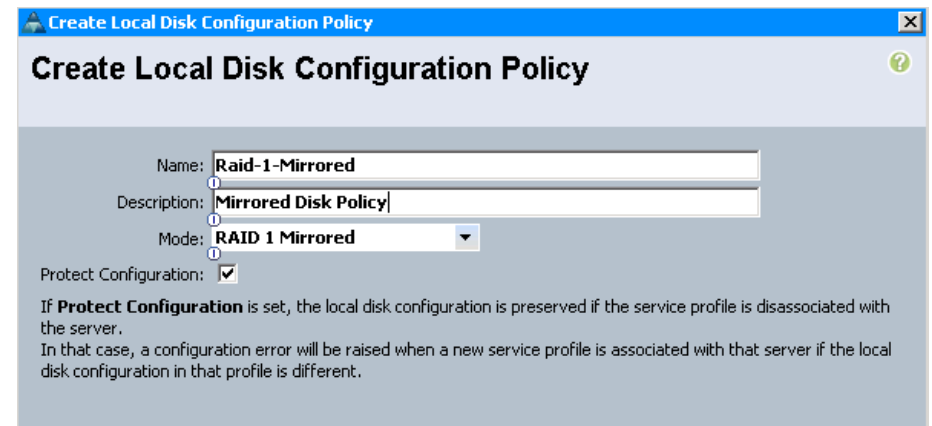
The local disk configuration policy allows the service profile to define how the block storage is structured on the local disks installed in each Cisco UCS blade server. A common configuration is to have two locally installed disks in each blade, set up for mirrored storage.

Step 1: In the navigation pane, click the **Servers** tab, and then expand **Servers > Policies > root > Local Disk Configuration Policies**.

Step 2: Right-click **Local Disk Configuration Policies**, and then select **Create Local Disk Configuration Policy**.

Step 3: Enter a **Name** and **Description** for the policy, and then in the **Mode** list, choose **Raid 1 Mirrored**.

Step 4: Ensure **Protect Configuration** is selected. If selected, the server retains the configuration in the local disk configuration policy even if the server is disassociated from the service profile.



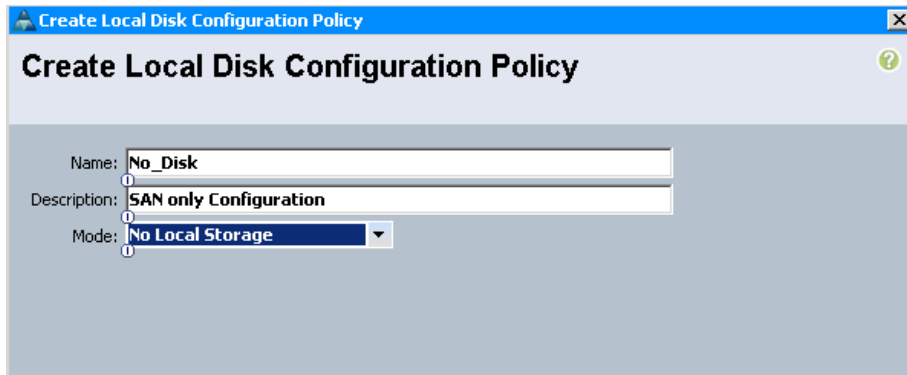
Step 5: Click **OK**, and then acknowledge the creation.

To prepare for servers that boot from SAN, you create a policy that will not configure and install any Local Disk for your blade server.

Step 6: In the navigation pane, click the **Servers** tab, and then expand **Servers > Policies > root > Local Disk Configuration Policies**.

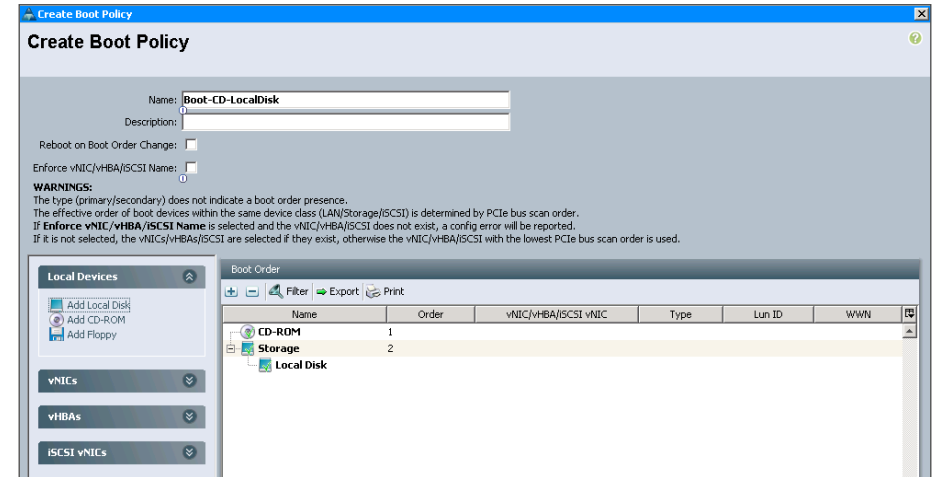
Step 7: Right-click **Local Disk Configuration Policies**, and then select **Create Local Disk Configuration Policy**.

Step 8: Enter a **Name** and **Description** for the policy, and then in the **Mode** list, choose **No Local Storage**.



Step 9: Click **OK**, and acknowledge the creation.

Step 5: Verify the choices, and then click **OK**.



Procedure 2 Create a local boot policy

The server boot order policy allows you to control the priority of different boot devices, to which the server will have access. In this procedure, you will first configure a basic boot policy that boots first from removable media—in this case, an attached CD or DVD drive—and then from the internal disk.

Step 1: In the navigation pane, click the **Servers** tab, and then expand **Servers > Policies > root > Boot Policies**.

Step 2: Right-click **Boot Policies**, and select **Create Boot Policy**.

Step 3: In the Create Boot Policy window, enter the **Name** and **Description** for the boot policy.

Step 4: Click the down arrows on the **Local Devices** container, click **Add CD-ROM** first, and then click **Add Local Disk**.

The order of the devices in the list is displayed as a number in the **Order** column of the table.

Procedure 3 Create a SAN boot policy

The following steps will guide you to create boot-from-SAN policy. The policy will include a boot order that starts with any attached removable media, such as CD or DVD, and then will specify target WWPN of the storage system that houses the server boot LUN.

In addition to the configuration on the Cisco UCS for SAN boot, you will need to configure a LUN on your storage array, and Fibre Channel zoning on the data center core for the server to storage array connections according to the *Cisco SBA—Data Center Deployment Guide*.

On storage arrays with redundant storage controllers, you may have up to four paths to the target LUN (LUN 0) for boot, two paths over SAN-A and two paths over SAN-B. If your storage array does not have redundant storage controllers, you only have two paths, one path over SAN-A and one over SAN-B. Only one of the paths will be configured as primary.

Table 5 - Example vHBA SAN boot target connections

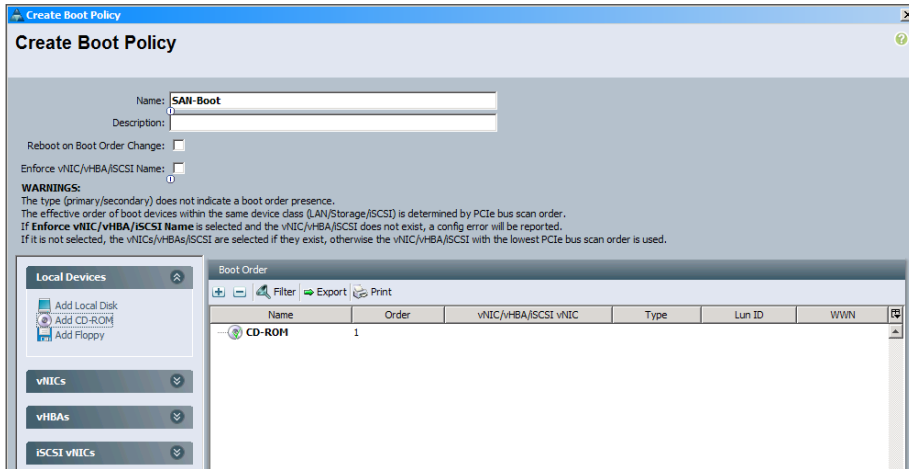
vHBA	Target type	Boot target WWPN	Target array controller
fc0	Primary	50:06:01:61:3C:E0:60:E2	A
fc0	Secondary	50:06:01:69:3C:E0:60:E2	B
fc1	Secondary	50:06:01:60:3C:E0:60:E2	A
fc1	Secondary	50:06:01:68:3C:E0:60:E2	B

Step 1: In the navigation pane, click the **Servers** tab, and then expand **Servers > Policies > root > Boot Policies**.

Step 2: Right-click **Boot Policies**, and then select **Create Boot Policy**.

Step 3: In the Create Boot Policy window, enter the **Name** and **Description** for the boot policy.

Step 4: Click the down arrows on the **Local Devices** container, and then click **Add CD-ROM** first.



Step 5: In the left pane, click **vHBAs**, and then click **Add SAN Boot**.



Tech Tip

When you create a boot policy that targets the WWPN of the storage system, the boot policy may be reused across multiple service profiles. Many storage systems can present a different LUN as a boot LUN or LUN 0 to different initiators, based on the initiator WWPN address. Referencing a common boot policy promotes configuration consistency across similar service profiles.

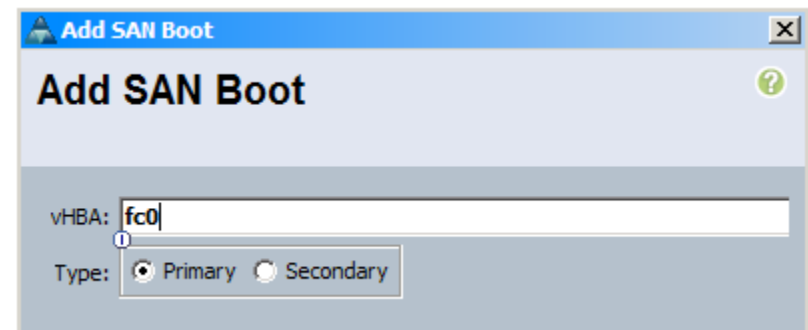
Step 6: In the Add SAN Boot window, in the **vHBA** box, enter a name (Example: fc0) that you will be defining for the vHBA of your system. For Type, select **Primary**, and then click **OK**.



Tech Tip

Because the boot policy references the vHBA by name, you must name interfaces consistently across service profiles that need to share a common boot policy definition.

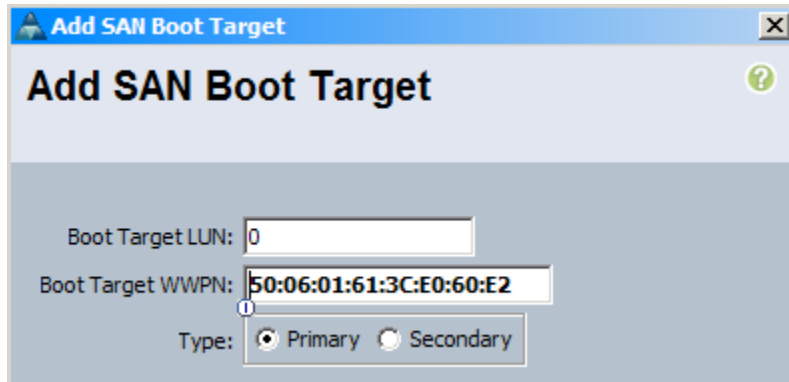
Make note of the vHBA names you use, as you will use the same name for vHBA in your service profiles in a later procedure.



Step 7: In the Create Boot Policy window, click **Add SAN Boot Target**.

Step 8: In the Add SAN Boot Target dialog box, in the **Boot Target LUN** box, enter the specific LUN number for the system to boot. Typically, the boot LUN is presented by the storage system as LUN 0 to the requesting initiator.

Step 9: In the **Boot Target WWPN** box, enter the proper SAN target WWPN of FC adapter interface of target array controller A using SAN-A, and then click **OK**.



Add SAN Boot Target

Boot Target LUN: 0

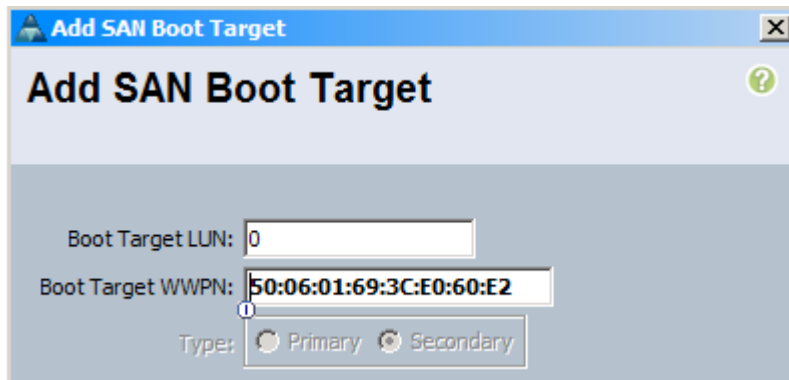
Boot Target WWPN: 50:06:01:61:3C:E0:60:E2

Type: ☒ Primary ☐ Secondary

Step 10: Click **Add SAN Boot Target**.

Step 11: In the **Add San Boot Target** dialog box, keep the **Boot Target LUN** as 0.

Step 12: In the **Boot Target WWPN** box, enter the proper SAN target WWPN of FC adapter interface of target array controller B using SAN-A, and then click **OK**.



Add SAN Boot Target

Boot Target LUN: 0

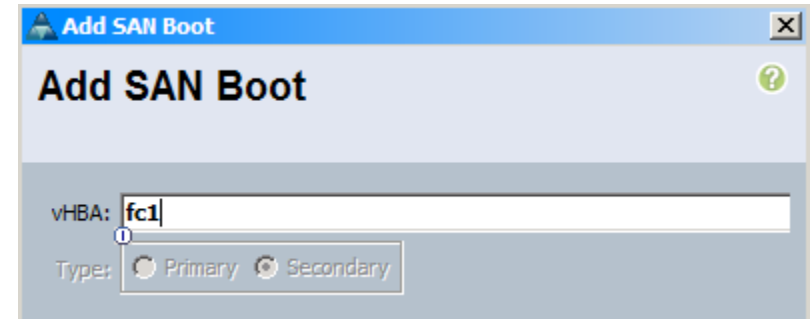
Boot Target WWPN: 50:06:01:69:3C:E0:60:E2

Type: ☒ Primary ☐ Secondary

Now you will add SAN Boot targets for your second vHBA.

Step 13: In the left pane, click **vHBAs**, and then click **Add SAN Boot**.

Step 14: In the **Add SAN Boot** window, in the **vHBA** box, enter a name (Example: fc1) that you will be defining for the second vHBA of your system, and then click **OK**. The type will be set to **Secondary**.



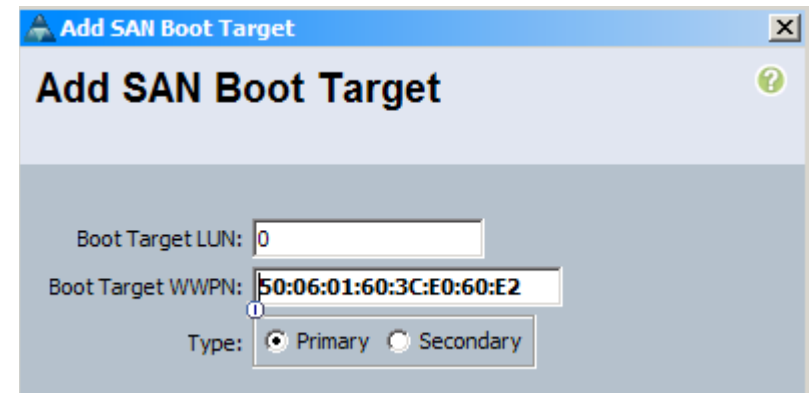
Add SAN Boot

vHBA: fc1

Type: ☐ Primary ☒ Secondary

Step 15: Click **Add SAN Boot Target**.

Step 16: In the **Add SAN Boot Target** dialog box, in the **Boot Target WWPN** box, enter the proper SAN target WWPN of FC adapter interface of target array controller A using SAN-B, and then click **OK**.



Add SAN Boot Target

Boot Target LUN: 0

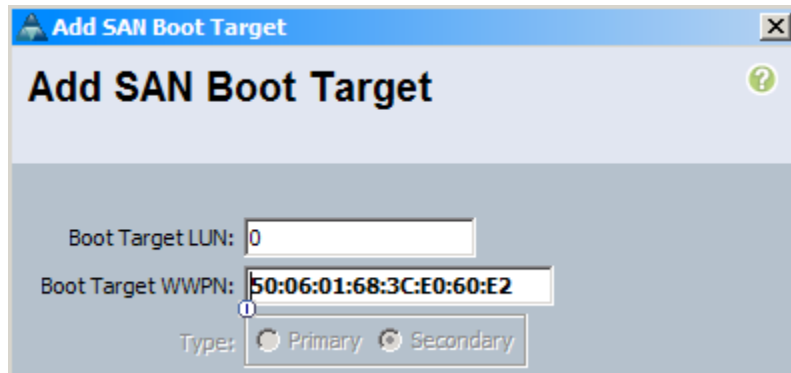
Boot Target WWPN: 50:06:01:60:3C:E0:60:E2

Type: ☒ Primary ☐ Secondary

Step 17: Click **Add SAN Boot Target**.

Step 18: In the **Add SAN Boot Target** dialog box, keep the value for **Boot Target LUN** as 0.

Step 19: In the **Boot Target WWPN** box, enter the proper SAN target WWPN of FC adapter interface of target array controller B using SAN-B, click **OK**, and then click **OK** to create the policy.



Add SAN Boot Target

Boot Target LUN: 0

Boot Target WWPN: 50:06:01:68:3C:E0:60:E2

Type: ☐ Primary ☒ Secondary



Tech Tip

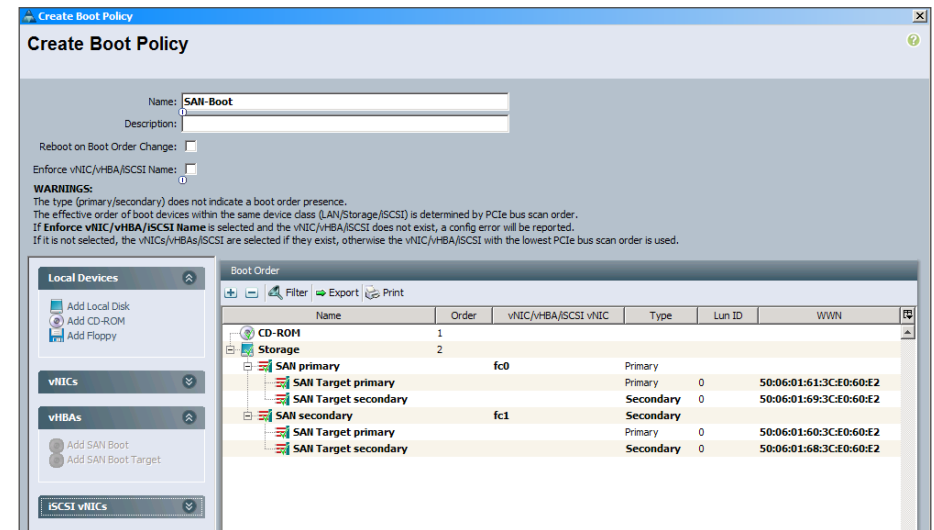
You can configure redundant access to the boot LUN for some operating systems during installation; on others it must be added after you have completed the initial installation.

For example: Windows requires a single HBA during installation until multipath drivers are installed. For more information, see:

<http://www.microsoft.com/downloads/details.aspx?FamilyID=f4095fae-553d-4700-aafa-1cce38b5618f&displaylang=en>

Other operating systems have different requirements. Please refer to your specific operating system documentation for handling redundant SAN connections.

The following summary screen shows multiple vHBAs configured with multiple paths to the SAN target boot LUN 0.



Create Boot Policy

Name: SAN-Boot

Description:

Reboot on Boot Order Change: ☐

Enforce vNIC/vHBA/SCSI Name: ☐

WARNINGS:
The type (primary/secondary) does not indicate a boot order presence.
The effective order of boot devices within the same device class (LAN/Storage/SCSI) is determined by PCIe bus scan order.
If **Enforce vNIC/vHBA/SCSI Name** is selected and the vNIC/vHBA/SCSI does not exist, a config error will be reported.
If it is not selected, the vNICs/vHBAs/SCSIs are selected if they exist, otherwise the vNIC/vHBA/SCSI with the lowest PCIe bus scan order is used.

Name	Order	vNIC/vHBA/SCSI	vNIC	Type	Lun ID	WWN
CD-ROM	1					
Storage	2					
SAN primary		fc0		Primary		
SAN Target primary				Primary	0	50:06:01:61:3C:E0:60:E2
SAN Target secondary				Secondary	0	50:06:01:69:3C:E0:60:E2
SAN secondary		fc1		Secondary		
SAN Target primary				Primary	0	50:06:01:60:3C:E0:60:E2
SAN Target secondary				Secondary	0	50:06:01:68:3C:E0:60:E2

Process

Creating an Initial Boot Service Profile for Local Boot

1. Create Service Profile for Local boot
2. Assign service profile and policies

One of the core concepts of Cisco UCS Manager is the *service profile*. A service profile defines all characteristics that are normally presented by a physical server to a host operating system or a hypervisor, including the presence of network interfaces and their addresses, host adapters and their addresses, boot order, disk configuration, and firmware versions. The profile can be assigned to one or more physical blade servers within the chassis. In this way, what is traditionally thought of as the personality of a given server or host is tied to the service profile rather than to the physical server blade where the profile is running. This is particularly true if network-based or SAN-based boot is configured for the profile. If local-boot is configured for the profile, the boot images installed on the local hard drives of the physical blade do tie the identity of the service profile to a given physical server blade.

There are multiple supporting objects within the Cisco UCS Manager GUI to streamline the creation of a service profile. These objects contain items such as pools of MAC addresses for Ethernet, World Wide Port Names (WWPNs) for Fibre Channel, disk configurations, VLANs, VSANs, etc. These objects are stored by the system so that they may be referenced by multiple service profiles, so you do not need to redefine them as you create each new profile.

This process provides an example of how to create a basic service profile for initial installation and boot of a host operating system or a hypervisor. Throughout this process, you create reusable system objects to facilitate faster creation of additional profiles that share similar characteristics. For simplicity, in this process you configure a basic boot policy using local mirrored disks. This initial profile creates the base system setup upon which you can build additional, more advanced profiles. Later sections in this guide show options for network-based or SAN-based boot.

Procedure 1

Create Service Profile for Local boot

Step 1: On the Servers tab in the navigation pane, expand the containers underneath **Service Profiles**, and then select the **Root** container.

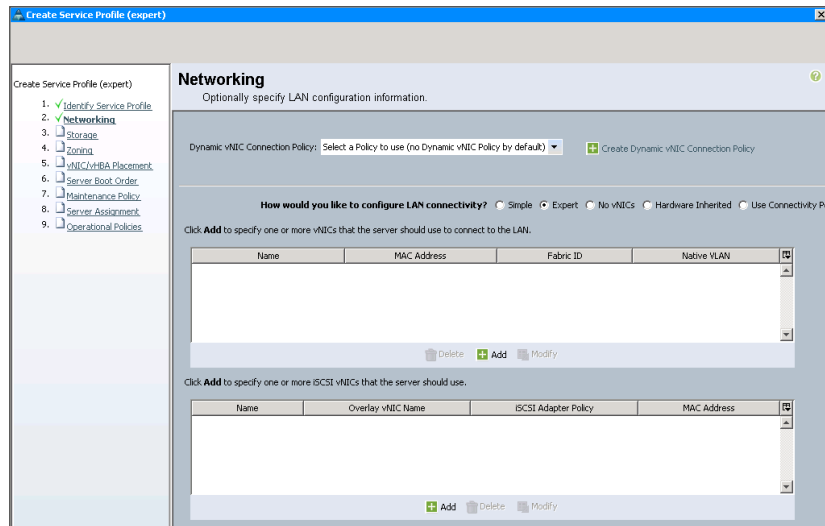
Step 2: On the General tab in the work pane, click **Create Service Profile (expert)**, and then on the Identify Service Profile page, enter a name for the service profile in the **Name** box.

Step 3: In the UUID section, in the UUID Assignment list, choose the UUID suffix pool you created in Procedure 2 “Create UUID pool”, and then click **Next**.

The screenshot shows the 'Create Service Profile (expert)' window in the Unified Computing System Manager. The 'Identify Service Profile' tab is active. The 'Name' field is set to 'Servers_Local_Disk'. The 'Where' field is set to 'org-root'. The 'UUID' section shows 'UUID Assignment' set to 'Default(S12/S12)'. There is a button to 'Create UUID Suffix Pool'. The 'Description' field is empty.

Step 4: In the Networking section, Leave the **Dynamic vNIC Connection Policy** list set to its default, and next to **How would you like to configure LAN connectivity?**, select **Expert**.

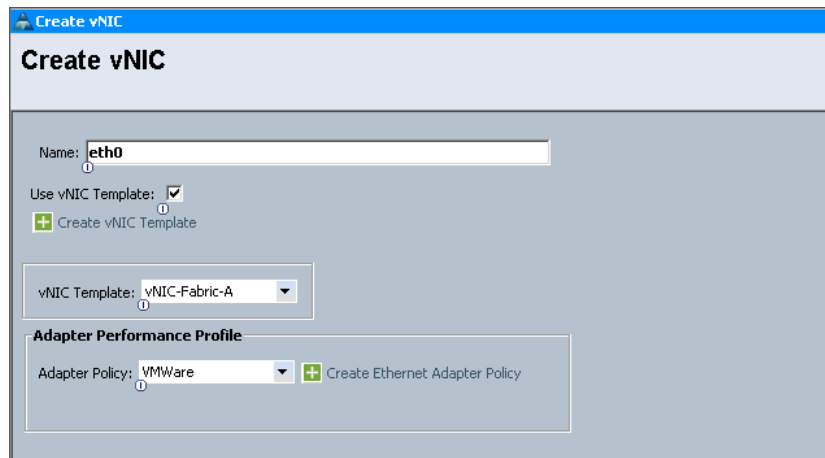
Step 5: Click **Add** to add vNICs to the server.



Step 6: In the Create vNIC window, in the **Name** box, enter a name for the vNIC. For the example configuration, this guide uses **eth0** as the interface name; representing Ethernet 0.

Step 7: Select **Use vNIC Template**. In the **vNIC Template** list, select the vNIC Template created for Fabric A in Procedure 2 “Create vNIC templates.”

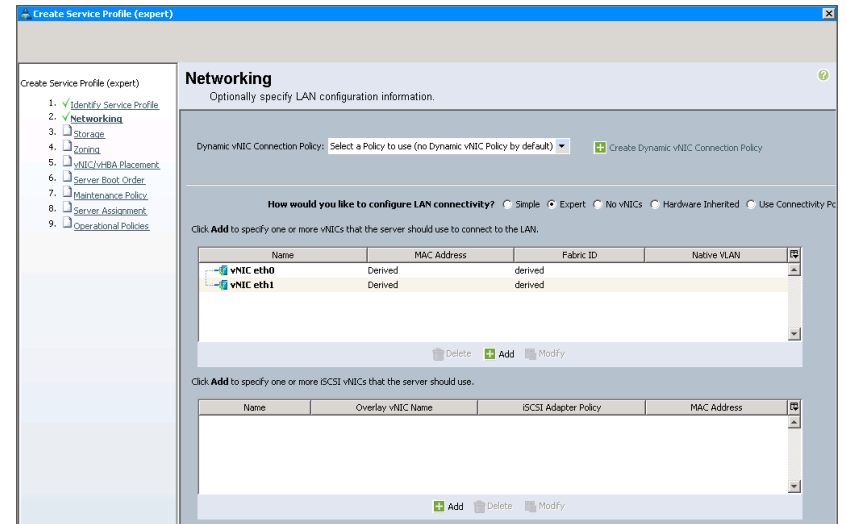
Step 8: In the **Adapter policy** list, select a policy from a list of pre-defined policies set according to the OS vendor's optimal performance suggestions. This example uses the Ethernet Adapter policy for VMware.



Step 9: Click **OK**. This adds the vNIC.

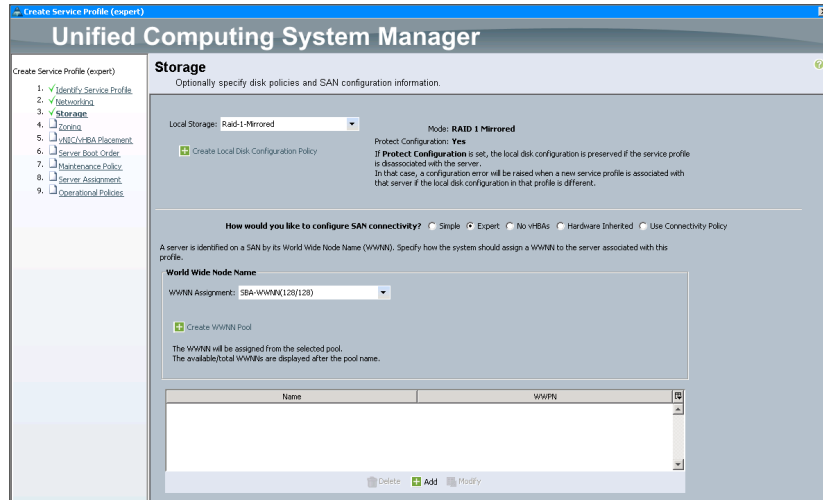
Step 10: Repeat Step 5 through Step 9 in order to add a second vNIC, eth 1, using the vNIC template for Fabric B, created in Procedure 2 “Create vNIC templates.”

Step 11: On the Networking page, click **Next**.



Step 12: On the Storage page, in the **Local Storage** list, select the local disk configuration policy created in Procedure 1 “Create local disk configuration policy” for local disks installed in the Cisco UCS blade server.

Step 13: Next to **How would you like to configure SAN connectivity?**, select **Expert**.



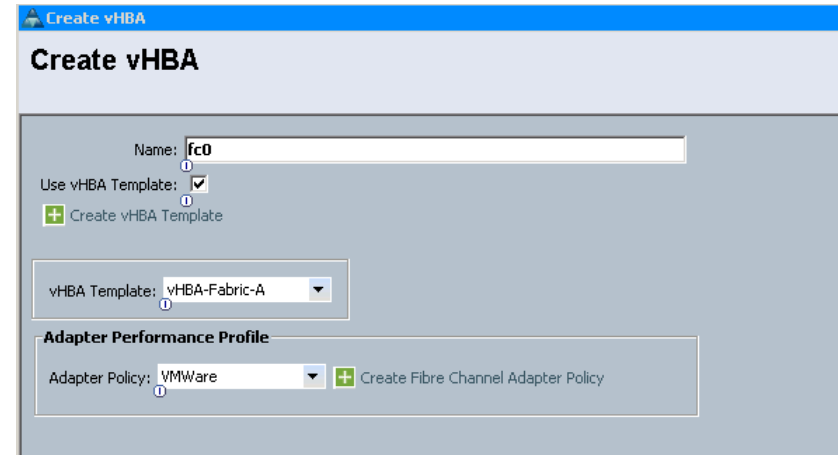
Step 14: In the **WWNN Assignment** list, select the WWNN pool created in Procedure 3 “Create WWNN pool.”

Step 15: Click **Add** to add vHBA to the server.

Step 16: In the Create vHBA window, in the **Name** box, enter a name for the vHBA. For the example configuration, this guide uses **fc0** as the interface name; representing vHBA 0.

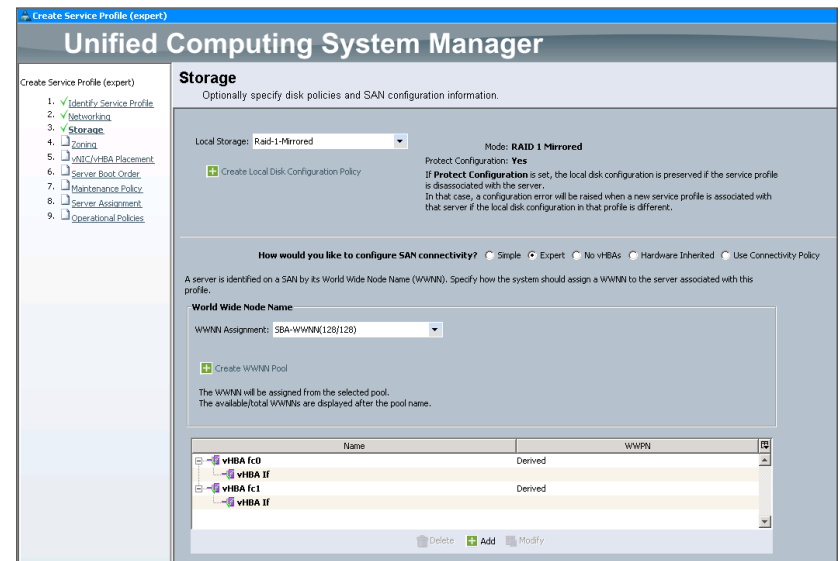
Step 17: Select **Use vHBA Template**. In the **vHBA Template** list, select the vHBA Template created for Fabric A in Procedure 3 “Create vHBA templates.”

Step 18: In the **Adapter policy** list, select a policy from a list of pre-defined policies set according to the OS vendor’s optimal performance suggestions. This example uses Fibre Channel Adapter policy for VMware.



Step 19: Repeat Step 15 through Step 18 in order to add a second vHBA, **fc1**. Select the vHBA Template created for Fabric B in Procedure 3 “Create vHBA templates.”

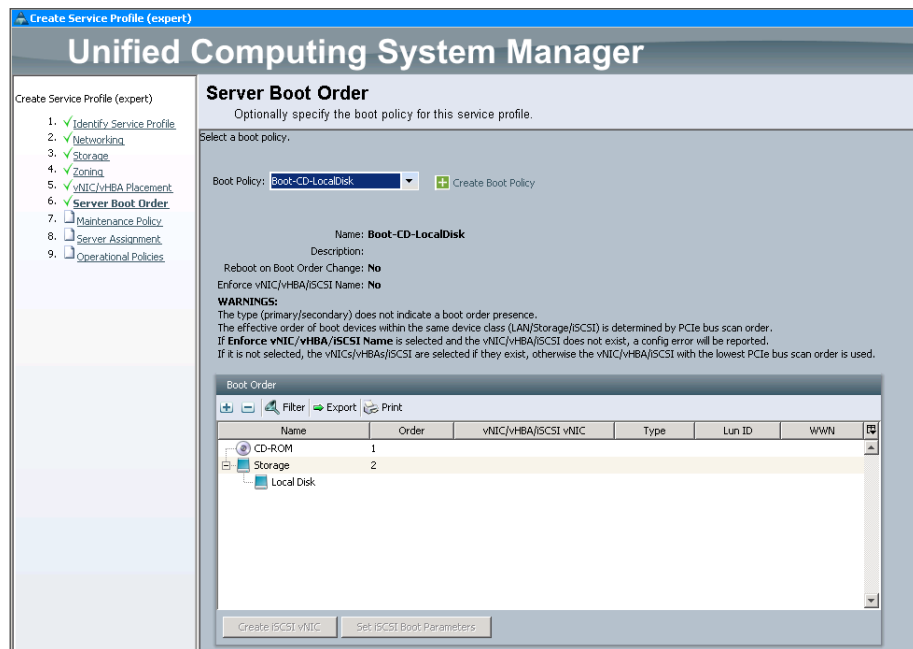
Step 20: On the Storage page, click **Next**.



Step 21: On the Zoning page, do not make any changes. Click **Next**.

Step 22: On the vNIC/vHBA Place page, leave the defaults, and then click **Next**. The system places the virtual interfaces on the physical interfaces that exist on the blade servers with which this profile will be associated.

Step 23: On the Server Boot Order page, in the **Boot policy** list, select the boot policy created in Procedure 2 “Create a local boot policy,” which is configured to first boot from CD/DVD drive and then from the internal disk. Click **Next**.



Step 24: On the Maintenance Policy page, leave all default settings, and then click **Next**.

Step 25: On the Server Assignment page, in the **Server Assignment** list, select **Assign Later**, and then click **Next**.

Step 26: On the Operational Policies page, leave all default settings, and then click **Finish**.

Step 27: On the successful completion message, click **OK**. This exits the Service Profile Creation Wizard.

Procedure 2

Assign service profile and policies

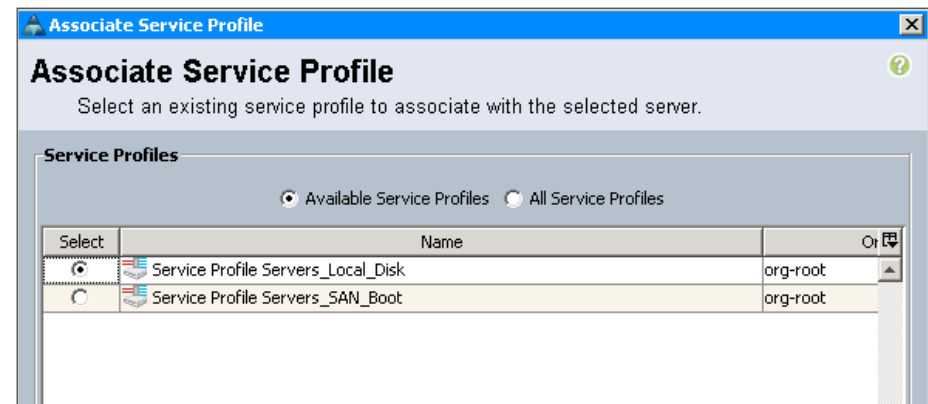
Cisco UCS has the ability to assign a service profile directly to a specific server, pre-provision an unused chassis slot, assign the profile to a pool of servers, or assign the profile to a physical blade server later.

Step 1: In the navigation pane, click the **Equipment** tab, and then click the **Chassis#** from which you want to select the server.

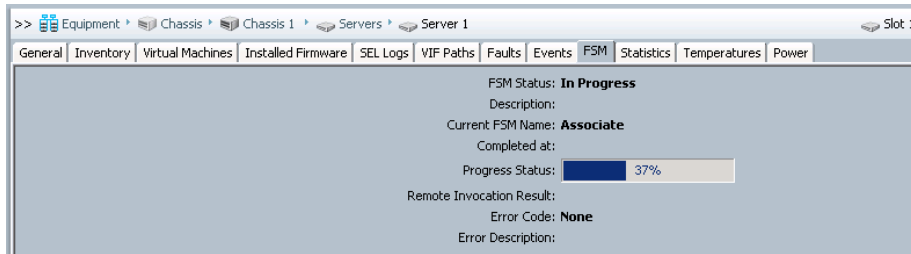
Step 2: Expand **Servers**, and then click the server you want. By default, the General tab displays.

Step 3: On the General page, in the Actions section, click the **Associate Service Profile** link.

Step 4: In the Associate Service Profile window, select the service profile from the list of available service profiles, and then click **OK**. This associates the service profile to the selected server.



Step 5: If you want to check the progress on the service profile that is being applied on the server, in the work pane, click the **FSM** tab. When progress status reaches 100%, it completes the service profile association to a server.



Step 6: After the service profile is applied to a server, you can now boot the server to install an operating system. The operating system installation media is available by either locally attached removable media, or KVM Console Virtual Media.



Reader Tip

For further details on how to install VMware on a server, please refer to *Cisco SBA—Data Center Virtualization with UCS, Nexus 1000V and VMware Deployment Guide*.

The installation begins as is typical for the given operating system.

Process

Creating a Service Profile for SAN Boot

1. Create service profile for SAN boot
2. Associate server to service profile

Booting service profiles directly from a Fibre Channel SAN can provide key advantages for ensuring server and application availability. With all operating system files and application data specific to the server stored on the SAN, your organization benefits from SAN disk redundancy and backup practices. This approach works in conjunction with the hardware independence provided by Cisco UCS-specific constructs such as shared pools of Ethernet and Fibre Channel addressing. Together, these attributes provide the ability to move a service profile among blade servers within the system programmatically, with no physical intervention required. This concept is known as *stateless computing*.

Fibre Channel uses World Wide Node Names (WWNN) and World Wide Port Names (WWPN) to communicate over the SAN. This process illustrates how to create a new service profile for SAN boot based on the existing example profile that you created in the previous process, "Creating an Initial Boot Service Profile for Local Boot."

Procedure 1

Create service profile for SAN boot

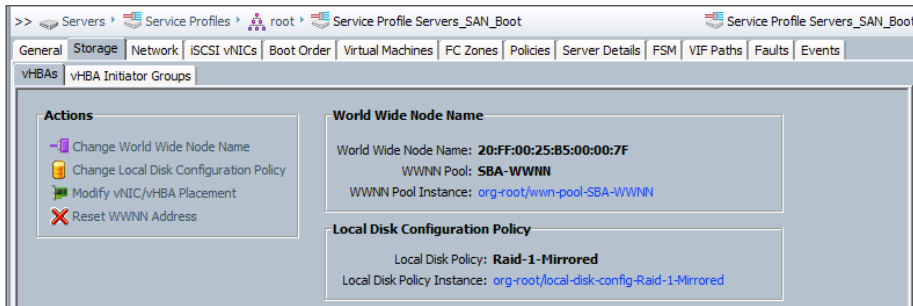
In this procedure, you clone the service profile that you created in the previous process, "Creating an Initial Boot Service Profile for Local Boot."

Step 1: On the **Servers** tab in the navigation pane, right-click the name of the profile you created in the previous process (Example: Servers_Local_Disk), and then choose **Create a Clone**.

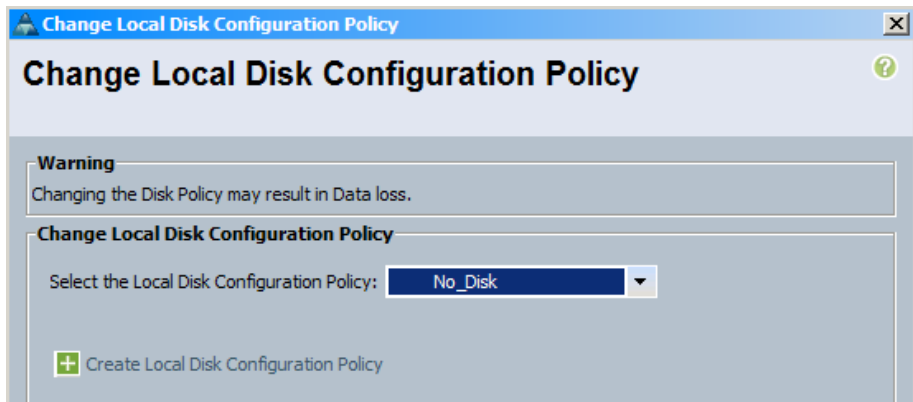
Step 2: In the **Clone Name** box, enter a name that clearly identifies the profile as a SAN boot server instance (Example: Servers_SAN_Boot), and then click **OK**.

Step 3: On the Servers tab in the navigation pane, click on the service profile you created in the previous step.

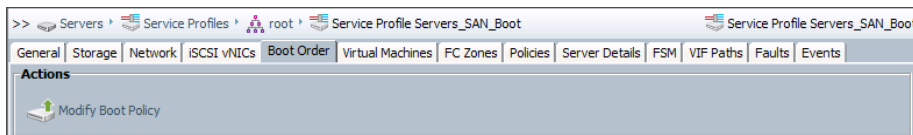
Step 4: Click the **Storage** tab, and then click the **vHBAs** tab. Under the Actions pane, click **Change Local Disk Configuration Policy**.



Step 5: In the Change Local Disk Configuration Policy window, in the **Select the Local Disk Configuration Policy** list, select the **No_Disk** configuration policy you created in Procedure 1 “Create local disk configuration policy,” and then click OK.

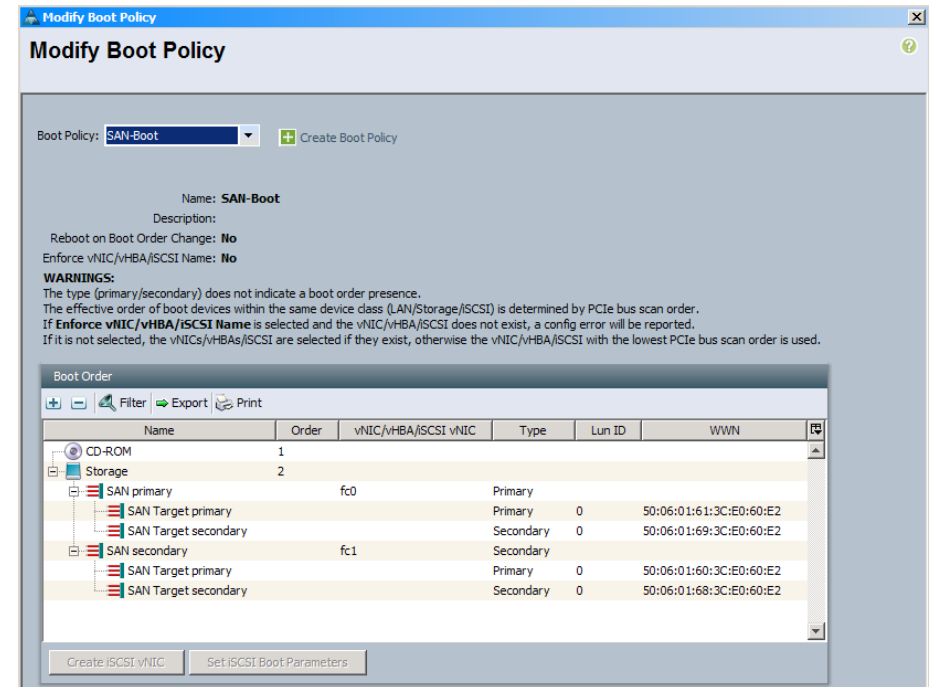


Step 6: Click the **Boot Order** tab in the work pane, and then in the Actions area, click **Modify Boot Policy**.



Step 7: In the Modify Boot Policy window, under **Boot Policy** list, select the policy created for SAN boot in Procedure 3 “Create a SAN boot policy,” and then click **OK**. This assigns the new boot policy to the profile.

After you select the new boot policy, the work pane shows the new boot order information, including the correct target LUN ID and WWPN number.



Procedure 2

Associate server to service profile

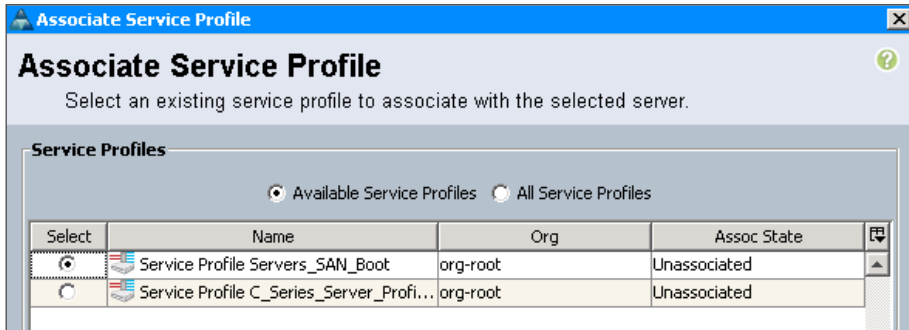
After the service profile is created and boot policy is assigned, associate the service profile to an open server on the chassis.

Step 1: In the navigation pane, click the **Equipment** tab, and then click the **Chassis#** from which you want to select the server.

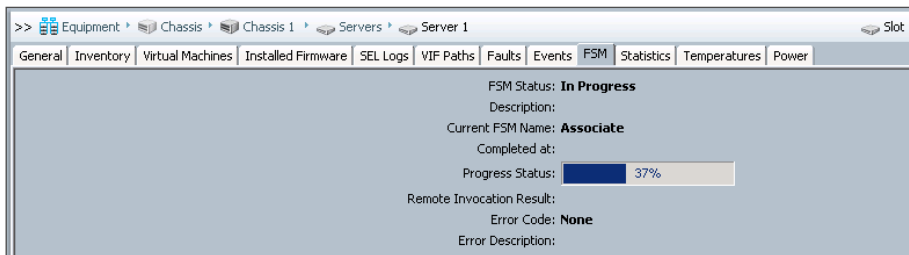
Step 2: Expand **Servers**, and then click the server you want. By default, the General tab displays.

Step 3: On the General page, in the Actions section, click the **Associate Service Profile** link.

Step 4: In the Associate Service Profile window, select the service profile from the list of available service profiles, and then click **OK**. This associates the service profile to the selected server.



Step 5: If you want to check the progress on the service profile that is being applied on the server, in the work pane, click the **FSM** tab. When progress status reaches 100%, it completes the service profile association to a server.



Step 6: After the service profile is applied to a server, you can now boot the server to install an operating system. The operating system installation media is available by either locally attached removable media, or KVM Console Virtual Media.

Step 7: When you choose a target disk destination for the installation, ensure that the new LUN 0, accessible over the Fibre Channel SAN, is selected.

Step 8: If you want, you can provision the SAN to expose multiple LUNs to a given initiator. For example, you can use separate LUNs to house operating system boot files and files that contain application-specific data or database contents. In a hypervisor environment, a LUN specific to an individual profile is presented as a boot LUN. A larger LUN, accessible to multiple initiators, is used to house virtual machine-specific files. In this way, multiple virtualized servers can access the virtual machine files.

Process

Creating Multiple Service Profiles through Templates

1. Create a service profile template
2. Create a service profile from a template

Service profile templates are one of the ways to simplify the creation of new service profiles. The template approach ensures that consistent policies within the system are applied to a given service or application by using the same basic parameters—such as the number of vNICs and vHBAs—and with identity information drawn from the same pools. These templates may be configured as one of two types of service profile templates:

- **Initial templates**—A service profile created from an initial template initially inherits all the properties of the template, but after you create the profile, it is no longer connected to the template. If any changes were to be made to one or more profiles created from this template, you must change each profile individually.
- **Updating templates**—A service profile created from an updating template inherits all of the properties of the template and remains connected to the template. Any change to the template automatically updates the service profiles created from the template. The updating template feature is a powerful tool for managing updates to multiple servers with minimal administrative overhead.

The following procedures describe how to create a service profile template and then create a service profile from the template.

Reader Tip

For further details on how to install VMware on a server, please refer to Cisco SBA— *Data Center Virtualization with UCS, Nexus 1000V and VMware Deployment Guide*.

The installation begins as is typical for the given operating system.

Procedure 1 Create a service profile template

Step 1: In the Cisco UCS Manager navigation pane, click the **Servers** tab, expand **Service Profile Templates**, and then click the organization **root**.

Step 2: In the work pane, on the General tab, click **Create Service Profile Template**.

Step 3: In the Create Service Profile Template window, enter the **Name** of the template.

Create Service Profile Template

Unified Computing System Manager

Create Service Profile Template

1. **Identify Service Profile Template**
2. Networking
3. Storage
4. Zoning
5. vNIC/vHBA Placement
6. Server Boot Order
7. Maintenance Policy
8. Server Assignment
9. Operational Policies

Identify Service Profile Template

You must enter a name for the service profile template and specify the template type. You can also specify how a UUID will be assigned to this template and enter a description.

Name:

The template will be created in the following organization. Its name must be unique within this organization.

Where: **org-root**

The template will be created in the following organization. Its name must be unique within this organization.

Type: ☒ Initial Template ☐ Updating Template

Specify how the UUID will be assigned to the server associated with the service generated by this template.

UUID

UUID Assignment:

The UUID will be assigned from the selected pool. The available/total UUIDs are displayed after the pool name.

Optionally enter a description for the profile. The description can contain information about when and where the service profile should be used.

Step 4: Verify that the **Initial Template** option (default value) is selected.

Step 5: In the **UUID Assignment** list, choose an existing UUID pool, and then click **Next**.

Step 6: Follow the steps in Procedure 1, "Create Service Profile for Local boot", to fill all required fields for the **Storage**, **Networking**, **Zoning**, **vNIC/vHBA Placement**, **Server Boot Order**, and **Maintenance Policy** pages.

The difference between creating a service profile versus creating a service profile template is that the template only allows you to choose a server pool in the Server Assignment window, but not for the individual blade server.

Step 7: Click **Next**.

Create Service Profile Template

Unified Computing System Manager

Create Service Profile Template

1. Identify Service Profile Template
2. Networking
3. Storage
4. Zoning
5. vNIC/vHBA Placement
6. Server Boot Order
7. Maintenance Policy
8. **Server Assignment**
9. Operational Policies

Server Assignment

Optionally specify a server pool for this service profile template.

You can select a server pool you want to associate with this service profile template.

Pool Assignment:

Select the power state to be applied when this profile is associated with the server.

☒ Up ☐ Down

The service profile template is not automatically associated with a server. Either select a server from the list or associate the service profile manually later.

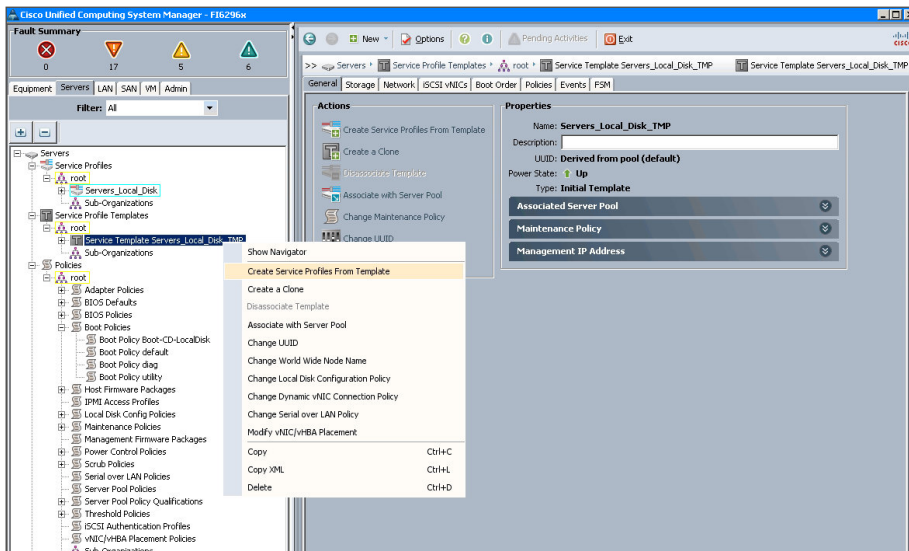
Firmware Management (BIOS, Disk Controller, Adapter)

Step 8: On the **Operational Policies** page, leave the default settings, and then click **Finish**.

Procedure 2 Create a service profile from a template

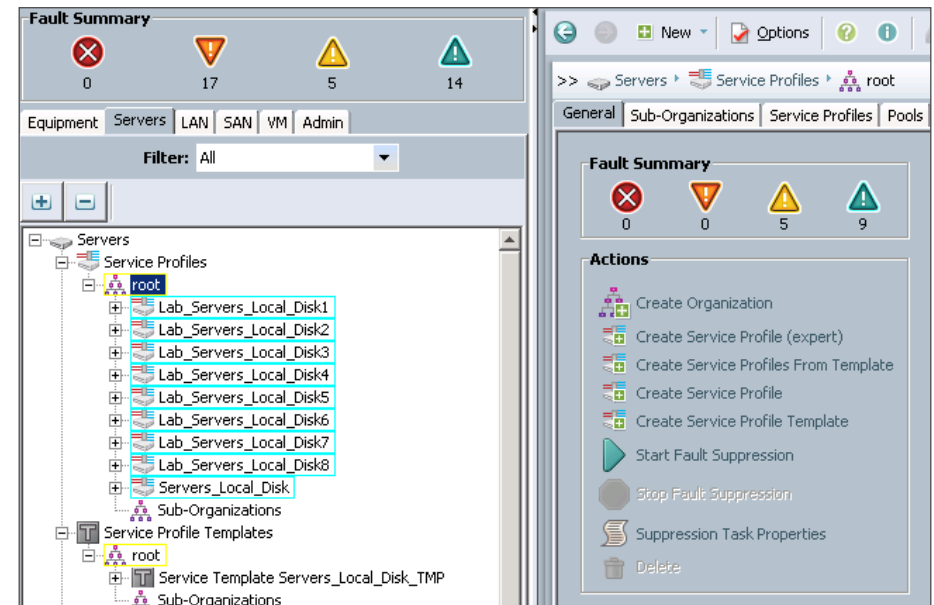
Step 1: In Cisco UCS Manager, click the **Servers** tab in the navigation pane, expand **Service Profile Templates**, and then click the organization where the new service profile template was created earlier under **root**.

Step 2: Right-click the service profile template from which you want to create the profiles, and then click **Create Service Profiles From Template**.



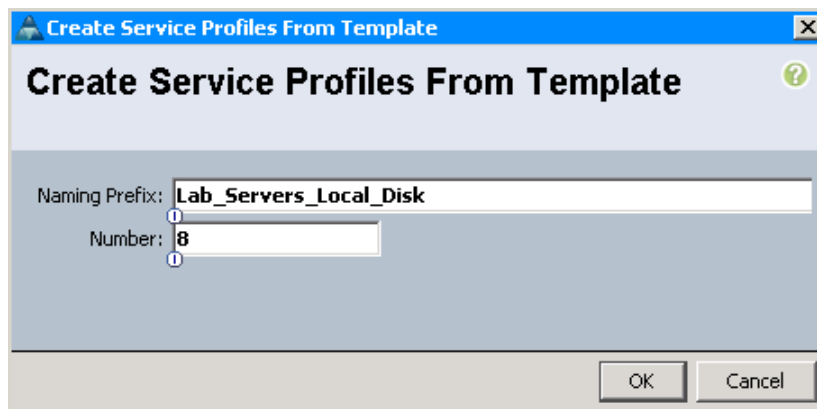
Step 4: On the message “Successfully created service profiles from template,” click OK.

Step 5: In the navigation pane under **Servers > Service Profiles > root**, verify that your new service profiles were created.



This completes the creation of service profiles from a service profile template.

Step 3: In the **Create Service Profiles from Template** window, enter a **Naming Prefix** for the new profiles, enter the **Number** of profiles you want to create (or leave the default value of 2), and then click **OK**.



Cisco UCS C-Series Rack-Mount Server

This module covers deploying the Cisco UCS C-Series Rack-Mount Server. This module includes information on initial system setup and basic configuration to prepare your server to communicate over Ethernet and FCoE using Cisco Integrated Management Controller (CIMC) to configure server settings. This module also includes details on integrating the Cisco UCS C-Series server with the Cisco Unified Computing System and allowing the server to be managed by Cisco UCS Manager. CIMC is the management service for the Cisco UCS C-Series servers. CIMC runs within the server and allows you to use a web-based GUI or SSH-based CLI to access, configure, administer, and monitor the server. Almost all tasks can be performed in either interface, and the results of tasks performed in one interface are displayed in the other.

Cisco UCS C-Series Rack-Mount Servers may be connected to the Cisco SBA data center infrastructure using available interfaces on the Cisco Nexus 5500UP Series Switches or through the Cisco Nexus 2000 Series Fabric Extenders. Switching access or trunk port modes may be configured according to the settings appropriate for the installed operating system. Details for data center core port configurations are covered in the *Cisco SBA—Data Center Deployment Guide*.

The final process in this module details how the Cisco UCS C-Series server can be integrated into the Cisco Unified Computing System and be managed by the same Cisco UCS Manager that controls the UCS B-Series blade servers by connecting to a UCS Fabric Interconnect through a Cisco Nexus 2232PP Fabric Extender. This integration provides a single management interface to Cisco UCS B-Series and C-Series servers.



Reader Tip

Details on supported C-Series servers and network adapter cards for UCS integration with Cisco UCS Manager 2.1(1a), as well as the installation instructions for your specific C-Series server, can be found at:

http://www.cisco.com/en/US/docs/unified_computing/ucs/c-series_integration/ucsm2.1/b_UCSM2-1_C-Integration.html

If you are deploying your Cisco UCS C-Series servers for UCS-managed integration, complete the following processes only:

- Configuring Cisco Integrated Management Controller
- Updating Firmware for Cisco UCS C-Series Server
- Integrating Cisco UCS C-Series into the Cisco UCS Manager Environment

Process

Configuring Cisco Integrated Management Controller

1. Configure management access

Procedure 1

Configure management access

To access the CIMC controller remotely, you must either statically assign a management IP address or have a DHCP server servicing the VLAN or subnet to which the server is connected. This procedure assigns a static IP address to the server and requires the following information:

- IP address—**10.4.63.66**
- Subnet mask—**255.255.255.0**
- Default gateway—**10.4.63.1**
- Password

Step 1: Connect a keyboard, video display, and mouse to the server for the initial setup, and then power up the server.

Step 2: When the server boots up, you have the option to set up BIOS, boot menu, network boot, and CIMC Configuration. While in BIOS, press **F8** to start CIMC Configuration.

```
Processor(s) Intel(R) Xeon(R) CPU E5-2630 0 @ 2.30GHz
Total Memory = 64 GB Effective Memory = 64 GB
Memory Operating Speed 1333 Mhz

Entering CIMC Configuration Utility...
```

Step 3: Under NIC mode, press the **Spacebar**. This enables Dedicated.

The 10/100 management ports included on the server are used to access CIMC. The management ports are connected to the out-of-band Ethernet management network, which is detailed in the *Cisco SBA—Data Center Deployment Guide*.

```
CIMC Configuration Utility Version 1.6 Cisco Systems, Inc.
*****
NIC Properties
NIC mode          NIC redundancy
Dedicated:        [X]          None: [ ]
Shared LOM:       [ ]          Active-standby: [X]
Cisco Card:       [ ]          Active-active: [ ]
Shared LOM Ext:   [ ]

IPV4 (Basic)      Factory Defaults
DHCP enabled:     [ ]          CIMC Factory Default:[ ]
CIMC IP:          10.4.63.66    Default User (Basic)
Subnetmask:       255.255.255.0 Default password:#####
Gateway:          10.4.63.1     Reenter password:#####_

VLAN (Advanced)   Port Profile
VLAN enabled:     [ ]          Name:
VLAN ID:          1
Priority:          0

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



Tech Tip

To manage the Cisco UCS C-Series server as a standalone server using dedicated Ethernet ports for CIMC access, choose NIC mode **Dedicated**. To access CIMC via Cisco Card, or to manage the server when connected to a Cisco UCS fabric interconnect, see the following guide for more information:
http://www.cisco.com/en/US/docs/unified_computing/ucs/c/hw/C240/install/install.html#wp1400933

Details for managing a Cisco UCS C-Series server with Cisco UCS Manager appear later in this guide, in the “Integrating Cisco UCS C-Series into the Cisco UCS Manager Environment” process.

Step 4: Under IPV4 (Basic), press the **Spacebar**. This action disables the default DHCP enabled. Then enter **CIMC IP**, **Subnetmask**, and the default **Gateway**.

Step 5: Under NIC redundancy, verify that **Active-Standby** is enabled.



Tech Tip

If you are using a server with a single management NIC, like the Cisco C200 Series, select a **NIC redundancy** of **None**.

Step 6: Under Default User (Basic), enter a default password. The default username is **admin**.

Step 7: Press **F10**. This saves the settings.

Step 8: Press **F5** (Refresh). This reflects the latest configuration.

Step 9: Wait until the new settings appear, and then press **Esc** to exit and reboot the server.

Process

Configuring LSI RAID

1. Configure the LSI RAID adapter

If you are going to connect your Cisco UCS C-Series Server to a Cisco UCS Fabric Interconnect and manage it with Cisco UCS Manager, you may skip this process and continue with the next process “Updating Firmware for Cisco UCS C-Series Server.”

Procedure 1 Configure the LSI RAID adapter

The LSI Integrated Mirroring feature is used to safeguard critical information by mirroring a set of data on two or more disks. In the event of a drive failure, data can be recovered from the mirrored drive, and the failed drive can be replaced. The server used in this lab setup has two identical 600 GB hard drives with one optional LSI RAID controller. This procedure configures the two drives for RAID 1 (*mirroring*).



Reader Tip

The following setup uses the LSI Integrated Mirroring feature. For a more elaborate RAID setup, see more specific LSI documentation at:
<http://www.lsi.com>

Step 1: After the server has started the boot process, look for the screen as shown in the figure below. When you see this screen, press **Ctrl-H**.



Tech Tip

This guide was tested with LSI MegaRAID. Servers provisioned with other RAID controllers, such as the LSI 1064E and LSI 1068E RAID controllers, use **Ctrl+C** to access the LSI RAID config utility setup screens.

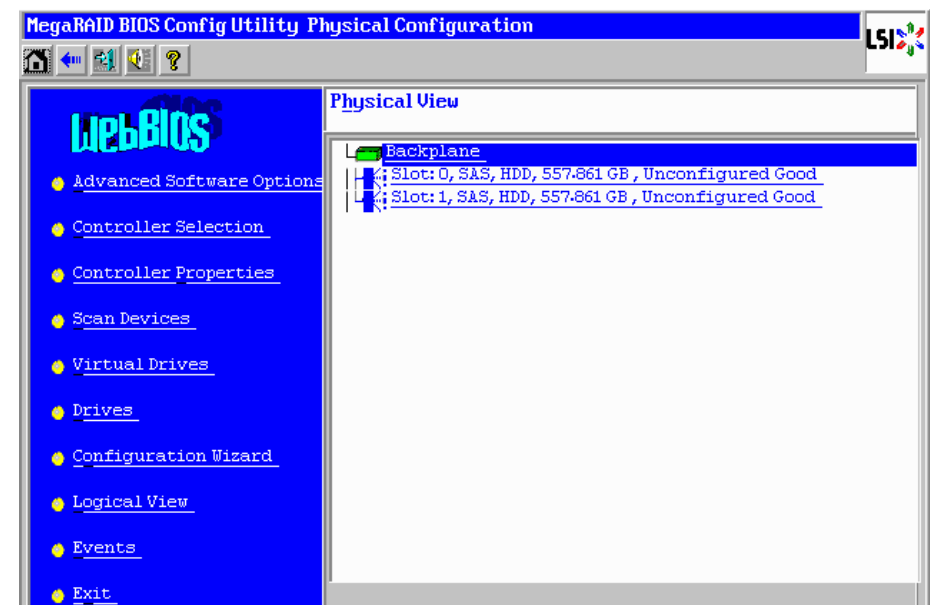
Press <Ctrl><H> for WebBIOS or press <Ctrl><Y> for Preboot CLI

Step 2: Choose the adapter, and then select **Start**.

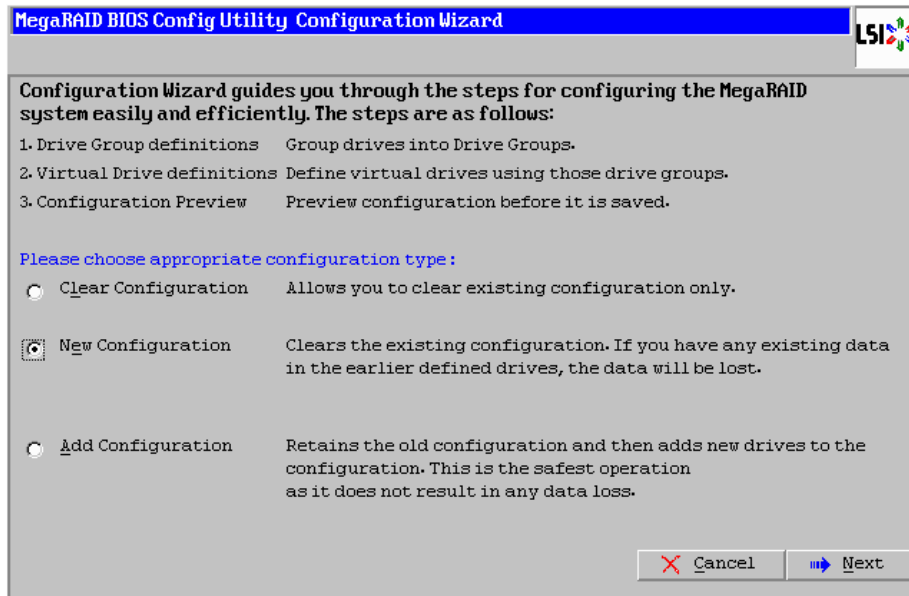
Adapter No.	Bus No.	Device No.	Type	Firmware Pkg. Version
0.	130	0	LSI MegaRAID SAS 9266-8i	23.2.1-0023

Start

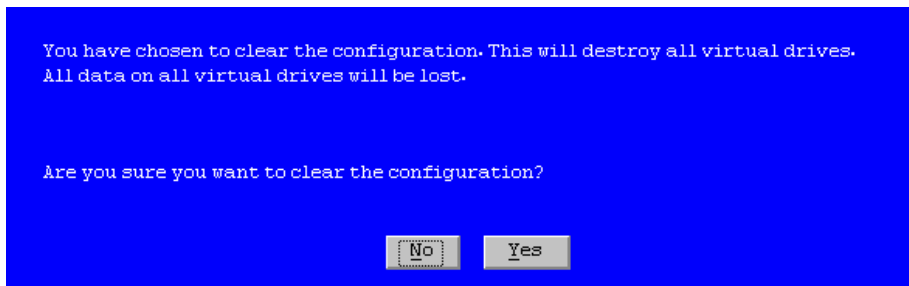
Step 3: On the MegaRAID BIOS Config Utility Physical Configuration window, select **Configuration Wizard**.



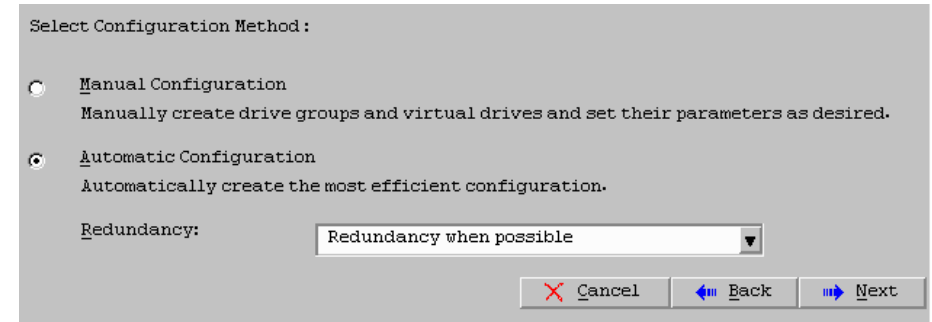
Step 4: On the Configuration Wizard, select **New Configuration**. This option deletes the previous configuration and creates a new configuration. Click **Next**.



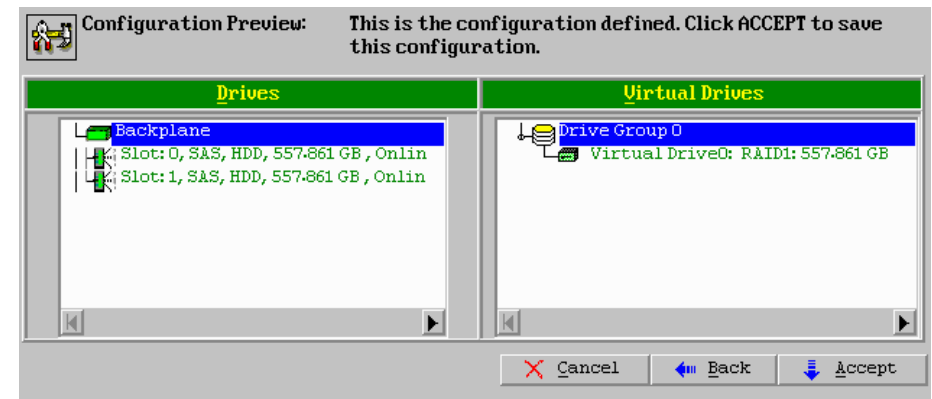
Step 5: On the MegaRAID BIOS utility confirm page, a warning message will be displayed, stating that you are about to delete all data from all virtual drives. Select **Yes**.



Step 6: In the Configuration wizard, select **Automatic Configuration**, and in the **Redundancy** list, choose **Redundancy when possible**, and then click **Next**. If two drives are available, WebBIOS creates a RAID1 configuration.

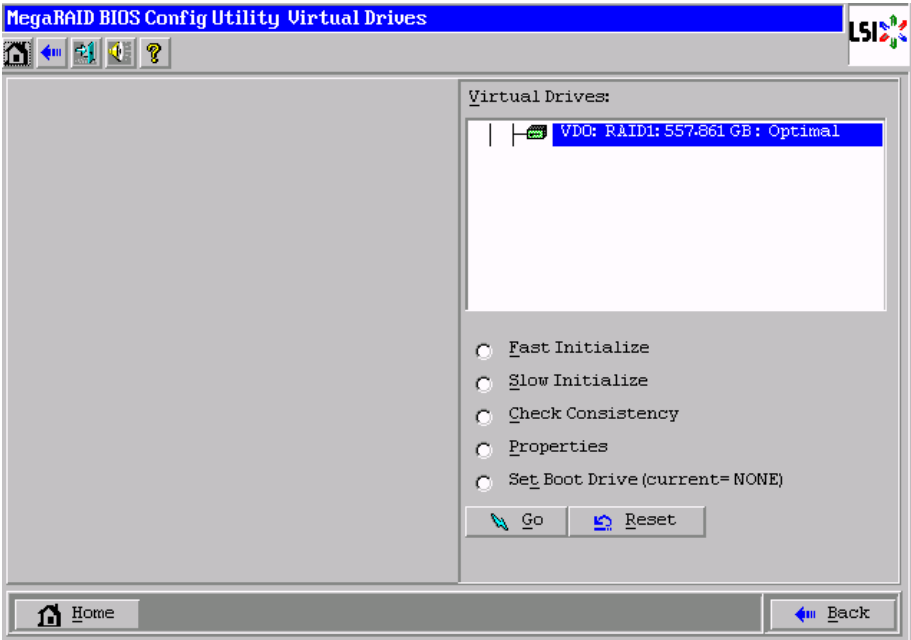


Step 7: In the Configuration Preview page, notice that the RAID level of the logical drive is RAID1. Select **Accept**.



Step 8: On the confirm page, select **Yes**. The configuration is saved.

Step 9: You will be prompted with a confirmation page, stating that all data on the new Virtual Drive will be deleted and the virtual drive will be initialized. Select **Yes**. Once the virtual drive has been initialized, you will see the following screen.



Step 10: On the MegaRAID BIOS Config Utility Virtual Drives window, select **Home**. You return to main WebBIOS config utility window.

Step 11: Select **Exit**. On the exit confirmation page, select **Yes**.

Step 12: Reboot the server. It recognizes the new RAID configuration.

Process

Updating Firmware for Cisco UCS C-Series Server

1. Configure virtual media
2. Upgrade UCS C-Series server firmware

It is recommended that you update your Cisco UCS C-Series servers with the latest firmware and BIOS. The Cisco UCS P81E Virtual Interface Card requires Management Controller Firmware version 1.2.X or later. Support for configuration of FCoE over network interface virtualization (NIV) needs Management Controller Firmware version 1.4.1 or later.

Support for integrating a Cisco UCS C-Series server with Cisco UCS to be managed by Cisco UCS Manager running release 2.1(1a) or later is listed in Table 7 below.

Table 6 - Cisco UCS C Series server firmware used in Cisco SBA

Server type	Host Upgrade utility version	Virtual interface card type
Cisco UCS C220 M3	1.4(7a)1	Cisco UCS VIC 1225
Cisco UCS C240 M3	1.4(7b)1	Cisco UCS VIC 1225
Cisco UCS C200 M2	1.4(3p)5	Cisco UCS P81E VIC
Cisco UCS C210 M2	1.4(3p)5	Cisco UCS P81E VIC

Table 7 - Cisco UCS C-Series integration with UCS Manager firmware requirements

Server model	Integration type	CIMC version	BIOS version	VIC firmware
Cisco UCS C220 M3	Single wire	1.4(6)	1.4(7a)	2.1(0.457a)
Cisco UCS C240 M3	Single wire	1.4(6)	1.4(7a)	2.1(0.457a)
Cisco UCS C200 M2	Dual wire	1.4(3c) minimum	—	2.0(2g)
Cisco UCS C210 M2	Dual wire	1.4(3c) minimum	—	2.0(2g)



Reader Tip

Details on supported Cisco UCS C-Series servers, network adapter cards, and firmware requirements for Cisco UCS integration, as well as the installation instructions for your specific C-Series server, can be found at:

http://www.cisco.com/en/US/products/ps11736/products_installation_and_configuration_guides_list.html

Note that Cisco UCS Manager single-wire-management integration requires a Cisco UCS Virtual Interface Card 1225.

Procedure 1

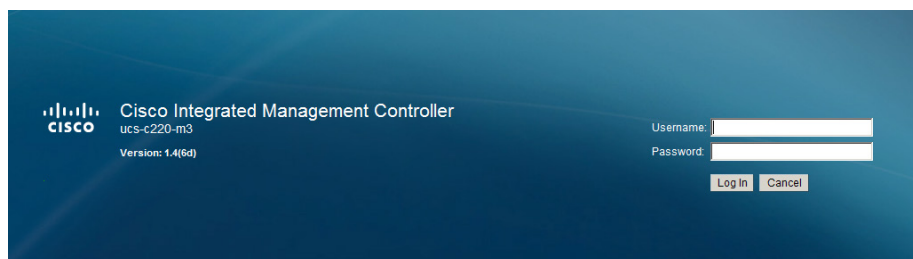
Configure virtual media

Step 1: In a browser, enter the IP address you configured earlier in Step 4 of the “Configure management access” procedure under the “Configuring Cisco Integrated Management Controller” process. This opens the CIMC login page.

You receive a Security Certificate warning in your browser on initial login before you can connect to the login screen.

Step 2: Click **Accept**. This acknowledges the certificate warning.

Step 3: Log in by using the default username **admin** and the password you configured earlier.

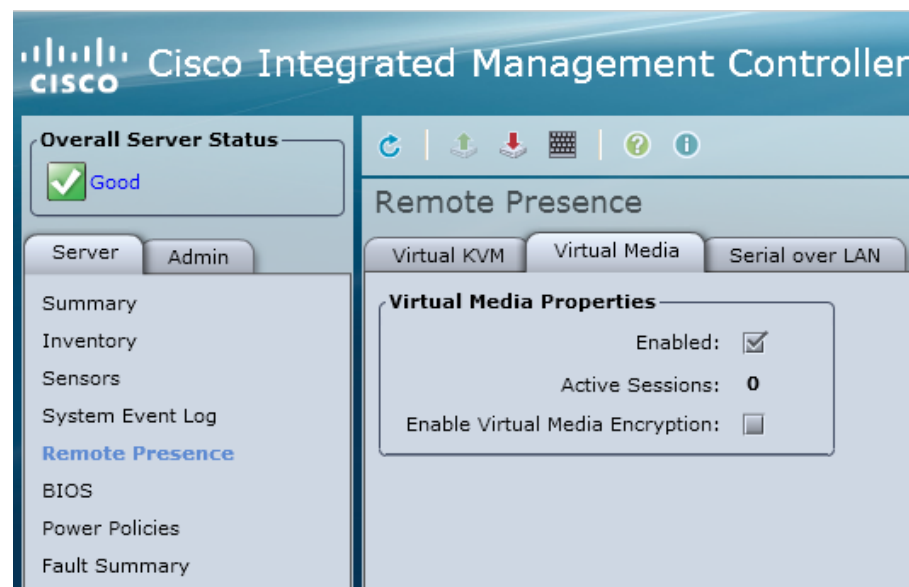


Tech Tip

You can launch the CIMC GUI and manage the server from any remote host that meets these minimum requirements: Java 1.6 or later, HTTP and HTTPS enabled, and Adobe Flash Player 10 or later.

Step 4: On the Server tab, click **Remote Presence**.

Step 5: On the Virtual Media tab, verify that **Enabled** is selected.



Tech Tip

If you do not select **Enabled**, you will receive the error “Either Virtual Media is detached or ...” when you try to map a remote disk.

Step 6: Click **Save Changes**.

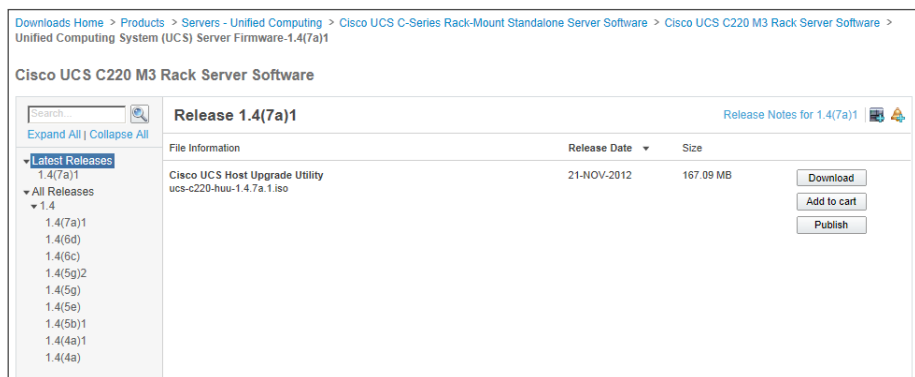
Procedure 2 Upgrade UCS C-Series server firmware

You can use the Cisco Host Upgrade utility to upgrade the following firmware:

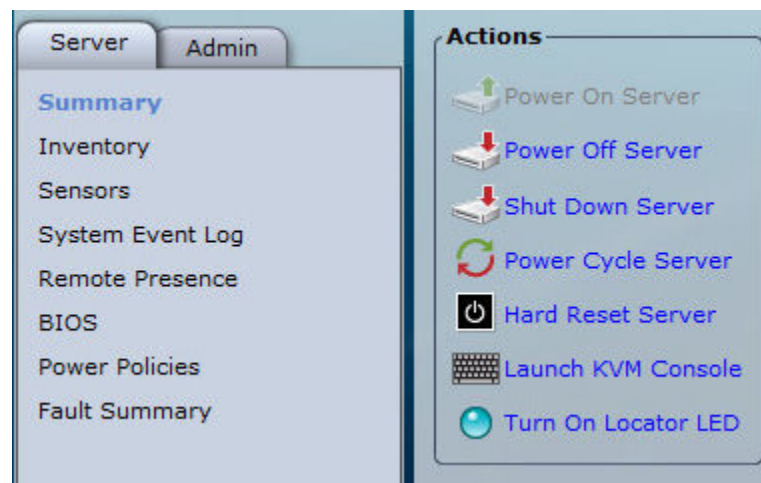
- CIMC
- System BIOS
- LAN on motherboard
- LSI
- Cisco UCS Virtual Interface Card

Step 1: Download the Cisco UCS Host Upgrade utility ISO file from www.cisco.com. The version of Cisco UCS used in this guide is Server Firmware version 1.4(7a)1 for a Cisco UCS C-Series C220 M3 Rack Server.

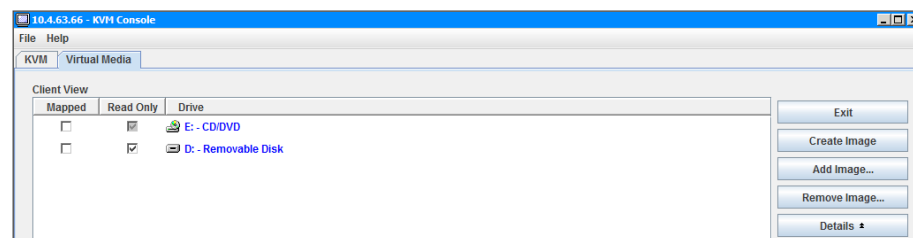
Step 2: Locate the ISO file corresponding to the model of your server, download the file, and store it locally on your hard disk.



Step 3: In the CIMC Console, on the Server tab, click **Summary**, and then click **Launch KVM Console**.

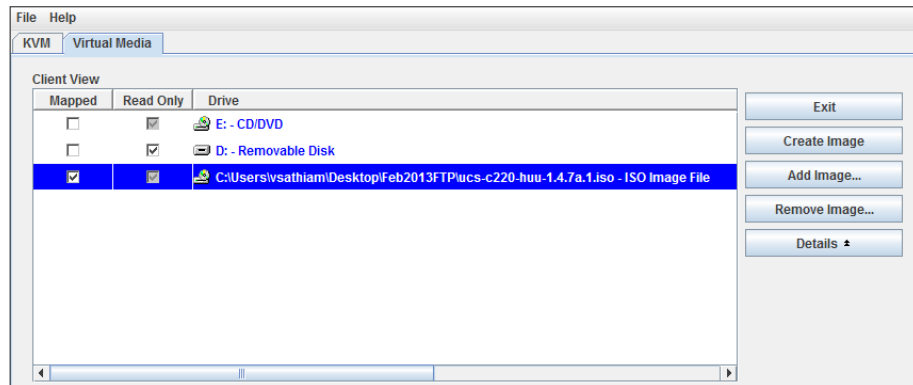


Step 4: In the KVM Console dialog box, select the **Virtual Media** tab. The virtual media feature allows for media on your desktop to be available to the remote host.



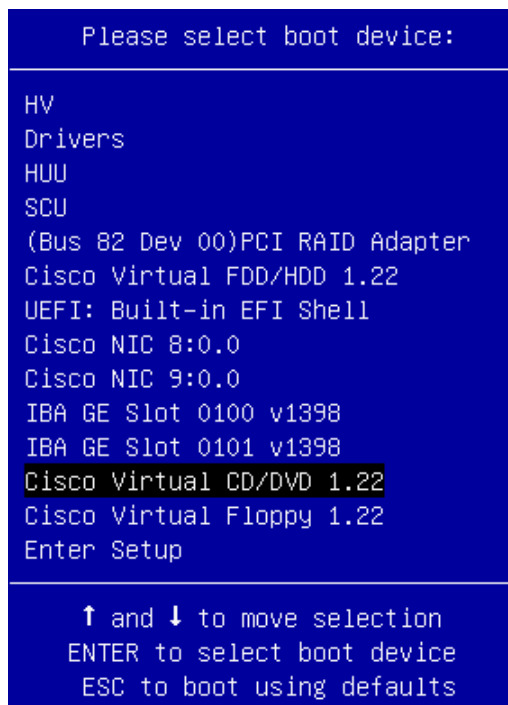
Step 5: Click **Add Image**, and in the Open dialog box, select the Host Upgrade utility ISO file that you downloaded in Step 2.

Step 6: Select the check box in the **Mapped** column for the ISO file. Do not click **Exit** when complete. Instead, proceed to the next step.

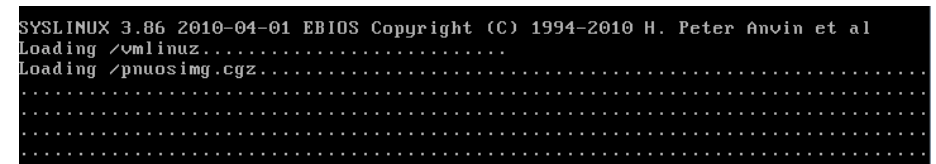


Step 7: In the KVM Console, click the **Macros** tab, and then select **Ctrl-Alt-Del**. The server reboots.

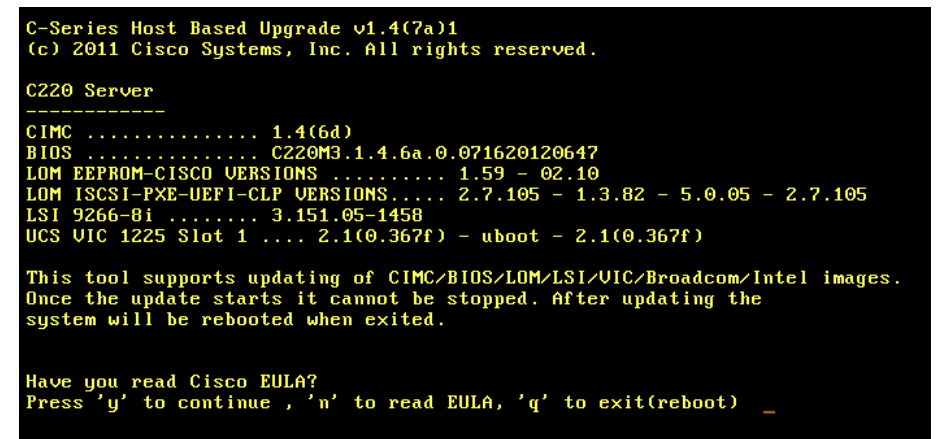
Step 8: During the server's power-on self-test, press **F6**. Use the arrow key to select **Cisco Virtual CD/DVD**, and then press **Enter**. Do not close the virtual media screen while it is in use.



After the server boots from the selected device, the following screen is displayed as the host loads the ISO image from the virtual disk drive.



Step 9: After the server loads the upgrade utility and displays the screen below, press **n** to read the Cisco end-user license agreement (EULA), and then press **y** to accept the EULA.



Step 10: In the Host Upgrade utility screen, at the Enter Choice prompt, enter **11** for all of the above. This upgrades CIMC, BIOS, LAN on motherboard (LOM), LSI, VIC firmware, and Peripheral Component Interconnect (PCI) adapters.

```
C220 Server Current Configuration
-----
0) Inventory
1) Update CIMC Firmware - 1.4(7a)
2) Update BIOS - C220M3.1.4.7b.0.100520120256
3) Update LOM Firmware - 1.61 - 02.12 - 2.7.111 - 1.3.98 - 5.1.01 - 2.7.111
4) Update LSI Firmware - 9266-8i(3.190.55-1868)
5) Update UCS VIC P81E - No devices found
6) Update UCS VIC 1225 - 2.1(1a) - uboot - 2.1(1a)
7) Update BCM 5709(Dual Port) - No Device
   BCM 5709(Quad Port) - No Device
   BCM 57712(Dual Port) - No Device
   BCM 57712(10G BaseT) - No Device
   BCM 57810(Dual Port) - No Device
8) Update Intel I350 (Quad port) - No Device
9) Update INTEL X520 (Dual port) - No Device
10) Update INTEL X540 (Dual port) - No Device
11) All the above
12) Save Logs into USB
13) Reboot (Retains current settings of CIMC)
14) Reboot (Restore factory default settings)

Enter Choice : 11
```

The firmware upgrade begins, and the status can be monitored as in the following figure.

```
Updating CIMC firmware from 1.4(6d) to 1.4(7a)
-----
[Approx Time : 13-15 min]

Firmware Update Utility v1.1 Build 9
Copyright (c) 2011 Cisco Systems Inc.
All rights reserved.

Locked the front panel.

Current Firmware Version
-----
Running Version : 1.4(6d)
Backup Version : 1.4(6c)

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

Step 11: Once all firmware except the BIOS has been upgraded, the following screen indicates that updating the BIOS will power down the server. For the “Updating BIOS will power down the server. This can take few minutes, do you want to continue (y/n)” question, enter **y**, and then for the “Do you want to automatically power up the server once bios update is completed (y/n)” question, enter **y**.

```
Summary Of Updates
-----
CIMC - 1.4(7a) [ Success ]
LOM (Intel I350) - 1.61 - 02.12 - 2.7.111 - 1.3.98 - 5.1.01 - 2.7.111 [ Success ]
LSI - 9266-8i(3.190.55-1868) [ LSI_9266-Success ]
UCS VIC P81E - No devices found
UCS VIC 1225 - 2.1(1a) - uboot - 2.1(1a) [ Slot1-Success ]
BCM 5709(Dual Port) - No Device
BCM 5709(Quad Port) - No Device
BCM 57712(Dual Port) - No Device
BCM 57712(10G BaseT) - No Device
BCM 57810(Dual Port) - No Device
Intel I350 (Quad port) - No Device
Intel X520 (Dual port) - No Device
Intel X540 (Dual port) - No Device

Updating BIOS will power down the server. This can take few minutes, do you want to continue (y/n) :
y
Do you want to automatically power up the server once bios update is completed (y/n) :
```

Step 12: Once the BIOS upgrade completes, the server power cycles and boots up. Log in to CIMC to reestablish the connection.

Step 13: Verify under **Server Properties** that the **BIOS Version** has been updated, and under **CIMC** that the **Firmware Version** has been updated.

Server Summary
Actions

- Power On Server
- Power Off Server
- Shut Down Server
- Power Cycle Server
- Hard Reset Server
- Launch KVM Console
- Turn On Locator LED

Server Properties
Product Name: **UCS C220 M3S**
Serial Number: **FCH1618V049**
PID: **UCSC-C220-M3S**
UUID: **EB471B75-CAD7-45D1-9AE4-2D4FD01F5462**
BIOS Version: **C220M3.1.4.7b.0 (Build Date: 10/05/2012)**
Description:

Server Status
Power State: On
Overall Server Status: Good
Temperature: Good
Power Supplies: Good
Fans: Good
Locator LED: Off

Cisco Integrated Management Controller (CIMC) Information
Hostname: **ucs-c220-m3**
IP Address: **10.4.63.66**
MAC Address: **50:57:A8:E1:BE:52**
Firmware Version: **1.4(7a)**
Current Time (UTC): **Mon Nov 26 15:22:22 2012**

Process

Configuring Ethernet and FCoE Connectivity

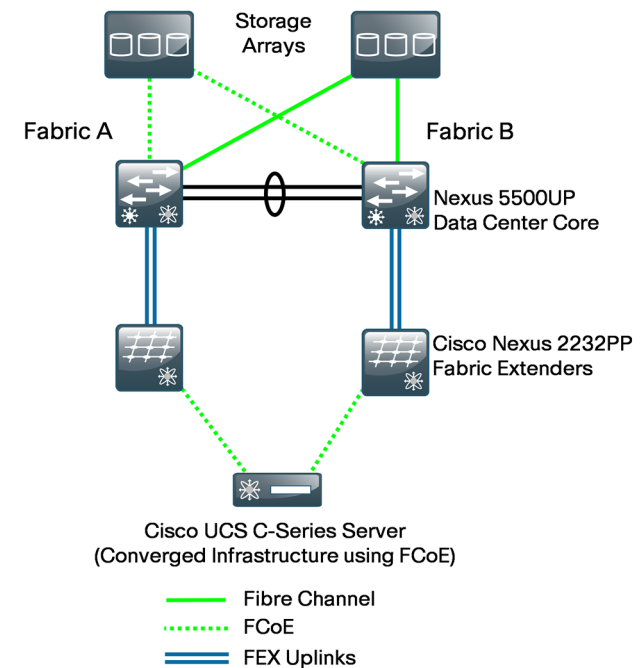
1. Configure vNICs
2. Configure vHBAs

If you are going to connect your Cisco UCS C-Series Server to a Cisco UCS Fabric Interconnect and manage it with Cisco UCS Manager, you may skip this process and continue with the next process "Integrating Cisco UCS C-Series into the Cisco UCS Manager Environment."

FCoE is an extension of the Fibre Channel SAN onto a lossless Ethernet fabric. This allows you to consolidate NICs and HBAs onto a single converged network adapter.

The FCoE-connected server is controlled by two drivers for Fibre Channel and Ethernet, respectively. Fibre Channel traffic over Ethernet is transparent to the operating system of the server. It operates as a Small Computer System Interface (SCSI) Initiator running over FCoE acting as if the server were connected over native Fibre Channel. In the following setup, you enable the Cisco UCS C-Series server to make use of FCoE capabilities. This is done by configuring vNICs and vHBAs, which enables the server to pass Ethernet and Fibre Channel traffic. With the help of adapter virtualization (*network interface virtualization*), it is possible to create multiple Ethernet and Fibre Channel adapters. Through Peripheral Component Interconnect Express (PCIe) virtualization, the adapter shows multiple Ethernet and Fibre Channel adapters to the server. The server can scan the PCIe bus and can find all the virtual adapters that have been provisioned.

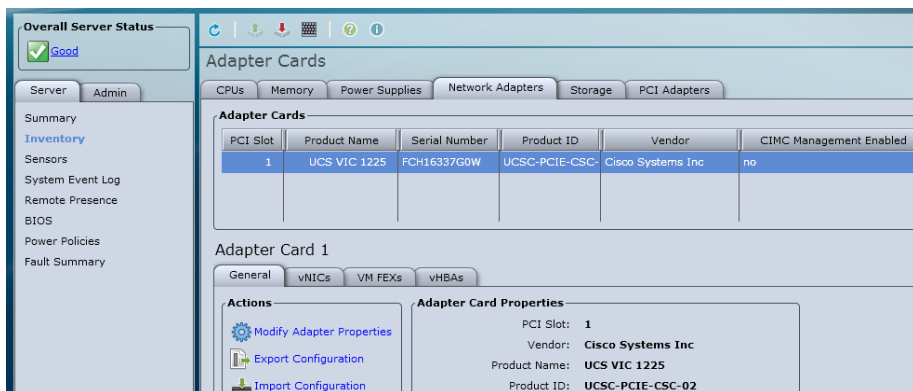
Figure 9 - Converged infrastructure using FCoE



Procedure 1 Configure vNICs

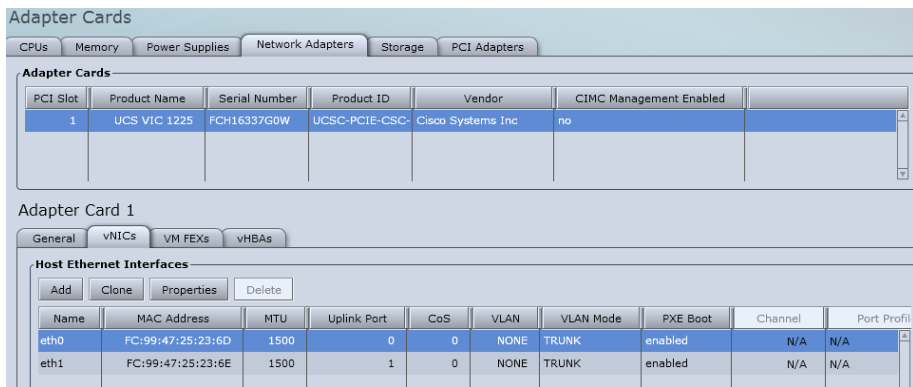
Step 1: In the CIMC console navigation pane, click the **Server** tab, and then click **Inventory**.

Step 2: On the **Network Adapters** tab, click the adapter.

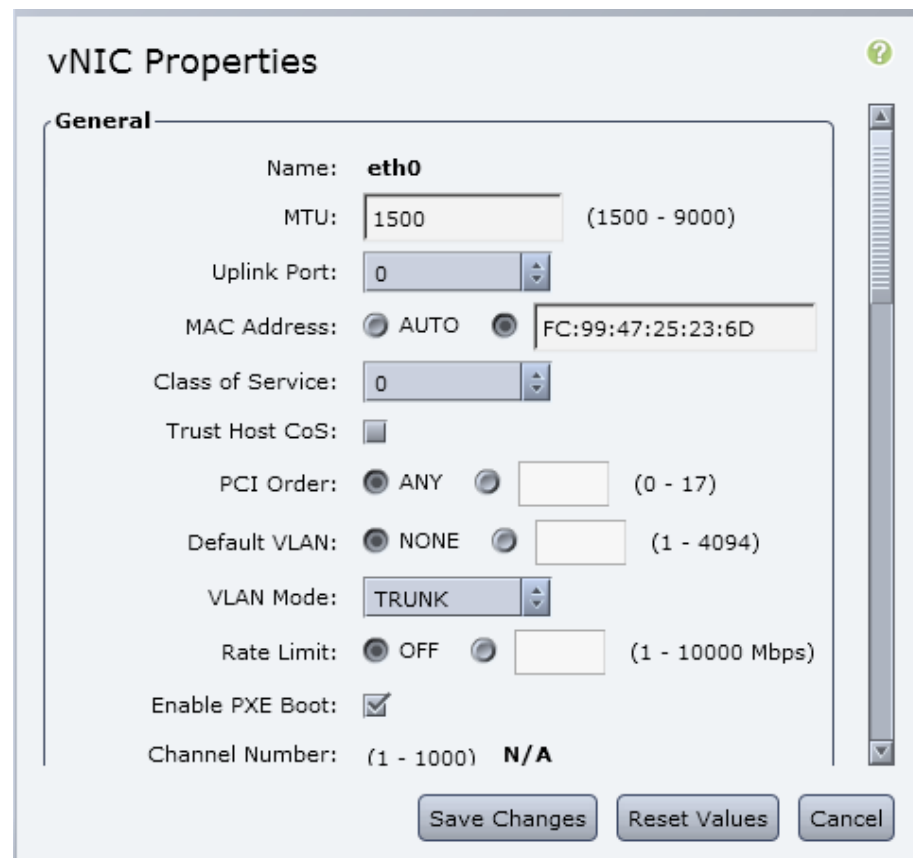


Step 3: On the General tab in the tabbed menu below the Adapter Cards area, verify that **FIP Mode** is set to **Enabled**. If the FIP mode is not enabled, click **Modify Adapter Properties**, select **Enable FIP Mode**, and then click **Save Changes**. FIP mode ensures that the adapter is compatible with current FCoE standards.

Step 4: On the tabbed menu below the Adapter Card area, click the **vNICs** tab. In the Host Ethernet Interfaces area, select a vNIC from the table.



Step 5: Click **Properties**. The vNIC Properties dialog box appears.



Most single operating system installations that have been installed directly on a server use a single VLAN for server-to-network operation. For a server environment where multiple VLANs will need to be available to the operating system, as is the case for VMware ESXi, you use a VLAN mode of Trunk.

Step 6: In the **VLAN Mode** list, choose **Trunk**.

The upstream data-center core switch ports to which the two physical ports of the Cisco UCS P81E VIC or Cisco UCS VIC 1225 adapter are connected should also be configured to match the VLAN selection as either a single VLAN or trunk ports. VLAN trunks on the adapter card carry traffic from all VLANs by default. The upstream data center core switch typically has VLAN-1 as the native VLAN by default.

Step 7: If you are not passing any data traffic on VLAN-1 to the host, leave **Default VLAN** set to **NONE**.

Step 8: Repeat Step 4 through Step 7 for the second vNIC, and ensure that the vNIC properties are the same as you set in Step 6 and Step 7.

Procedure 2 Configure vHBAs

The Cisco UCS P81E VIC and Cisco UCS VIC 1225 converged network adapters include two physical 10–Gigabit Ethernet ports and have two vHBAs created by default. The two vHBAs labeled as **fc0** and **fc1** are connected to the upstream data-center core switches Cisco Nexus 5500-A and Nexus 5500-B, respectively, as configured in the Cisco *SBA—Data Center Deployment Guide*. VSAN allows logical partitioning of the physical SAN infrastructure. It is recommended that you dedicate a separate VLAN for FCoE traffic corresponding to each VSAN. The following table shows the FCoE VLAN for each VSAN as was set up in the *Data Center Deployment Guide*.

Table 8 - SBA data center core switch VSAN and FCoE VLAN values

Data center core switch	VSAN	FCoE VLAN
Cisco Nexus 5500-A	4	304
Cisco Nexus 5500-B	5	305

FCoE Initialization Protocol (FIP) is the control plane protocol used to establish the FCoE virtual link between the Ethernet-attached Fibre Channel node and the FCoE switch. FIP performs FCoE VLAN discovery by sending untagged frames to its neighbor. It provides a way for the host to log into and log out from the FCoE switch. Note that FIP VLAN discovery is not supported by Linux or VMware ESX server. Because of this, the FCoE VLAN has to be configured on the vHBA from the CIMC console. More details about the Fibre Channel and FCoE setup can be found in the *Cisco SBA—Data Center Deployment Guide*.

Step 1: In the Adapter Cards area, select the available adapter card.

PCI Slot	Product Name	Serial Number	Product ID	Vendor	CIMC Management Enabled
1	UCS VIC 1225	FCH16337G0W	UCSC-PCIE-CSC	Cisco Systems Inc	no

Name	WWPN	WWNN	Uplink	Boot	Channel	Port Profile
fc0	20:00:FC:99:47:25:23:6F	10:00:FC:99:47:25:23:6F	0	disabled	N/A	N/A
fc1	20:00:FC:99:47:25:23:70	10:00:FC:99:47:25:23:70	1	disabled	N/A	N/A

Step 2: On the tabbed menu below the Adapter Card area, click the **vHBAs** tab, and in the Host Fibre Channel Interfaces area, select the vHBA labeled **fc0** from the table, and then click **Properties**.

Step 3: In the **Default VLAN** field, select the second option button, and then enter the FCoE VLAN, which in this case is VLAN **304** (as shown in Table 8 earlier in this procedure).

vHBA Properties

General

Name: **fc0**

World Wide Node Name: ☐ AUTO ☒ 10:00:FC:99:47:25:23:6

World Wide Port Name: ☐ AUTO ☒ 20:00:FC:99:47:25:23:6

FC SAN Boot: ☐

Enable Persistent LUN Binding: ☐

Uplink Port: 0

MAC Address: ☐ AUTO ☒ FC:99:47:25:23:6F

Default VLAN: ☐ NONE ☒ 304 (1 - 4094)

Class of Service: 3

Rate Limit: ☒ OFF ☐ (1 - 10000 Mbps)

PCIe Device Order: ☒ ANY ☐ (0 - 17)

EDTOL: 1000 (1000 - 100000)

Save Changes Reset Values Cancel

Step 4: Click **Save Changes**.

Step 5: In the Host Fibre Channel Interfaces area, select the vHBA labeled as **fc1** from the table, and then click **Properties**.

Step 6: In the **Default VLAN** field, select the second option button, and then enter the FCoE VLAN, which in this case is VLAN **305**. This value must match with the FCoE VLAN configured in the upstream connected switch.

vHBA Properties

General

Name: **fc1**

World Wide Node Name: ☐ AUTO ☒ 10:00:FC:99:47:25:23:7

World Wide Port Name: ☐ AUTO ☒ 20:00:FC:99:47:25:23:7

FC SAN Boot: ☐

Enable Persistent LUN Binding: ☐

Uplink Port: 1

MAC Address: ☐ AUTO ☒ FC:99:47:25:23:70

Default VLAN: ☐ NONE ☒ 305 (1 - 4094)

Class of Service: 3

Rate Limit: ☒ OFF ☐ (1 - 10000 Mbps)

PCIe Device Order: ☒ ANY ☐ (0 - 17)

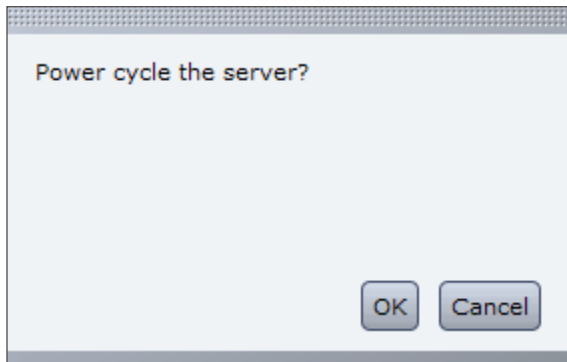
EDTOL: 1000 (1000 - 100000)

Save Changes Reset Values Cancel

Step 7: Click **Save Changes**.

Step 8: In the navigation pane, click the **Server** tab, click **Summary**, and then in the work pane, under Actions, click **Power Cycle Server**. You must reboot the server for changes to take effect.

Step 9: On the “Power cycle the server?” message, click **OK**.



After the server reboots, it is ready to have an operating system installed.



Reader Tip

How to configure a VMware environment is explained in detail in the *Cisco SBA —Data Center Virtualization with UCS, Nexus 1000V and VMware Deployment Guide*.

Process

Integrating Cisco UCS C-Series into the Cisco UCS Manager Environment

1. Connect Cisco Nexus 2232PP FEX
2. Configuring dual-wire management
3. Configuring single-wire management
4. Associate service profile to server

The previous process for the Cisco UCS C-Series prepared the server for connectivity directly to the Cisco Nexus 2000 Series Fabric Extenders and Nexus 5000 Series Switches data center foundation, where the C-Series

server would be managed as a standalone device. This section describes deploying infrastructure to allow the C-series server to connect to the fabric interconnects of the Cisco UCS B-Series environment and to allow you to manage both the B-Series and C-Series servers from Cisco UCS Manager and transport traffic through the Fabric Interconnect.



Reader Tip

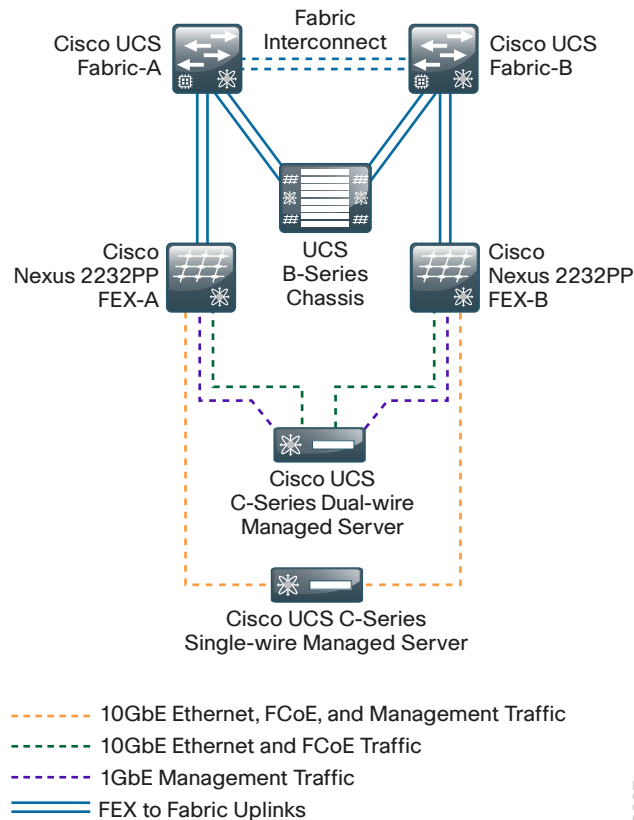
Details on supported Cisco UCS C-Series servers and network adapter cards for Cisco UCS integration, as well as the installation instructions for your specific C-Series server, can be found at: http://www.cisco.com/en/US/products/ps11736/products_installation_and_configuration_guides_list.html

This design guide is using Cisco UCS Manager Release 2.1(1a). With UCS Manager Release 2.1(1a) and later, there are now two modes of managing the UCS C-Series server connected to the fabric interconnects:

- **Single-wire-management**—Requires the Cisco UCS VIC1225 Virtual Interface Card, which can carry both data traffic and management traffic on the same interface cable. The Cisco UCS VIC 1225 is supported on the Cisco UCS C-Series M3 model servers and select M2 model servers.
- **Dual-wire-management**—Is supported in the Cisco UCS Manager release 2.1 and earlier releases. Shared LAN on Motherboard (LOM) ports on the rack server are used exclusively for carrying management traffic. A separate cable connected to one of the ports on the PCIe card or Cisco UCS P81E Virtual Interface Card carries the data traffic. The Cisco UCS VIC 1225 supports dual-wire-management as well.

The Cisco UCS C-Series servers connect to the UCS Fabric Interconnects via Cisco Nexus 2232PP Fabric Extenders (FEX), as shown in Figure 10. The C-Series server requires four connections to the FEX: two management links and two data traffic links. The Nexus 2232PP FEX allows higher density server connectivity and can support both data and management traffic flows to the fabric. In this design, the Nexus 2232PP FEX can connect up to 16 UCS C-Series servers.

Figure 10 - Cisco UCS C-Series server to UCS Fabric connection details



The quantity of FEX to fabric uplinks must be equal to or greater than the minimum number of links specified in the Chassis Discovery Policy set in Step 3 of the "Configure fabric-to-I/O-module links" procedure earlier in this guide.

Procedure 1

Connect Cisco Nexus 2232PP FEX

Step 1: Connect FEX uplink ports to fabric interconnects, as follows:

- Connect FEX-A uplinks p1 through p4 to Fabric Interconnect-A (FI-A).
- Connect FEX-B uplinks p1 through p4 to Fabric Interconnect-B (FI-B).

You can use up to 8 FEX uplinks to a fabric interconnect for maximum throughput, and a minimum of 2 is required for the Chassis Discovery Policy set in Step 3 of the "Configure fabric-to-I/O-module links" procedure earlier in this guide. It is recommended that for maximum virtual NIC scalability, that a FEX connect to the fabric interconnect with all FEX uplink ports included in a group of 8 fabric interconnect ports; that is all FEX uplink ports connect to fabric interconnect ports 1-8, or 9-16, or 17-24, etc.



Tech Tip

The number of vNICs and vHBAs that can be defined on virtual interface cards in the servers connected to the FEX is dependent on the number of uplinks and the connectivity to the fabric interconnect. For more information see:

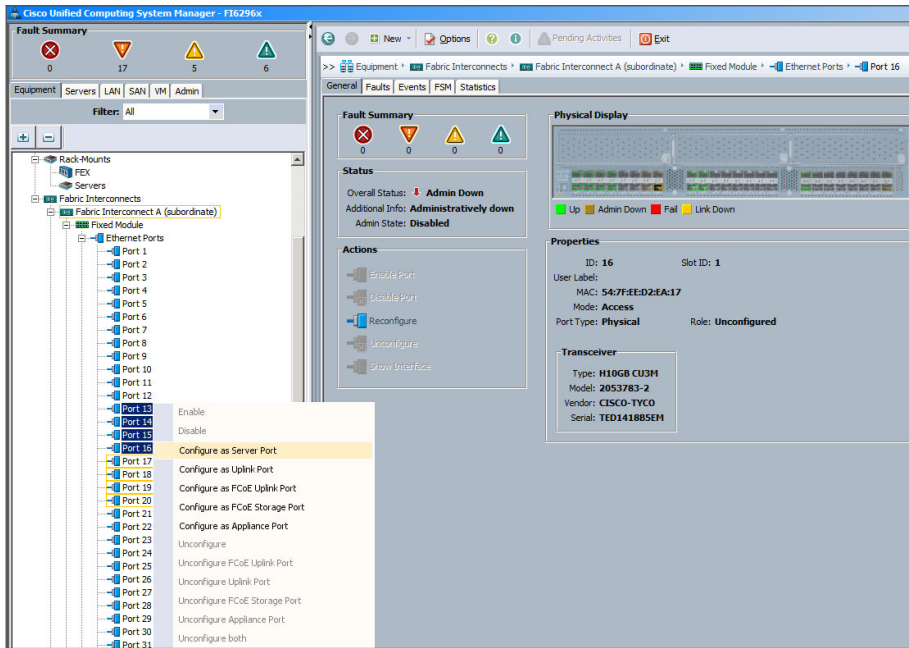
http://www.cisco.com/en/US/docs/unified_computing/ucs/c-series_integration/ucsm2.1/b_UCSM2-1_C-Integration_chapter_01.html#reference_7F381038303B4825ACD303765905086A

Step 2: Using a browser, access the cluster IP address **10.4.63.31** that you assigned during initial setup in Procedure 3 "Complete initial fabric interconnect setup" of the "Completing the Initial System Setup" process, and then choose **Launch**. The Cisco UCS Manager Java application downloads.

Step 3: In the navigation pane, click the **Equipment** tab, and then expand **Fabric Interconnects > Fabric Interconnect A > Fixed Module > Ethernet Ports**.

Objects are displayed representing each of the physical ports on the base fabric interconnect system. This deployment uses ports 13, 14, 15 and 16 of fabric interconnect ports to FEX.

Step 4: Right-click the selected port or group of ports, and then choose **Configure as Server Port**.

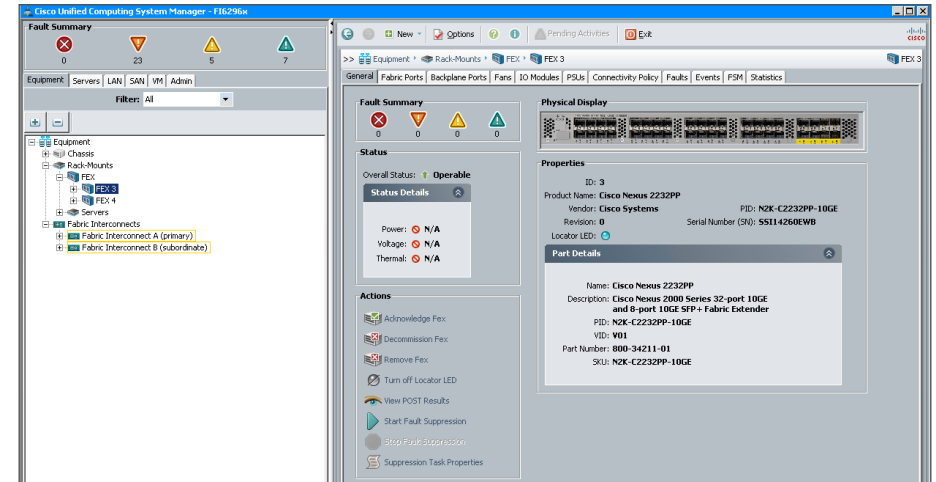


Step 5: On the “Successfully Configured...” message, click **OK**.

Step 6: Repeat Step 3 and Step 4 on Fabric Interconnect B.

Step 7: Connect power to FEX-A and FEX-B.

Step 8: In the navigation pane, expand **Equipment > Rack-Mounts > FEX**. The Cisco Nexus 2232PP FEXs should appear with automatically generated FEX numbering. In the screen below the new FEXs are FEX 3 and FEX 4.



It will take a few minutes for the FEX to power up, download software from the fabric interconnect, and report to the system. If you click a FEX, the status in the work pane should appear as Operable.

Procedure 2 Configuring dual-wire management

If you will be configuring for single-wire-management you can skip this procedure, and proceed to the next procedure.

Dual-wire-management is supported in the Cisco UCS Manager release 2.1 and releases earlier than 2.1 which meet the adapter card and Cisco UCS C-Series server requirements. Shared LAN on Motherboard (LOM) ports on the rack server are used exclusively for carrying management traffic. A separate cable connected to one of the ports on the PCIe card or Cisco UCS P81E Virtual Interface Card carries the data traffic. You must ensure that the Cisco UCS C-Series server CIMC settings are set to factory default prior to attempting dual-wire management integration.



Reader Tip

For more information on dual-wire-management and support on releases prior to Cisco UCS Manager 2.1 please see: http://www.cisco.com/en/US/products/ps11736/products_installation_and_configuration_guides_list.html

In this procedure, you connect the Cisco UCS C-Series server management traffic path to FEX-A and FEX-B deployed in Procedure 1, as shown in Figure 10. In Step 1 and Step 2, you must use Cisco UCS C-Series Ethernet LOM ports for server management traffic, and not the CIMC management ports.

Step 1: Insert one GLC-T transceiver into a port of FEX-A. You can use any port on the FEX. Connect an RJ-45 Ethernet cable between the 1-Gb Ethernet LOM port Eth 1 on the rear panel of the server and the transceiver that you inserted in FEX-A.

Step 2: Insert one GLC-T transceiver into a port of FEX-B. You can use any port on the FEX. Connect an RJ-45 Ethernet cable between the 1-Gb Ethernet LOM port Eth 2 on the rear panel of the server and the transceiver that you inserted in FEX-B.

Next, connect the data traffic path to FEX-A and FEX-B deployed in Procedure 1, as shown in Figure 10.

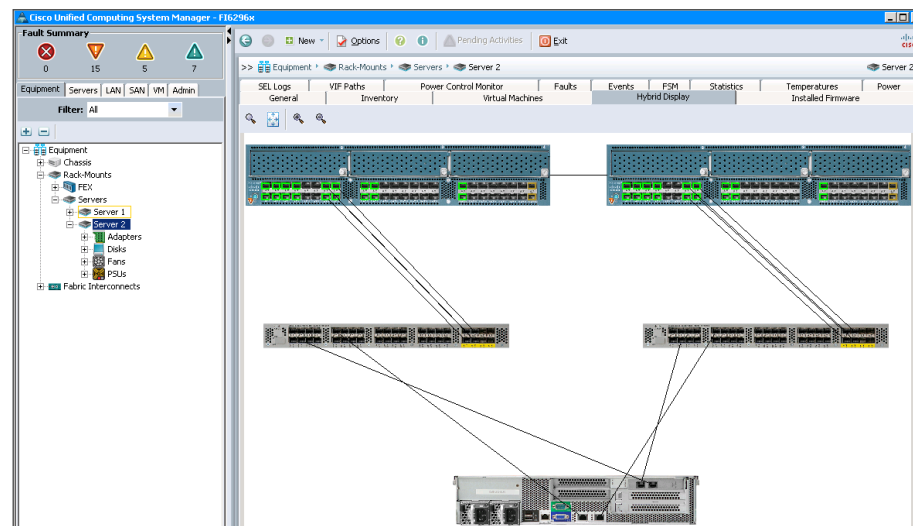
Step 3: Connect a 10-Gb Small Form-Factor Pluggable Plus (SFP+) cable between the 10-Gb adapter card Port 1 in the server and a port on FEX-A. You can use any port on the FEX.

Step 4: Connect a 10-Gb SFP+ cable between the 10-Gb adapter card Port 2 in the server and a port on FEX-B. You can use any port on the FEX.

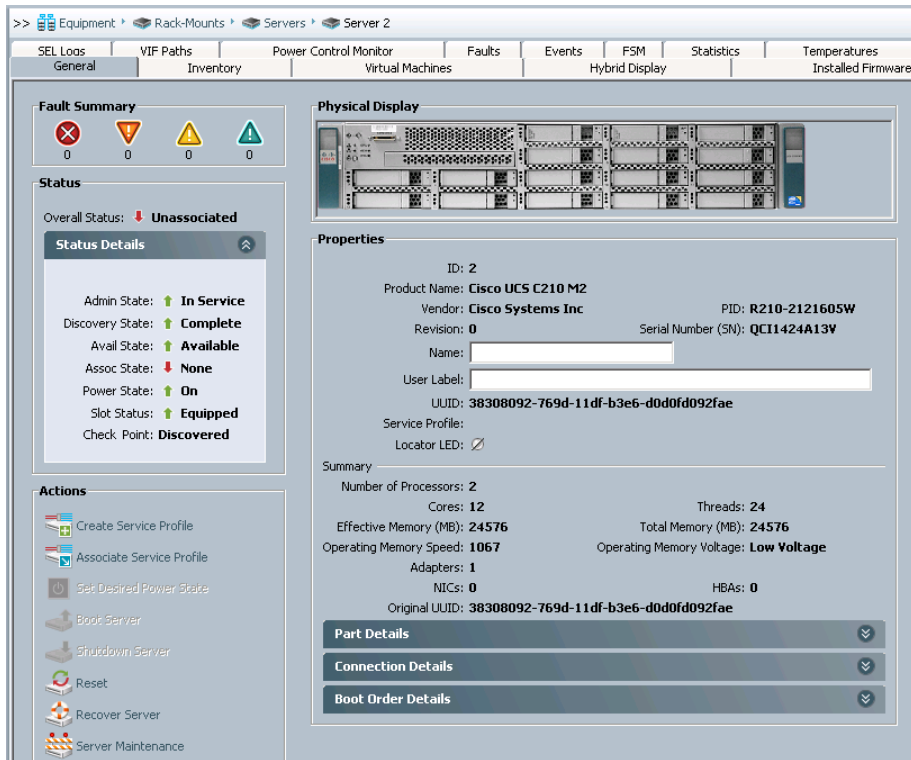
Step 5: Power on or reboot the server. Cisco UCS Manager dynamically discovers the server.

Step 6: In the navigation pane, expand **Equipment > Rack-Mounts > Servers**. Server 2 is listed.

Step 7: Click the server (Example: Server 2). The connectivity for the Cisco UCS C-Series Server 2 is shown in the work pane.



Step 8: Click the **General** tab. The operational status and the properties of the physical Server 2 are displayed.



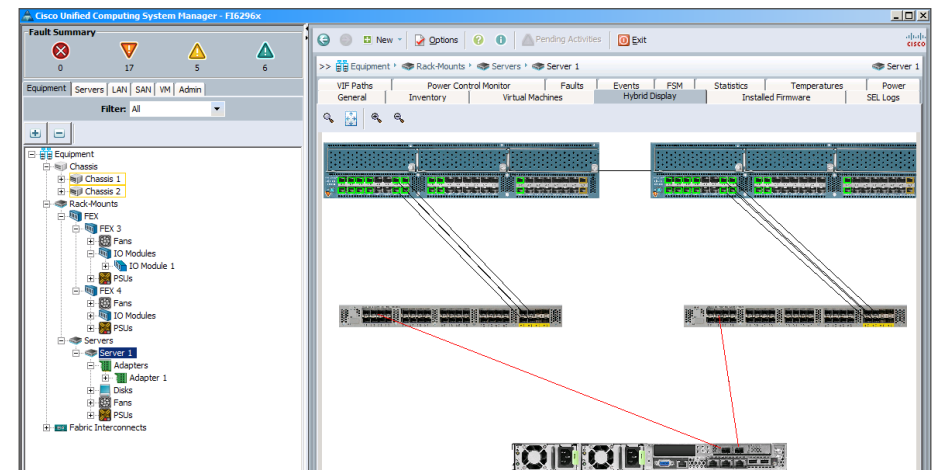
Step 1: Connect a 10-Gb Small Form-Factor Pluggable Plus (SFP+) cable between the 10-Gb adapter card Port 1 in the server and a port on FEX-A. You can use any port on the FEX.

Step 2: Connect a 10-Gb SFP+ cable between the 10-Gb adapter card Port 2 in the server and a port on FEX-B. You can use any port on the FEX.

Step 3: Power on or reboot the server. Cisco UCS Manager dynamically discovers the server.

Step 4: In the navigation pane, expand **Equipment > Rack-Mounts > Servers**. Server 1 is listed.

Step 5: Click **Server 1**. The connectivity for the Cisco UCS C-Series Server 1 is shown in the work pane.

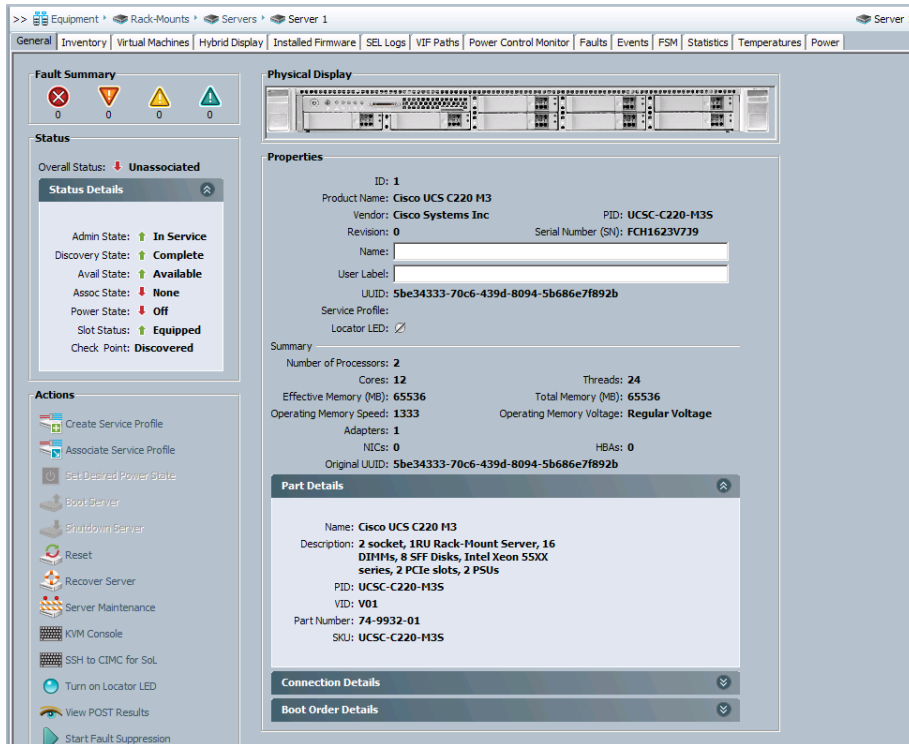


Procedure 3 Configuring single-wire management

Single-wire-management requires the Cisco UCS VIC 1225, which can carry both data traffic and management traffic on the same interface cable. The Cisco UCS VIC 1225 is supported on the Cisco UCS C-Series M3 model servers and select M2 model servers. You must ensure that the Cisco UCS C-Series server CIMC settings are set to factory default prior to attempting single-wire management integration.

In this deployment, you connect one of the Cisco UCS VIC 1225 adapter 10-Gb Ethernet interfaces to each FEX, FEX-A and FEX-B, deployed in Procedure 1, as shown in Figure 10.

Step 6: Click the **General** tab. The operational status and the properties of the physical Server 1 are displayed.



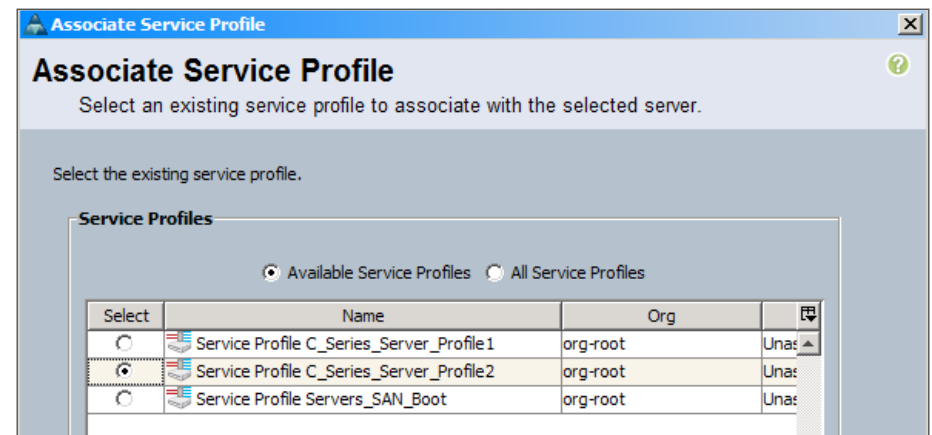
Procedure 4

Associate service profile to server

You can now attach a previously defined service profile to the Cisco UCS C-Series server the same way you are able to do with a Cisco UCS B-Series server, as detailed in Procedure 2, "Associate server to service profile."

Step 1: In the work pane, click the **General** tab, and then, in the Actions field, click **Associate Service Profile**.

Step 2: Select a service profile for your server from the list of available service profiles, and then click **OK**. The physical server blade boots up with the assigned service profile.



This completes the Cisco UCS C-Series server integration to Cisco UCS Manager environment. You can now build and assign profiles for C-Series servers the same way as a B-Series server, as detailed earlier in this guide.

Appendix A: Product List

Data Center Core

Functional Area	Product Description	Part Numbers	Software
Core Switch	Cisco Nexus 5596 up to 96-port 10GbE, FCoE, and Fibre Channel SFP+	N5K-C5596UP-FA	NX-OS 5.2(1)N1(1b) Layer 3 License
	Cisco Nexus 5596 Layer 3 Switching Module	N55-M160L30V2	
	Cisco Nexus 5548 up to 48-port 10GbE, FCoE, and Fibre Channel SFP+	N5K-C5548UP-FA	
	Cisco Nexus 5548 Layer 3 Switching Module	N55-D160L3	
Ethernet Extension	Cisco Nexus 2000 Series 48 Ethernet 100/1000BASE-T (enhanced) Fabric Extender	N2K-C2248TP-E	—
	Cisco Nexus 2000 Series 48 Ethernet 100/1000BASE-T Fabric Extender	N2K-C2248TP-1GE	
	Cisco Nexus 2000 Series 32 1/10 GbE SFP+, FCoE capable Fabric Extender	N2K-C2232PP-10GE	

Data Center Services

Functional Area	Product Description	Part Numbers	Software
Application Resiliency	Cisco ACE 4710 Application Control Engine 2Gbps	ACE-4710-02-K9	A5(1.2)
	Cisco ACE 4710 Application Control Engine 1Gbps	ACE-4710-01-K9	
	Cisco ACE 4710 Application Control Engine 1Gbps 2-Pack	ACE-4710-2PAK	
	Cisco ACE 4710 Application Control Engine 500 Mbps	ACE-4710-0.5-K9	
Firewall	Cisco ASA 5585-X Security Plus IPS Edition SSP-40 and IPS SSP-40 bundle	ASA5585-S40P40-K9	ASA 9.0(1) IPS 7.1(6) E4
	Cisco ASA 5585-X Security Plus IPS Edition SSP-20 and IPS SSP-20 bundle	ASA5585-S20P20X-K9	
	Cisco ASA 5585-X Security Plus IPS Edition SSP-10 and IPS SSP-10 bundle	ASA5585-S10P10XK9	

Storage Network Extension

Functional Area	Product Description	Part Numbers	Software
Fibre-channel Switch	Cisco MDS 9148 Multilayer Fibre Channel Switch	DS-C9148D-8G16P-K9	NX-OS 5.0(8)
	Cisco MDS 9124 Multilayer Fibre Channel Switch	DS-C9124-K9	

Computing Resources

Functional Area	Product Description	Part Numbers	Software
UCS Fabric Interconnect	Cisco UCS up to 48-port Fabric Interconnect	UCS-FI-6248UP	2.1(1a)
	Cisco UCS up to 96-port Fabric Interconnect	UCS-FI-6296UP	Cisco UCS Release
UCS B-Series Blade Servers	Cisco UCS Blade Server Chassis	N20-C6508	2.1(1a) Cisco UCS Release
	Cisco UCS 8-port 10GbE Fabric Extender	UCS-IOM2208XP	
	Cisco UCS 4-port 10GbE Fabric Extender	UCS-IOM2204XP	
	Cisco UCS B200 M3 Blade Server	UCSB-B200-M3	
	Cisco UCS B200 M2 Blade Server	N20-B6625-1	
	Cisco UCS B250 M2 Blade Server	N20-B6625-2	
	Cisco UCS 1280 Virtual Interface Card	UCS-VIC-M82-8P	
	Cisco UCS M81KR Virtual Interface Card	N20-AC0002	
UCS C-Series Rack-mount Servers	Cisco UCS C220 M3 Rack Mount Server	UCSC-C220-M3S	1.4.6 Cisco UCS CIMC Release
	Cisco UCS C240 M3 Rack Mount Server	UCSC-C240-M3S	
	Cisco UCS C200 M2 Rack Mount Server	R200-1120402W	
	Cisco UCS C210 M2 Rack Mount Server	R210-2121605W	
	Cisco UCS C250 M2 Rack Mount Server	R250-2480805W	
	Cisco UCS 1225 Virtual Interface Card Dual Port 10Gb SFP+	UCSC-PCIE-CSC-02	
	Cisco UCS P81E Virtual Interface Card Dual Port 10Gb SFP+	N2XX-ACPCI01	

Appendix B: Changes

This appendix summarizes the changes to this guide since the previous Cisco SBA series:

- We improved process and step flow in the “Data Center Core Network Infrastructure” section.
- We upgraded the Cisco UCS Manager on the Cisco UCS Fabric Interconnects to release 2.1(1a), and we added Cisco UCS B200 M3 Blade Server with the modular LAN on Motherboard (mLOM) based on the new Cisco UCS VIC 1240 Virtual Interface Card.
- We added FCoE uplinks as an option in both the data center core and on the Cisco UCS Fabric Interconnects.
- We redesigned the Cisco UCS B-Series server process and procedures, to streamline address pool creation, profile creation, and template creation. We added Cisco UCS Manager domain identification, to address pool creation.
- We removed the Cisco UCS 6100 Series Fabric Interconnects and Cisco UCS 2100 Series Fabric Extenders.
- We added Cisco UCS C-Series C220 M3 and C240 M3 rack mount servers to the Cisco SBA data center along with the new Cisco UCS VIC 1225.
- We updated the Cisco UCS C-Series server LSI RAID controller configuration, to use the more recent LSI MegaRAID controller.
- We added Cisco UCS Manager single-wire-management to the process for Cisco C-Series server integration to the Cisco UCS Manager environment.

Notes

Feedback

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