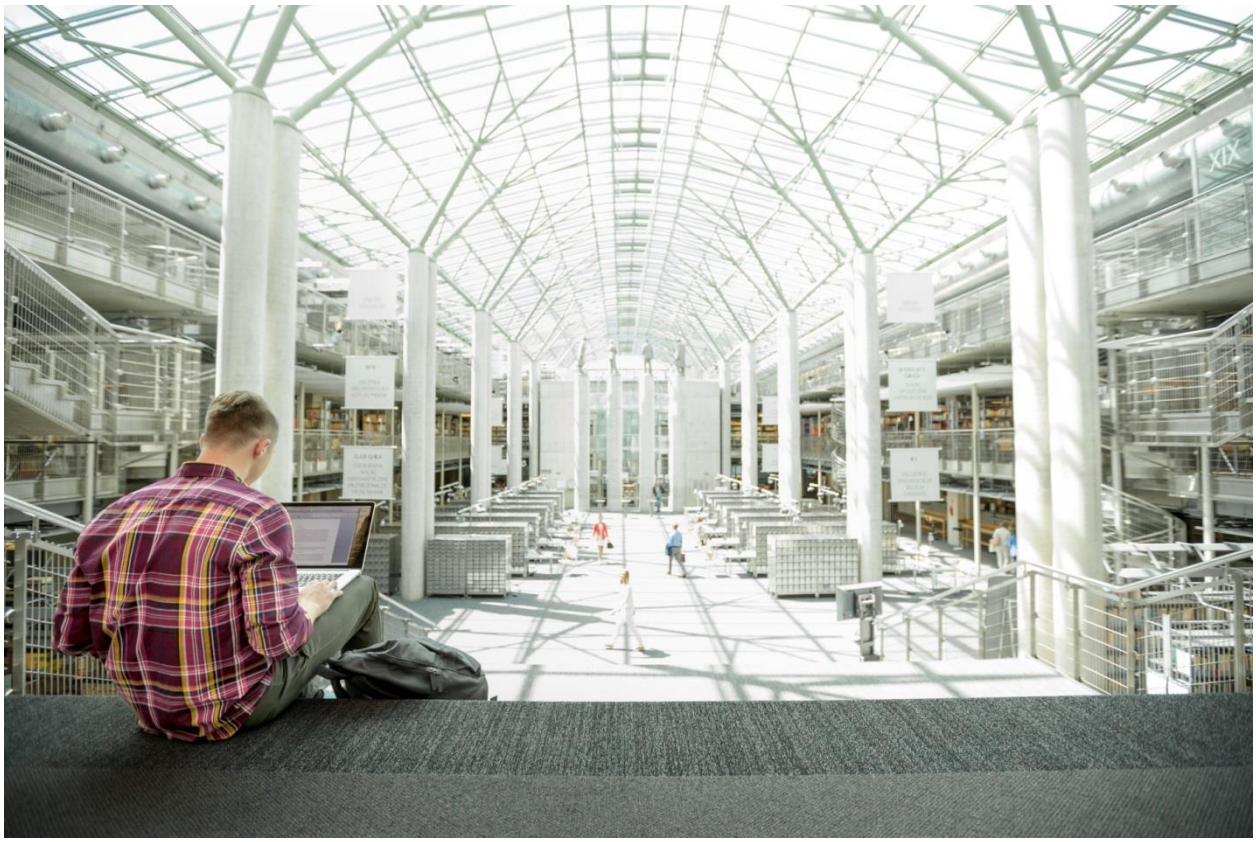


FlashStack Virtual Server Infrastructure with iSCSI Storage for VMware vSphere 6.5 U1

iSCSI Deployment Guide for FlashStack with Cisco UCS 6300 Fabric Interconnect and Pure Storage FlashArray//X70

Last Updated: March 5, 2018

About the Cisco Validated Design (CVD) Program

The CVD program consists of systems and solutions designed, tested, and documented to facilitate faster, more reliable, and more predictable customer deployments. For more information, visit:

http://www.cisco.com/go/designzone.

Table of Contents

Executive Summary

Cisco Validated Designs consist of systems and solutions that are designed, tested, and documented to facilitate and improve customer deployments. These designs incorporate a wide range of technologies and products into a portfolio of solutions that have been developed to address the business needs of our customers.

This document details the design described in the FlashStack Virtual Server Infrastructure Design Guide for VMware vSphere 6.5 U1, which showed a validated converged infrastructure jointly developed by Cisco and Pure Storage. In this solution we will walk through the deployment of a predesigned, best-practice data center architecture with VMware vSphere built on the Cisco Unified Computing System (UCS), the Cisco Nexus® 9000 family of switches, and Pure Storage FlashArray//X all flash storage configured for iSCSI based storage access.

When deployed, the architecture presents a robust infrastructure viable for a wide range of application workloads implemented as a virtual server infrastructure.

Solution Overview

Introduction

In the current industry there is a trend for pre-engineered solutions which standardize the data center infrastructure, offering the business operational efficiencies, agility and scale to address cloud, bimodal IT and their business. Their challenge is complexity, diverse application support, efficiency and risk; all these are met by FlashStack with:

- Reduced complexity and automatable infrastructure and easily deployed resources
- Robust components capable of supporting high performance and high bandwidth virtualized applications
- Efficiency through optimization of network bandwidth and in-line storage compression with de-duplication
- Risk reduction at each level of the design with resiliency built into each touch point throughout

Cisco and Pure Storage have partnered to deliver this Cisco Validated Design, which uses best of breed storage, server and network components to serve as the foundation for virtualized workloads, enabling efficient architectural designs that can be quickly and confidently deployed.

In this document we will describe a reference architecture detailing a Virtual Server Infrastructure composed of Cisco Nexus switches, Cisco UCS Compute, and a Pure Storage FlashArray//X delivering a VMware vSphere 6.5 U1 hypervisor environment.

Audience

The audience for this document includes, but is not limited to; sales engineers, field consultants, professional services, IT managers, partner engineers, and customers who want to take advantage of an infrastructure built to deliver IT efficiency and enable IT innovation.

Purpose of this Document

This document details a step-by-step configuration and implementation guide for FlashStack, centered around the Cisco UCS 6332-16UP Fabric Interconnect and the Pure Storage FlashArray//X70. These components are supported by the 100G capable Cisco Nexus 93180YC-EX switch to deliver a Virtual Server infrastructure on Cisco UCS B200 M5 Blade Servers running VMware vSphere 6.5 U1.

The design that will be implemented is discussed in the FlashStack Virtual Server Infrastructure Design Guide for VMware vSphere 6.5 U1 found here:

http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/UCS_CVDs/ucs_flashstack_vsi_vm65_M5_designs.html

Solution Summary

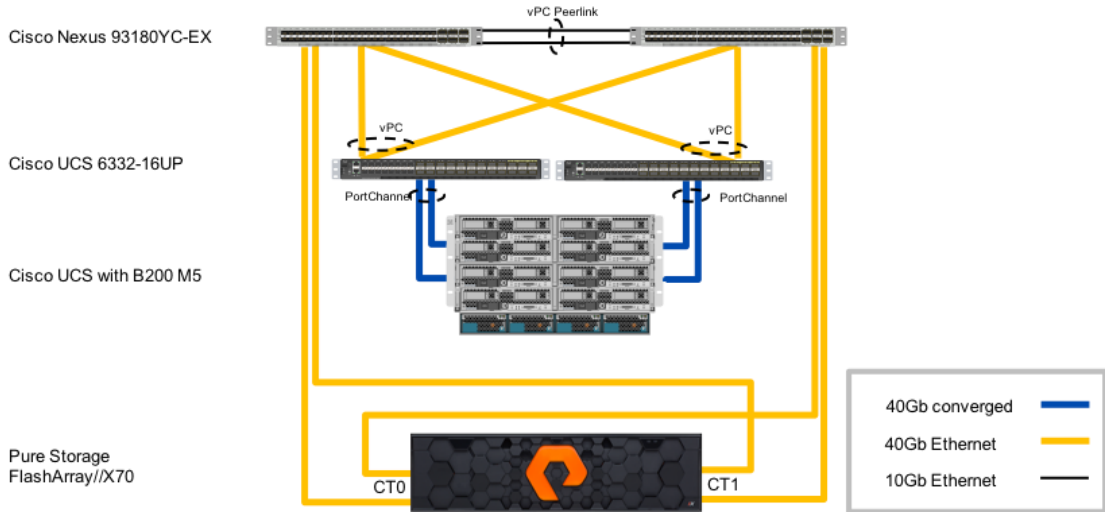
The FlashStack Virtual Server Infrastructure is a validated reference architecture, collaborated on by Cisco and Pure Storage, built to serve enterprise data centers. The solution is built to deliver a VMware vSphere

based environment, leveraging the Cisco Unified Computing System (UCS), Cisco Nexus switches, and Pure Storage FlashArray.

The architecture brings together a simple, wire once solution that is SAN booted from iSCSI and is highly resilient at each layer of the design. This creates an infrastructure that is ideal for a variety of virtual application deployments that can reliably scale when growth is needed.

Figure 1 shows the base physical architecture used in FlashStack Virtual Server Infrastructure.

Figure 1 FlashStack with Cisco UCS 6332-16UP and Pure Storage FlashArray//X70



The reference hardware configuration includes:

- Two Cisco Nexus 93180YC-EX Switches
- Two Cisco UCS 6332-16UP Fabric Interconnects
- Cisco UCS 5108 Chassis with two Cisco UCS 2304 Fabric Extenders
- Cisco UCS B200 M5 Blade Servers
- A Pure Storage FlashArray//X70

The virtual environment this supports is within VMware vSphere 6.5 U1, and includes virtual management and automation components from Cisco and Pure Storage built into the solution, or as optional add-ons.

This document will provide a low-level example of steps to deploy this base architecture that may need some adjustments depending on the customer environment. These steps include physical cabling, network, storage, compute, and virtual device configurations.

Deployment Guidelines

Software Revisions

Table 1 lists the software versions for hardware and virtual components used in this solution. Each of these versions have been used have been certified within interoperability matrixes supported by Cisco, Pure Storage, and VMware. For more current supported version information, consult the following sources:

- Cisco UCS Hardware and Software Interoperability Tool: http://www.cisco.com/web/techdoc/ucs/interoperability/matrix/matrix.html
- Pure Storage Interoperability(note, this interoperability list will require a support login form Pure): https://support.purestorage.com/FlashArray/Getting_Started/Compatibility_Matrix
- VMware Compatibility Guide: http://www.vmware.com/resources/compatibility/search.php

Additionally, it is also strongly suggested to align FlashStack deployments with the recommended release for the Cisco Nexus 9000 switches used in the architecture:

- Nexus: https://www.cisco.com/c/en/us/td/docs/switches/datacenter/nexus9000/sw/recommended_release/b_Minimum_and_Recommended_Cisco_NX-OS_Releases_for_Cisco_Nexus_9000_Series_Switches.html

If versions are selected that differ from the validated versions below, it is highly recommended to read the release notes of the selected version to be aware of any changes to features or commands that may have occurred.

Table 1 Software Revisions

Layer	Device	Image	Comments
Compute	Cisco UCS Fabric Interconnects 6300 Series, UCS B-200 M5	3.2(1d)	Includes the Cisco UCS IOM 2304 and Cisco UCS VIC 1340 Cisco source
Network	Cisco Nexus 9000 NX-OS	7.0(3)I5(2)	
Storage	Pure Storage FlashArray//X70	4.10.5	
Software	Cisco UCS Manager	3.2(1d)	Cisco source
	VMware vSphere ESXi Cisco Custom ISO	6.5 U1	VMware Source
	VMware vSphere fnic driver for ESXi	1.6.0.34	Included in 6.5 U1 Cisco Custom ISO

Layer	Device	Image	Comments
	VMware vSphere nenic driver for ESXi	1.0.6.0	Included in 6.5 U1 Cisco Custom ISO
	VMware vCenter	6.5 U1	
	Pure Storage vSphere Web Client Plugin	3.0	The 2.5.1 version is provided with Purity 4.10.5, but will default to provisioning of VMFS-5 datastores within the plugin. To enable the option of VMFS-6 through the plugin, a support request can be made with Pure to enable access to the 3.0 plugin.
	Cisco UCSM plugin for the Sphere Web Client	2.0.3	

Configuration Guidelines

This document details the step-by-step configuration of a fully redundant and highly available Virtual Server Infrastructure built on Cisco and Pure Storage components. References are made to which component is being configured with each step, either 01 or 02 or A and B. For example, controller-1 and controller-2 are used to identify the two controllers within the Pure Storage FlashArray//X that are provisioned with this document, and Cisco Nexus A or Cisco Nexus B identifies the pair of Cisco Nexus switches that are configured. The Cisco UCS fabric interconnects are similarly configured. Additionally, this document details the steps for provisioning multiple Cisco UCS hosts, and these examples are identified as: VM-Host-iSCSI-01, VM-Host-iSCSI-02 to represent iSCSI booted infrastructure and production hosts deployed to the fabric interconnects in this document. Finally, to indicate that you should include information pertinent to your environment in a given step, <<text>> appears as part of the command structure. See the following example during a configuration step for both Nexus switches:

```
b19-93180-1&2 (config)# ntp server <<var_oob_ntp>> use-vrf management
```

This document is intended to enable you to fully configure the customer environment. In this process, various steps require you to insert customer-specific naming conventions, IP addresses, and VLAN schemes, as well as to record appropriate MAC addresses. Table 2 describes the VLANs necessary for deployment as outlined in this guide, and Table 3 lists the virtual machines (VMs) necessary for deployment as outlined in this guide.

Table 2 Necessary VLANs

VLAN Name	VLAN Purpose	ID Used in Validating this Document	Customer Deployed Value
Native	VLAN to which untagged frames are assigned	2	
Out of Band Mgmt	VLAN for out-of-band management interfaces	15	
In-Band Mgmt	VLAN for in-band management interfaces	115	
vMotion	VLAN for VMware vMotion	200	
VM-App1	VLAN for Production VM Interfaces	201	
VM-App2	VLAN for Production VM Interfaces	202	
VM-App2	VLAN for Production VM Interfaces	203	
iSCSI-A	VLAN for iSCSI A	901	
iSCSI-B	VLAN for iSCSI B	902	

Table 3 Infrastructure Virtual Machines

Virtual Machine Description	VM Name Used in Validating This Document	Customer Deployed Value
Active Directory	Pure-AD	
vCenter Server	Pure-VC	

Table 4 Configuration Variables

Variable	Variable Description	Customer Deployed Value
<<var_nexus_A_hostname>>	Nexus switch A hostname (Example: b19-93180-1)	

Variable	Variable Description	Customer Deployed Value
<<var_nexus_A_mgmt_ip>>	Out-of-band management IP for Nexus switch A (Example: 192.168.164.13)	
<<var_oob_mgmt_mask>>	Out-of-band management network netmask (Example: 255.255.255.0)	
<<var_oob_gateway>>	Out-of-band management network gateway (Example: 192.168.164.254)	
<<var_oob_ntp>>	Out-of-band management network NTP server (Example: 192.168.164.254)	
<<var_nexus_B_hostname>>	Nexus switch B hostname (Example: b19-93180-2)	
<<var_nexus_B_mgmt_ip>>	Out-of-band management IP for Nexus switch B (Example: 192.168.164.14)	
<<var_nexus_A_ib_ip>>	In-band management network interface for Nexus switch A (Example: 10.1.164.13)	
<<var_nexus_B_ib_ip>>	In-band management network interface for Nexus switch B (Example: 10.1.164.14)	
<<var_flasharray_hostname>>	Array hostname set during setup (Example: flashstack-1)	
<<var_flasharray_vip>>	Virtual IP that will answer for the active management controller (Example: 192.168.164.40	
<<var_contoller-1_mgmt_ip>>	Out-of-band management IP for FlashArray controller-1 (Example: 192.168.164.41)	
<<var_ contoller-1_mgmt_mask>>	Out-of-band management network netmask (Example: 255.255.255.0)	

Variable	Variable Description	Customer Deployed Value
<<var_ contoller-1_mgmt_gateway>>	Out-of-band management network default gateway (Example: 192.168.164.254)	
<<var_ contoller-2_mgmt_ip>>	Out-of-band management IP for FlashArray controller-2 (Example: 192.168.164.42)	
<<var_ contoller-2_mgmt_mask>>	Out-of-band management network netmask (Example: 255.255.255.0)	
<<var_ contoller-2_mgmt_gateway>>	Out-of-band management network default gateway (Example: 192.168.164.1)	
<<var_password>>	Administrative password (Example: Fl@shSt4x)	
<<var_dns_domain_name>>	DNS domain name (Example: flashstack.cisco.com)	
<<var_nameserver_ip>>	DNS server IP(s) (Example: 10.1.164.9)	
<<var_smtp_ip>>	Email Relay Server IP Address or FQDN (Example: smtp.flashstack.cisco.com)	
<<var_smtp_domain_name>>	Email Domain Name (Example: flashstack.cisco.com)	
<<var_timezone>>	FlashStack time zone (Example: America/New_York)	
<<var_oob_mgmt_vlan_id>>	Out-of-band management network VLAN ID (Example: 15)	
<<var_ib_mgmt_vlan_id>>	In-band management network VLAN ID (Example: 115)	
<<var_ib_mgmt_vlan_netmask_length>>	Length of IB-MGMT-VLAN Netmask (Example: /24)	
<<var_ib_gateway_ip>>	In-band management network VLAN ID (Example: 10.1.164.254)	
<<var_iscsi-a_vlan_id>>	iSCSI-A VLAN ID (Example: 101)	

Variable	Variable Description	Customer Deployed Value
<<var_iscsi-b_vlan_id>>	iSCSI-B VLAN ID (Example: 102)	
<<var_vmotion_vlan_id>>	In-band management network VLAN ID (Example: 200)	
<<var_vmotion_vlan_netmask_length>>	Length of IB-MGMT-VLAN Netmask (Example: /24)	
<<var_native_vlan_id>>	Native network VLAN ID (Example: 2)	
<<var_app_vlan_id>>	Example Application network VLAN ID (Example: 201)	
<<var_snmp_contact>>	Administrator e-mail address (Example: admin@flashstack.cisco.com)	
<<var_snmp_location>>	Cluster location string (Example: RTP9-B19)	
<<var_ucs_clustername>>	Cisco UCS Manager cluster host name (Example: ucs-6332)	
<<var_ucsa_mgmt_ip>>	Cisco UCS fabric interconnect (FI) A out-of-band management IP address (Example: 192.168.164.51)	
<<var_ucs_mgmt_vip>>	Cisco UCS fabric interconnect (FI) Cluster out-of-band management IP address (Example: 192.168.164.50)	
<<var_ucsb_mgmt_ip>>	Cisco UCS FI B out-of-band management IP address (Example: 192.168.164.52)	
<<var_vm_host_iscsi_01_ip>>	VMware ESXi host 01 in-band management IP (Example: 10.1.164.21)	
<<var_vm_host_iscsi_02_ip>>	VMware ESXi host 02 in-band management IP (Example: 10.1.164.22)	
<<var_vm_host_iscsi_vmotion_01_ip>>	VMware ESXi host 01 vMotion IP (Example: 10.1.15.21)	

Variable	Variable Description	Customer Deployed Value
<<var_vm_host_iscsi_vmotion_01_ip>>	VMware ESXi host 02 in-band management IP (Example: 10.1.15.22)	
<<var_vmotion_subnet_mask>>	vMotion subnet mask (Example: 255.255.255.0)	
<<var_vcenter_server_ip>>	IP address of the vCenter Server (Example: 10.1.164.100)	

FlashStack Cabling

This section details a cabling example for a FlashStack environment. To make connectivity clear in this example, the tables include both the local and remote port locations.

This document assumes that out-of-band management ports are plugged into an existing management infrastructure at the deployment site. The upstream network from the Nexus 93180YC-EX switches is out of scope of this document, with only the assumption that these switches will connect to the upstream switch or switches with a vPC.

Figure 2 shows the cabling configuration used in this FlashStack design.

Figure 2 FlashStack Cabling in the Validated Topology

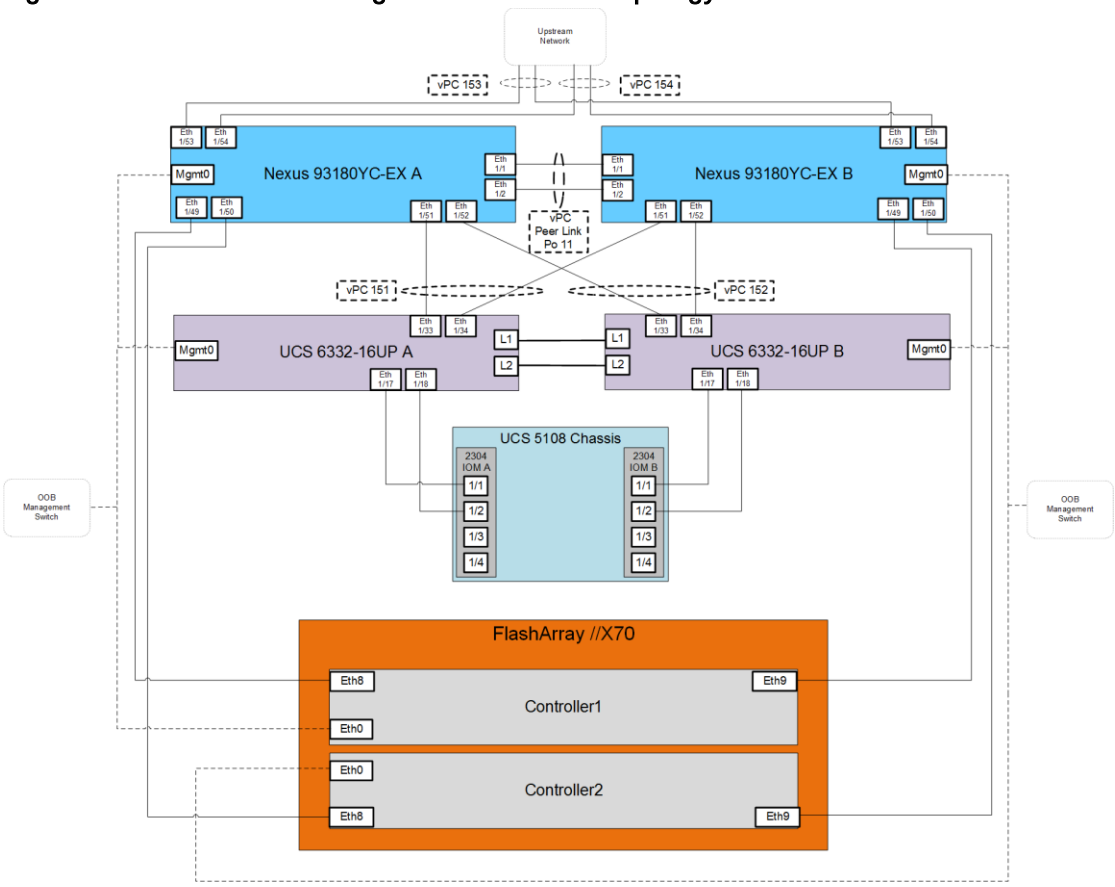


Table 5 through Table 10 provide the connectivity information for the components in 0.

Table 5 Cisco Nexus 93180YC-EX-A Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 93180YC-EX A	Eth1/1	10GbE	Cisco Nexus 93180YC-EX B	Eth1/1
	Eth1/2	10GbE	Cisco Nexus 93180YC-EX B	Eth1/2
	Eth1/49	40GbE	FlashArray//X70 Controller 1	CT0.ETH8
	Eth1/50	40GbE	FlashArray//X70 Controller 2	CT1.ETH8
	Eth1/51	40GbE	Cisco UCS 6332-16UP FI A	Eth 1/33
	Eth1/52	40GbE	Cisco UCS 6332-16UP FI B	Eth 1/33
	Eth1/53	40GbE or 100GbE	Upstream Network Switch	Any
	Eth1/54	40GbE or 100GbE	Upstream Network Switch	Any
	MGMT0	GbE	GbE management switch	Any

Table 6 Cisco Nexus 93180YC-EX-B Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco Nexus 93180YC-EX B	Eth1/1	10GbE	Cisco Nexus 93180YC-EX A	Eth1/1
	Eth1/2	10GbE	Cisco Nexus 93180YC-EX A	Eth1/2
	Eth1/49	40GbE	FlashArray//X70 Controller 1	CT0.ETH9
	Eth1/50	40GbE	FlashArray//X70 Controller 2	CT1.ETH9
	Eth1/51	40GbE	Cisco UCS 6332-16UP FI A	Eth 1/34
	Eth1/52	40GbE	Cisco UCS 6332-16UP FI B	Eth 1/34
	Eth1/53	40GbE or 100GbE	Upstream Network Switch	Any
	Eth1/54	40GbE or 100GbE	Upstream Network Switch	Any
	MGMT0	GbE	GbE management switch	Any

The ports Eth1/49-1/54 of the 93180YC-EX switches are ALE (Application Leaf Engine) uplink ports and do not support auto-negotiation. Devices connecting to these ports may need to have speed forced to 40GbE in interfaces on both sides. For the connections shown above going to the 6332-16UP FIs, BiDi (QSFP-40G-SR-BD) transceivers were used between the 93180YC-EX switches and the Fabric Interconnects to establish the 40Gb connection.

Table 7 Cisco UCS 6332-16UP FI A Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS 6332-16UP FI A	Eth1/17	40GbE	Cisco UCS Chassis 1 2304 FEX A	IOM 1/1
	Eth1/18	40GbE	Cisco UCS Chassis 1 2304 FEX A	IOM 1/2
	Eth1/33	40GbE	Cisco Nexus 93180YC-EX A	Eth1/51
	Eth1/34	40GbE	Cisco Nexus 93180YC-EX B	Eth1/51
	MGMT0	GbE	GbE management switch	Any
	L1	GbE	Cisco UCS 6332-16UP FI B	L1
	L2	GbE	Cisco UCS 6332-16UP FI B	L2

Table 8 Cisco UCS 6332-16UP FI B Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
Cisco UCS 6332-16UP FI B	Eth1/17	40GbE	Cisco UCS Chassis 1 2304 FEX B	IOM 1/1
	Eth1/18	40GbE	Cisco UCS Chassis 1 2304 FEX B	IOM 1/2
	Eth1/33	40GbE	Cisco Nexus 93180YC-EX A	Eth1/52
	Eth1/34	40GbE	Cisco Nexus 93180YC-EX B	Eth1/52
	MGMT0	GbE	GbE management switch	Any
	L1	GbE	Cisco UCS 6332-16UP FI B	L1
	L2	GbE	Cisco UCS 6332-16UP FI B	L2

Table 9 Pure Storage FlashArray//X70 Controller 1 Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
FlashArray//X70 Controller 1	Eth0	GbE	GbE management switch	Any
	ETH8	40GbE	Cisco Nexus 93180YC-EX A	Eth 1/49
	ETH9	40GbE	Cisco Nexus 93180YC-EX B	Eth 1/49

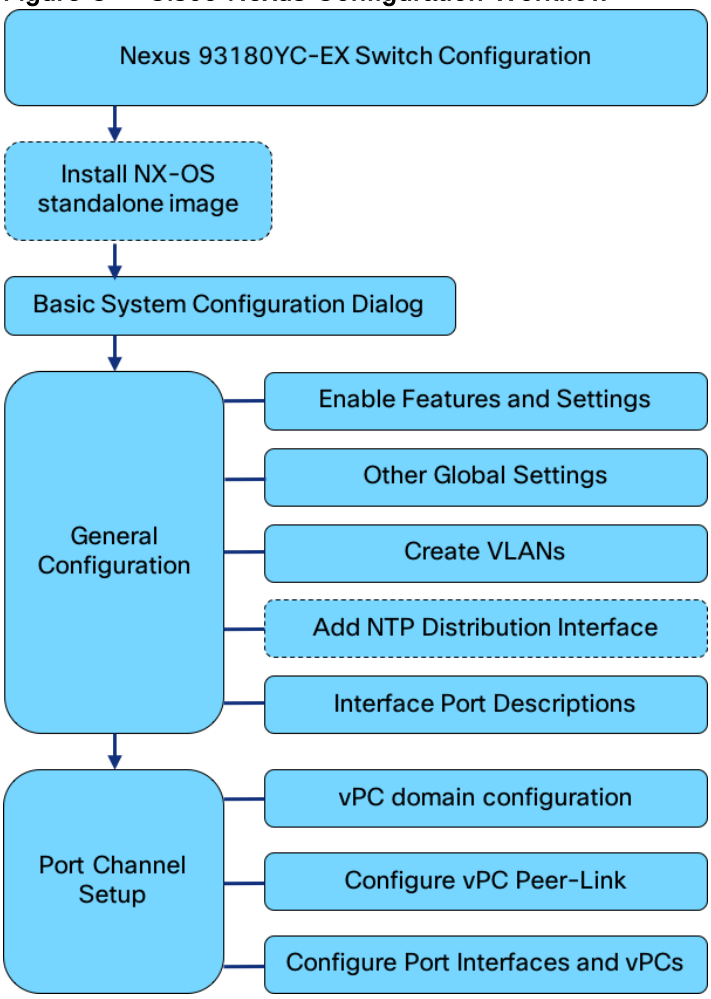
Table 10 Pure Storage FlashArray//X70 Controller 2 Cabling Information

Local Device	Local Port	Connection	Remote Device	Remote Port
FlashArray//X70 Controller 2	Eth0	GbE	GbE management switch	Any
	ETH8	40GbE	Cisco Nexus 93180YC-EX A	Eth 1/50
	ETH9	40GbE	Cisco Nexus 93180YC-EX B	Eth 1/50

Network Switch Configuration

This section provides detailed instructions for the configuration of the Cisco Nexus 93180YC-EX switches used in this FlashStack solution. Some changes may be appropriate for a customer's environment, but care should be taken when stepping outside of these instructions as it may lead to an improper configuration.

Figure 3 Cisco Nexus Configuration Workflow



Physical Connectivity

Physical cabling should be completed by following the diagram and table references in the previous section referenced as FlashStack Cabling.

FlashStack Nexus Switch Configuration

The following procedures describe how to configure the Cisco Nexus switches for use in a base FlashStack environment. This procedure assumes the use of Nexus 93180YC-EX switches running 7.0(3)I5(2). Configuration on a differing model of Nexus 9000 series switch should be comparable, but may differ slightly

with model and changes in NX-OS release. The Cisco Nexus 93180YC-EX switch and NX-OS release were used in validation of this FlashStack solution, so steps will reflect this model and release.

The following procedure includes setup of NTP distribution on the In-Band Management VLAN. The interface-vlan feature and ntp commands are used to set this up. This procedure also assumes the default VRF will be used to route the In-Band Management VLAN.

Setting the NX-OS image on the switch

The Cisco Nexus 93180YC-EX switch ships with the Application Centric Infrastructure (ACI) and will need to be reinstalled with NX-OS standalone release specified in this document. The NX-OS standalone software can be downloaded from software.cisco.com. With the image downloaded, it can be transferred to the switches via a USB or SCP from the loader prompt.

For an SCP transfer, the image will need to be accessible from a host reachable by the management interface connected to the switch. Login as admin and configure an available IP for the switch if it is not already on the network. Copy the image over from the server it has been placed on and reload the switch.

```
(none)#
(none)# ifconfig eth0 inet <<var_nexus_A_mgmt_ip>> netmask <<var_oob_mgmt_mask>>
(none)# scp localadmin@192.168.164.155:/tmp/nxos.7.0.3.I5.2.bin /bootflash
(none)# reload
This command will reload the chassis, Proceed (y/n)? [n]: y
```

During the reload, press Ctrl-C to interrupt the boot process and enter the loader prompt. From the loader prompt, boot the image copied over.

```
loader >

loader > boot nxos.7.0.3.I5.2.bin
Booting nxos.7.0.3.I5.2.bin
Trying diskboot
....
```

Cisco Nexus Basic System Configuration Dialog

Set up the initial configuration for the Cisco Nexus A switch on <<var_nexus_A_hostname>>, by walking through the following dialogue steps:

```
Abort Auto Provisioning and continue with normal setup ?(yes/no)[n]: y

         ---- System Admin Account Setup ----

Do you want to enforce secure password standard (yes/no) [y]: <Enter>

  Enter the password for "admin": ********
  Confirm the password for "admin": ********

         ---- Basic System Configuration Dialog VDC: 1 ----

This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.

Please register Cisco Nexus9000 Family devices promptly with your
supplier. Failure to register may affect response times for initial
service calls. Nexus9000 devices must be registered to receive
entitled support services.

Press Enter at anytime to skip a dialog. Use ctrl-c at anytime
to skip the remaining dialogs.
```

```
Would you like to enter the basic configuration dialog (yes/no): yes

  Create another login account (yes/no) [n]: <Enter>

  Configure read-only SNMP community string (yes/no) [n]: <Enter>

  Configure read-write SNMP community string (yes/no) [n]: <Enter>

  Enter the switch name : <<var_nexus_A_hostname>>

  Continue with Out-of-band (mgmt0) management configuration? (yes/no) [y]: <Enter>

    Mgmt0 IPv4 address : <<var_nexus_A_mgmt_ip>>

    Mgmt0 IPv4 netmask : <<var_oob_mgmt_mask>>

  Configure the default gateway? (yes/no) [y]: <Enter>

    IPv4 address of the default gateway : <<var_oob_gateway>>

  Configure advanced IP options? (yes/no) [n]: <Enter>

  Enable the telnet service? (yes/no) [n]: <Enter>

  Enable the ssh service? (yes/no) [y]: <Enter>

    Type of ssh key you would like to generate (dsa/rsa) [rsa]: <Enter>

    Number of rsa key bits <1024-2048> [1024]: <Enter>

  Configure the ntp server? (yes/no) [n]: y

    NTP server IPv4 address : <<var_oob_ntp>>

  Configure default interface layer (L3/L2) [L2]: <Enter>

  Configure default switchport interface state (shut/noshut) [noshut]: shut

  Configure CoPP system profile (strict/moderate/lenient/dense) [strict]: <Enter>

The following configuration will be applied:
  password strength-check
  switchname b19-93180-1
vrf context management
ip route 0.0.0.0/0 192.168.164.254
exit
  no feature telnet
  ssh key rsa 1024 force
  feature ssh
  ntp server 192.168.164.254
  system default switchport
  system default switchport shutdown
  copp profile strict
interface mgmt0
ip address 192.168.164.13 255.255.255.0
no shutdown

Would you like to edit the configuration? (yes/no) [n]: <Enter>
Use this configuration and save it? (yes/no) [y]: <Enter>
```

Login and set the image if there is an older image present within bootflash.

```
User Access Verification
b19-93180-1 login: admin
b19-93180-1# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
b19-93180-1(config)# boot nxos bootflash:nxos.7.0.3.I5.2.bin
Performing image verification and compatibility check, please wait....
b19-93180-1(config)# copy run start
```

```
[########################################] 100%
Copy complete.
```

Set up the initial configuration for the Cisco Nexus B switch on <<var_nexus_B_hostname>>, by running through the same steps followed in the above configuration, making the appropriate substitutions for <<var_nexus_B_hostname>> and <<var_nexus_B_mgmt_ip>>.

Cisco Nexus Switch Configuration

Enable Features and Settings

To enable IP switching features, run the following commands on each Cisco Nexus:

```
b19-93180-1&2 (config)# feature lacp
b19-93180-1&2 (config)# feature vpc
b19-93180-1&2 (config)# feature interface-vlan
```

The feature interface-vlan is an optional requirement if configuring an In-Band VLAN interface to re-distribute NTP. Layer-3 routing is possible with Nexus switches after setting this feature, but is not covered in this architecture.

Additionally, configure spanning tree and save the running configuration to start-up:

```
b19-93180-1&2 (config)# spanning-tree port type network default
b19-93180-1&2 (config)# spanning-tree port type edge bpduguard default
b19-93180-1&2 (config)# spanning-tree port type edge bpdufilter default
```

Set Global Configurations

Run the following commands on both switches to set global configurations:

```
b19-93180-1&2 (config)# port-channel load-balance src-dst l4port
b19-93180-1&2 (config)# ip route 0.0.0.0/0 <<var_ib-mgmt-vlan_gateway>>
b19-93180-1&2 (config)# ntp server <<var_oob_ntp>> use-vrf management
b19-93180-1&2 (config)# ntp master 3
```

Create VLANs

Run the following commands on both switches to create VLANs:

```
b19-93180-1&2 (config)# vlan <<var_ib-mgmt_vlan_id>>
b19-93180-1&2 (config-vlan)# name IB-MGMT-VLAN
b19-93180-1&2 (config-vlan)# vlan <<var_native_vlan_id>>
b19-93180-1&2 (config-vlan)# name Native-VLAN
b19-93180-1&2 (config-vlan)# vlan <<var_vmotion_vlan_id>>
b19-93180-1&2 (config-vlan)# name vMotion-VLAN
b19-93180-1&2 (config-vlan)#  vlan <<var_application_vlan_id>>
b19-93180-1&2 (config-vlan)#  name VM-App1-VLAN
b19-93180-1&2 (config-vlan)#  vlan <<var_iscsi-a_vlan_id>>
b19-93180-1&2 (config-vlan)#  name iSCSI-A-VLAN
b19-93180-1&2 (config-vlan)#  vlan <<var_iscsi-b_vlan_id>>
b19-93180-1&2 (config-vlan)#  name iSCSI-B-VLAN
```

Continue adding VLANs as appropriate to the customer's environment.

Add Individual Port Descriptions for Troubleshooting

To add individual port descriptions for troubleshooting activity and verification for switch A, enter the following commands from the global configuration mode:

```
b19-93180-1(config)# interface Vlan115
b19-93180-1(config-if)# description In-Band NTP Redistribution Interface VLAN 115
b19-93180-1(config-if)# interface port-channel 11
b19-93180-1(config-if)# description vPC peer-link
b19-93180-1(config-if)# interface port-channel 151
b19-93180-1(config-if)# description vPC UCS 6332-16UP-1 FI
b19-93180-1(config-if)# interface port-channel 152
b19-93180-1(config-if)# description vPC UCS 6332-16UP-2 FI
b19-93180-1(config-if)# interface port-channel 153
b19-93180-1(config-if)# description vPC Upstream Network Switch A
b19-93180-1(config-if)# interface port-channel 154
b19-93180-1(config-if)# description vPC Upstream Network Switch B
b19-93180-1(config-if)# interface Ethernet1/1
b19-93180-1(config-if)# description vPC peer-link connection to b19-93180-2 Ethernet1/1
b19-93180-1(config-if)# interface Ethernet1/2
b19-93180-1(config-if)# description vPC peer-link connection to b19-93180-2 Ethernet1/2
b19-93180-1(config-if)# interface Ethernet1/49
b19-93180-1(config-if)# description iSCSI A connection to FlashArray//X CT0.ETH8
b19-93180-1(config-if)# interface Ethernet1/50
b19-93180-1(config-if)# description iSCSI A connection to FlashArray//X CT1.ETH8
b19-93180-1(config-if)# interface Ethernet1/51
b19-93180-1(config-if)# description vPC 151 connection to UCS 6332-16UP-1 FI Ethernet1/33
b19-93180-1(config-if)# interface Ethernet1/52
b19-93180-1(config-if)# description vPC 152 connection to UCS 6332-16UP-2 FI Ethernet1/33
b19-93180-1(config-if)# interface Ethernet1/53
b19-93180-1(config-if)# description vPC 153 connection to Upstream Network Switch A
b19-93180-1(config-if)# interface Ethernet1/54
b19-93180-1(config-if)# description vPC 154 connection to Upstream Network Switch B
```

In these steps the interface commands for the VLAN interface and Port-Channel interfaces will create these interfaces if they do not already exist.

To add individual port descriptions for troubleshooting activity and verification for switch B, enter the following commands from the global configuration mode:

```
b19-93180-2(config)# interface Vlan115
b19-93180-2(config-if)# description In-Band NTP Redistribution Interface VLAN 115
b19-93180-2(config-if)# interface port-channel 11
b19-93180-2(config-if)# description vPC peer-link
b19-93180-2(config-if)# interface port-channel 151
b19-93180-2(config-if)# description vPC UCS 6332-16UP-1 FI
b19-93180-2(config-if)# interface port-channel 152
b19-93180-2(config-if)# description vPC UCS 6332-16UP-2 FI
b19-93180-2(config-if)# interface port-channel 153
b19-93180-2(config-if)# description vPC Upstream Network Switch A
b19-93180-2(config-if)# interface port-channel 154
b19-93180-2(config-if)# description vPC Upstream Network Switch B
b19-93180-2(config-if)# interface Ethernet1/1
b19-93180-2(config-if)# description vPC peer-link connection to b19-93180-1 Ethernet1/1
b19-93180-2(config-if)# interface Ethernet1/2
b19-93180-2(config-if)# description vPC peer-link connection to b19-93180-1 Ethernet1/2
b19-93180-2(config-if)# interface Ethernet1/49
b19-93180-2(config-if)# description iSCSI B connection to FlashArray//X CT0.ETH9
b19-93180-2(config-if)# interface Ethernet1/50
b19-93180-2(config-if)# description iSCSI B connection to FlashArray//X CT1.ETH9
b19-93180-2(config-if)# interface Ethernet1/51
b19-93180-2(config-if)# description vPC 151 connection to UCS 6332-16UP-1 FI Ethernet1/34
b19-93180-2(config-if)# interface Ethernet1/52
b19-93180-2(config-if)# description vPC 152 connection to UCS 6332-16UP-2 FI Ethernet1/34
b19-93180-2(config-if)# interface Ethernet1/53
b19-93180-2(config-if)# description vPC 153 connection to Upstream Network Switch A
b19-93180-2(config-if)# interface Ethernet1/54
```

```
b19-93180-2(config-if)# description vPC 154 connection to Upstream Network Switch B
```

Add NTP Distribution Interfaces

Optional VLAN interfaces are created on each Nexus switch to redistribute NTP to In-Band networks from their Out of Band network source. For 93180YC-EX A this will be:

```
b19-93180-1(config)# ntp source <<var_nexus_A_ib_ip>>
b19-93180-1(config)# ntp master 3
b19-93180-1(config)# interface Vlan115
b19-93180-1(config)# ip route 0.0.0.0/0 <<var_ib_gateway_ip>>
b19-93180-1(config-if)# no shutdown
b19-93180-1(config-if)# no ip redirects
b19-93180-1(config-if)# ip address <<var_nexus_A_ib_ip>>/<<var_ib-mgmt_vlan_netmask_length>>
b19-93180-1(config-if)# no ipv6 redirects
```

For 93180YC-EX B this will be:

```
b19-93180-2(config)# ntp source <<var_nexus_B_ib_ip>>
b19-93180-2(config)# ntp master 3
b19-93180-2(config)# interface Vlan115
b19-93180-1(config)# ip route 0.0.0.0/0 <<var_ib_gateway_ip>>
b19-93180-2(config-if)# no shutdown
b19-93180-2(config-if)# no ip redirects
b19-93180-2(config-if)# ip address <<var_nexus_A_ib_ip>>/<<var_ib-mgmt_vlan_netmask_length>>
b19-93180-2(config-if)# no ipv6 redirects
```

Configure iSCSI Interfaces

Configure iSCSI interfaces for connecting to the FlashArray//X. For 93180YC-EX A this will be:

```
b19-93180-1(config-if)# interface Ethernet1/49
b19-93180-1(config-if)# switchport access vlan <<var_iscsi-a_vlan_id>>
b19-93180-1(config-if)# spanning-tree port type edge
b19-93180-1(config-if)# mtu 9216
b19-93180-1(config-if)# no negotiate auto
b19-93180-1(config-if)# no shutdown

b19-93180-1(config-if)# interface Ethernet1/50
b19-93180-1(config-if)# switchport access vlan <<var_iscsi-a_vlan_id>>
b19-93180-1(config-if)# spanning-tree port type edge
b19-93180-1(config-if)# mtu 9216
b19-93180-1(config-if)# no negotiate auto
b19-93180-1(config-if)# no shutdown
```

For 93180YC-EX B this will be:

```
b19-93180-2(config-if)# interface Ethernet1/49
b19-93180-2(config-if)# switchport access vlan <<var_iscsi-b_vlan_id>>
b19-93180-1(config-if)# spanning-tree port type edge
b19-93180-2(config-if)# mtu 9216
b19-93180-2(config-if)# no negotiate auto
b19-93180-2(config-if)# no shutdown

b19-93180-2(config-if)# interface Ethernet1/50
b19-93180-2(config-if)# switchport access vlan <<var_iscsi-b_vlan_id>>
b19-93180-1(config-if)# spanning-tree port type edge
b19-93180-2(config-if)# mtu 9216
b19-93180-2(config-if)# no negotiate auto
b19-93180-2(config-if)# no shutdown
```

Create the vPC Domain

The vPC domain will be assigned a unique number from 1-1000 and will handle the vPC settings specified within the switches. To set the vPC domain configuration on 93180YC-EX A, run the following commands:

```
b19-93180-1(config)# vpc domain 10
b19-93180-1(config-vpc-domain)# peer-switch
b19-93180-1(config-vpc-domain)# role priority 10
b19-93180-1(config-vpc-domain)# peer-keepalive destination <<var_nexus_B_mgmt_ip>> source
<<var_nexus_A_mgmt_ip>>
b19-93180-1(config-vpc-domain)# delay restore 150
b19-93180-1(config-vpc-domain)# peer-gateway
b19-93180-1(config-vpc-domain)# auto-recovery
b19-93180-1(config-vpc-domain)# ip arp synchronize
```

On the 93180YC-EX B switch run these slightly differing commands, noting that role priority and peer-keepalive commands will differ from what was previously set:

```
b19-93180-2(config)# vpc domain 10
b19-93180-2(config-vpc-domain)# peer-switch
b19-93180-2(config-vpc-domain)# role priority 20
b19-93180-2(config-vpc-domain)# peer-keepalive destination <<var_nexus_A_mgmt_ip>> source
<<var_nexus_B_mgmt_ip>>
b19-93180-2(config-vpc-domain)# delay restore 150
b19-93180-2(config-vpc-domain)# peer-gateway
b19-93180-2(config-vpc-domain)# auto-recovery
b19-93180-2(config-vpc-domain)# ip arp synchronize
```

Configure Port Channel Member Interfaces

On each switch, configure the Port Channel member interfaces that will be part of the vPC Peer Link and configure the vPC Peer Link:

```
b19-93180-1&2 (config)# int eth 1/1-2
b19-93180-1&2 (config-if-range)# channel-group 11 mode active
b19-93180-1&2 (config-if-range)# no shut
b19-93180-1&2 (config-if-range)# int port-channel 11
b19-93180-1&2 (config-if)# switchport mode trunk
b19-93180-1&2 (config-if)# switchport trunk native vlan 2
b19-93180-1&2 (config-if)# switchport trunk allowed vlan 115,200-203,901,902
b19-93180-1&2 (config-if)# vpc peer-link
```

Configure Virtual Port Channels

On each switch, configure the Port Channel member interfaces and the vPC Port Channels to the Cisco UCS Fabric Interconnect and the upstream network switches:

Nexus Connection vPC to UCS Fabric A

```
b19-93180-1&2 (config-if)# int ethernet 1/51
b19-93180-1&2 (config-if)# channel-group 151 mode active
b19-93180-1&2 (config-if)# no shut
b19-93180-1&2 (config-if)# int port-channel 151
b19-93180-1&2 (config-if)# switchport mode trunk
b19-93180-1&2 (config-if)# switchport trunk native vlan 2
b19-93180-1&2 (config-if)# switchport trunk allowed vlan 115,200-203,901
b19-93180-1&2 (config-if)# spanning-tree port type edge trunk
b19-93180-1&2 (config-if)# mtu 9216
b19-93180-1&2 (config-if)# load-interval counter 3 60
b19-93180-1&2 (config-if)# vpc 151
```

Nexus Connection vPC to UCS Fabric B

```
b19-93180-1&2 (config-if)# int ethernet 1/52
b19-93180-1&2 (config-if)# channel-group 152 mode active
b19-93180-1&2 (config-if)# no shut
b19-93180-1&2 (config-if)# int port-channel 152
b19-93180-1&2 (config-if)# switchport mode trunk
b19-93180-1&2 (config-if)# switchport trunk native vlan 2
b19-93180-1&2 (config-if)# switchport trunk allowed vlan 115,200-203,902
b19-93180-1&2 (config-if)# spanning-tree port type edge trunk
b19-93180-1&2 (config-if)# mtu 9216
b19-93180-1&2 (config-if)# load-interval counter 3 60
b19-93180-1&2 (config-if)# vpc 152
```

Nexus Connection vPC to Upstream Network Switch A

```
b19-93180-1&2 (config-if)# interface Ethernet1/53
b19-93180-1&2 (config-if)# channel-group 153 mode active
b19-93180-1&2 (config-if)# no shut
b19-93180-1&2 (config-if)# int port-channel 153
b19-93180-1&2 (config-if)# switchport mode trunk
b19-93180-1&2 (config-if)# switchport trunk native vlan 2
b19-93180-1&2 (config-if)# switchport trunk allowed vlan 115
b19-93180-1&2 (config-if)# vpc 153
```

Nexus Connection vPC to Upstream Network Switch B

```
b19-93180-1&2 (config-if)# interface Ethernet1/54
b19-93180-1&2 (config-if)# channel-group 154 mode active
b19-93180-1&2 (config-if)# no shut
b19-93180-1&2 (config-if)# int port-channel 154
b19-93180-1&2 (config-if)# switchport mode trunk
b19-93180-1&2 (config-if)# switchport trunk native vlan 2
b19-93180-1&2 (config-if)# switchport trunk allowed vlan 115
b19-93180-1&2 (config-if)# int port-channel 154
b19-93180-1&2 (config-if)# vpc 154
```

*** Save all configuration to this point on both Nexus Switches ***

```
b19-93180-1&2 (config)# copy running-config startup-config
```

vPC numbers have been picked to correspond with the module and first port within a Port Channel, so that in example having a first member of Ethernet 1/54 results in a vPC/Port Channel number of 154. This is optional, but can help in identifying port to Port Channel memberships.

FlashArray Storage Configuration

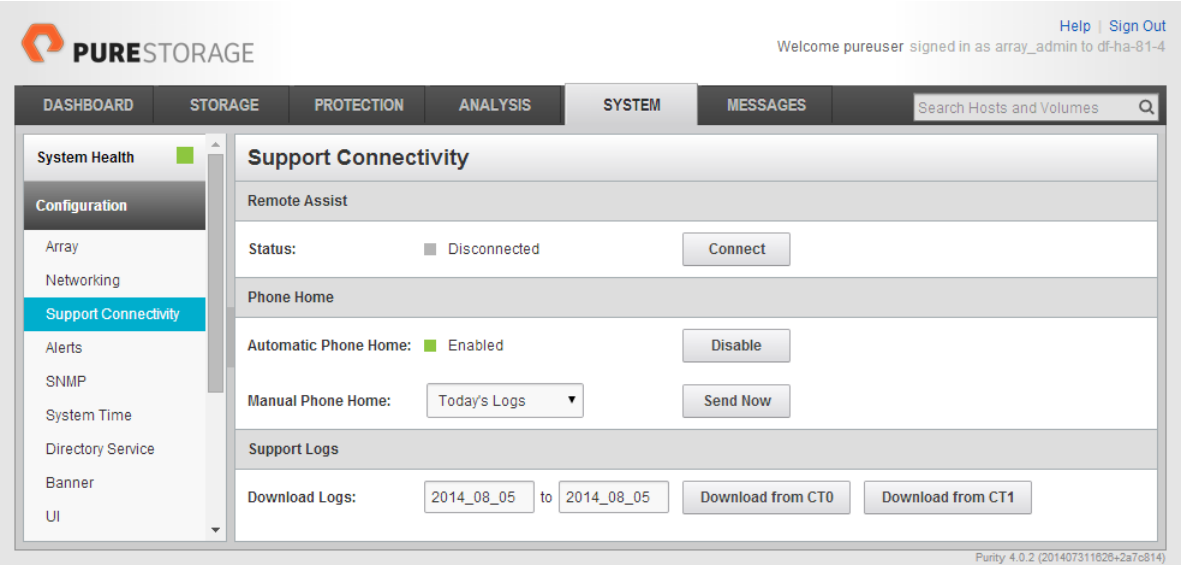
FlashArray Initial Configuration

The following information should be gathered to enable the installation and configuration of the FlashArray. An official representative of Pure Storage will help rack and configure the new installation of the FlashArray.

Table 11 FlashArray Setup Information

Global Array Settings	
Array Name (Hostname for Pure Array):	
Virtual IP Address for Management:	
Physical IP Address for Management on Controller 0 (CT0):	
Physical IP Address for Management on Controller 1 (CT1):	
Netmask:	
Gateway IP Address:	
DNS Server IP Address(es):	
DNS Domain Suffix: (Optional)	
NTP Server IP Address or FQDN:	
Email Relay Server (SMTP Gateway IP address or FQDN): (Optional)	
Email Domain Name:	
Alert Email Recipients Address(es): (Optional)	
HTTP Proxy Server and Port (For Pure1): (Optional)	
Time Zone:	

When the FlashArray has completed initial configuration, it is important to configure the Cloud Assist phone-home connection in order to provide the best pro-active support experience possible. Furthermore, this will enable the analytics functionalities provided by Pure1.



The Support Connectivity sub-view allows you to view and manage the Purity remote assist, phone home, and log features.

The Remote Assist section displays the remote assist status as "Connected" or "Disconnected". By default, remote assist is disconnected. A connected remote assist status means that a remote assist session has been opened, allowing Pure Storage Support to connect to the array. Disconnect the remote assist session to close the session.

The Phone Home section manages the phone home facility. The phone home facility provides a secure direct link between the array and the Pure Storage Technical Support web site. The link is used to transmit log contents and alert messages to the Pure Storage Support team so that when diagnosis or remedial action is required, complete recent history about array performance and significant events is available.

By default, the phone home facility is enabled. If the phone home facility is enabled to send information automatically, Purity transmits log and alert information directly to Pure Storage Support via a secure network connection. Log contents are transmitted hourly and stored at the support web site, enabling detection of array performance and error rate trends. Alerts are reported immediately when they occur so that timely action can be taken.

Phone home logs can also be sent to Pure Storage Technical support on demand, with options including Today's Logs, Yesterday's Logs, or All Log History.

The Support Logs section allows you to download the Purity log contents of the specified controller to the current administrative workstation. Purity continuously logs a variety of array activities, including performance summaries, hardware and operating status reports, and administrative actions.

Adding an Alert Recipient

The Alerts sub-view is used to manage the list of addresses to which Purity delivers alert notifications, and the attributes of alert message delivery. You can designate up to 19 alert recipients. The Alert Recipients section displays a list of email addresses that are designated to receive Purity alert messages. Up to 20 alert recipients can be designated. The list includes the built-in flasharray-alerts@purestorage.com address, which cannot be deleted.

The Relay Host section displays the hostname or IP address of an SMTP relay host, if one is configured for the array. If you specify a relay host, Purity routes the email messages via the relay (mail forwarding) address rather than sending them directly to the alert recipient addresses.

In the Sender Domain section, the sender domain determines how Purity logs are parsed and treated by Pure Storage Support and Escalations. By default, the sender domain is set to the domain name please-configure.me.

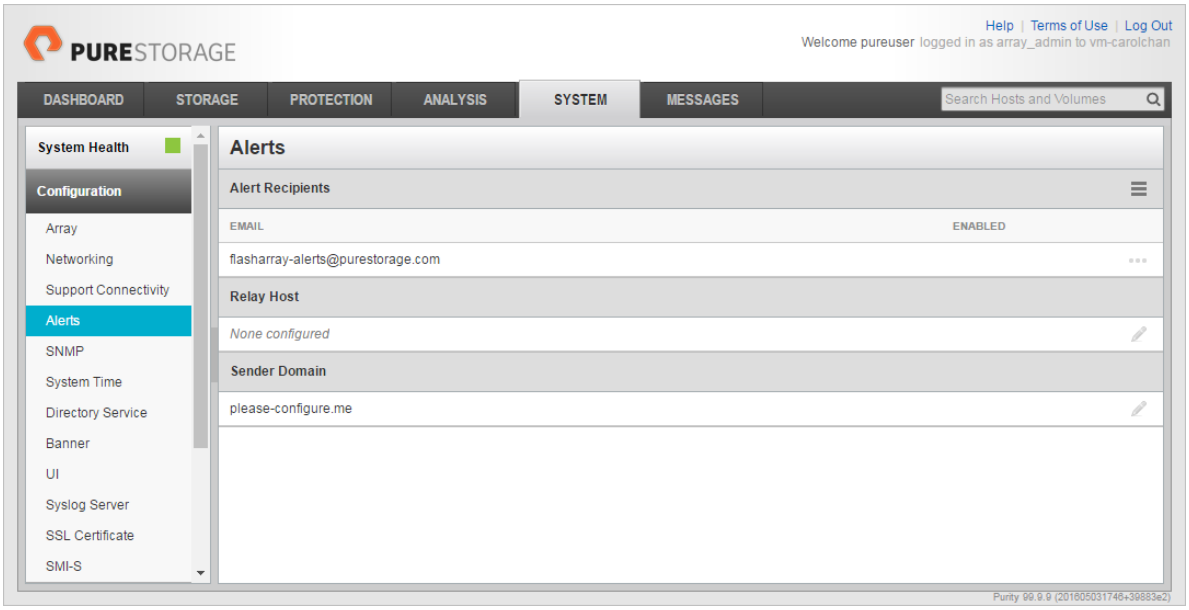
It is crucial that you set the sender domain to the correct domain name. If the array is not a Pure Storage test array, set the sender domain to the actual customer domain name. For example, mycompany.com.

The email address that Purity uses to send alert messages includes the sender domain name and is comprised of the following components:

<Array_Name>-<Controller_Name>@<Sender_Domain_Name>.com

To add an alert recipient, complete the following steps:

1. Select System > Configuration > Alerts.
2. In the Alert Recipients section, click the menu icon and select Add Alert Recipient. The Create Alert User dialog box appears.
3. In the email field, enter the email address of the alert recipient.
4. Click Save.



Configuring the Domain Name System (DNS) Server IP Addresses

To configure the DNS server IP addresses, complete the following steps:

1. Select System > Configuration > Networking.

2. In the DNS section, hover over the domain name and click the pencil icon. The Edit DNS dialog box appears.

3. Complete the following fields:

    a. Domain: Specify the domain suffix to be appended by the array when doing DNS lookups.

    b. DNS#: Specify up to three DNS server IP addresses for Purity to use to resolve hostnames to IP addresses. Enter one IP address in each DNS# field. Purity queries the DNS servers in the order that the IP addresses are listed.

4. Click Save.

iSCSI Interface Configuration

The iSCSI traffic will be carried on two VLANs, A (901) and B (902) that are configured in our example with the following values:

Table 12 Table 1 iSCSI A FlashArray//X Interface Configuration Settings

Device	Interface	IP	Netmask
FlashArray//X70 Controller 1	CT0.ETH8	10.164.101.41	255.255.255.0
FlashArray//X70 Controller 2	CT1.ETH8	10.164.101.42	255.255.255.0

Table 13 Table 2 iSCSI B FlashArray//X Interface Configuration Settings

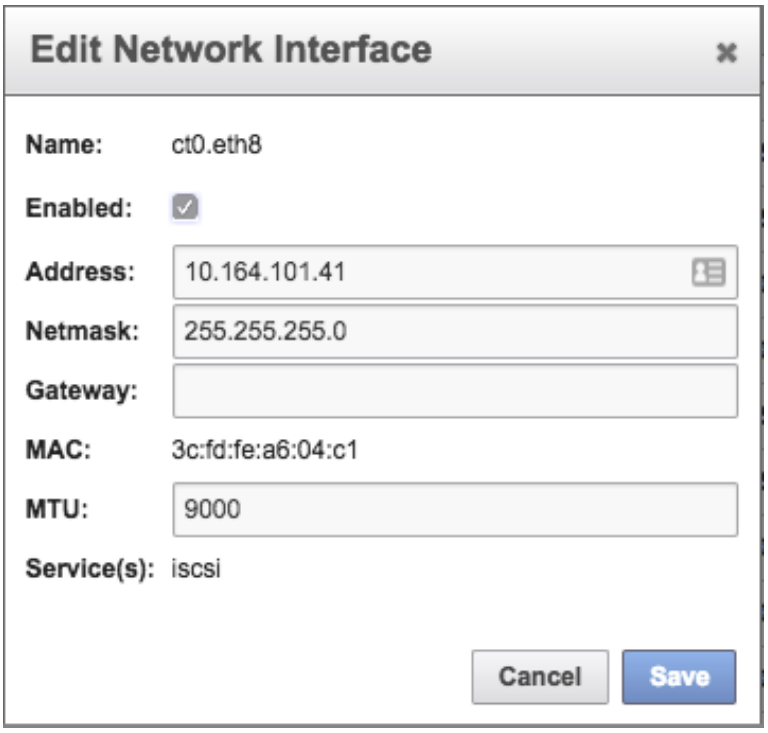
Device	Interface	IP	Netmask
FlashArray//X70 Controller 1	CT0.ETH9	10.164.102.41	255.255.255.0
FlashArray//X70 Controller 2	CT1.ETH9	10.164.102.42	255.255.255.0

To configure iSCSI interfaces for environments deploying iSCSI boot LUNs and/or datastores, complete the following steps:

1. Select System > Configuration > Networking.

2. Click the ellipsis (...) on the far right side of ct0.eth0 and select edit.

3. Select the Enabled check mark box within the Edit Network Interface dialogue window, enter the Address and Netmask from Table 1 above, and set the MTU to 9000 to enable jumbo frames.

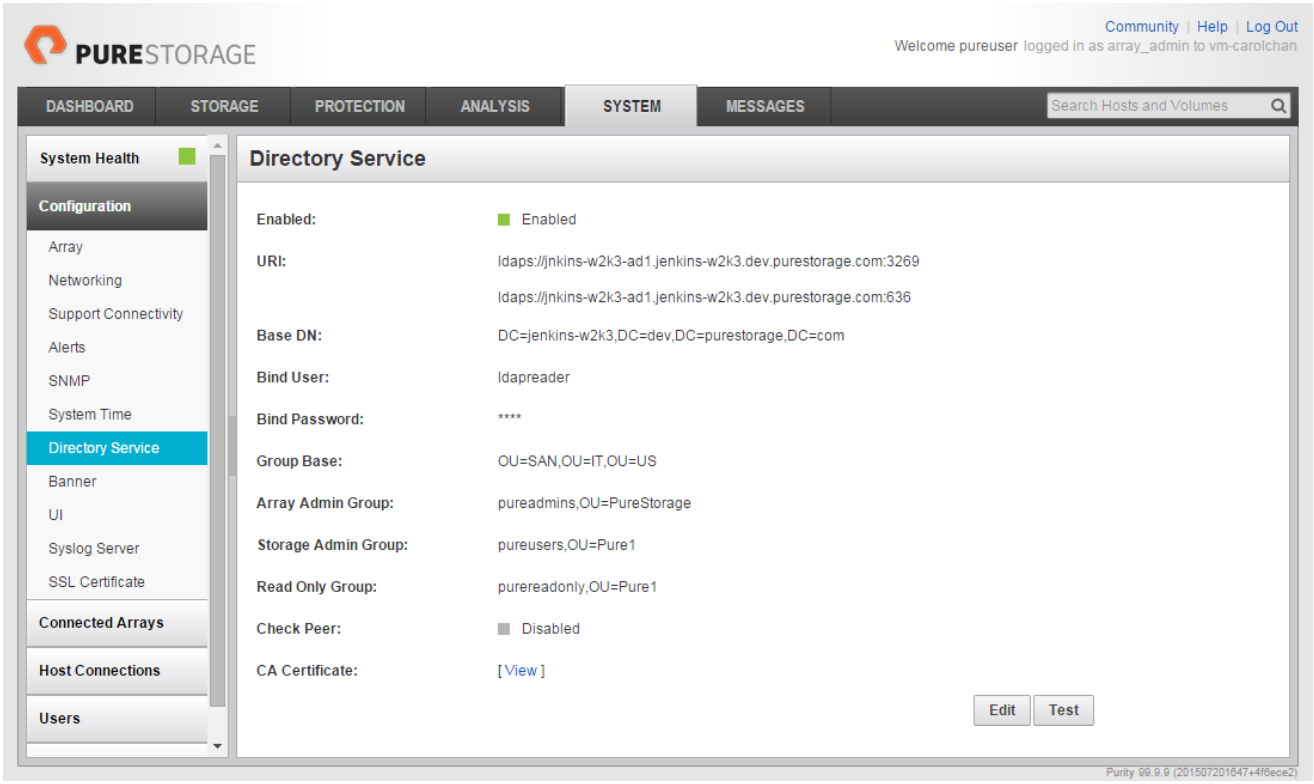


4. Click Save.

5. Repeat these steps for ct0.eth9, ct1.eth8, and ct1.eth9 using values from Table 1 and Table 2 .

Directory Service Sub-View

The Directory Service sub-view manages the integration of FlashArrays with an existing directory service. When the Directory Service sub-view is configured and enabled, the FlashArray leverages a directory service to perform user account and permission level searches. Configuring directory services is OPTIONAL.



The FlashArray is delivered with a single local user, named pureuser, with array-wide (Array Admin) permissions.

To support multiple FlashArray users, integrate the array with a directory service, such as Microsoft Active Directory or OpenLDAP.

Role-based access control is achieved by configuring groups in the directory that correspond to the following permission groups (roles) on the array:

- Read Only Group. Read Only users have read-only privileges to run commands that convey the state of the array. Read Only uses cannot alter the state of the array.
- Storage Admin Group. Storage Admin users have all the privileges of Read Only users, plus the ability to run commands related to storage operations, such as administering volumes, hosts, and host groups. Storage Admin users cannot perform operations that deal with global and system configurations.
- Array Admin Group. Array Admin users have all the privileges of Storage Admin users, plus the ability to perform array-wide changes. In other words, Array Admin users can perform all FlashArray operations.

When a user connects to the FlashArray with a username other than pureuser, the array confirms the user's identity from the directory service. The response from the directory service includes the user's group, which Purity maps to a role on the array, granting access accordingly.

To configure the directory service settings, complete the following steps:

1. Select System > Configuration > Directory Service.

2. Configure the Directory Service fields:

   a. Enabled: Select the check box to leverage the directory service to perform user account and permission level searches.

   b. URI: Enter the comma-separated list of up to 30 URIs of the directory servers. The URI must include a URL scheme (ldap, or ldaps for LDAP over SSL), the hostname, and the domain. You can optionally specify a port. For example, ldap://ad.company.com configures the directory service with the hostname "ad" in the domain "company.com" while specifying the unencrypted LDAP protocol.

   c. Base DN: Enter the base distinguished name (DN) of the directory service. The Base DN is built from the domain and should consist only of domain components (DCs). For example, for ldap://ad.storage.company.com, the Base DN would be: “DC=storage,DC=company,DC=com”

   d. Bind User: Username used to bind to and query the directory. For Active Directory, enter the username - often referred to as sAMAccountName or User Logon Name - of the account that is used to perform directory lookups. The username cannot contain the characters " [ ] : ; | = + * ? < > / \, and cannot exceed 20 characters in length. For OpenLDAP, enter the full DN of the user. For example, "CN=John,OU=Users,DC=example,DC=com".

   e. Bind Password: Enter the password for the bind user account.

   f. Group Base: Enter the organizational unit (OU) to the configured groups in the directory tree. The Group Base consists of OUs that, when combined with the base DN attribute and the configured group CNs, complete the full Distinguished Name of each groups. The group base should specify "OU=" for each OU and multiple OUs should be separated by commas. The order of OUs should get larger in scope from left to right. In the following example, SANManagers contains the sub-organizational unit PureGroups: "OU=PureGroups,OU=SANManagers".

   g. Array Admin Group: Common Name (CN) of the directory service group containing administrators with full privileges to manage the FlashArray. Array Admin Group administrators have the same privileges as pureuser. The name should be the Common Name of the group without the "CN=" specifier. If the configured groups are not in the same OU, also specify the OU. For example, "pureadmins,OU=PureStorage", where pureadmins is the common name of the directory service group.

   h. Storage Admin Group: Common Name (CN) of the configured directory service group containing administrators with storage related privileges on the FlashArray. The name should be the Common Name of the group without the "CN=" specifier. If the configured groups are not in the same OU, also specify the OU. For example, "pureusers,OU=PureStorage", where pureusers is the common name of the directory service group.

   i. Read Only Group: Common Name (CN) of the configured directory service group containing users with read-only privileges on the FlashArray. The name should be the Common Name of the group without the "CN=" specifier. If the configured groups are not in the same OU, also specify the OU. For example, "purereadonly,OU=PureStorage", where purereadonly is the common name of the directory service group.

   j. Check Peer: Select the check box to validate the authenticity of the directory servers using the CA Certificate. If you enable Check Peer, you must provide a CA Certificate.

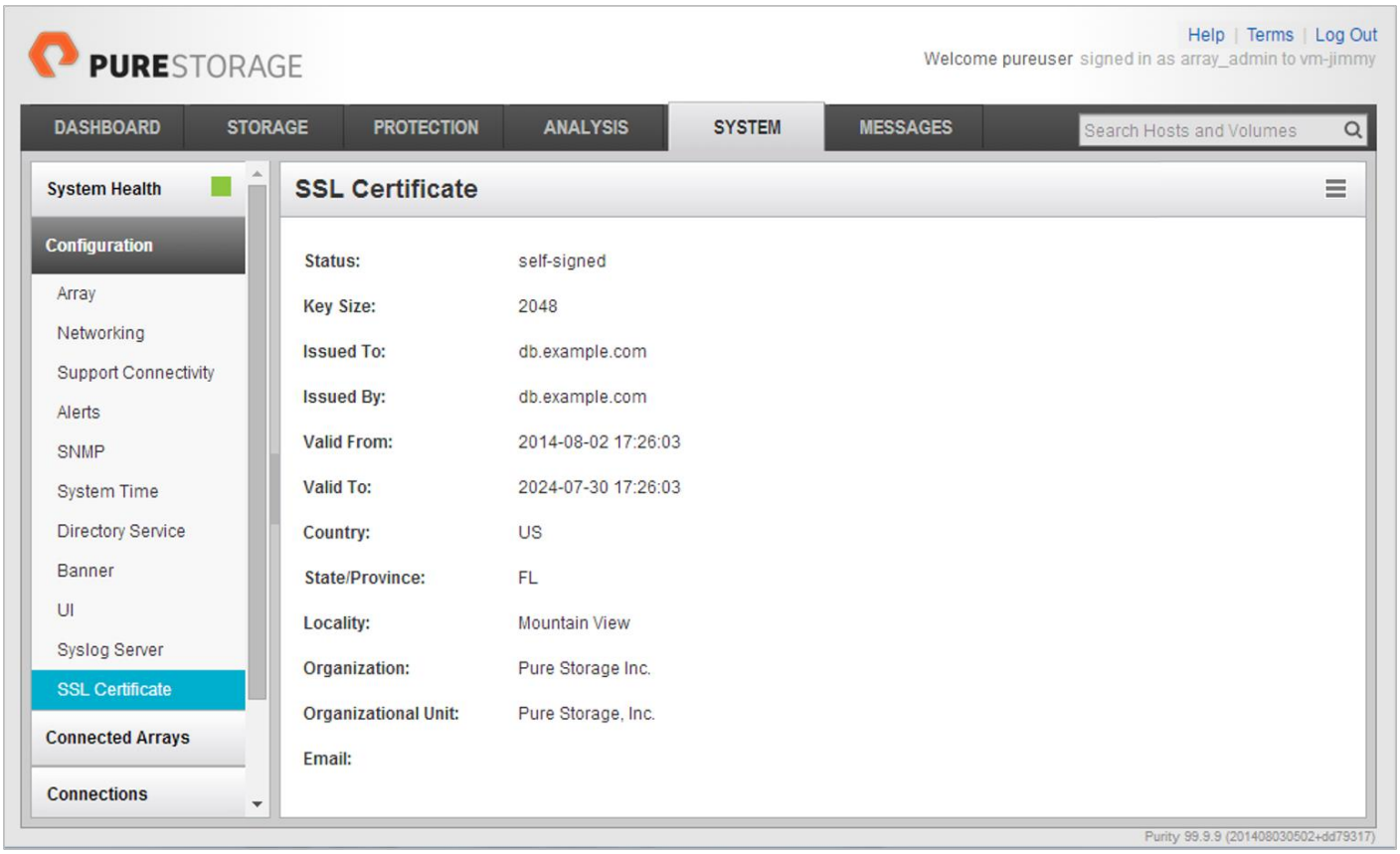
k. CA Certificate: Enter the certificate of the issuing certificate authority. Only one certificate can be configured at a time, so the same certificate authority should be the issuer of all directory server certificates. The certificate must be PEM formatted (Base64 encoded) and include the "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" lines. The certificate cannot exceed 3000 characters in total length.

3. Click Save.

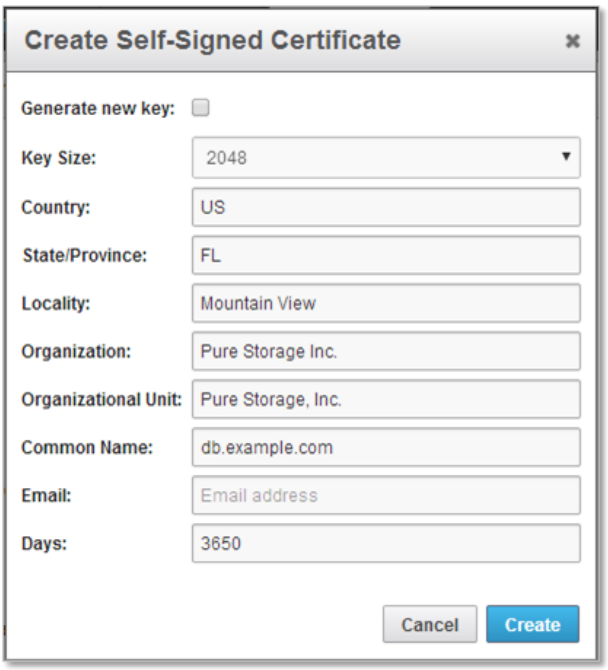
4. Click Test to test the configuration settings. The LDAP Test Results pop-up window appears. Green squares represent successful checks. Red squares represent failed checks.

SSL Certificate Sub-View

Purity creates a self-signed certificate and private key when you start the system for the first time. The SSL Certificate sub-view allows you to view and change certificate attributes, create a new self-signed certificate, construct certificate signing requests, import certificates and private keys, and export certificates.



Creating a self-signed certificate replaces the current certificate. When you create a self-signed certificate, include any attribute changes, specify the validity period of the new certificate, and optionally generate a new private key.

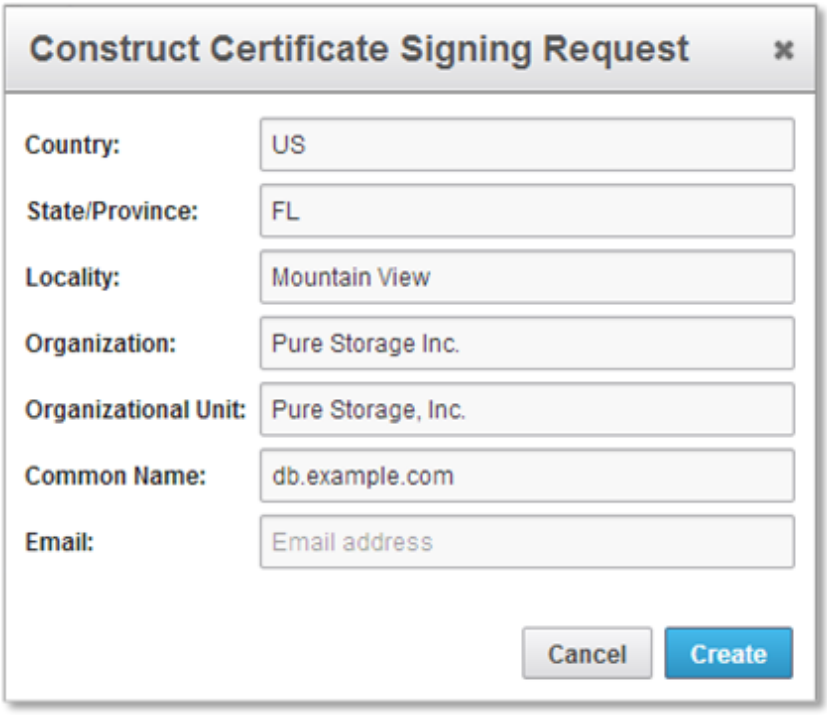


When you create the self-signed certificate, you can generate a private key and specify a different key size. If you do not generate a private key, the new certificate uses the existing key.

You can change the validity period of the new self-signed certificate. By default, self-signed certificates are valid for 3650 days.

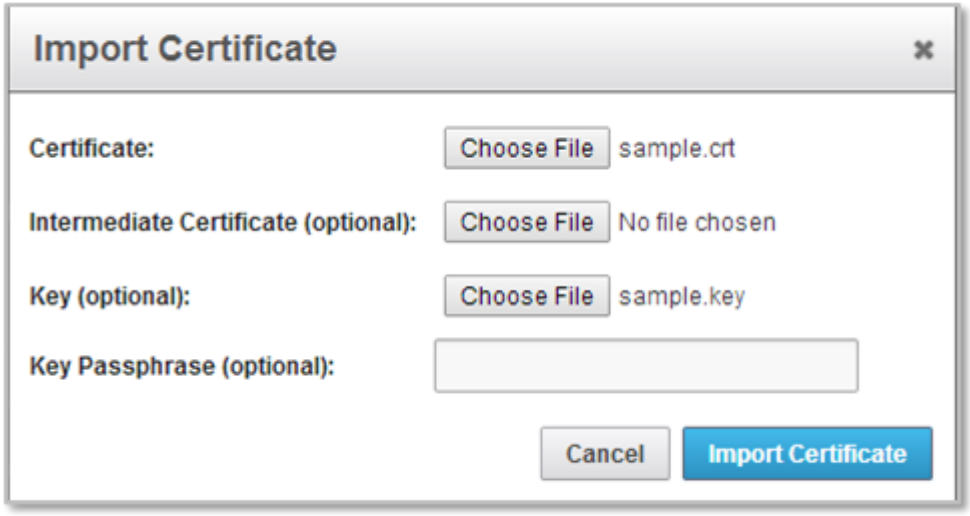
CA-Signed Certificate

Certificate authorities (CA) are third party entities outside the organization that issue certificates. To obtain a CA certificate, you must first construct a certificate signing request (CSR) on the array.



The CSR represents a block of encrypted data specific to your organization. You can change the certificate attributes when you construct the CSR; otherwise, Purity will reuse the attributes of the current certificate (self-signed or imported) to construct the new one. Note that the certificate attribute changes will only be visible after you import the signed certificate from the CA.

Send the CSR to a certificate authority for signing. The certificate authority returns the SSL certificate for you to import. Verify that the signed certificate is PEM formatted (Base64 encoded), includes the "-----BEGIN CERTIFICATE-----" and "-----END CERTIFICATE-----" lines, and does not exceed 3000 characters in total length. When you import the certificate, also import the intermediate certificate if it is not bundled with the CA certificate.

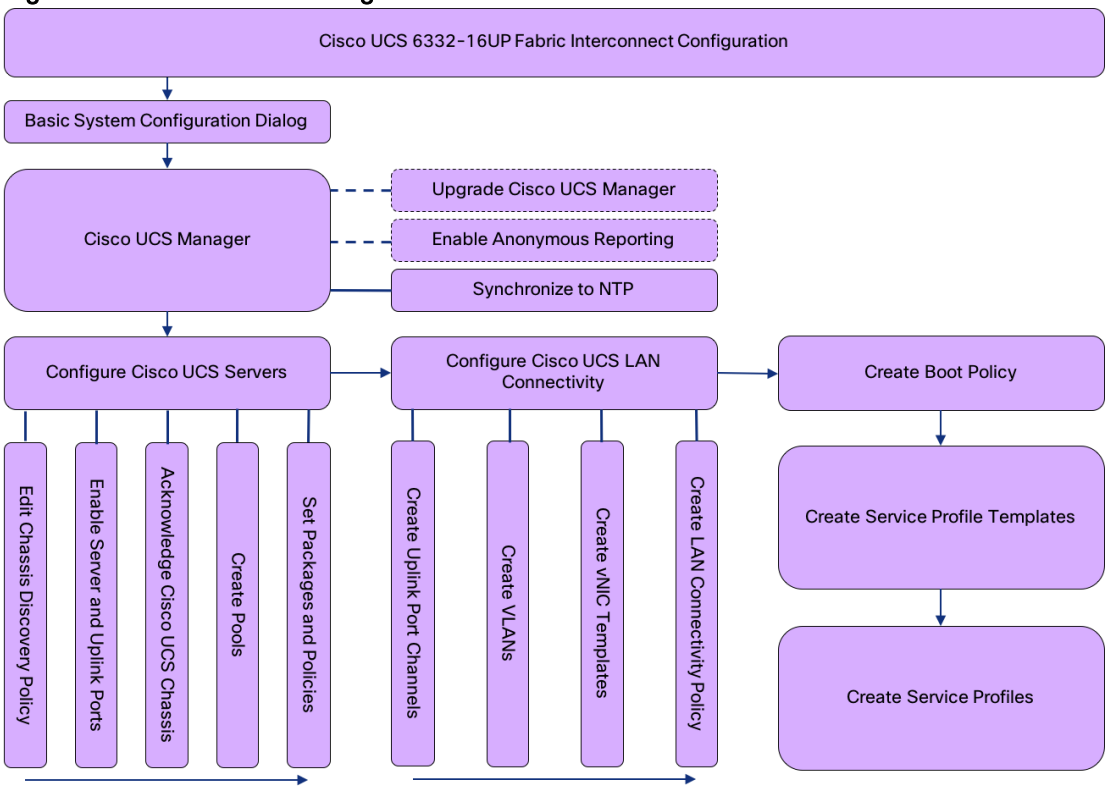


If the certificate is signed with the CSR that was constructed on the current array and you did not change the private key, you do not need to import the key. However, if the CSR was not constructed on the current array or if the private key has changed since you constructed the CSR, you must import the private key. If the private key is encrypted, also specify the passphrase.

Cisco UCS Compute Configuration

This section provides detailed instructions for the configuration of the Cisco UCS 6332-16UP Fabric Interconnects used in this FlashStack solution. As with the Nexus Switches covered beforehand, some changes may be appropriate for a customer's environment, but care should be taken when stepping outside of these instructions as it may lead to an improper configuration.

Figure 4 Cisco UCS Configuration Workflow



Physical Connectivity

Physical cabling should be completed by following the diagram and table references in the previous section referenced as FlashStack Cabling.

Cisco UCS Base Configuration

The initial configuration dialogue for the Cisco UCS 6332-16UP Fabric Interconnects will be provide the primary information to the first fabric interconnect, with the second taking on most settings after joining the cluster.

To start on the configuration of the Fabric Interconnect A, connect to the console of the fabric interconnect and step through the Basic System Configuration Dialogue:

```
        ---- 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]: <Enter>

Enter the password for "admin": ********
Confirm the password for "admin": ********

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

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

Enter the system name:  <<var_ucs_6332_clustername>>

Physical Switch Mgmt0 IP address : <<var_ucsa_mgmt_ip>>

Physical Switch Mgmt0 IPv4 netmask : <<var_oob_mgmt_mask>>

IPv4 address of the default gateway : <<var_oob_gateway>>

Cluster IPv4 address : <<var_ucs_mgmt_vip>>

Configure the DNS Server IP address? (yes/no) [n]: y

  DNS IP address : <<var_nameserver_ntp>>

Configure the default domain name? (yes/no) [n]: y

  Default domain name : <<var_dns_domain_name>>

Join centralized management environment (UCS Central)? (yes/no) [n]: <Enter>

Following configurations will be applied:

  Switch Fabric=A
  System Name=bb08-6332
  Enforced Strong Password=yes
  Physical Switch Mgmt0 IP Address=192.168.164.51
  Physical Switch Mgmt0 IP Netmask=255.255.255.0
  Default Gateway=192.168.164.254
  Ipv6 value=0
  DNS Server=10.1.164.9
  Domain Name=earthquakes.cisco.com

  Cluster Enabled=yes
  Cluster IP Address=192.168.164.50
  NOTE: Cluster IP will be configured only after both Fabric Interconnects are initialized.
        UCSM will be functional only after peer FI is configured in clustering mode.

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

Configuration file - Ok
```

Continue the configuration on the console of the Fabric Interconnect B:

```
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:
    Connecting to peer Fabric interconnect... done
    Retrieving config from peer Fabric interconnect... done
    Peer Fabric interconnect Mgmt0 IPv4 Address: 192.168.164.51
    Peer Fabric interconnect Mgmt0 IPv4 Netmask: 255.255.255.0
    Cluster IPv4 address          : 192.168.164.50

    Peer FI is IPv4 Cluster enabled. Please Provide Local Fabric Interconnect Mgmt0 IPv4 Address

  Physical Switch Mgmt0 IP address : 192.168.164.52


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

Cisco UCS Manager Setup

Log in to Cisco UCS Manager

To log in to the Cisco Unified Computing System (UCS) environment, complete the following steps:

1. Open a web browser and navigate to the Cisco UCS fabric interconnect cluster address.
2. Click the Launch UCS Manager link within the opening page.
3. If prompted to accept security certificates, accept as necessary.
4. When the UCS Manager login is prompted, enter admin as the user name and enter the administrative password.
5. Click Login to log in to Cisco UCS Manager.

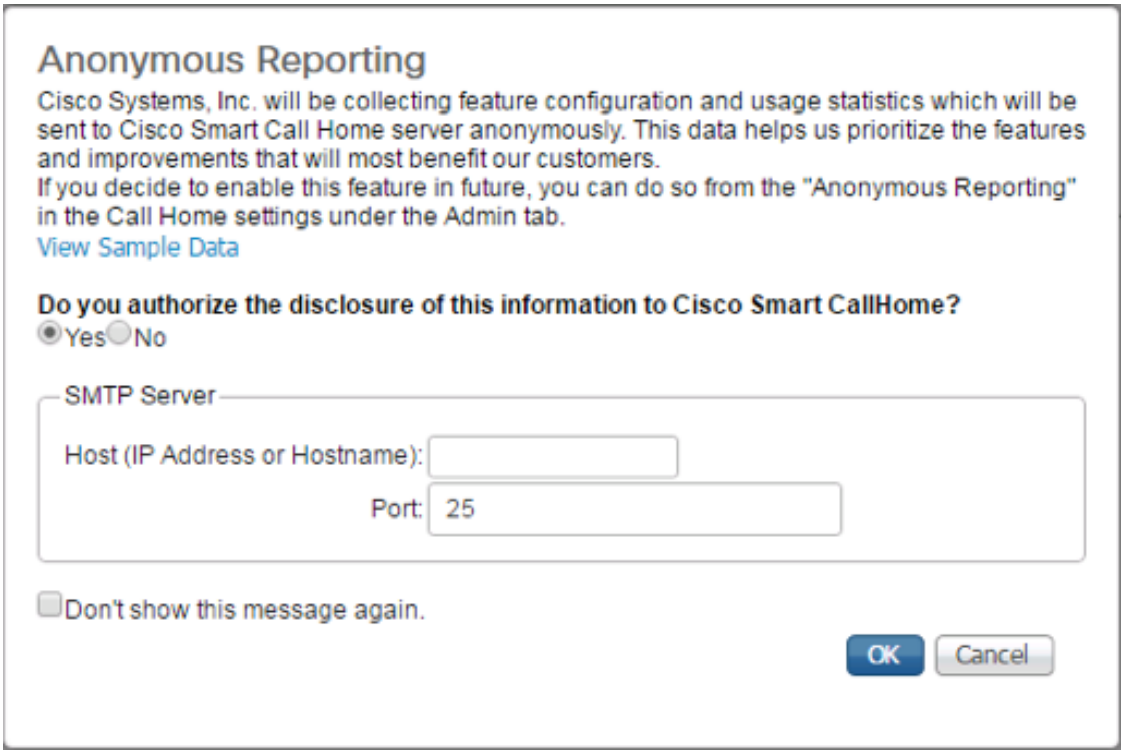
Upgrade Cisco UCS Manager Software to Version 3.2(1d)

This document assumes the use of Cisco UCS 3.2(1d). To upgrade the Cisco UCS Manager software and the Cisco UCS Fabric Interconnect software to version 3.2(1d), refer to Cisco UCS Manager Install and Upgrade Guides.

Anonymous Reporting

During the first connection to the Cisco UCS Manager GUI, a pop-up window will appear to allow for the configuration of Anonymous Reporting to Cisco on use to help with future development. To create anonymous reporting, complete the following step:

1. In the Anonymous Reporting window, select whether to send anonymous data to Cisco for improving future products, and provide the appropriate SMTP server gateway information if configuring:



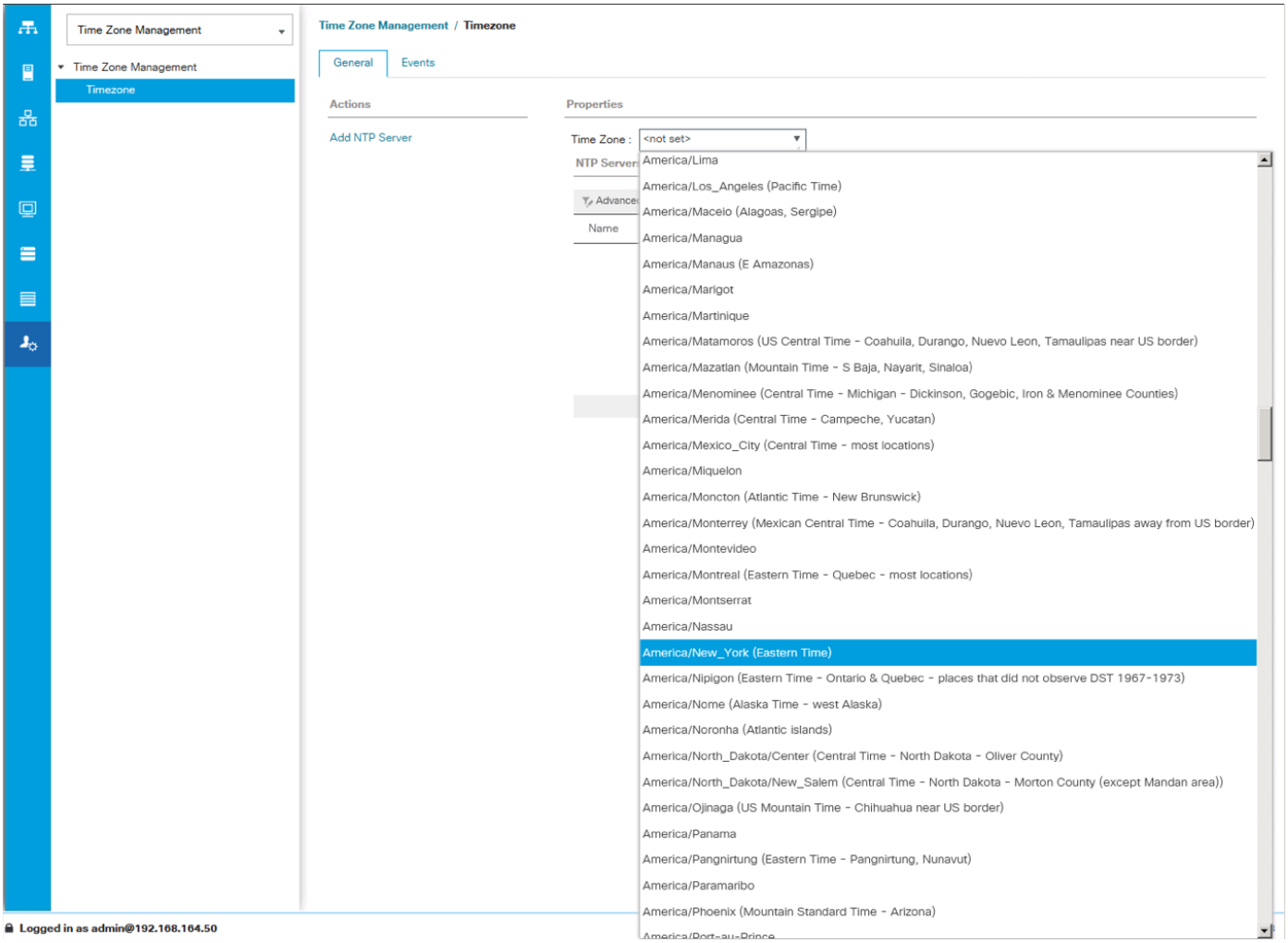
If you want to enable or disable Anonymous Reporting at a later date, it can be found within Cisco UCS Manager under: Admin -> Communication Management -> Call Home, which has a tab on the far right for Anonymous Reporting.

Synchronize Cisco UCS to NTP

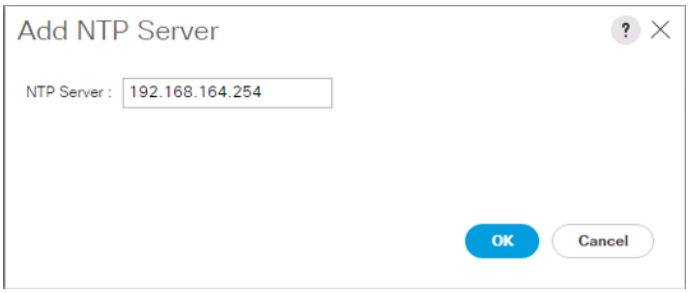
To synchronize the Cisco UCS environment to the NTP server, complete the following steps:

1. In Cisco UCS Manager, click the Admin tab in the navigation pane.

2. Select Timezone Management and click Timezone.



3. In the Properties pane, select the appropriate time zone in the Timezone menu.
4. Click Save Changes and then click OK.
5. Click Add NTP Server.
6. Enter <<var_oob_ntp>> and click OK.



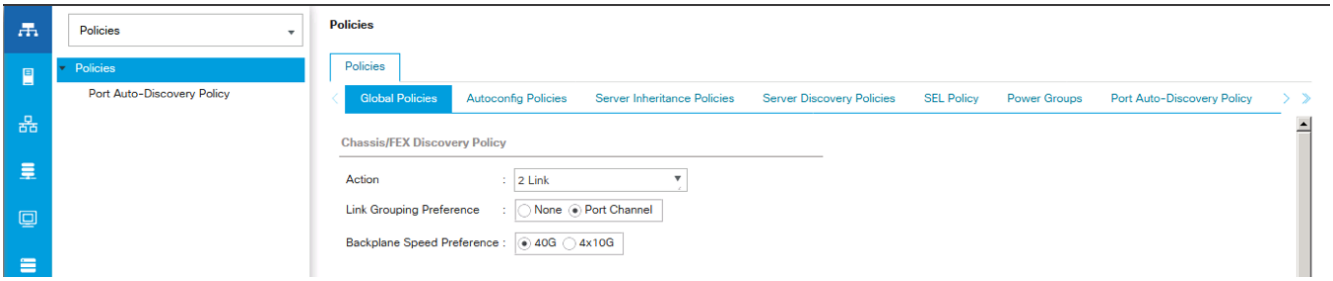
7. Click OK.

Configure Cisco UCS Servers

Edit Chassis Discovery Policy

Setting the discovery policy simplifies the addition of B-Series Cisco UCS chassis. To modify the chassis discovery policy, complete the following steps:

1. In Cisco UCS Manager, click the Equipment tab in the navigation pane and select Policies in the list on the left under the drop-down.
2. Under Global Policies, set the Chassis/FEX Discovery Policy to match the number of uplink ports that are cabled between the chassis or fabric extenders (FEXes) and the fabric interconnects.
3. Set the Link Grouping Preference to Port Channel.

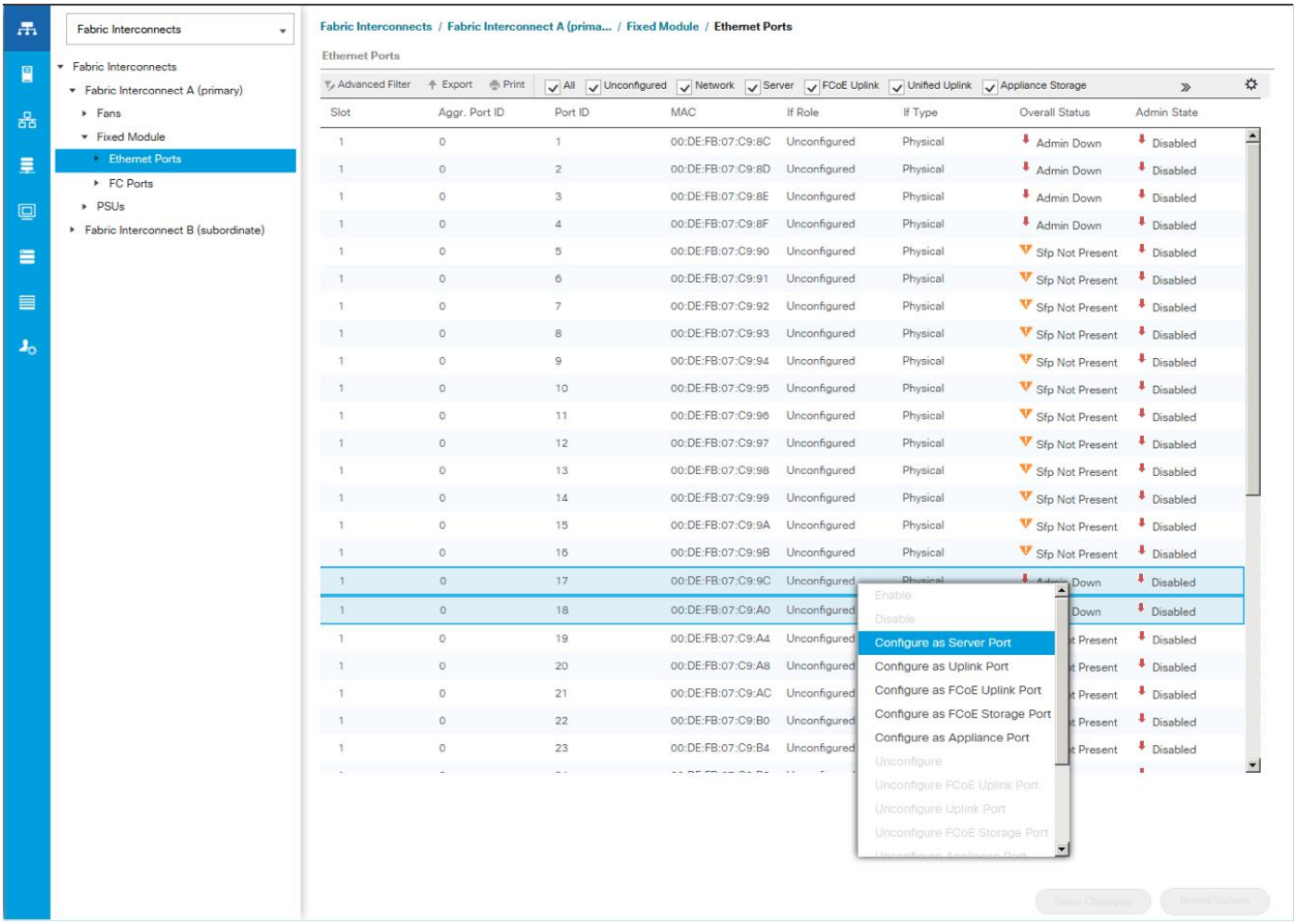


4. Leave other settings alone or change if appropriate to your environment.
5. Click Save Changes.
6. Click OK.

Enable Server and Uplink Ports

To enable server and uplink ports, complete the following steps:

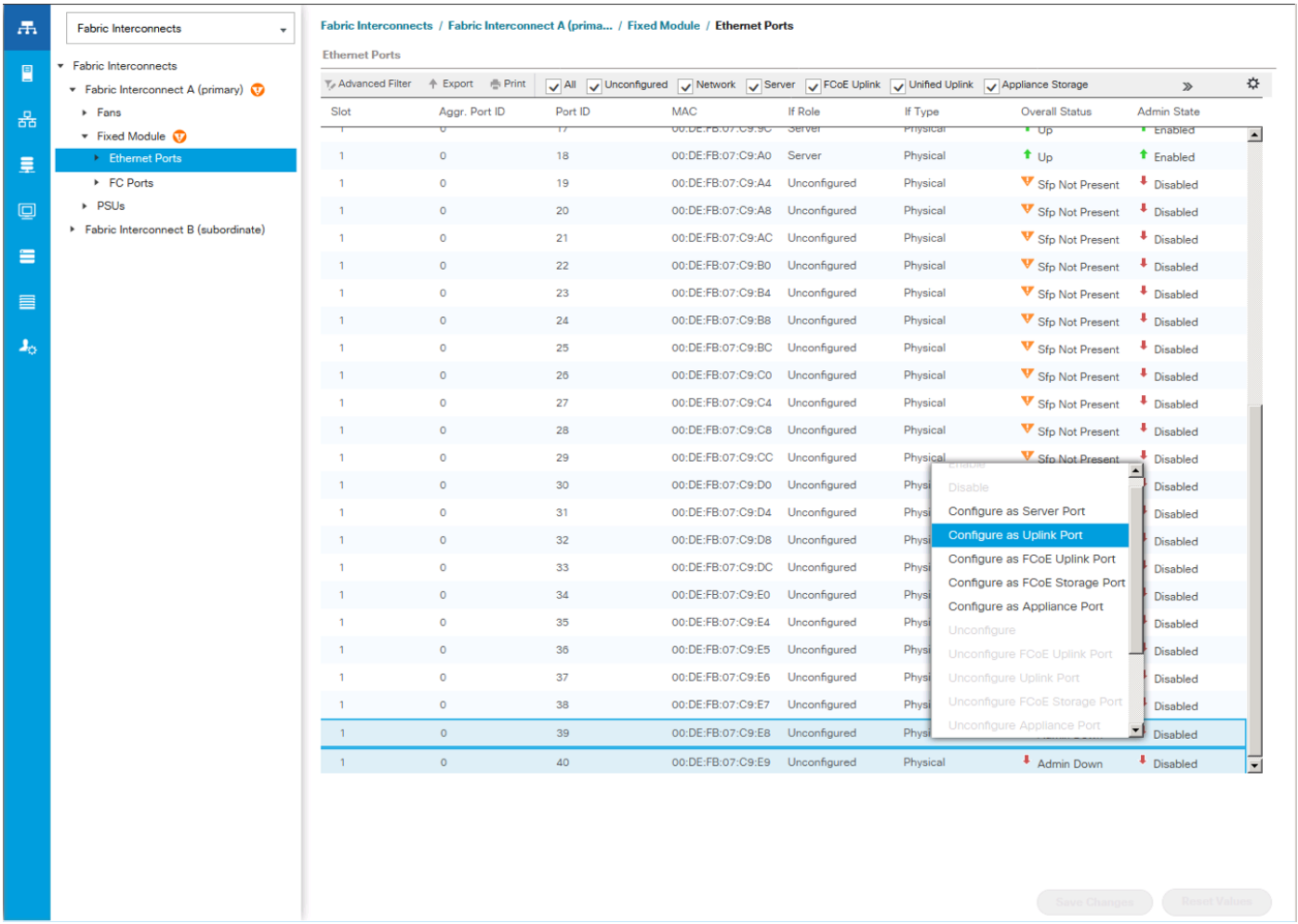
1. In Cisco UCS Manager, click the Equipment tab in the navigation pane.
2. Select Equipment > Fabric Interconnects > Fabric Interconnect A (primary) > Fixed Module.
3. Expand Ethernet Ports.
4. Select the ports that are connected to the chassis, right-click them, and select “Configure as Server Port.”



5. Click Yes to confirm server ports and click OK.

6. Verify that the ports connected to the chassis are now configured as server ports.

7. Select ports 39 and 40 that are connected to the Cisco Nexus switches, right-click them, and select Configure as Uplink Port.



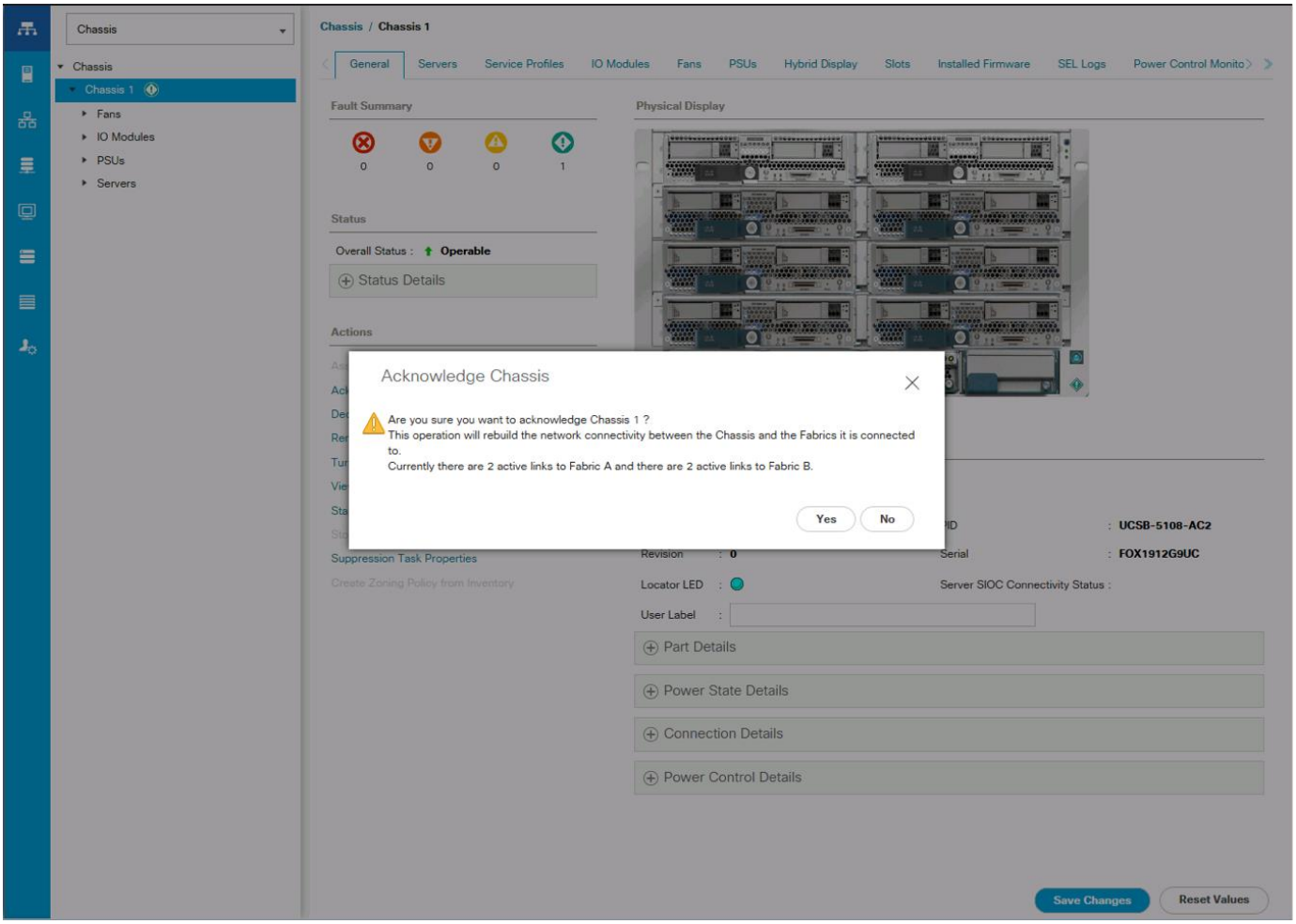
The last 6 ports of the Cisco UCS 6332 and UCS 6332-16UP FIs will only work with optical based QSFP transceivers and AOC cables, so they can be better utilized as uplinks to upstream resources that might be optical only.

8. Click Yes to confirm uplink ports and click OK.
9. Select Equipment > Fabric Interconnects > Fabric Interconnect B (subordinate) > Fixed Module.
10. Expand Ethernet Ports.
11. Select the ports that are connected to the chassis, right-click them and select Configure as Server Port.
12. Click Yes to confirm server ports and click OK.
13. Select ports 39 and 40 that are connected to the Cisco Nexus switches, right-click them, and select Configure as Uplink Port.
14. Click Yes to confirm the uplink ports and click OK.

Acknowledge Cisco UCS Chassis

To acknowledge all Cisco UCS chassis, complete the following steps:

1. In Cisco UCS Manager, click the Equipment tab in the navigation pane.
2. Expand Chassis and select each chassis that is listed.
3. Right-click each chassis and select Acknowledge Chassis.



4. Click Yes and then click OK to complete acknowledging the chassis.

Create Pools

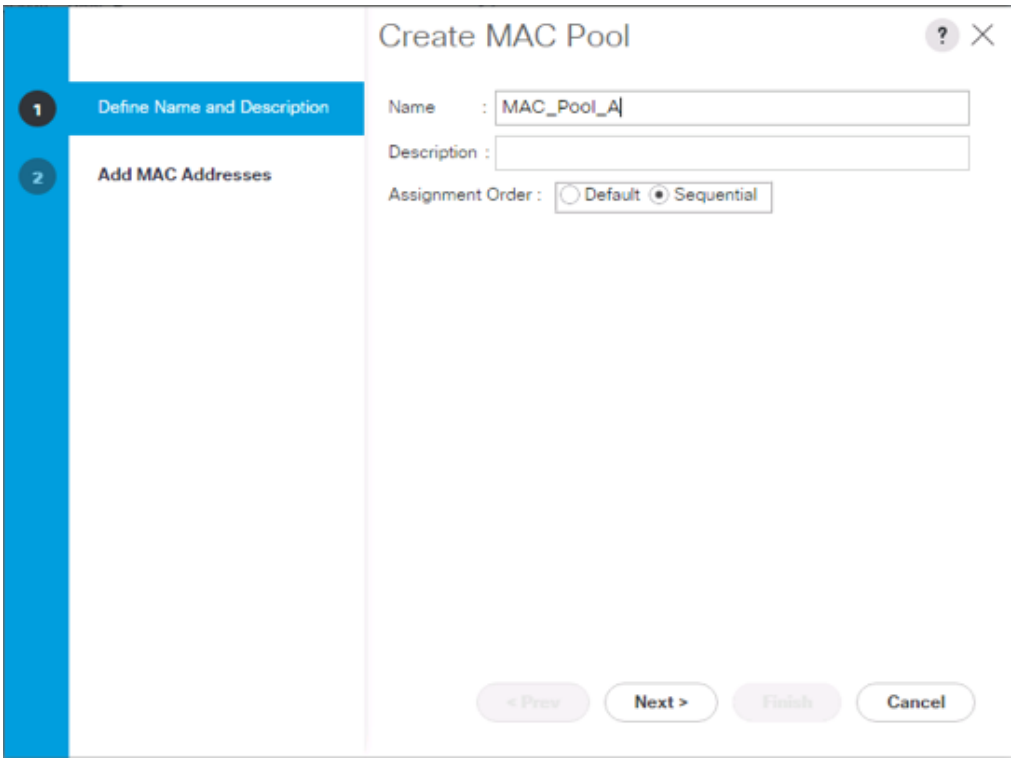
Create MAC Address Pools

To configure the necessary MAC address pools for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Pools > root.

In this procedure, two MAC address pools are created, one for each switching fabric.

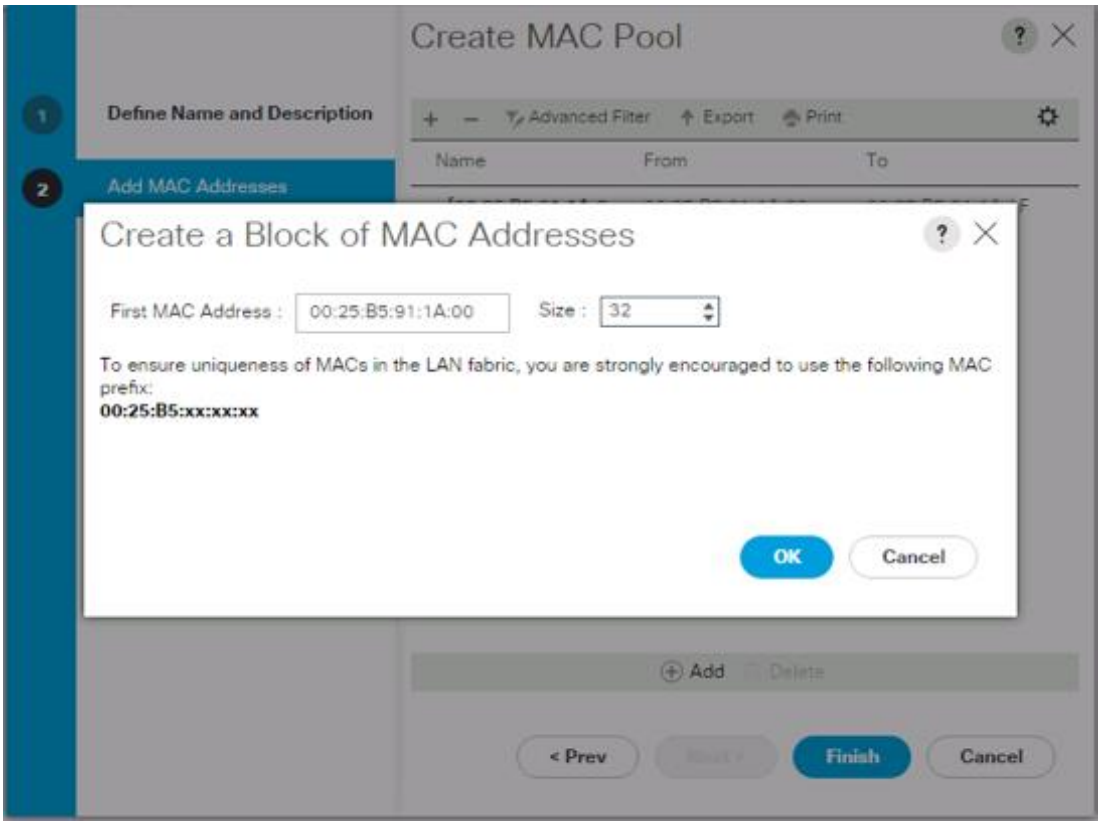
3. Right-click MAC Pools under the root organization.
4. Select Create MAC Pool to create the MAC address pool.
5. Enter MAC_Pool_A as the name of the MAC pool.
6. Optional: Enter a description for the MAC pool.
7. Select Sequential as the option for Assignment Order.



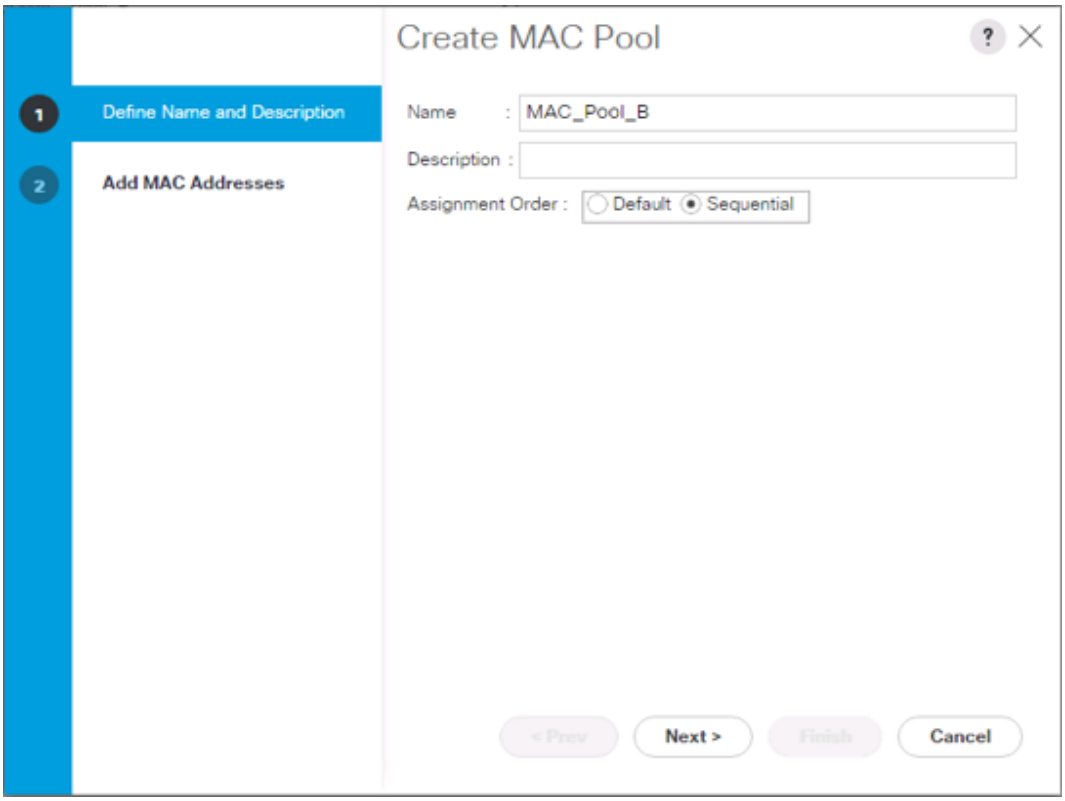
8. Click Next.
9. Click Add.
10. Specify a starting MAC address.

For Cisco UCS deployments, the recommendation is to place `0A` in the next-to-last octet of the starting MAC address to identify all of the MAC addresses as fabric A addresses. In our example, we have carried forward the of also embedding the extra building, floor and Cisco UCS domain number information giving us `00:25:B5:91:1A:00` as our first MAC address.

11. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources.



12. Click OK.
13. Click Finish.
14. In the confirmation message, click OK.
15. Right-click MAC Pools under the root organization.
16. Select Create MAC Pool to create the MAC address pool.
17. Enter MAC_Pool_B as the name of the MAC pool.
18. Optional: Enter a description for the MAC pool.



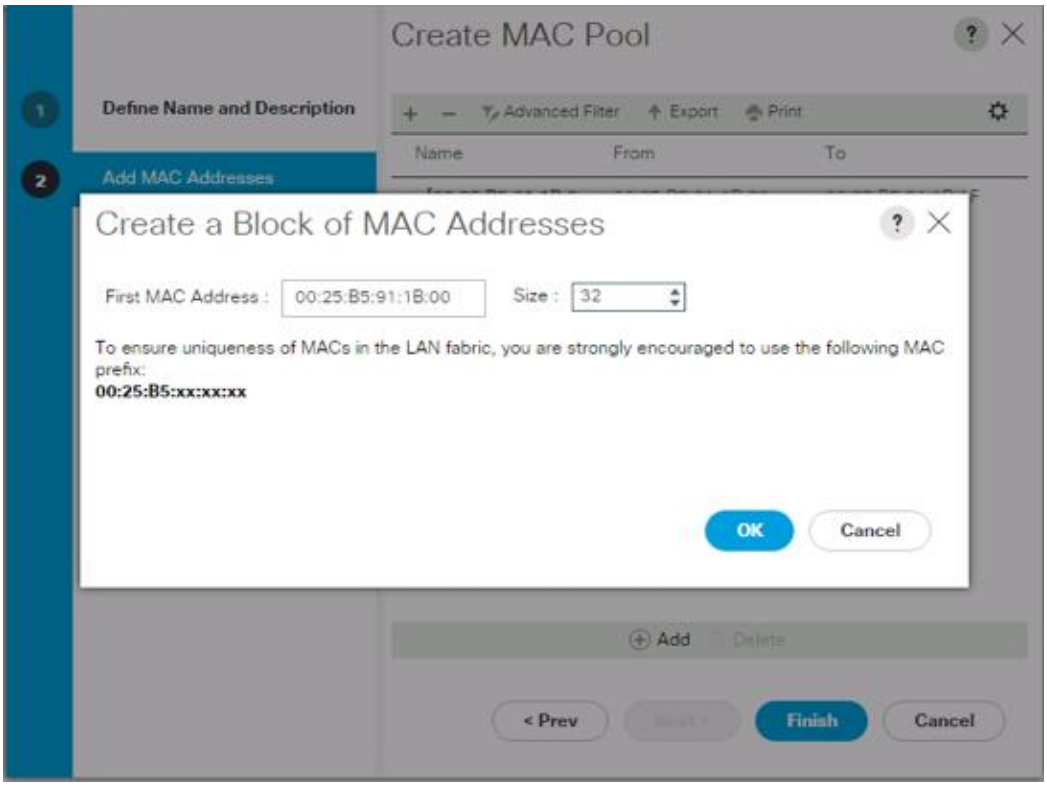
19. Click Next.

20. Click Add.

21. Specify a starting MAC address.

For Cisco UCS deployments, it is recommended to place `0B` in the next to last octet of the starting MAC address to identify all the MAC addresses in this pool as fabric B addresses. Once again, we have carried forward in our example of also embedding the extra building, floor and Cisco UCS domain number information giving us `00:25:B5:91:1B:00` as our first MAC address.

22. Specify a size for the MAC address pool that is sufficient to support the available blade or server resources.

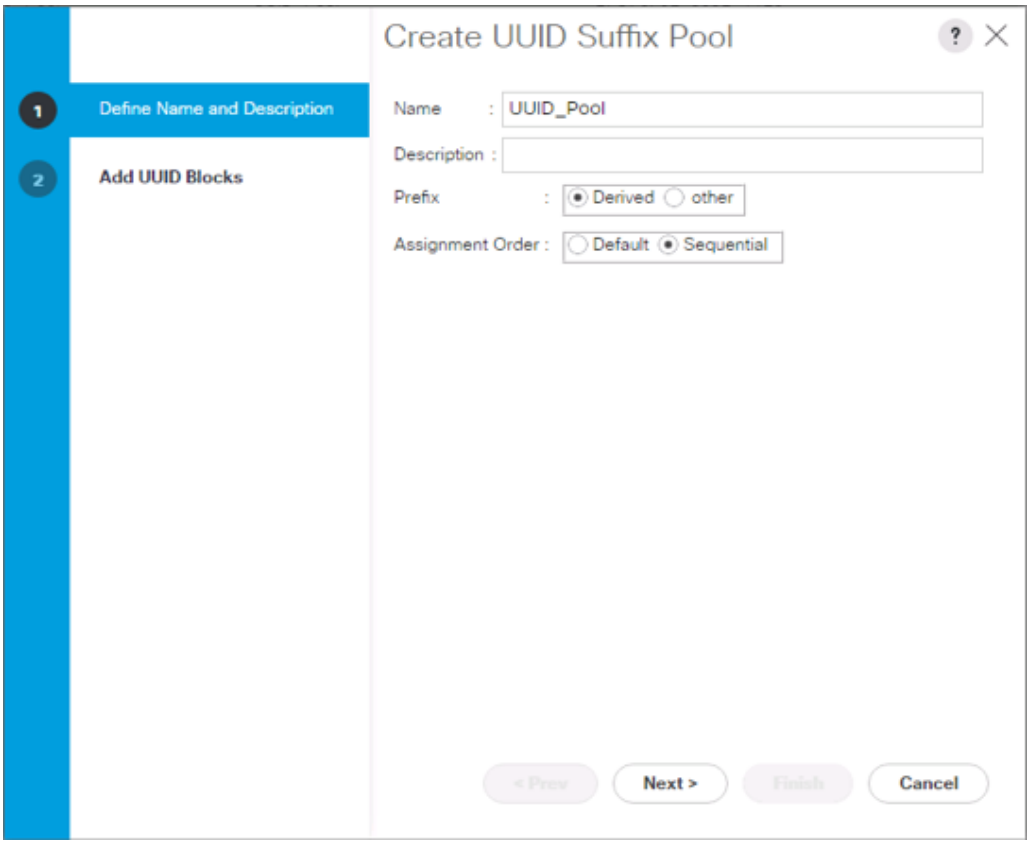


23. Click OK.
24. Click Finish.
25. In the confirmation message, click OK.

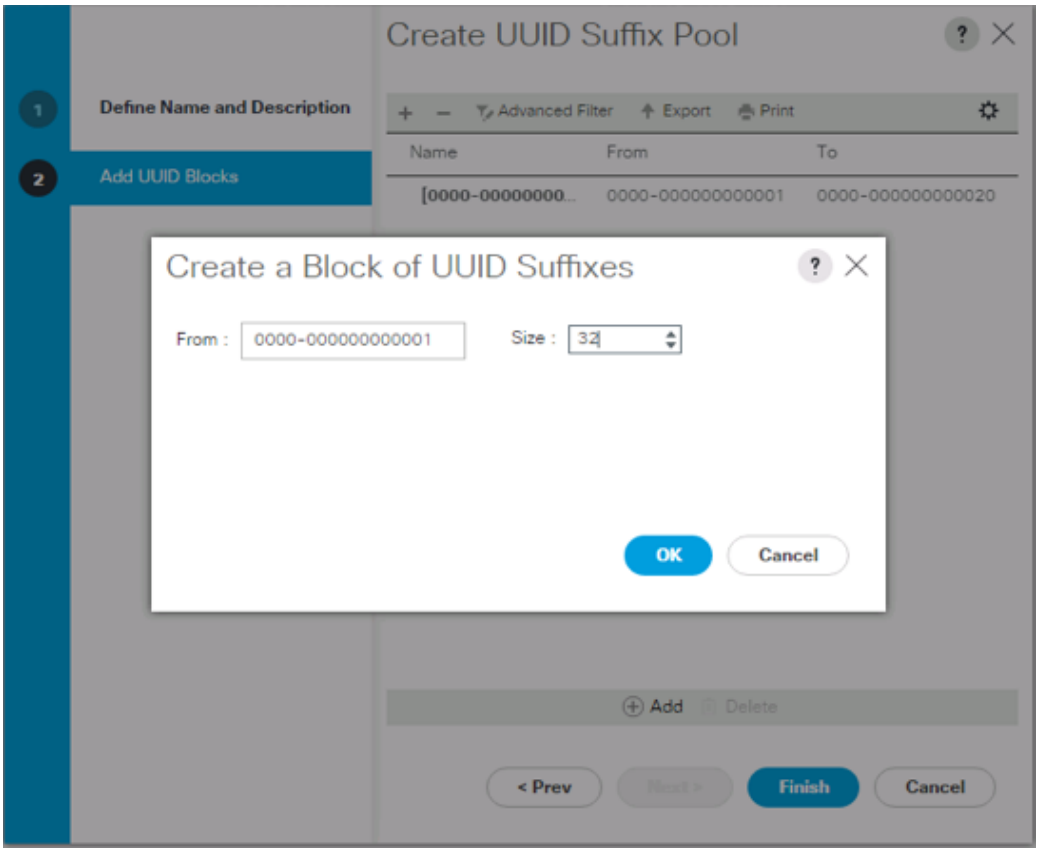
Create UUID Suffix Pool

To configure the necessary universally unique identifier (UUID) suffix pool for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Pools > root.
3. Right-click UUID Suffix Pools.
4. Select Create UUID Suffix Pool.
5. Enter UUID_Pool as the name of the UUID suffix pool.



6. Optional: Enter a description for the UUID suffix pool.
7. Keep the prefix at the derived option.
8. Select Sequential for the Assignment Order.
9. Click Next.
10. Click Add to add a block of UUIDs.



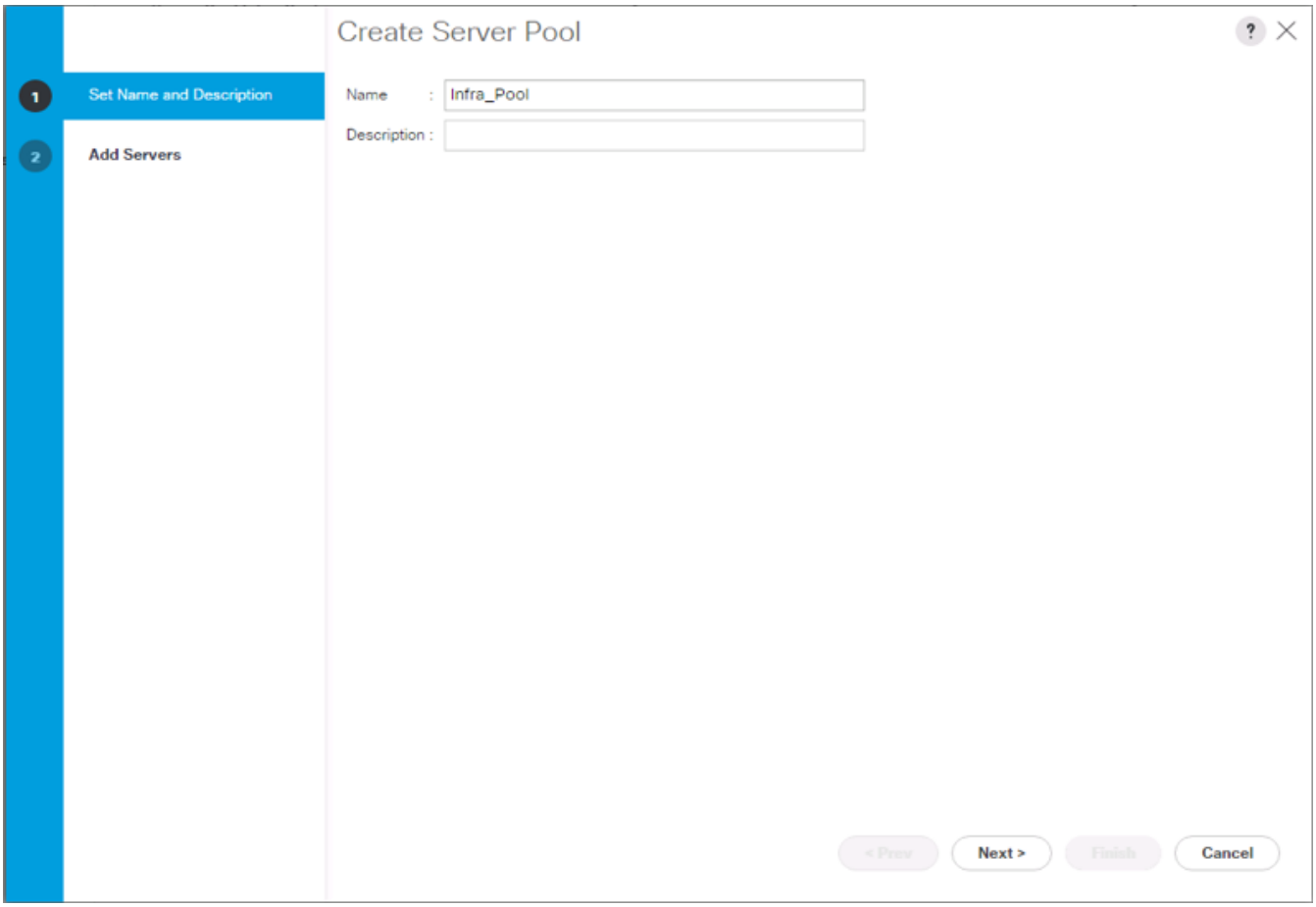
11. Keep the From: field at the default setting.
12. Specify a size for the UUID block that is sufficient to support the available blade or server resources.
13. Click OK.
14. Click Finish.
15. Click OK.

Create Server Pool

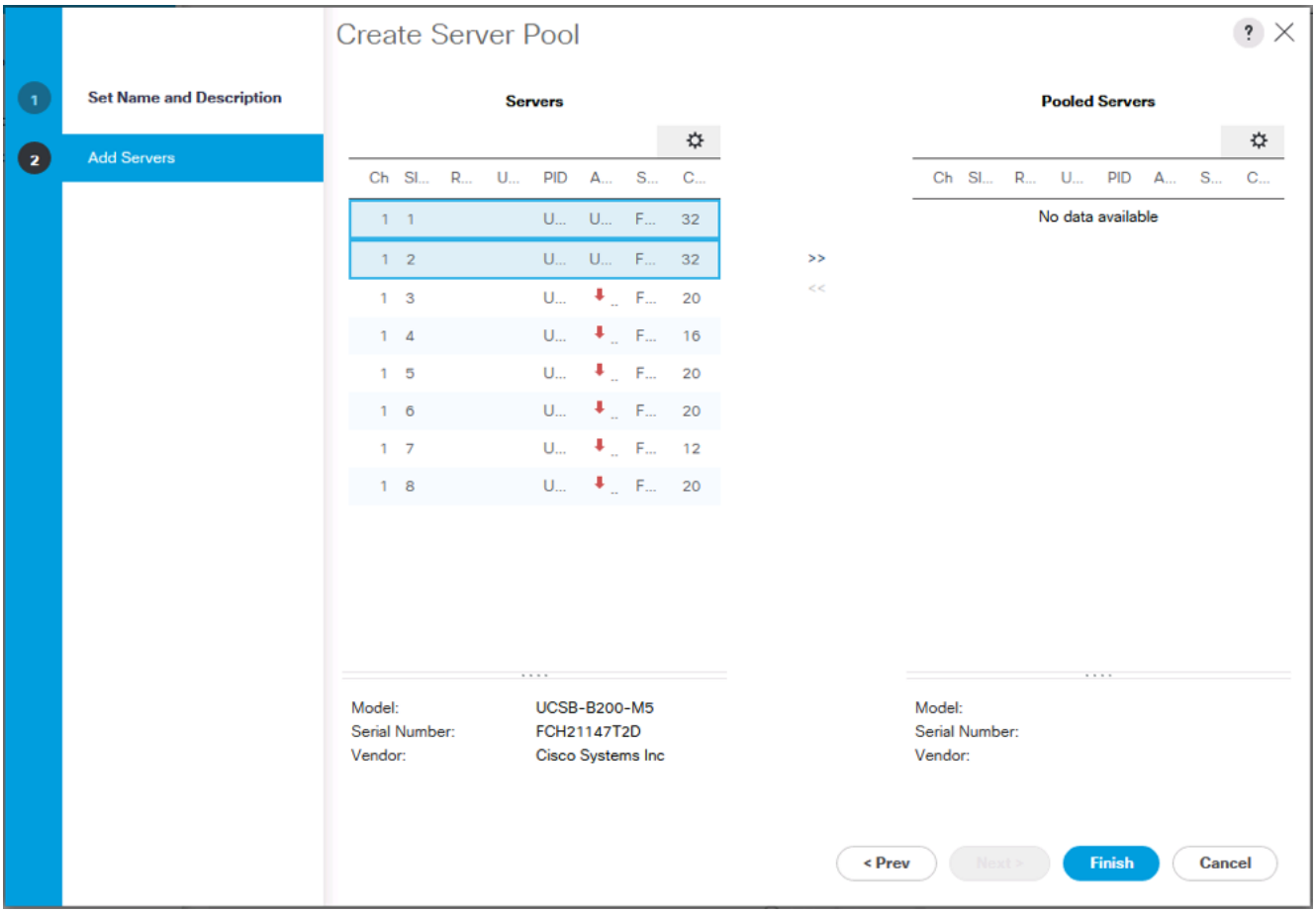
To configure the necessary server pool for the Cisco UCS environment, complete the following steps:

Consider creating unique server pools to achieve the granularity that is required in your environment.

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Pools > root.
3. Right-click Server Pools.
4. Select Create Server Pool.
5. Enter Infra_Pool as the name of the server pool.



6. Optional: Enter a description for the server pool.
7. Click Next.
8. Select two (or more) servers to be used for the VMware management cluster and click >> to add them to the Infra_Pool server pool.



9. Click Finish.
10. Click OK.

Create IQN Pools for iSCSI Boot

To configure the necessary IQN pools for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click SAN on the left.
2. Select Pools > root.
3. Right-click IQN Pools.
4. Select Create IQN Suffix Pool to create the IQN pool.
5. Enter IQN-Pool for the name of the IQN pool
6. Optional: Enter a description for the IQN pool
7. Enter iqn.1992-08.com.cisco as the prefix.
8. Select Sequential for Assignment Order

9. Click Next.

10. Click Add.

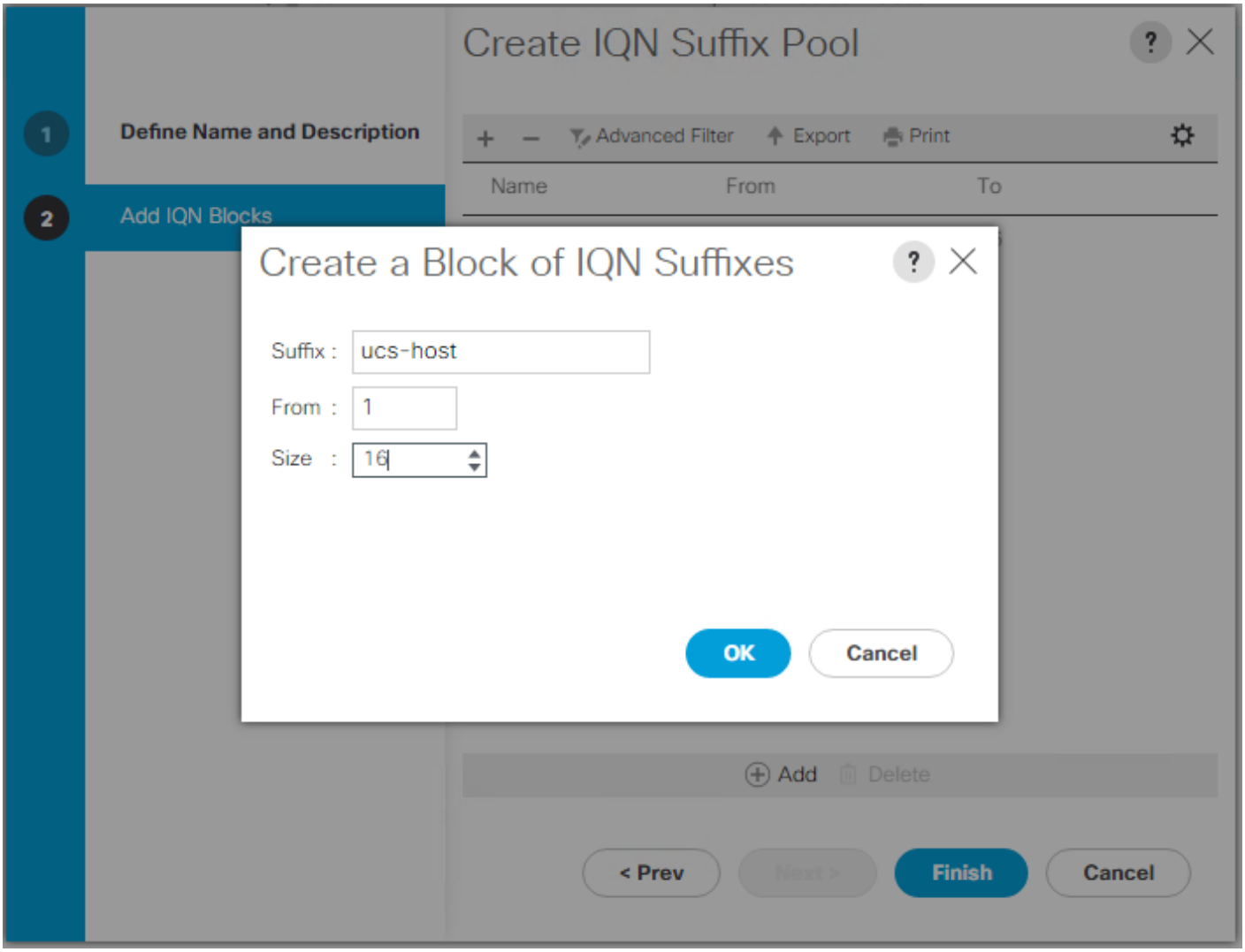
11. Enter ucs-host as the suffix.

If multiple Cisco UCS domains are being used, a more specific IQN suffix may need to be used.

12. Enter 1 in the From field.

13. Specify the size of the IQN block sufficient to support the available server resources.

14. Click OK.

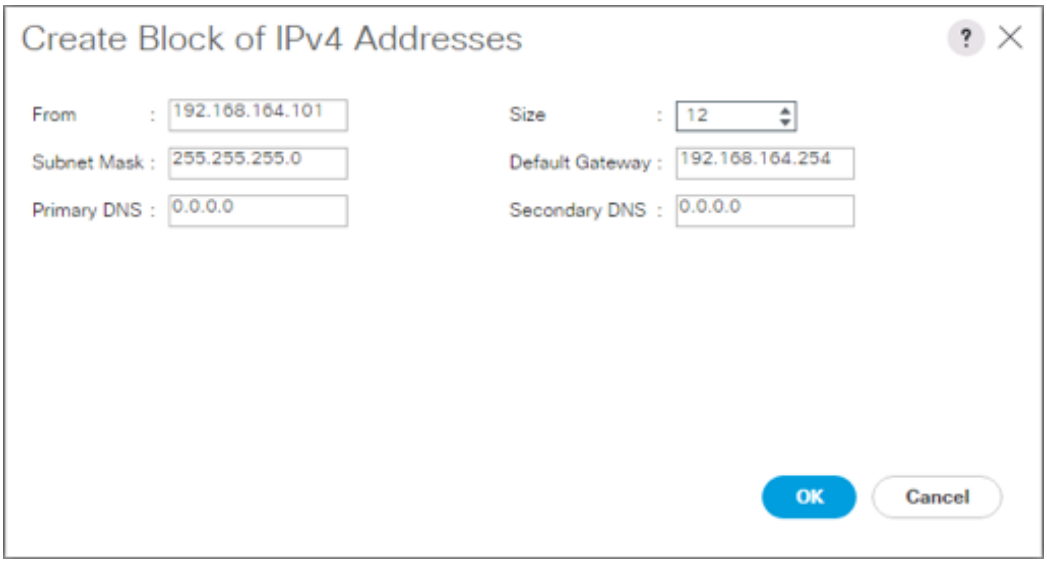


15. Click Finish.

Add a Block of IP Addresses for KVM Access

To create a block of IP addresses for in band server Keyboard, Video, Mouse (KVM) access in the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Pools > root > IP Pools.
3. Right-click IP Pool ext-mgmt and select Create Block of IPv4 Addresses.



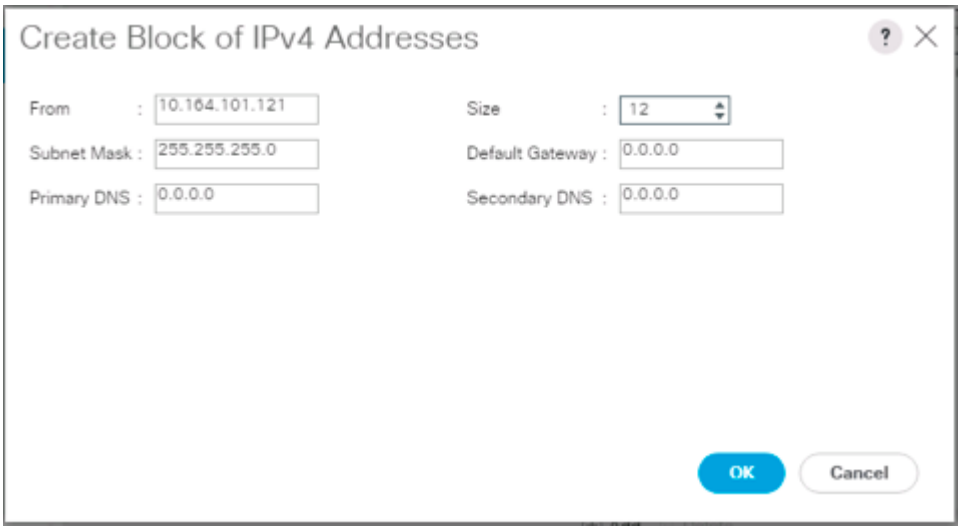
4. Enter the starting IP address of the block and the number of IP addresses required, and the subnet and gateway information.
5. Click OK to create the block of IPs.
6. Click OK.

Create IP Pools for iSCSI Boot

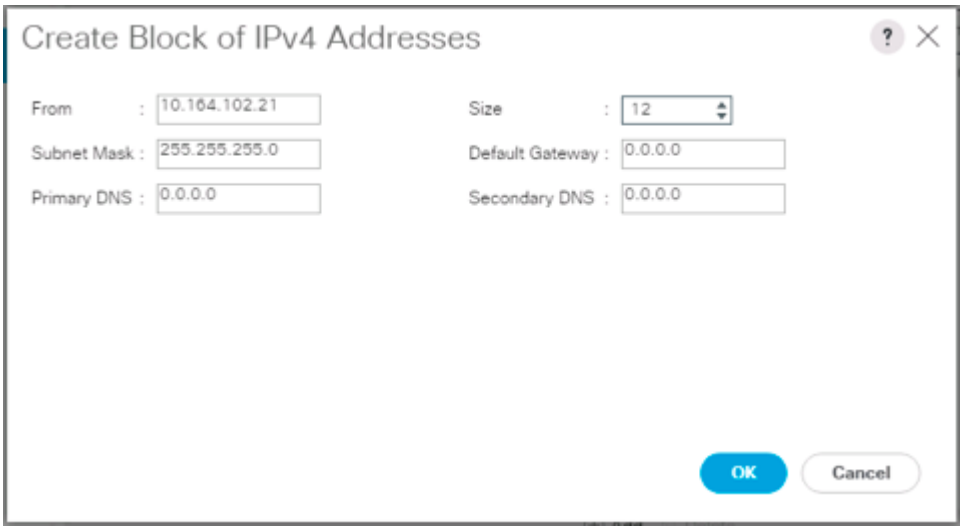
To configure the necessary IP pools iSCSI boot for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click LAN on the left.
2. Select Pools > root.
3. Right-click IP Pools.
4. Select Create IP Pool.
5. Enter iSCSI-IP-Pool-A as the name of IP pool.
6. Optional: Enter a description for the IP pool.

7. Select Sequential for the assignment order.
8. Click Next.
9. Click Add to add a block of IP address.
10. In the From field, enter the beginning of the range to assign as iSCSI IP addresses
11. Set the size to enough addresses to accommodate the servers



12. Click OK.
13. Click Next.
14. Click Finish.
15. Right-click IP Pools.
16. Select Create IP Pool.
17. Enter iSCSI-IP-Pool-B as the name of IP pool.
18. Optional: Enter a description for the IP pool.
19. Select Sequential for the assignment order.
20. Click Next.
21. Click Add to add a block of IP address.
22. In the From field, enter the beginning of the range to assign as iSCSI IP addresses
23. Set the size to enough addresses to accommodate the servers



24. Click OK.
25. Click Next.
26. Click Finish.

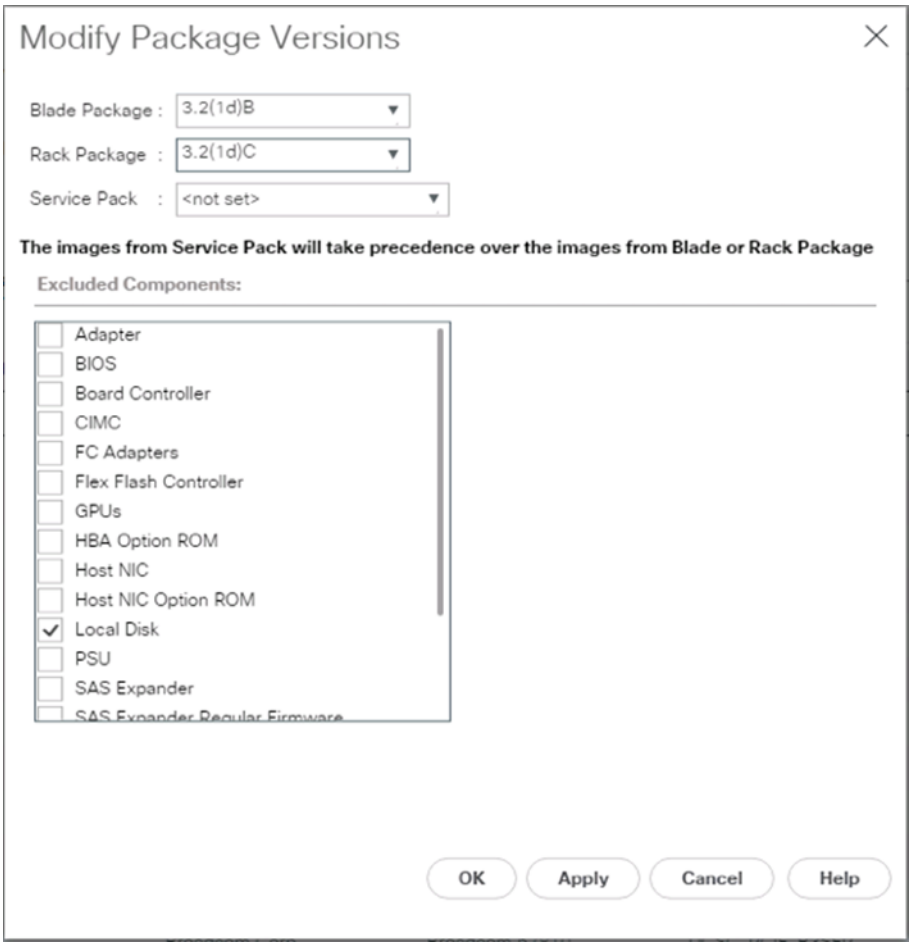
Set Packages and Policies

Create Host Firmware Package

Firmware management policies allow the administrator to select the corresponding packages for a given server configuration. These policies often include packages for adapter, BIOS, board controller, FC adapters, host bus adapter (HBA) option ROM, and storage controller properties.

To create a firmware management policy for a given server configuration in the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Policies > root.
3. Expand Host Firmware Packages.
4. Select default.
5. In the Actions pane, select Modify Package Versions.
6. Select the version 3.2(1d)B for the Blade Package, and optionally set version 3.2(1d)C for the Rack Package.
7. Leave Excluded Components with only Local Disk selected.



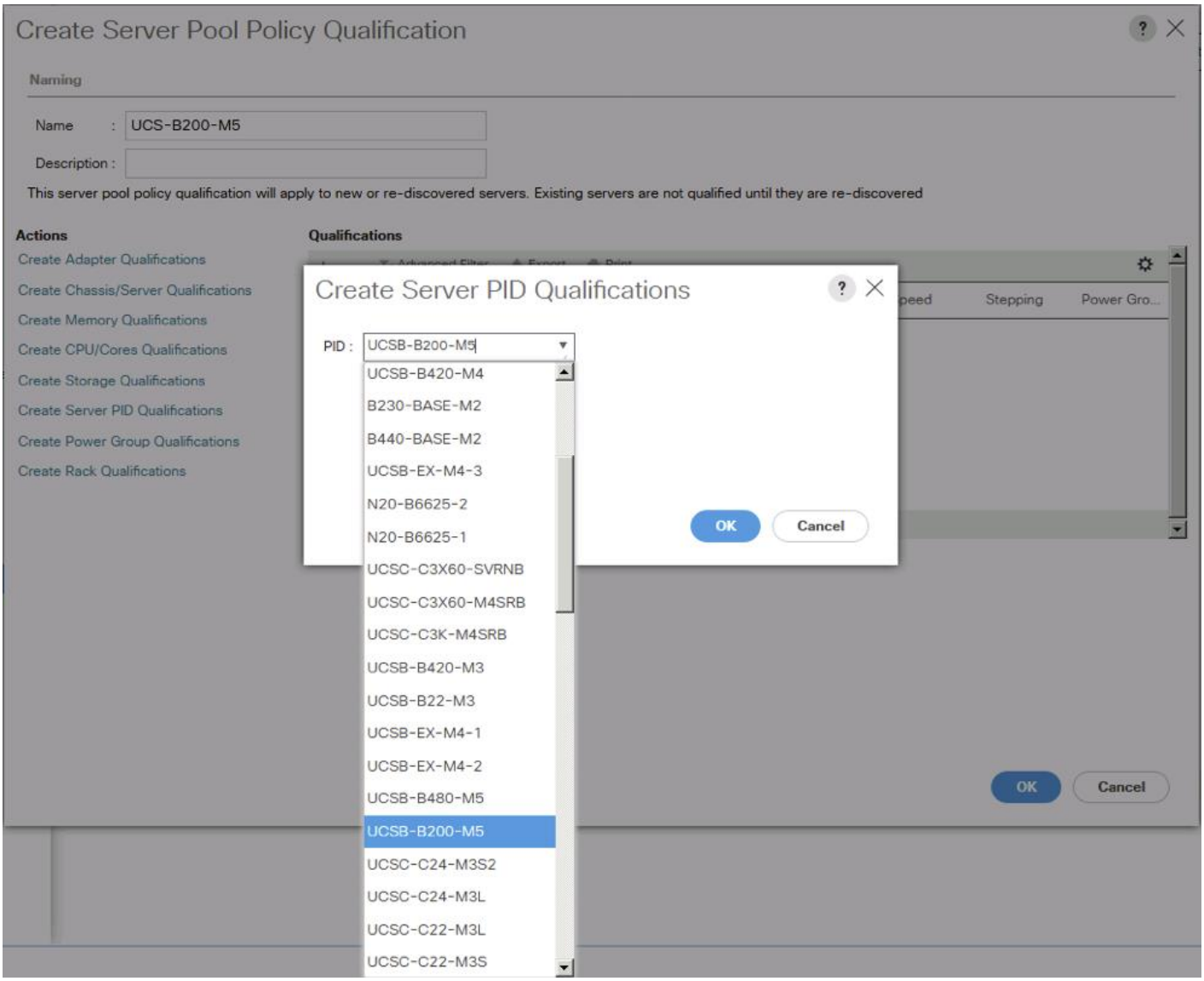
8. Click OK to modify the host firmware package.

Create Server Pool Qualification Policy (Optional)

To create an optional server pool qualification policy for the Cisco UCS environment, complete the following steps:

 This example creates a policy for Cisco UCS B200 M5 servers for a server pool.

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Policies > root.
3. Right-click Server Pool Policy Qualifications.
4. Select Create Server Pool Policy Qualification.
5. Name the policy `UCS-B200M5`.
6. Select Create Server PID Qualifications.
7. Select UCS-B200-M5 from the PID drop-down.



8. Click OK.
9. Optionally select additional qualifications to refine server selection parameters for the server pool.
10. Click OK to create the policy then OK for the confirmation.

Download Cisco Custom Image for ESXi 6.5 U1

The VMware Cisco Custom Image will need to be downloaded for use during installation by manual access to the UCS KVM vMedia, or through a vMedia Policy covered in the subsection that follows these steps. To download the Cisco Custom Image, complete the following steps:

1. Click the following link: VMware vSphere Hypervisor Cisco Custom Image (ESXi) 6.5 U1.
2. You will need a user id and password on vmware.com to download this software.
3. Download the .iso file.

Create vMedia Policy for VMware ESXi 6.5 U1 Install Boot (optional if manually attaching ISO through KVM)

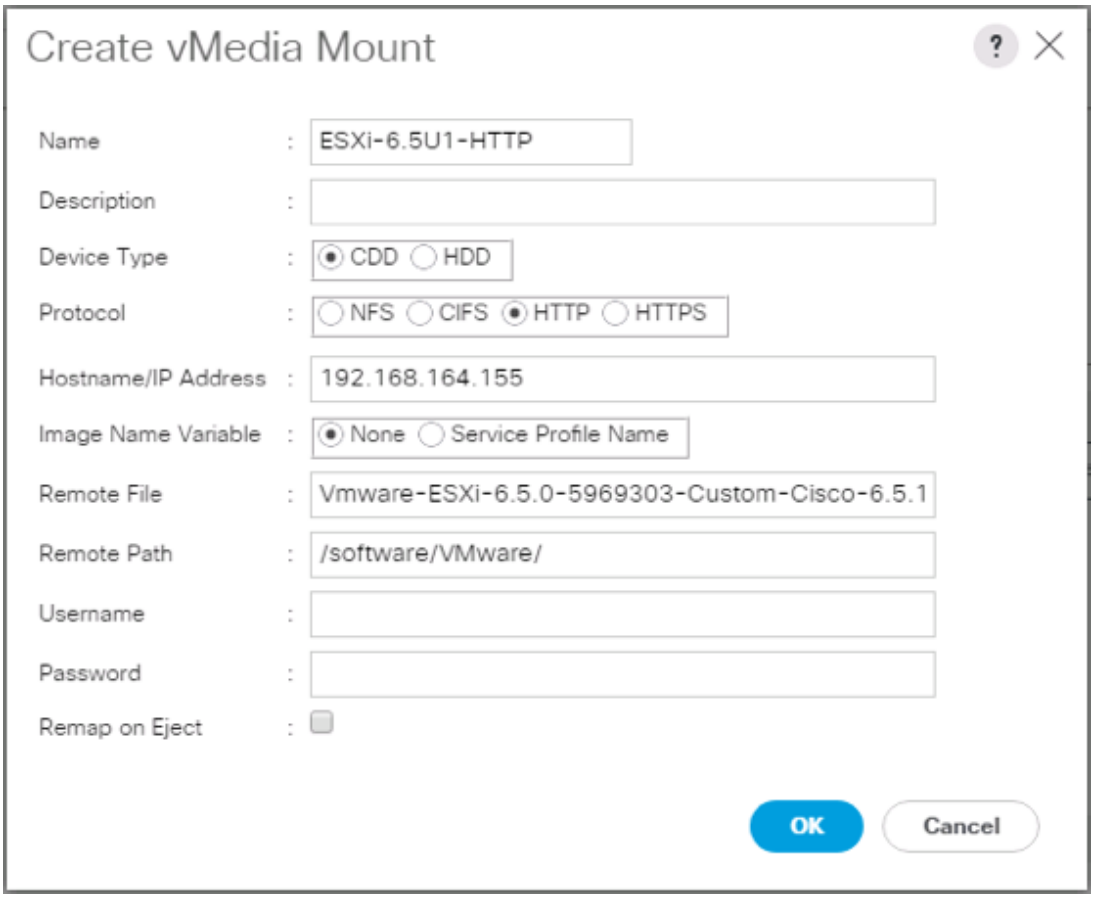
A separate HTTP web server is required to automate the availability of the ESXi image to each Service Profile on first power on. The creation of this web server is not covered in this document, but can be any existing web server capable of serving files via HTTP that are accessible on the OOB network that the ESXi image can be placed upon.

Place the Cisco Custom Image VMware ESXi 6.5 U1 ISO on the HTTP server and complete the following steps to create a vMedia Policy:

1. In Cisco UCS Manager, select Servers on the left.
2. Select Policies > root.
3. Right-click vMedia Policies.
4. Select Create vMedia Policy.
5. Name the policy `ESXi-6.5U1-HTTP`.
6. Enter "`Mounts ISO for ESXi 6.5 U1`" in the Description field.
7. Click Add.
8. Name the mount `ESXi-6.5U1-HTTP`.
9. Select the CDD Device Type.
10. Select the HTTP Protocol.
11. Enter the IP Address of the web server.

Since DNS server IPs were not entered into the KVM IP earlier, it is necessary to enter the IP of the web server instead of the hostname.

12. Leave "None" selected for Image Name Variable.
13. Enter Vmware-ESXi-6.5.0-5969303-Custom-Cisco-6.5.1.1.iso as the Remote File name.
14. Enter the web server path to the ISO file in the Remote Path field.



15. Click OK to create the vMedia Mount.

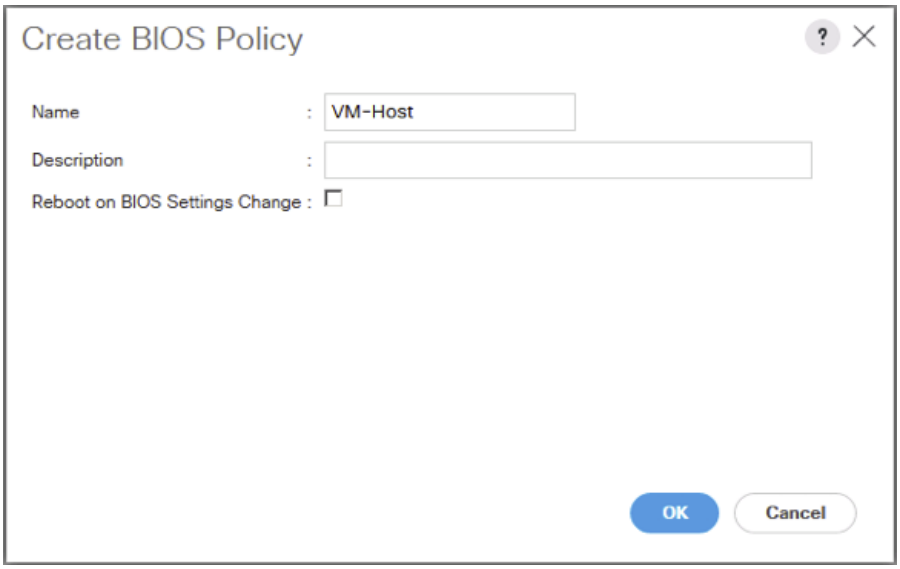
16. Click OK then OK again to complete creating the vMedia Policy.

For any new servers added to the Cisco UCS environment the vMedia service profile template can be used to install the ESXi host. On first boot the host will boot into the ESXi installer. After ESXi is installed, the vMedia will not be referenced as long as the boot disk is accessible.

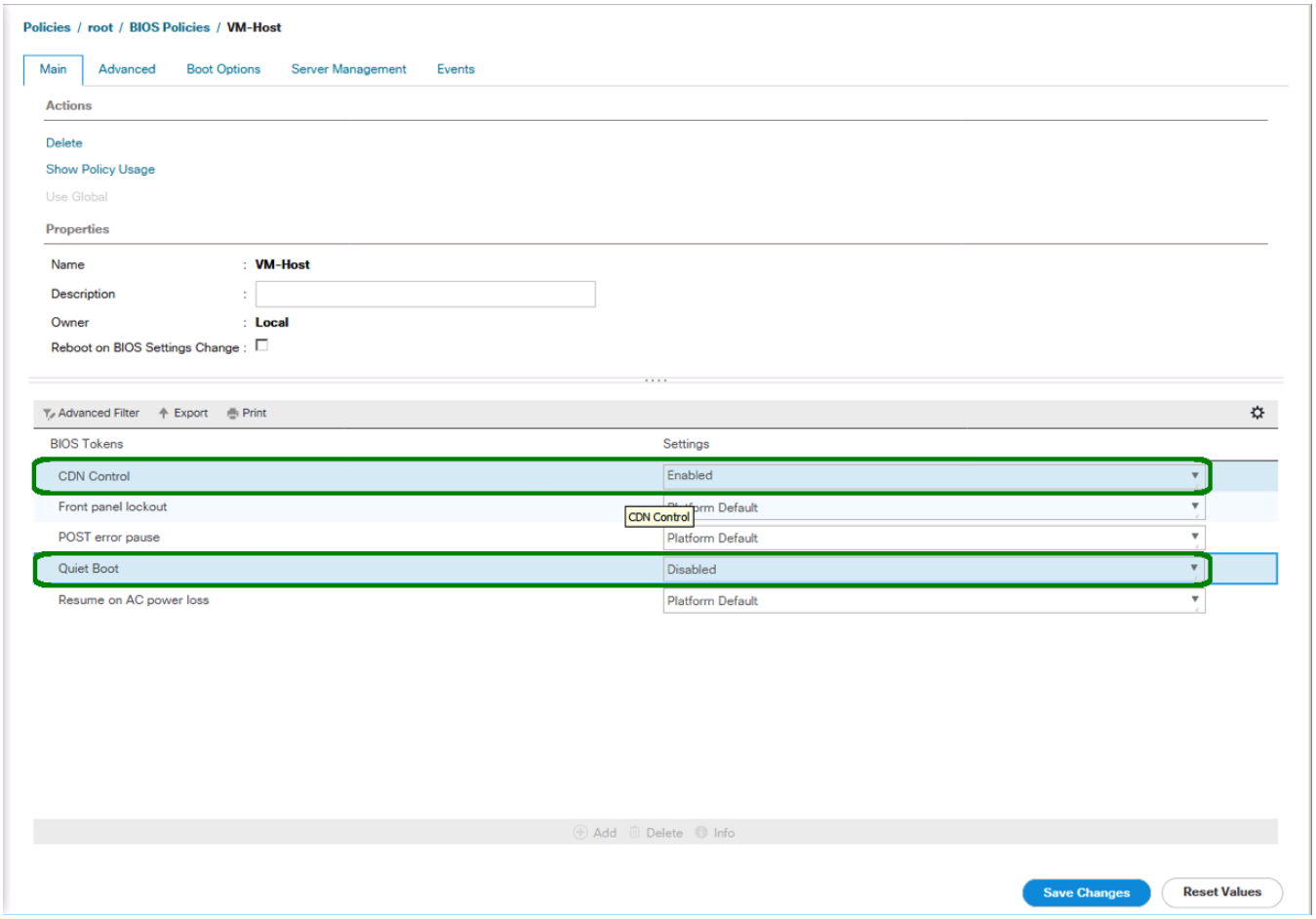
Create Server BIOS Policy

To create a server BIOS policy for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click Servers on the left.
2. Select Policies > root.
3. Right-click BIOS Policies.
4. Select Create BIOS Policy.
5. Enter `VM-Host` as the BIOS policy name.



6. Select and right click the newly created BIOS Policy.
7. Within the Main tab of the Policy:
8. Change CDN Control to enabled.
9. Change the Quiet Boot setting to disabled.



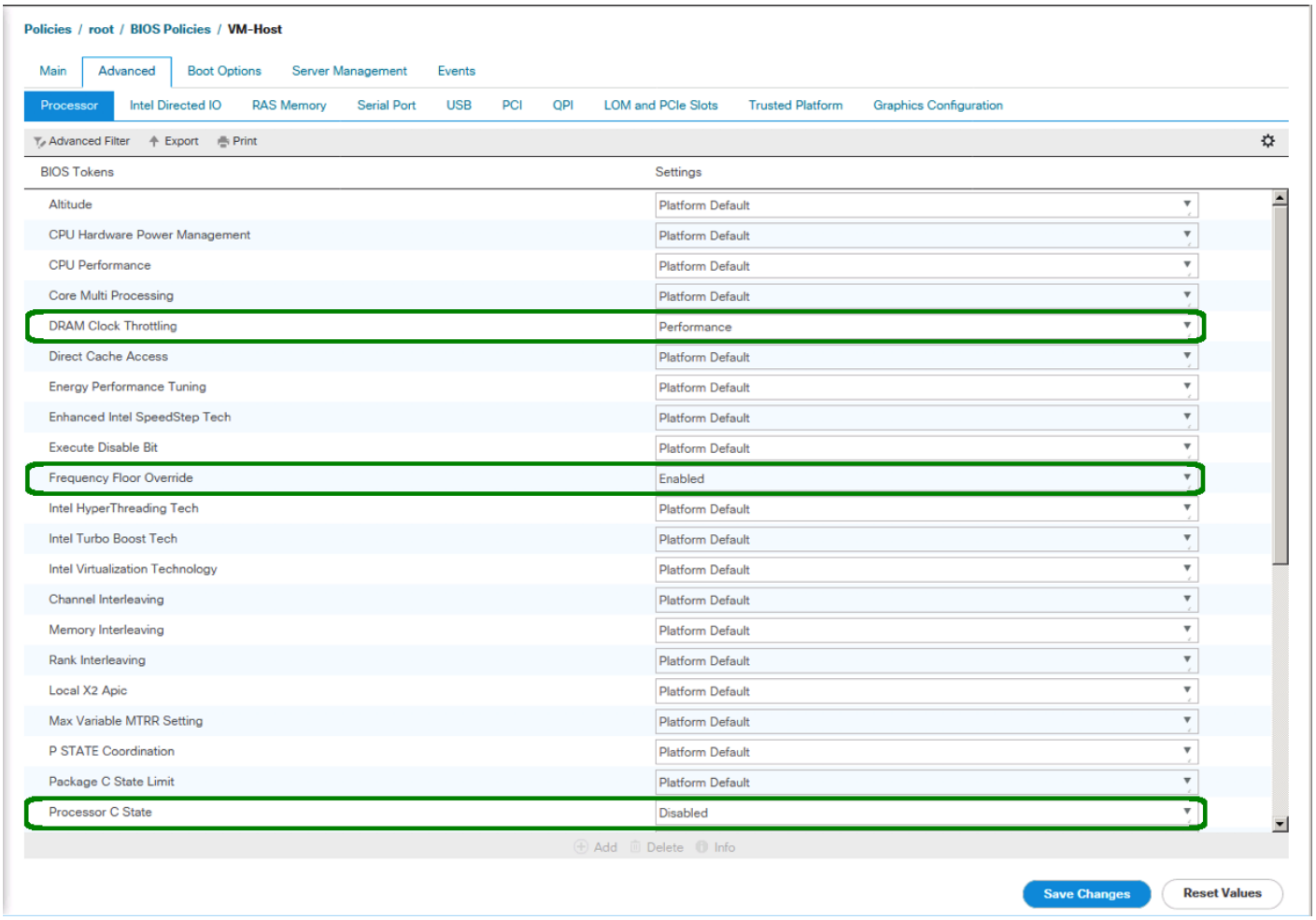
10. Click the Advanced tab, leaving the Processor tab selected within the Advanced tab.

11. Set the following within the Processor tab:

    a. DRAM Clock Throttling -> Performance

    b. Frequency Floor Override -> Enabled

    c. Processor C State -> Disabled



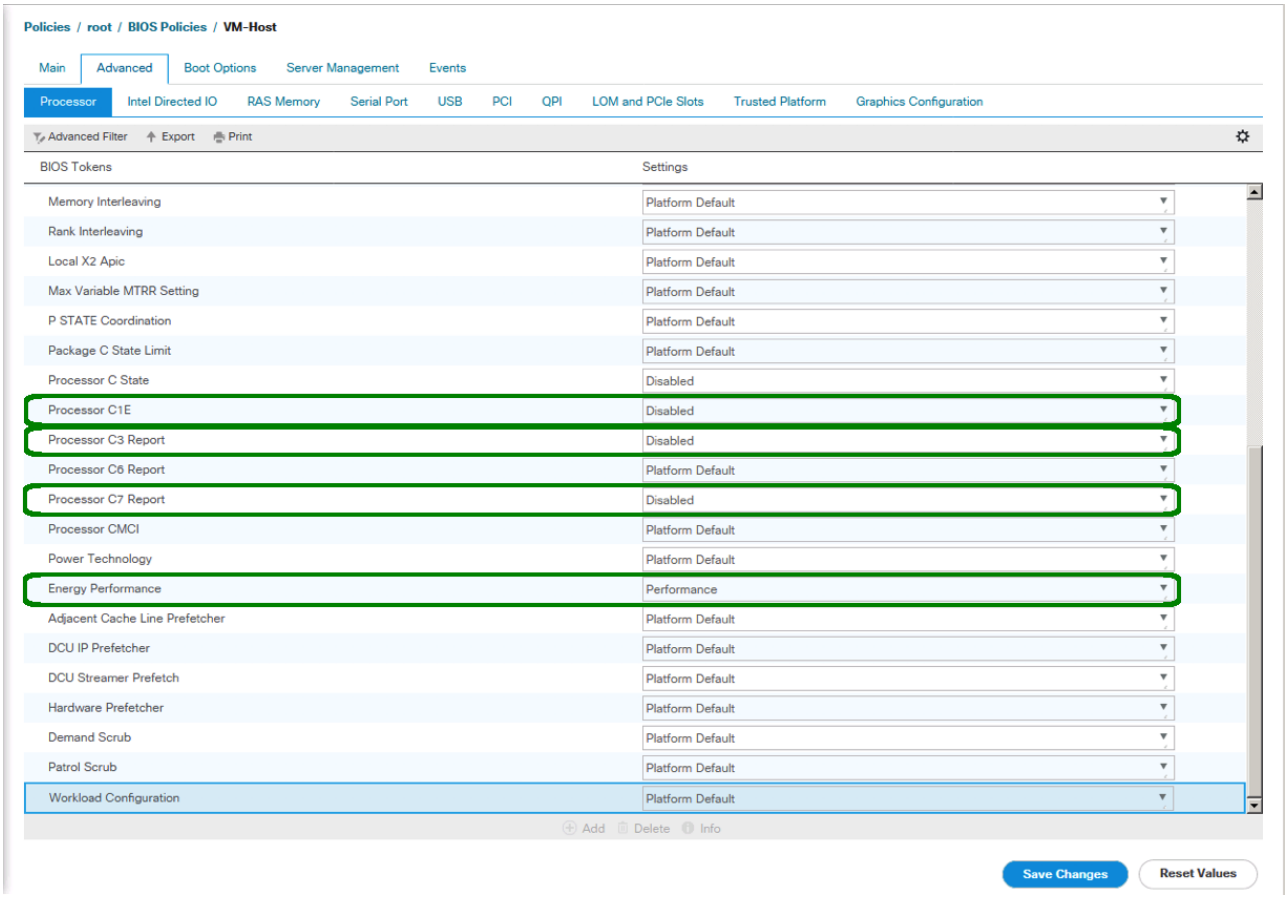
12. Scroll down to the remaining Processor options and select:

    a. Processor C1E -> disabled

    b. Processor C3 Report -> disabled

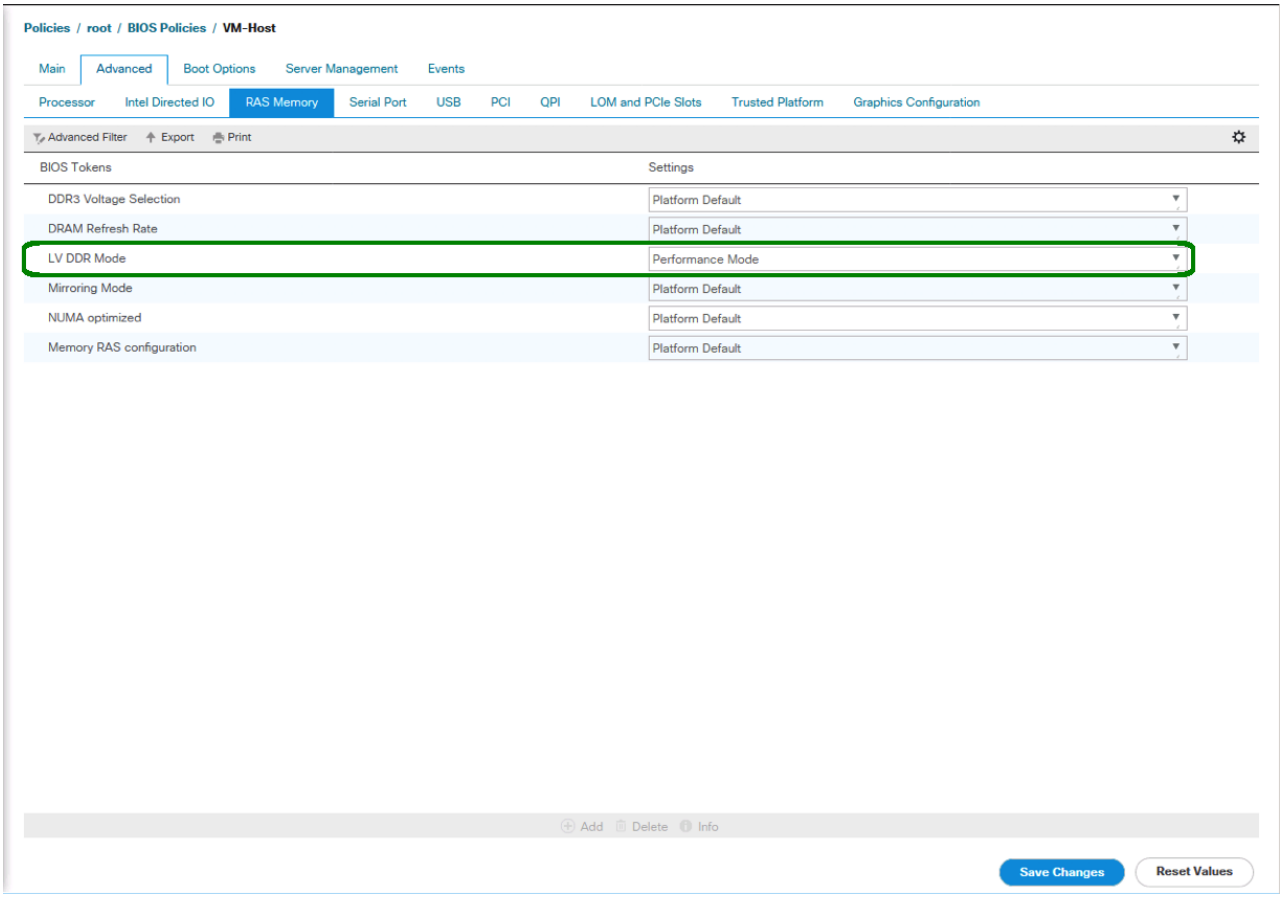
    c. Processor C7 Report -> disabled

    d. Energy Performance -> performance



13. Click the RAS Memory tab and select:

    a. LV DDR Mode -> performance-mode

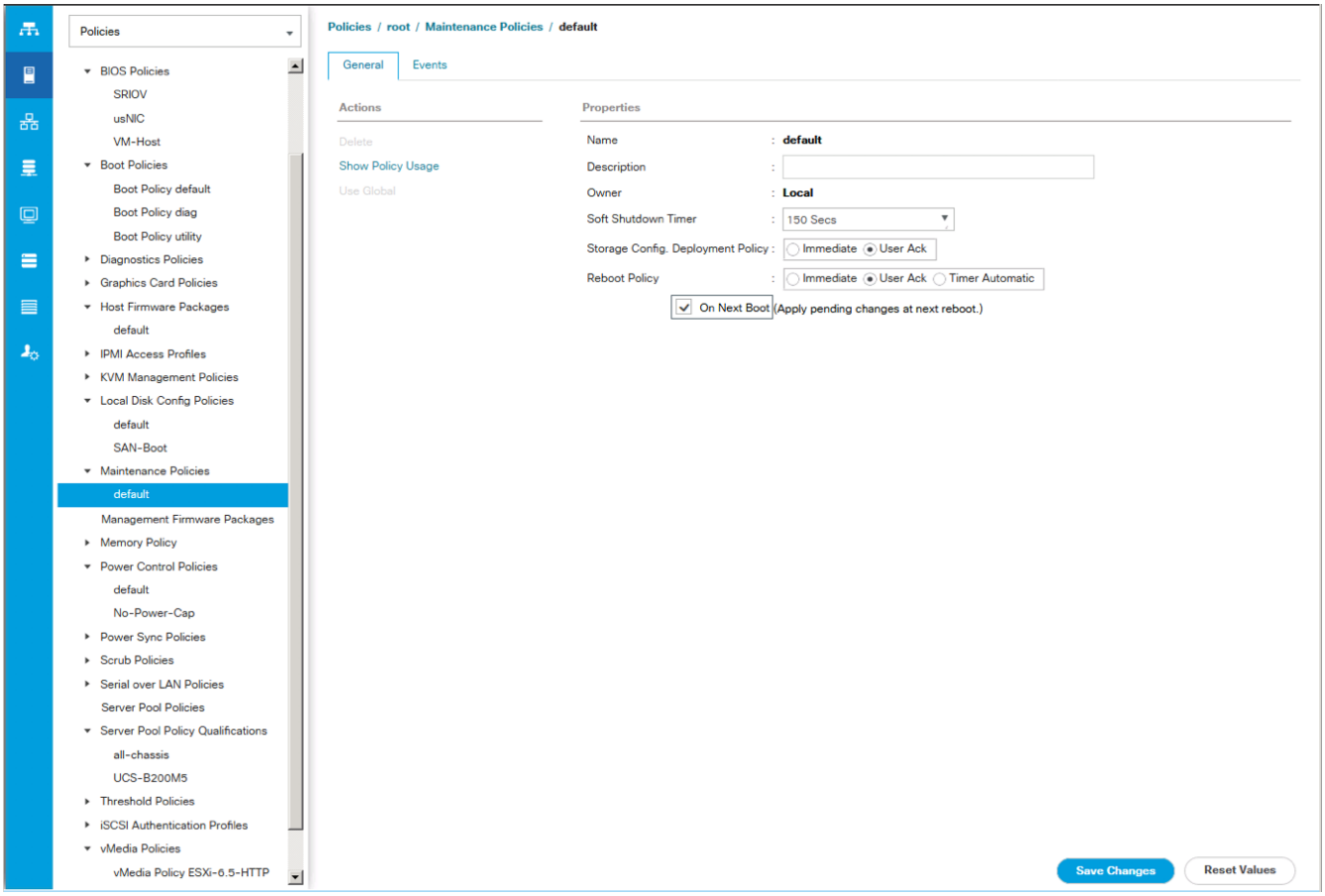


14. Click Save Changes.
15. Click OK.

Update the Default Maintenance Policy

To update the default Maintenance Policy, complete the following steps:

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Policies > root.
3. Select Maintenance Policies > default.
4. Change the Reboot Policy to User Ack.
5. (Optional: Click “On Next Boot” to delegate maintenance windows to server owners).



6. Click Save Changes.
7. Click OK to accept the change.

Create Local Disk Configuration Policy (Optional)

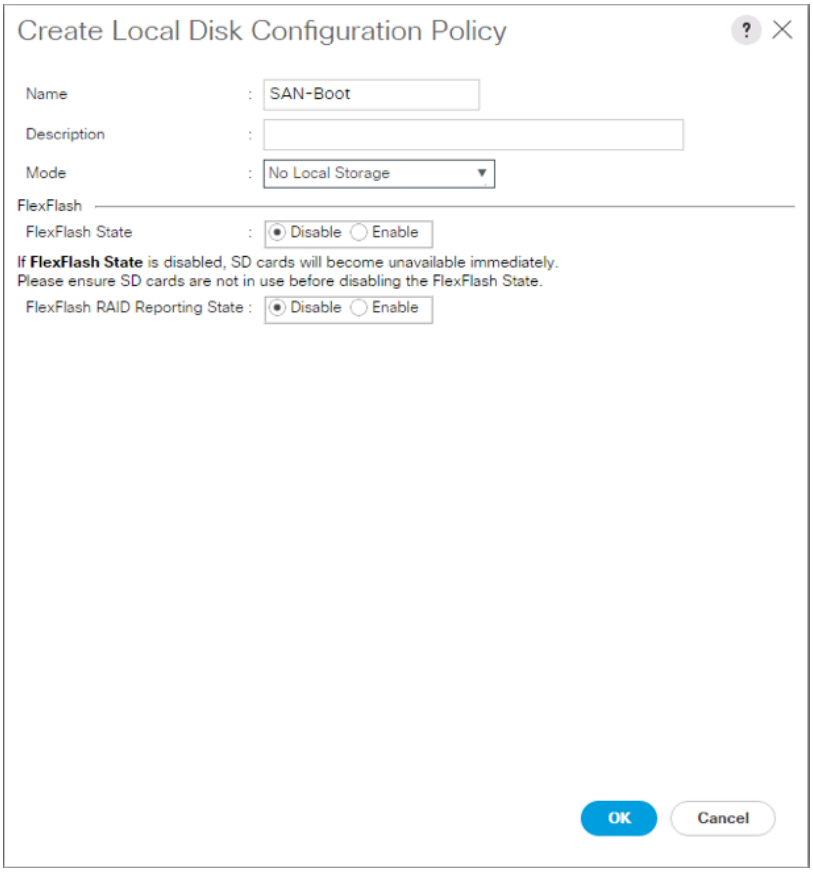
A local disk configuration for the Cisco UCS environment is necessary if the servers in the environment do not have a local disk.

This policy should not be used on servers that contain local disks.

To create a local disk configuration policy, complete the following steps:

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Policies > root.
3. Right-click Local Disk Config Policies.
4. Select Create Local Disk Configuration Policy.
5. Enter SAN-Boot as the local disk configuration policy name.
6. Change the mode to No Local Storage.

7. Click OK to create the local disk configuration policy.

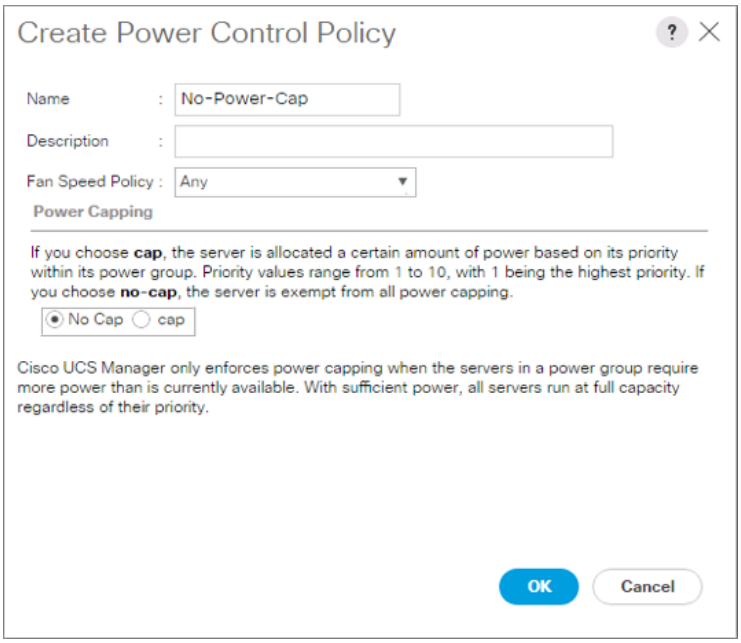


8. Click OK.

Create Power Control Policy

To create a power control policy for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Policies > root.
3. Right-click Power Control Policies.
4. Select Create Power Control Policy.
5. Enter No-Power-Cap as the power control policy name.
6. Change the power capping setting to No Cap.

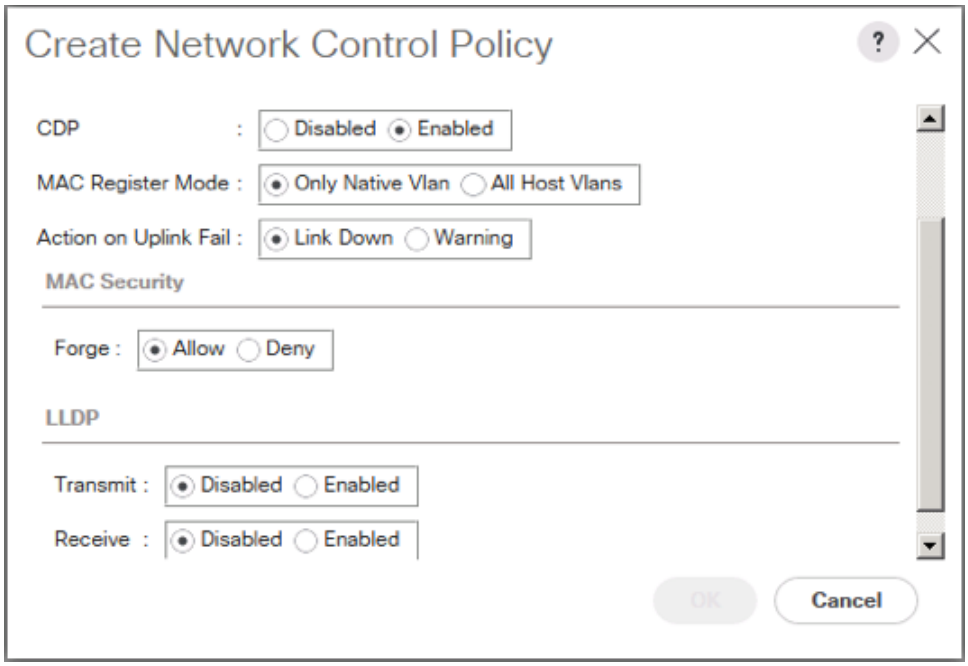


7. Click OK to create the power control policy.
8. Click OK.

Create Network Control Policy for Cisco Discovery Protocol

To create a network control policy that enables Cisco Discovery Protocol (CDP) on virtual network ports, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Policies > root.
3. Right-click Network Control Policies.
4. Select Create Network Control Policy.
5. Enter `Enable_CDP` as the policy name.
6. For CDP, select the Enabled option.
7. Click OK to create the network control policy.



8. Click OK.

Configure Cisco UCS LAN Connectivity

Create Uplink Port Channels

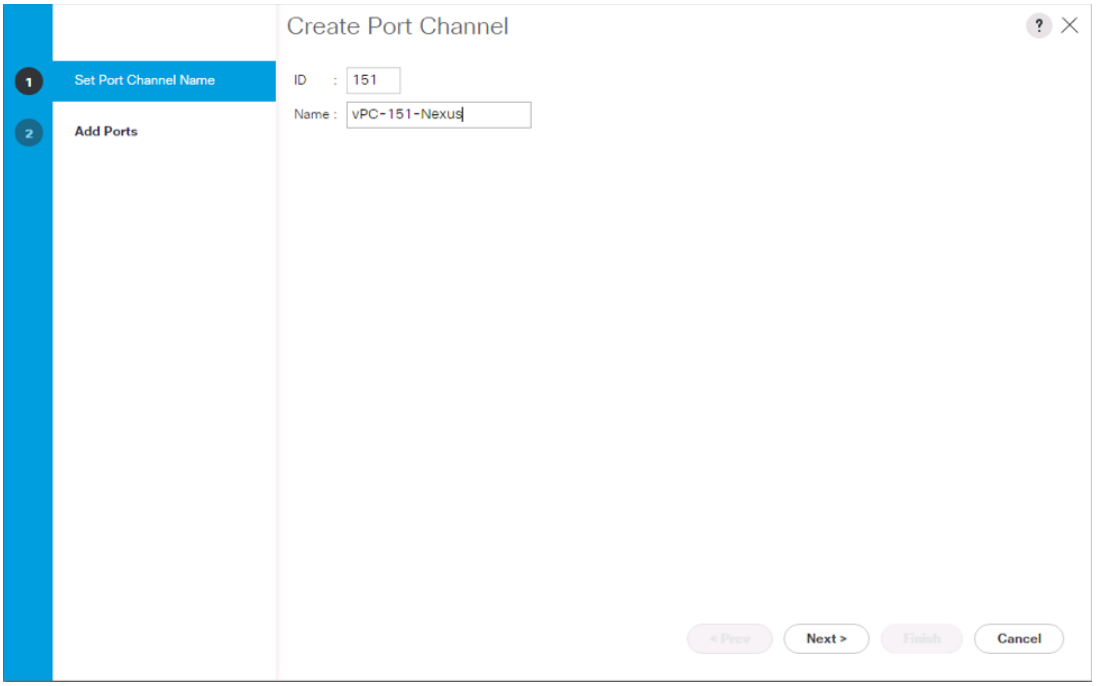
To configure the necessary port channels out of the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.

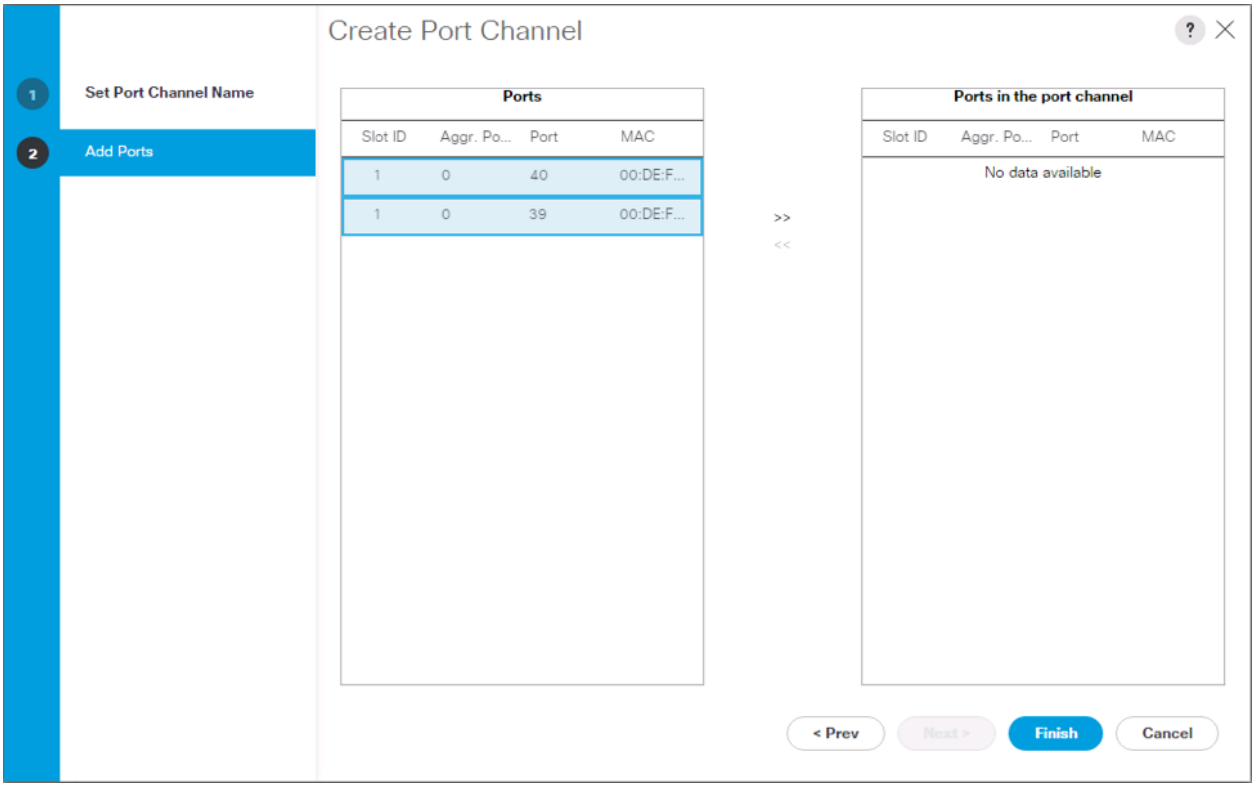
In this procedure, two port channels are created: one from fabric A to both Cisco Nexus switches and one from fabric B to both Cisco Nexus switches.

---

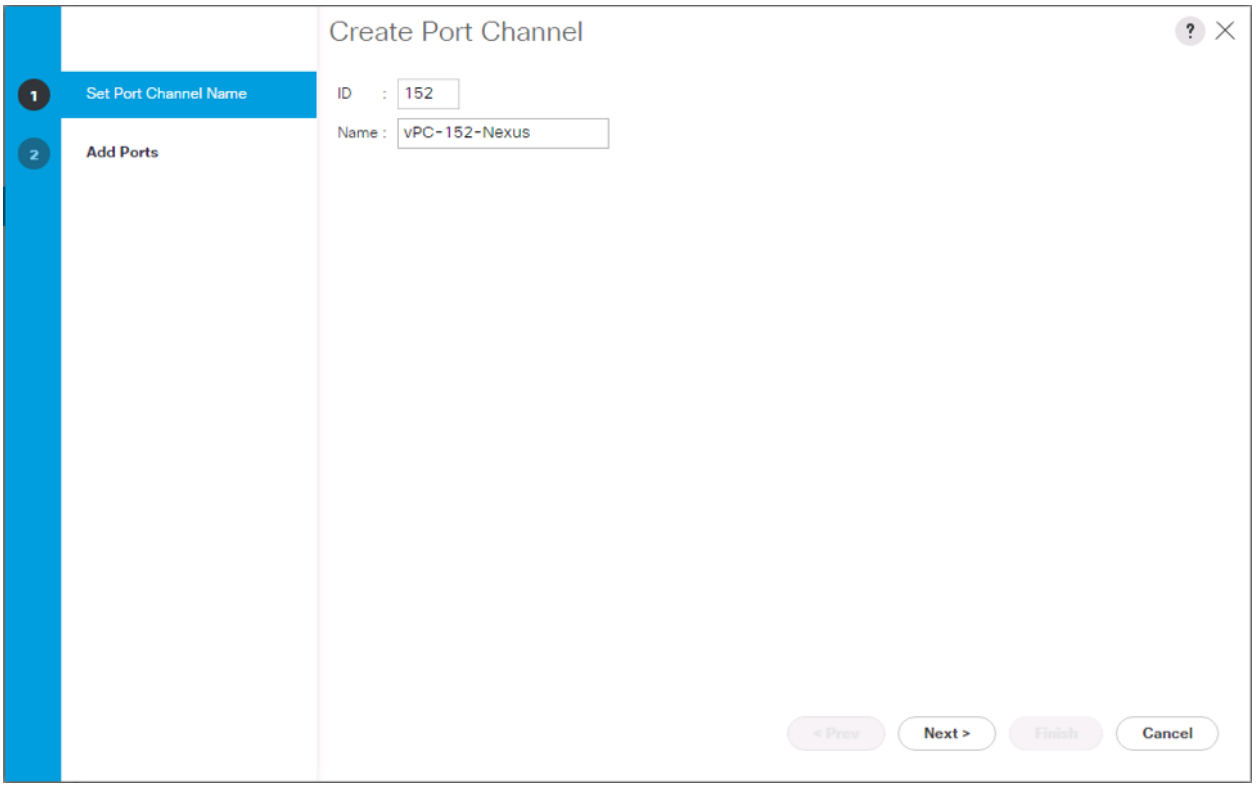
2. Under LAN > LAN Cloud, expand the Fabric A tree.
3. Right-click Port Channels.
4. Select Create Port Channel.
5. Enter a unique ID for the port channel, (`151` in our example to correspond with the upstream Nexus port channel).
6. With 151 selected, enter `vPC-151-Nexus` as the name of the port channel.



7. Click Next.
8. Select the following ports to be added to the port channel:
   - Slot ID 1 and port 39
   - Slot ID 1 and port 40



9. Click >> to add the ports to the port channel.
10. Click Finish to create the port channel.
11. Click OK.
12. In the navigation pane, under LAN > LAN Cloud, expand the fabric B tree.
13. Right-click Port Channels.
14. Select Create Port Channel.
15. Enter a unique ID for the port channel, (`152` in our example to correspond with the upstream Nexus port channel).
16. With 152 selected, enter `vPC-152-Nexus` as the name of the port channel.

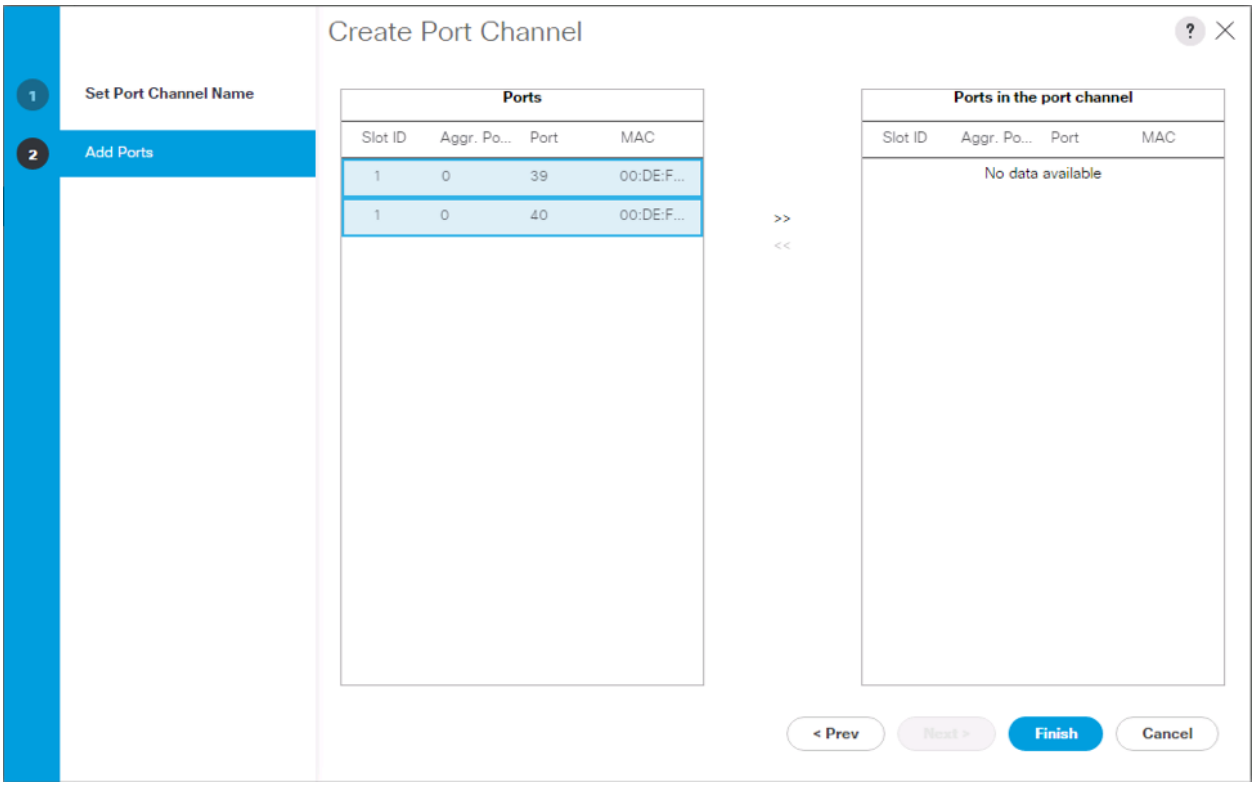


17. Click Next.

18. Select the following ports to be added to the port channel:

    – Slot ID 1 and port 39

    – Slot ID 1 and port 40



19. Click >> to add the ports to the port channel.
20. Click Finish to create the port channel.
21. Click OK.

Create VLANs

To configure the necessary virtual local area networks (VLANs) for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.

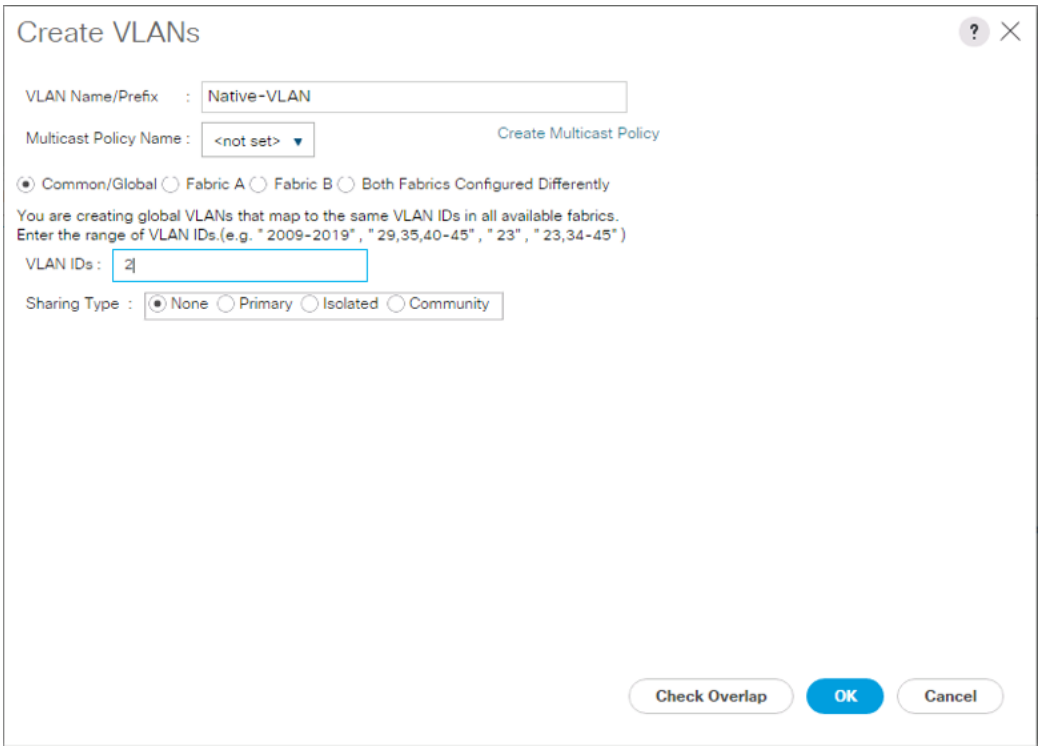
In this procedure, six unique VLANs are created. See **Error! Reference source not found.** for a list of VLANs to be created.

---

2. Select LAN > LAN Cloud.
3. Right-click VLANs.
4. Select Create VLANs.
5. Enter `Native-VLAN` as the name of the VLAN to be used as the native VLAN.
6. Keep the Common/Global option selected for the scope of the VLAN.

7. Enter the native VLAN ID.

8. Keep the Sharing Type as None.



9. Click OK and then click OK again.

10. Expand the list of VLANs in the navigation pane, right-click the newly created `Native-VLAN` and select Set as Native VLAN.

11. Click Yes, and then click OK.

12. Right-click VLANs.

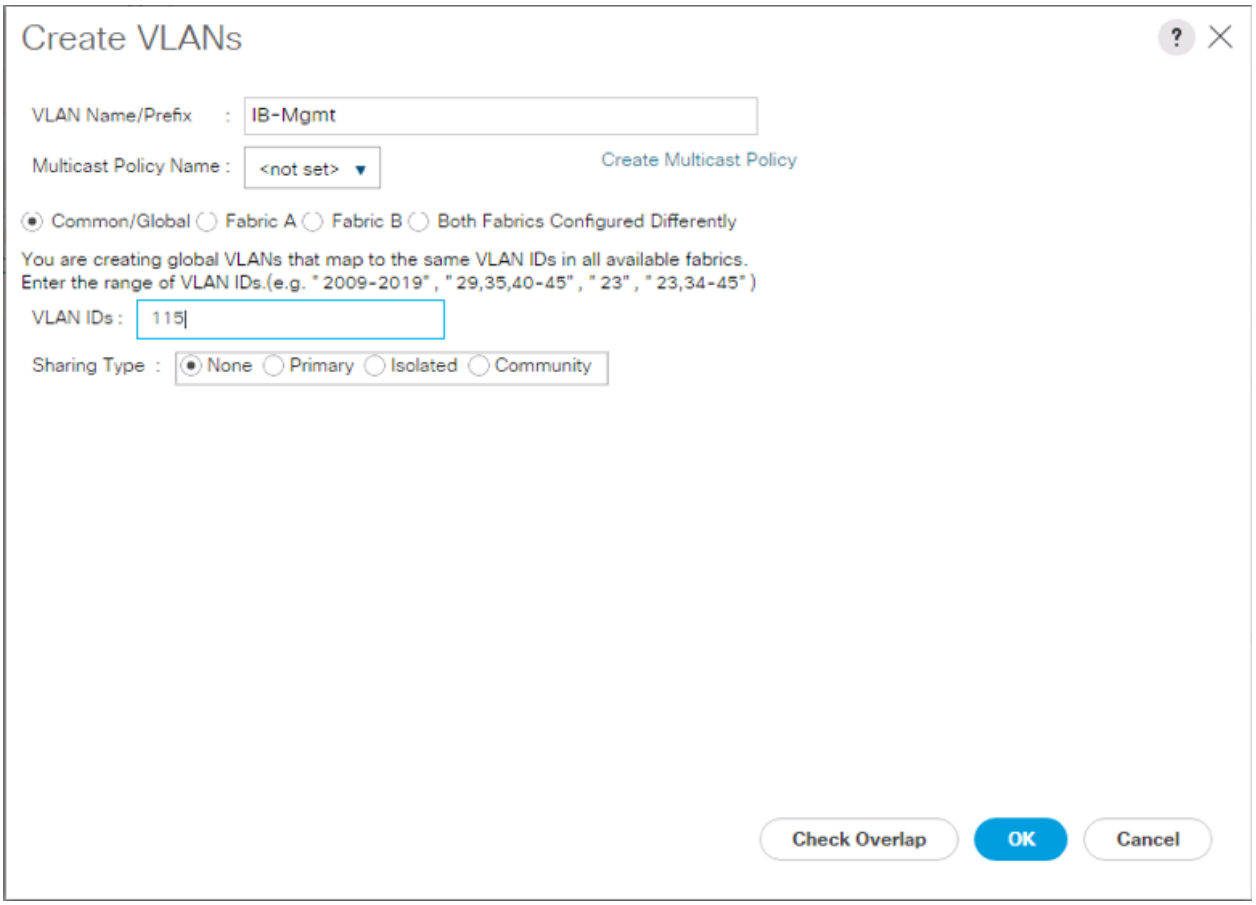
13. Select Create VLANs

14. Enter `IB-Mgmt` as the name of the VLAN to be used for management traffic.

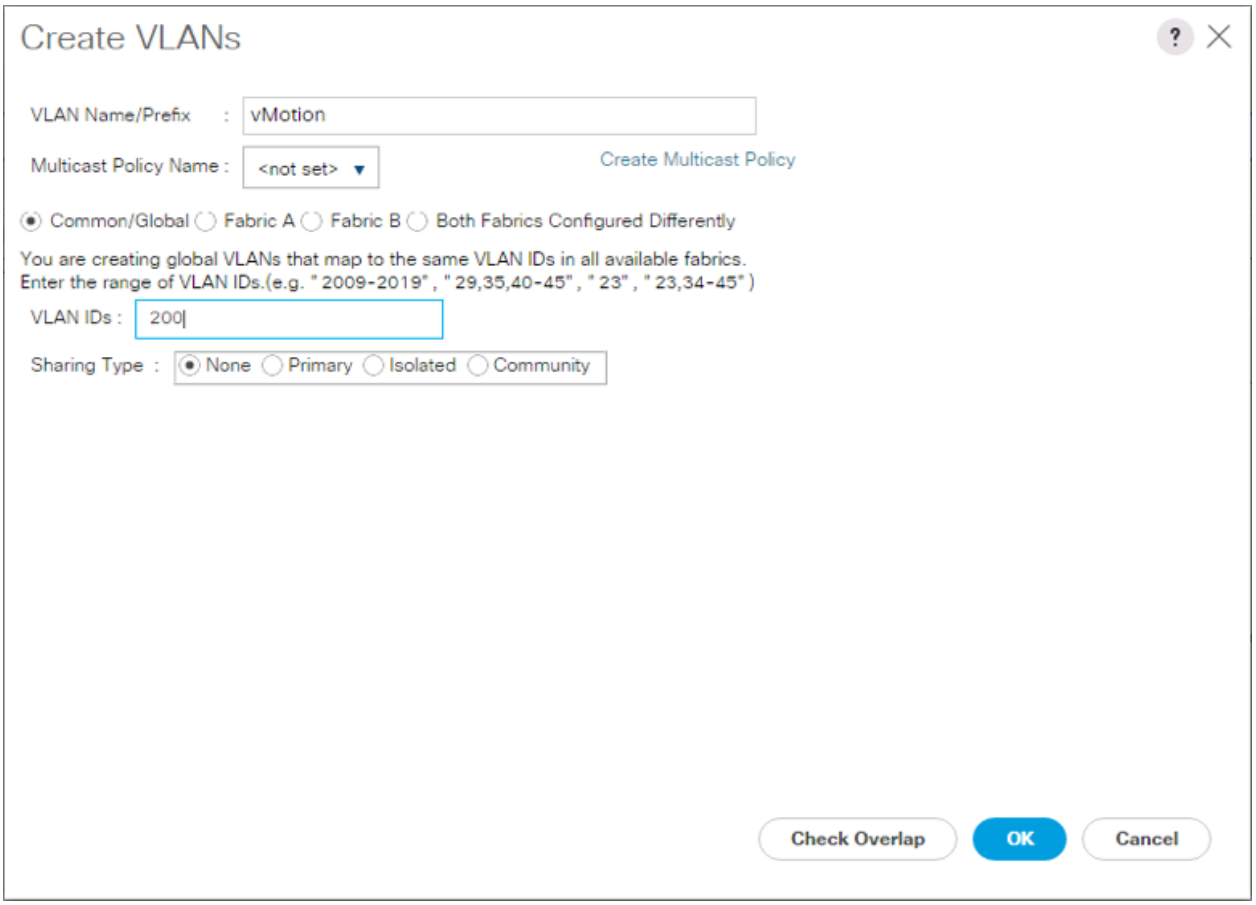
15. Keep the Common/Global option selected for the scope of the VLAN.

16. Enter the In-Band management VLAN ID.

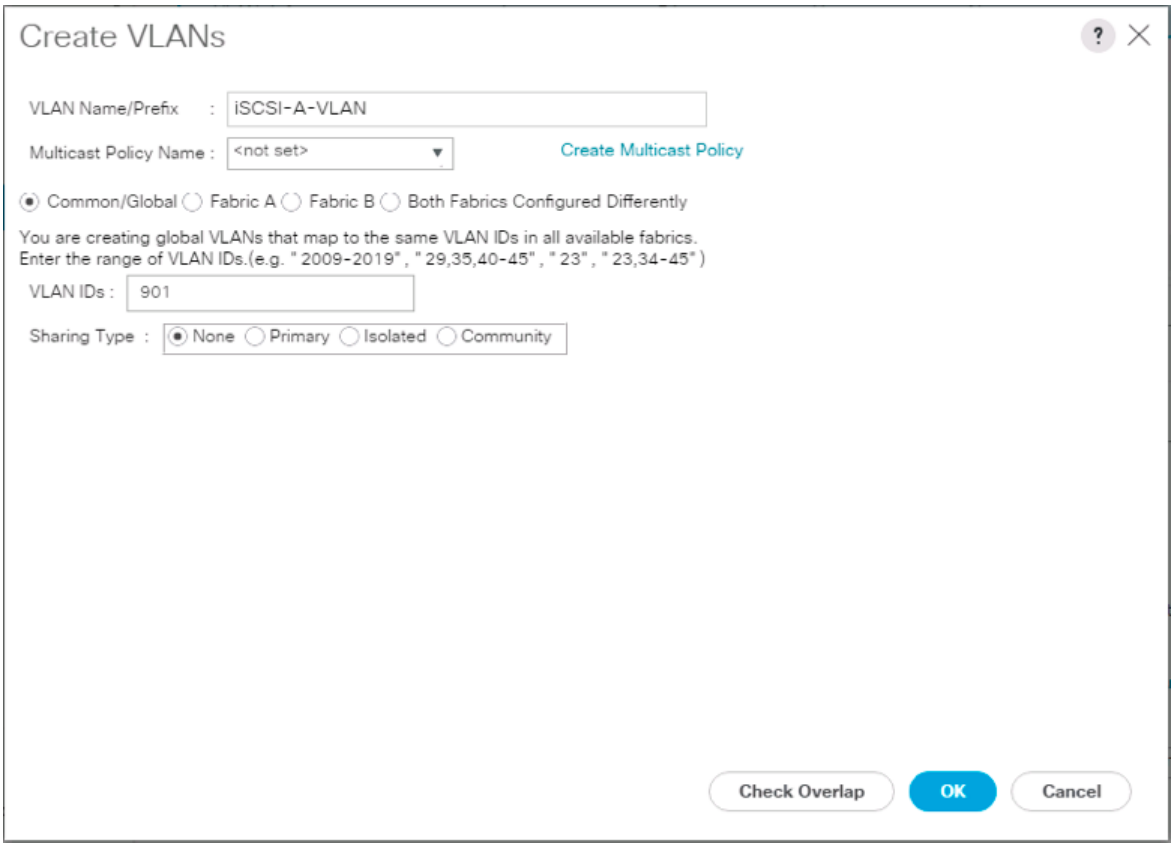
17. Keep the Sharing Type as None.



18. Click OK and then click OK again.
19. Right-click VLANs.
20. Select Create VLANs.
21. Enter `vMotion` as the name of the VLAN to be used for vMotion.
22. Keep the Common/Global option selected for the scope of the VLAN.
23. Enter the vMotion VLAN ID.
24. Keep the Sharing Type as None.



25. Click OK and then click OK again.
26. Right-click VLANs.
27. Select Create VLANs.
28. Enter `iSCSI-A-VLAN` as the name of the VLAN to be used for iSCSI-A.
29. Keep the Common/Global option selected for the scope of the VLAN.
30. Enter the iSCSI-A VLAN ID.
31. Keep the Sharing Type as None.



32. Click OK and then click OK again.

33. Right-click VLANs.

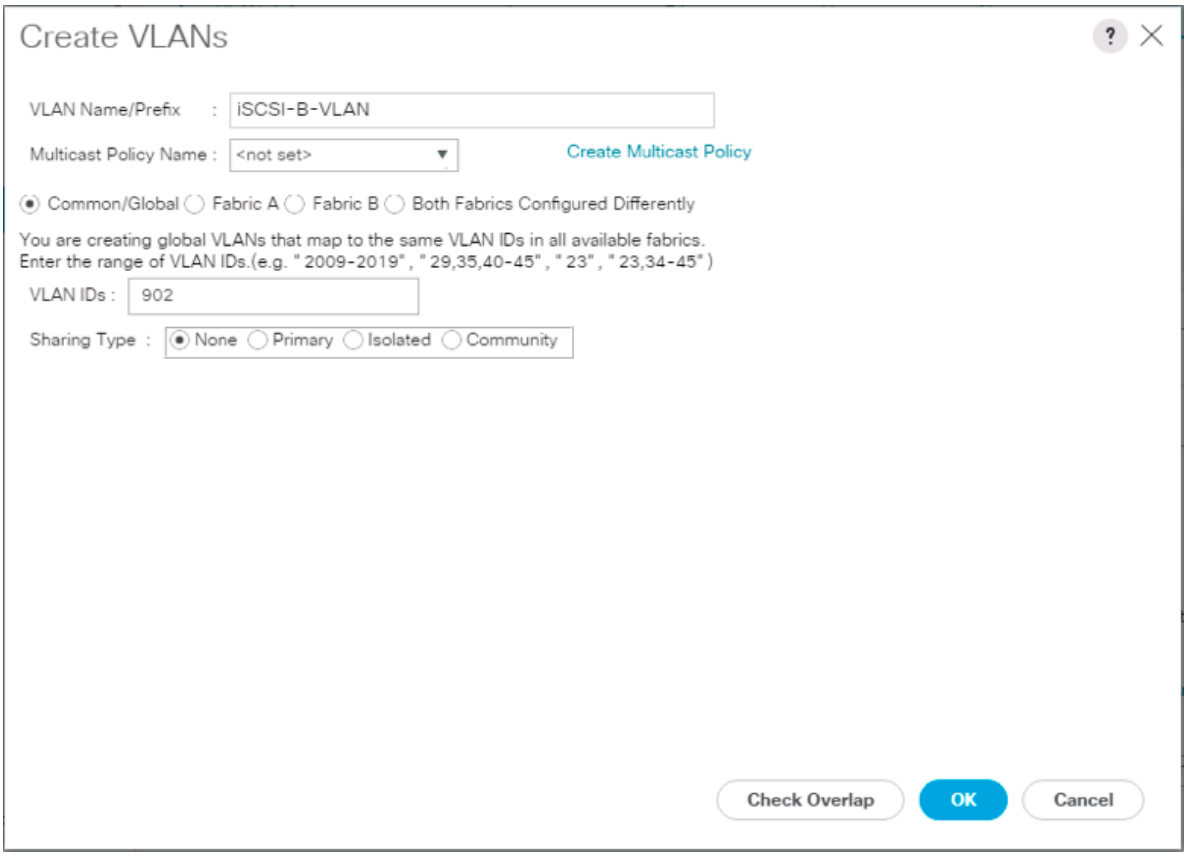
34. Select Create VLANs.

35. Enter `iSCSI-B-VLAN` as the name of the VLAN to be used for iSCSI-B.

36. Keep the Common/Global option selected for the scope of the VLAN.

37. Enter the iSCSI-B VLAN ID.

38. Keep the Sharing Type as None.



39. Click OK and then click OK again.

40. Right-click VLANs.

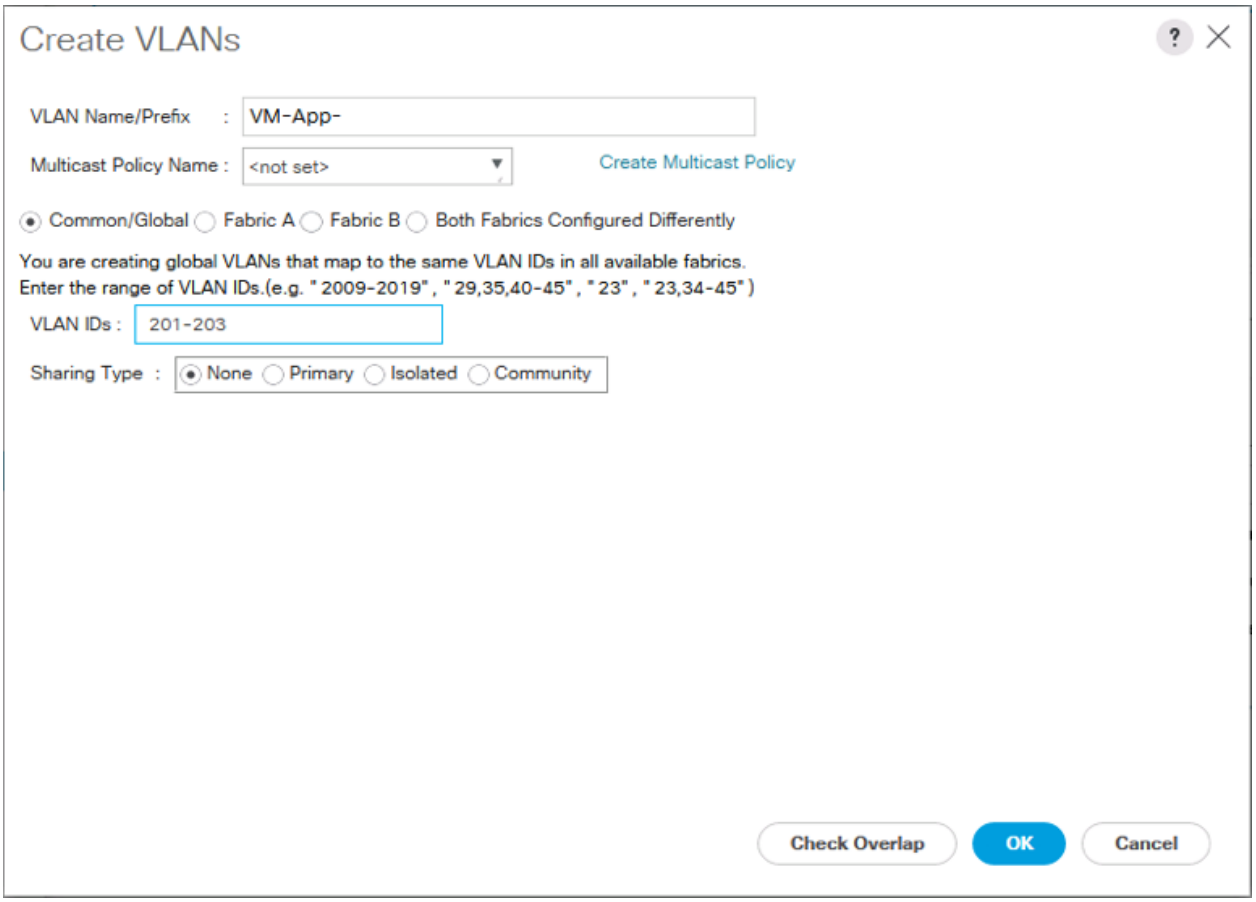
41. Select Create VLANs.

42. Enter `VM-App-` as the prefix of the VLANs to be used for VM Traffic.

43. Keep the Common/Global option selected for the scope of the VLAN.

44. Enter the VM-Traffic VLAN ID range.

45. Keep the Sharing Type as None.



46. Click OK and then click OK again.

47. Repeat as needed for any additional VLANs created on the upstream Nexus switches.

Create vNIC Templates

To create the multiple virtual network interface card (vNIC) templates for the Cisco UCS environment, complete the following steps:

Create Management vNICs

For the vNIC_Mgmt_A Template, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template.
5. Enter `vNIC_Mgmt_A` as the vNIC template name.
6. Keep Fabric A selected.

7. Optional: select the Enable Failover checkbox.

Selecting Failover can improve link failover time by handling it at the hardware level, and can guard against any potential for NIC failure not being detected by the virtual switch.

8. Select `Primary Template` for the Redundancy Type.

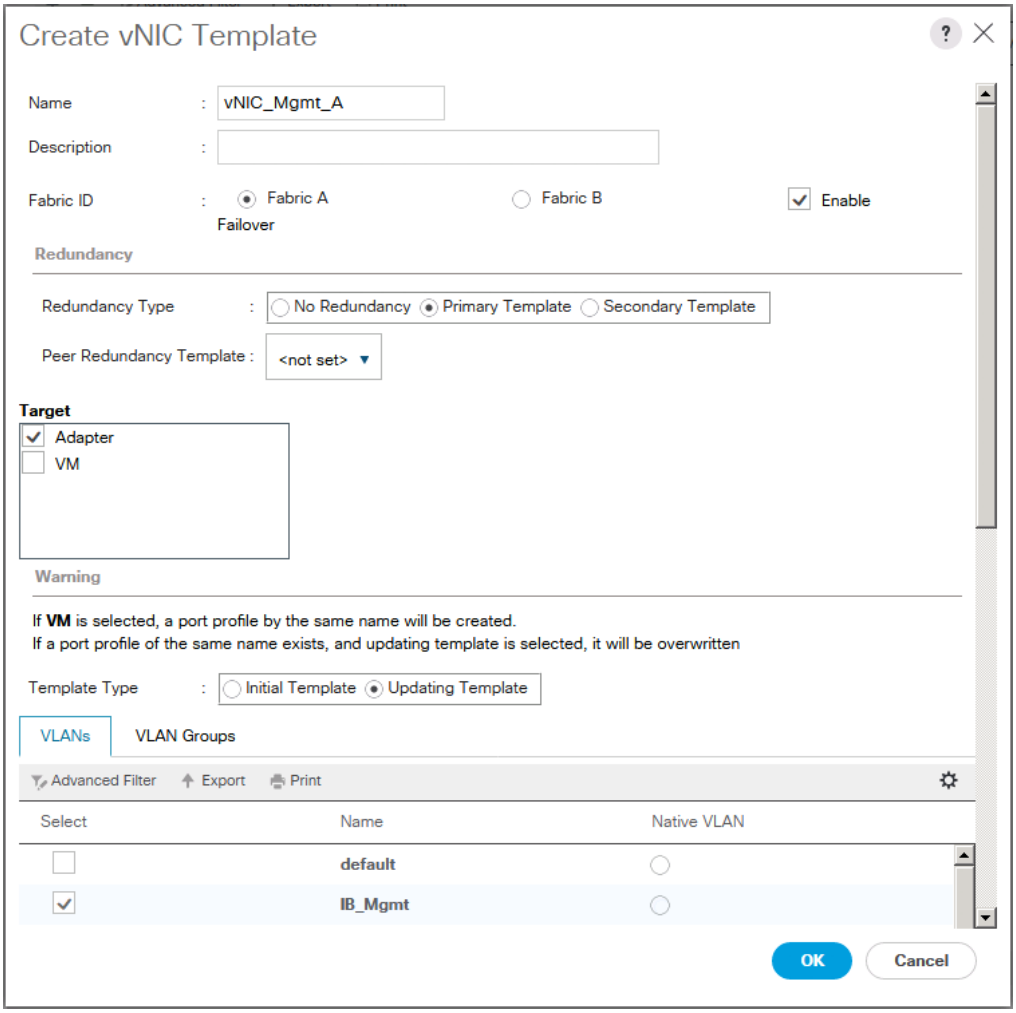
9. Leave Peer Redundancy Template as <not set>

Redundancy Type and specification of Redundancy Template are configuration options to later allow changes to the Primary Template to automatically adjust onto the Secondary Template.

10. Under Target, make sure that the VM checkbox is not selected.

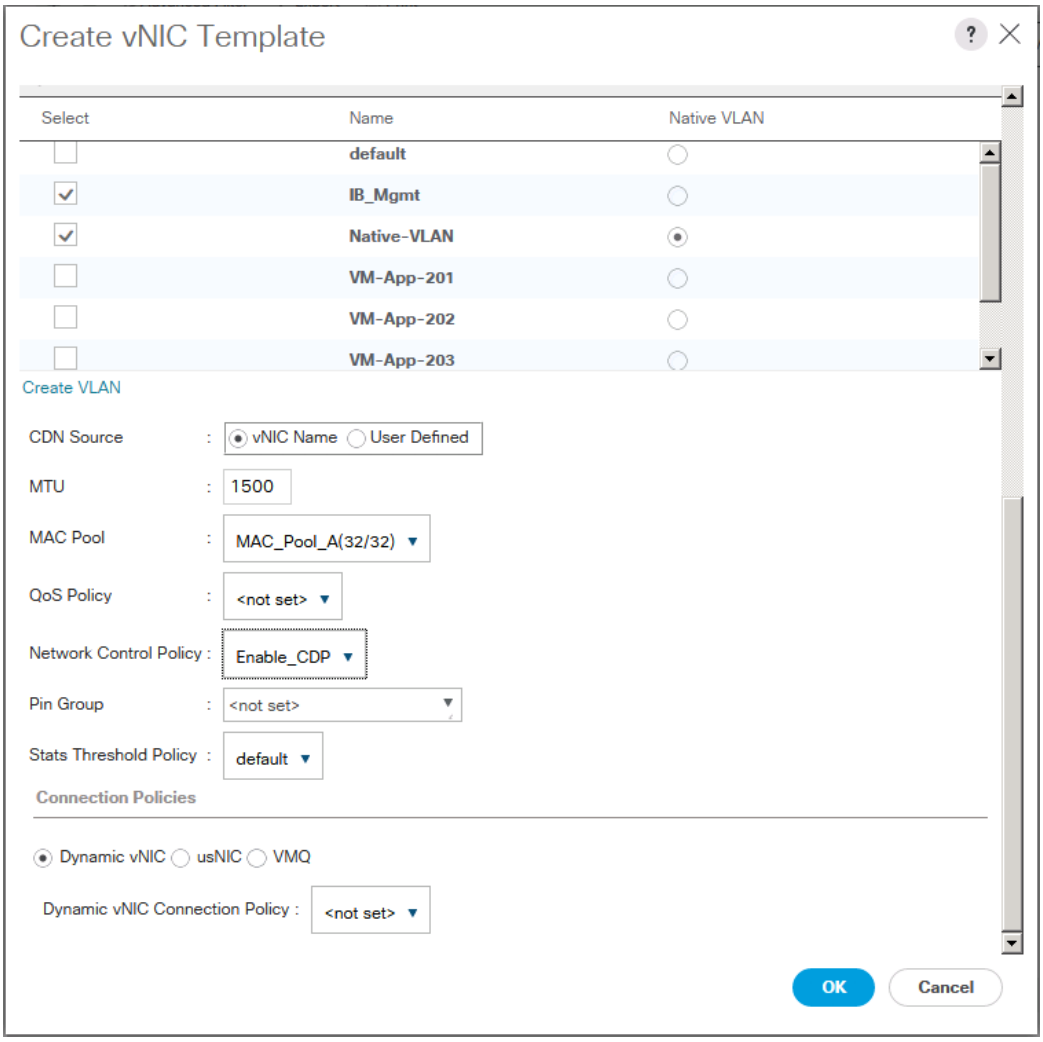
11. Select Updating Template as the Template Type.

12. Under VLANs, select the checkboxes for `IB-Mgmt and Native-VLAN` VLANs.



13. Set `Native-VLAN` as the native VLAN.

14. Leave `vNIC Name` selected for the CDN Source.
15. Leave 1500 for the MTU.
16. In the MAC Pool list, select `MAC_Pool_A`.
17. In the Network Control Policy list, select `Enable_CDP`.



18. Click OK to create the vNIC template.
19. Click OK.

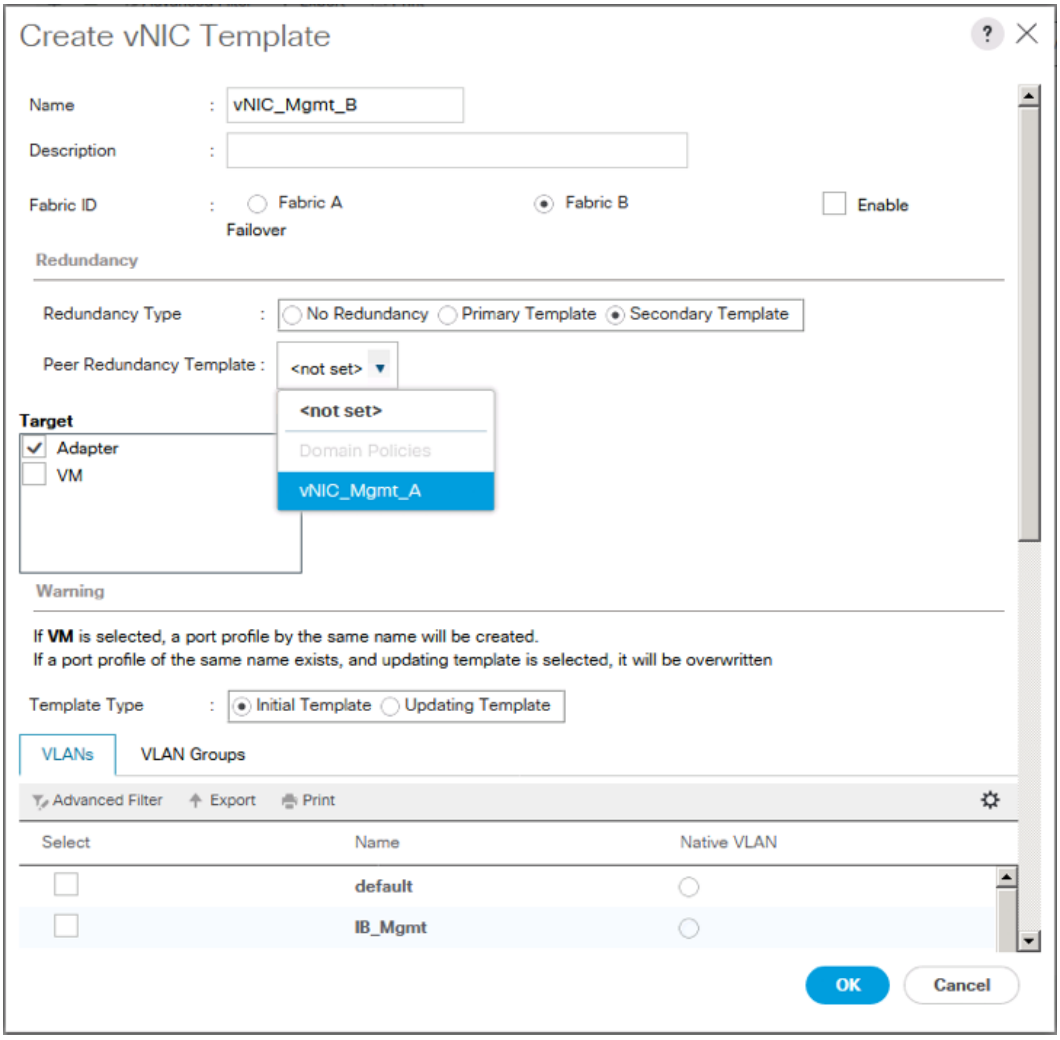
For the vNIC_Mgmt_B Template, complete the following steps:

1. In the navigation pane, select the LAN tab.
2. Select Policies > root.
3. Right-click vNIC Templates.

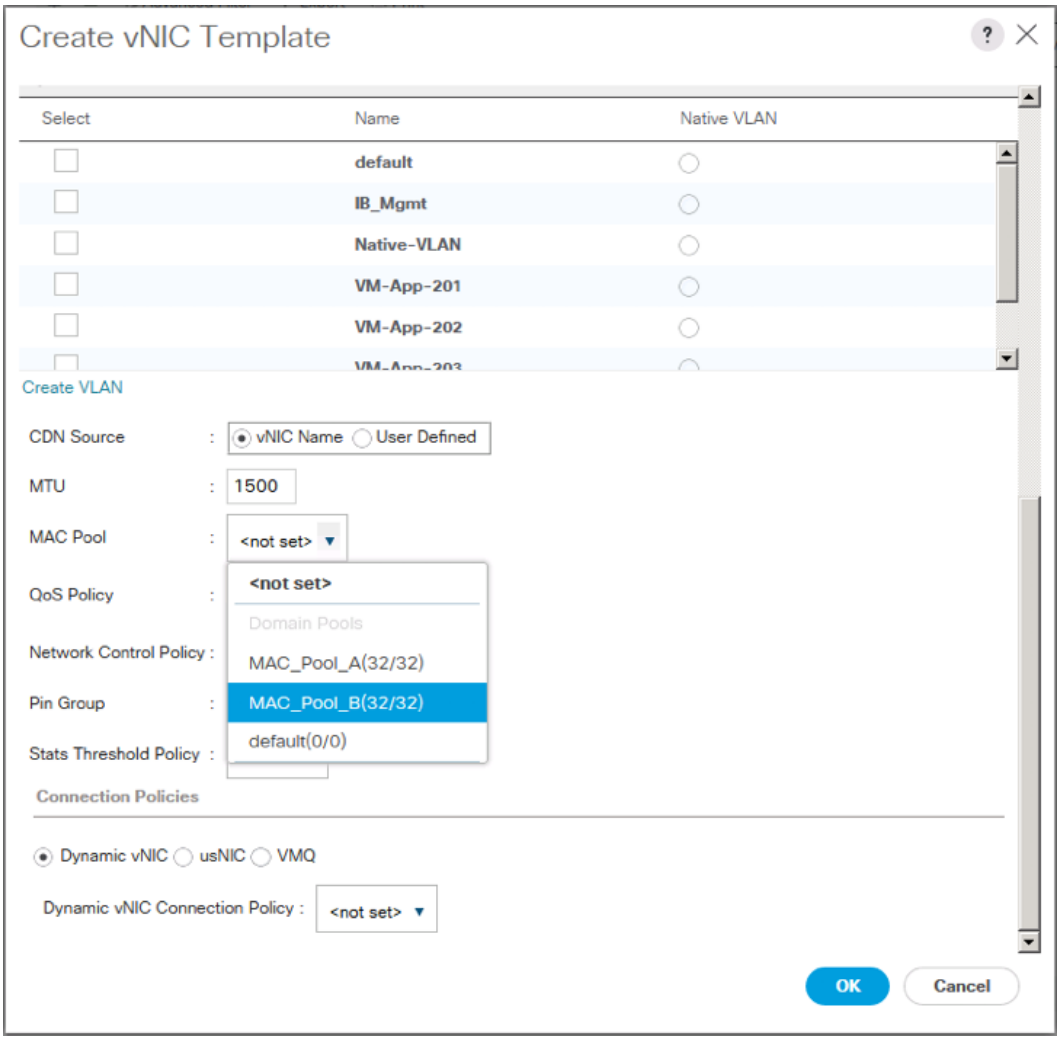
4. Select Create vNIC Template
5. Enter `vNIC_Mgmt_B` as the vNIC template name.
6. Select Fabric B.
7. Select Secondary Template for Redundancy Type.
8. For the Peer Redundancy Template drop-down, select vNIC_Mgmt_A.

With Peer Redundancy Template selected, Failover specification, Template Type, VLANs, CDN Source, MTU, and Network Control Policy are all pulled from the Primary Template.

9. Under Target, make sure the VM checkbox is not selected.



10. In the MAC Pool list, select MAC_Pool_B.



11. Click OK to create the vNIC template.

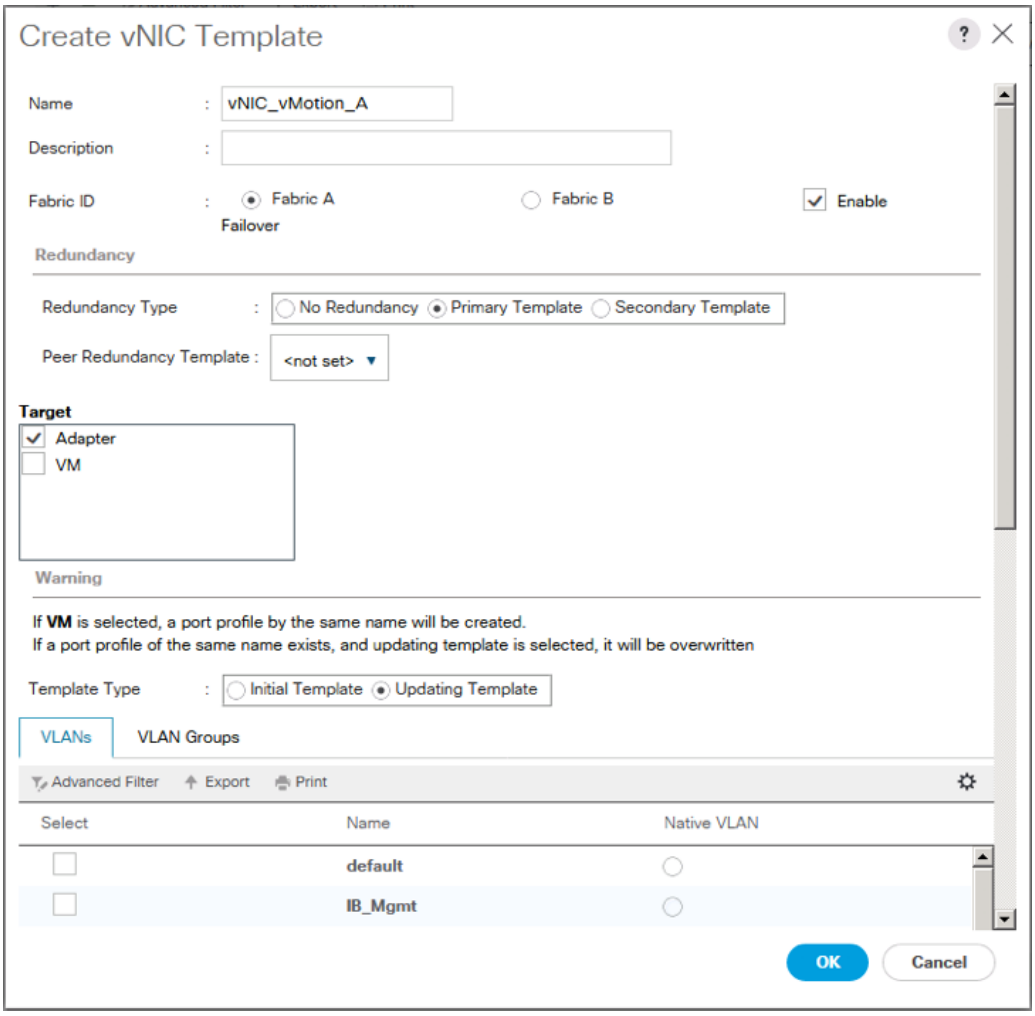
12. Click OK.

Create vMotion vNICs

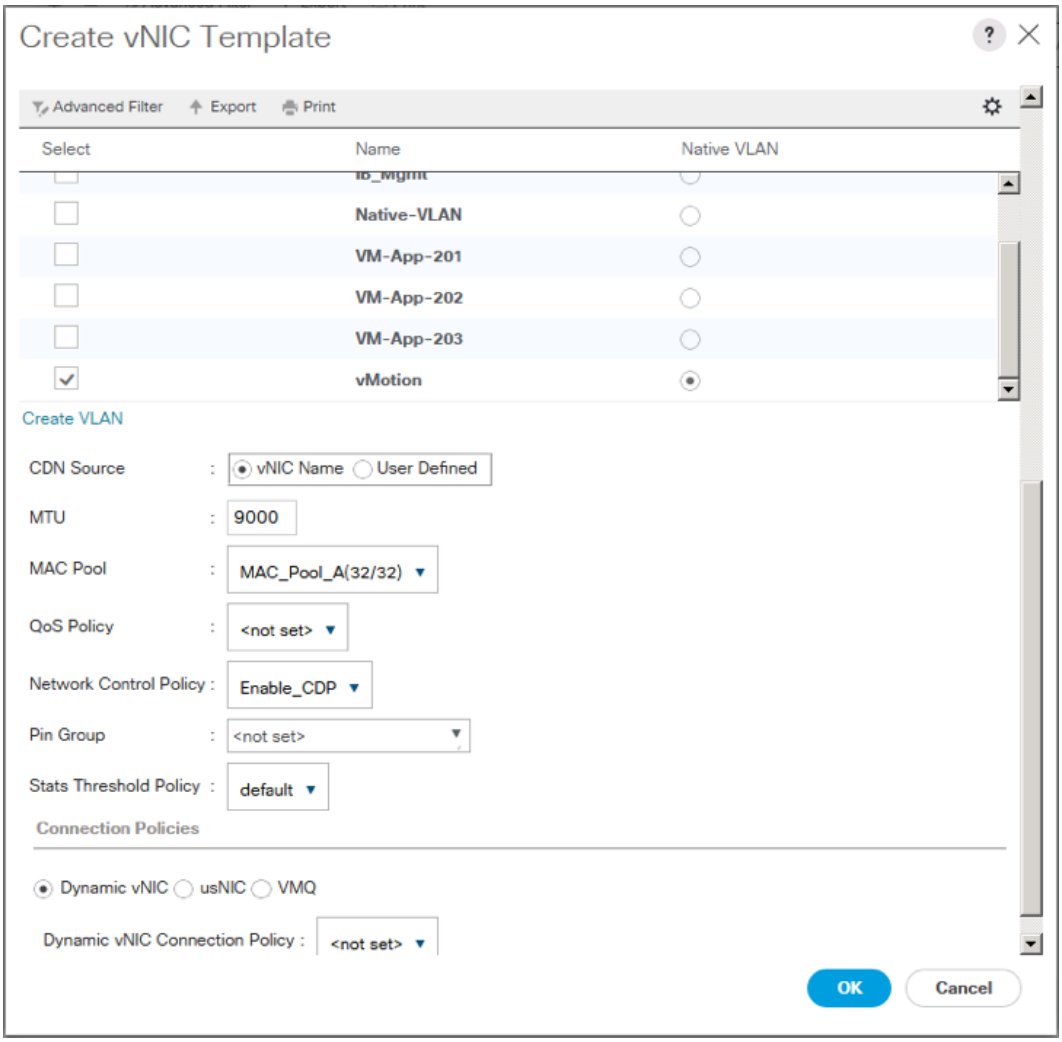
For the vNIC_vMotion_A Template, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template.
5. Enter `vNIC_vMotion_A` as the vNIC template name.
6. Keep Fabric A selected.

7. Optional: select the Enable Failover checkbox.
8. Select Primary Template for the Redundancy Type.
9. Leave Peer Redundancy Template as `<not set>`
10. Under Target, make sure that the VM checkbox is not selected.
11. Select Updating Template as the Template Type.



12. Under VLANs, select the checkboxes vMotion as the only VLAN.
13. Set vMotion as the native VLAN.
14. For MTU, enter 9000.
15. In the MAC Pool list, select MAC_Pool_A.
16. In the Network Control Policy list, select Enable_CDP.



17. Click OK to create the vNIC template.
18. Click OK.

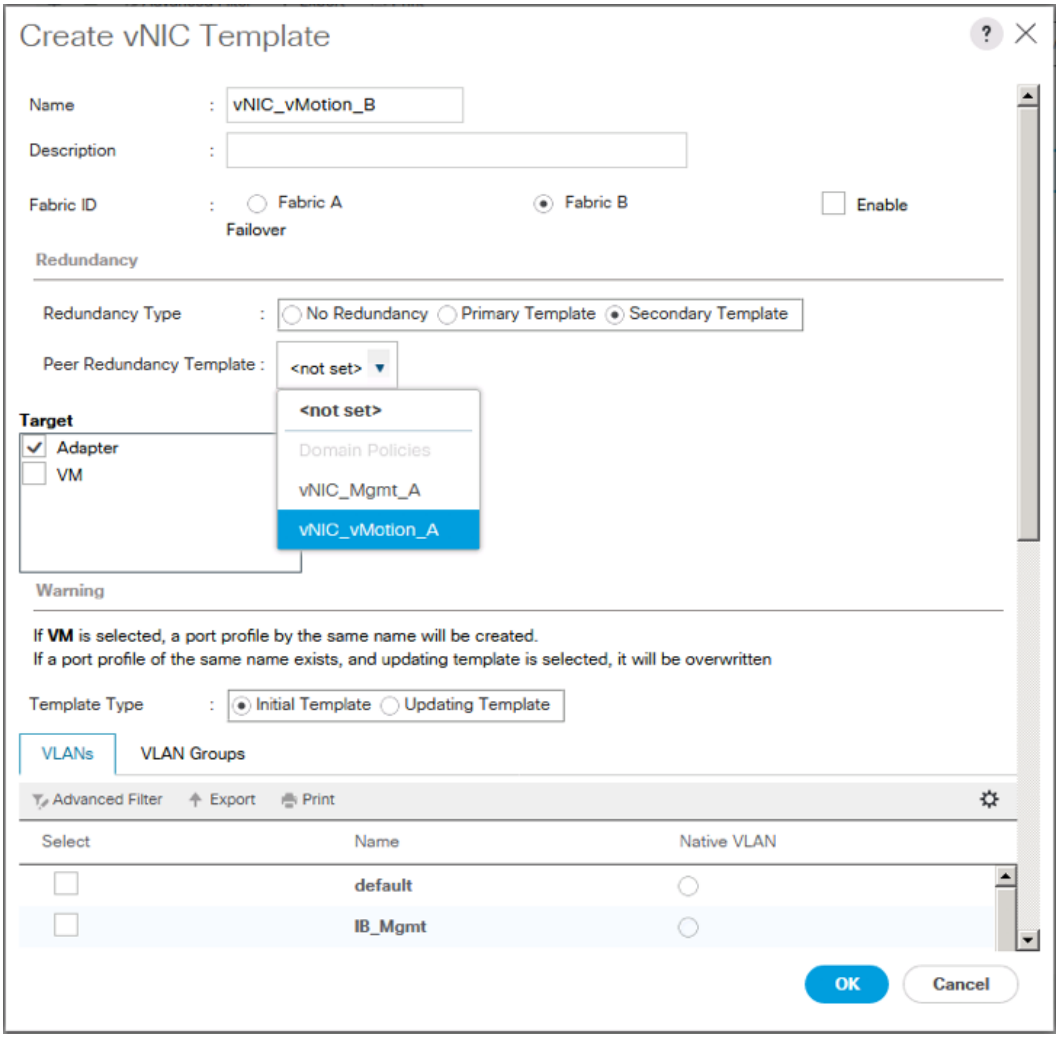
For the vNIC_vMotion_B Template, complete the following steps:

1. In the navigation pane, select the LAN tab.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template
5. Enter vNIC_vMotion_B as the vNIC template name.
6. Select Fabric B.
7. Select Secondary Template for Redundancy Type.

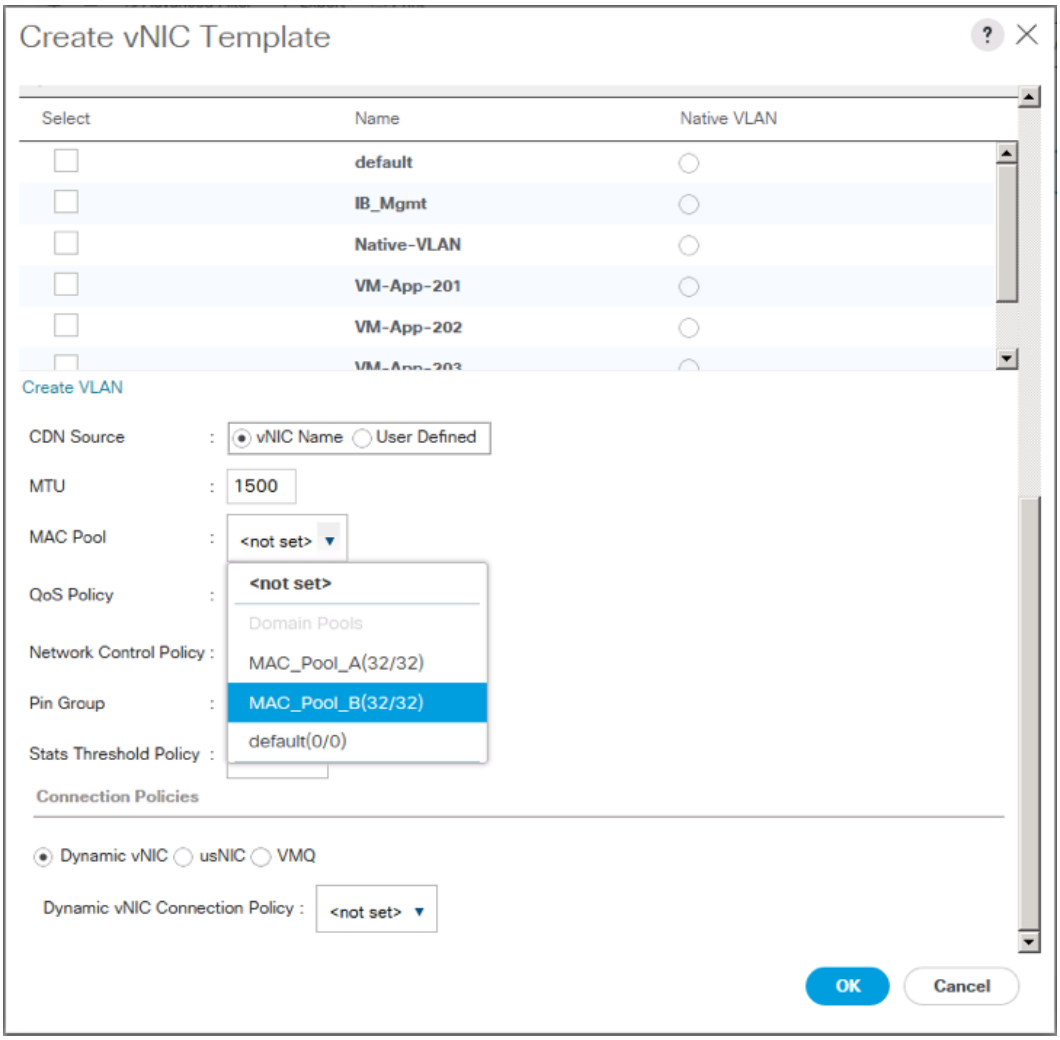
8. For the Peer Redundancy Template drop-down, select vNIC_vMotion_A.

With Peer Redundancy Template selected, MAC Pool will be the main configuration option left for this vNIC template.

9. Under Target, make sure the VM checkbox is not selected.



10. In the MAC Pool list, select MAC_Pool_B.



11. Click OK to create the vNIC template.

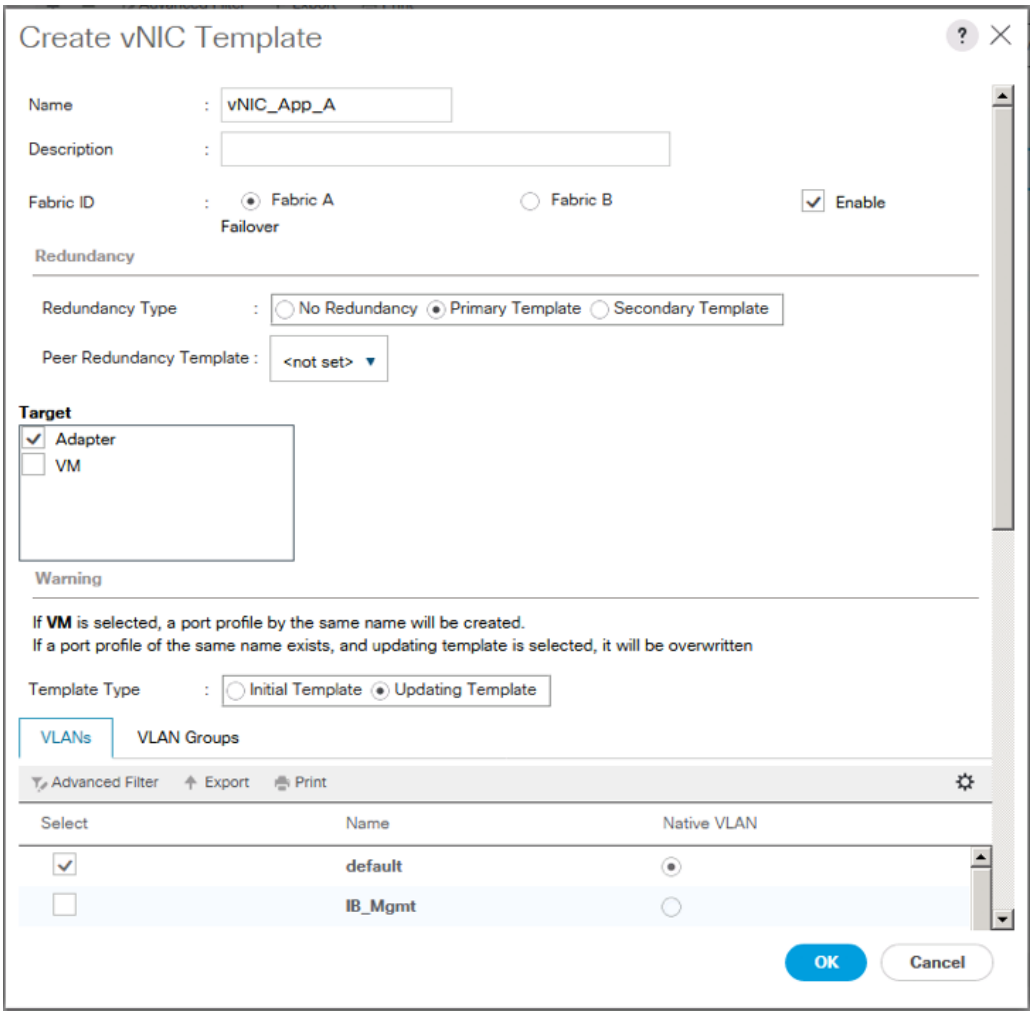
12. Click OK.

Create Application vNICs

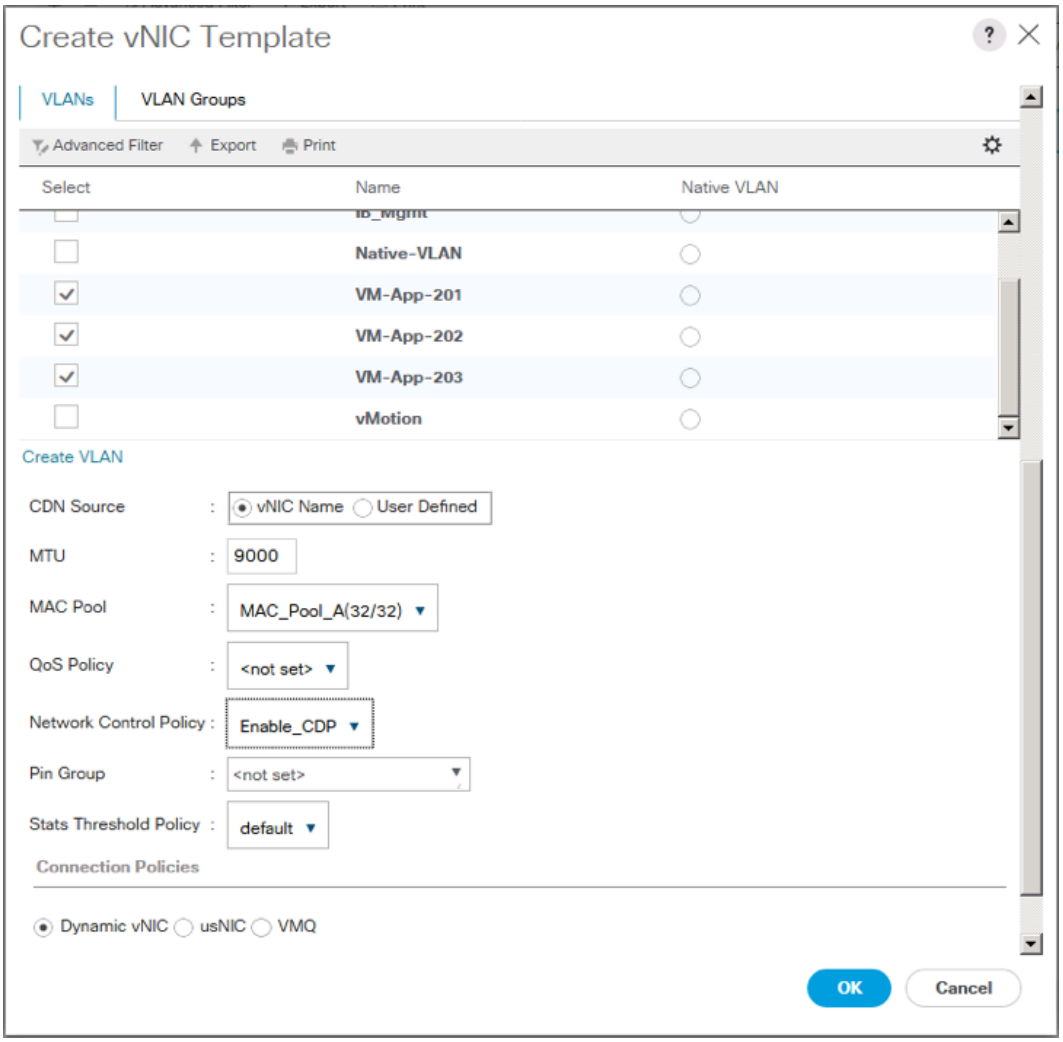
For the vNIC_App_A Template, complete the following steps:

1. In Cisco UCS Manager, click the LAN tab in the navigation pane.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template.
5. Enter `vNIC_App_A` as the vNIC template name.
6. Keep Fabric A selected.

7. Optional: select the Enable Failover checkbox.
8. Select `Primary Template` for the Redundancy Type.
9. Leave Peer Redundancy Template as <not set>
10. Under Target, make sure that the VM checkbox is not selected.
11. Select Updating Template as the Template Type.
12. Set `default` as the native VLAN.



13. Under VLANs, select the checkboxes for any application or production VLANs that should be delivered to the ESXi hosts.
14. For MTU, enter `9000`.
15. In the MAC Pool list, select `MAC_Pool_A`.
16. In the Network Control Policy list, select `Enable_CDP`.



17. Click OK to create the vNIC template.
18. Click OK.

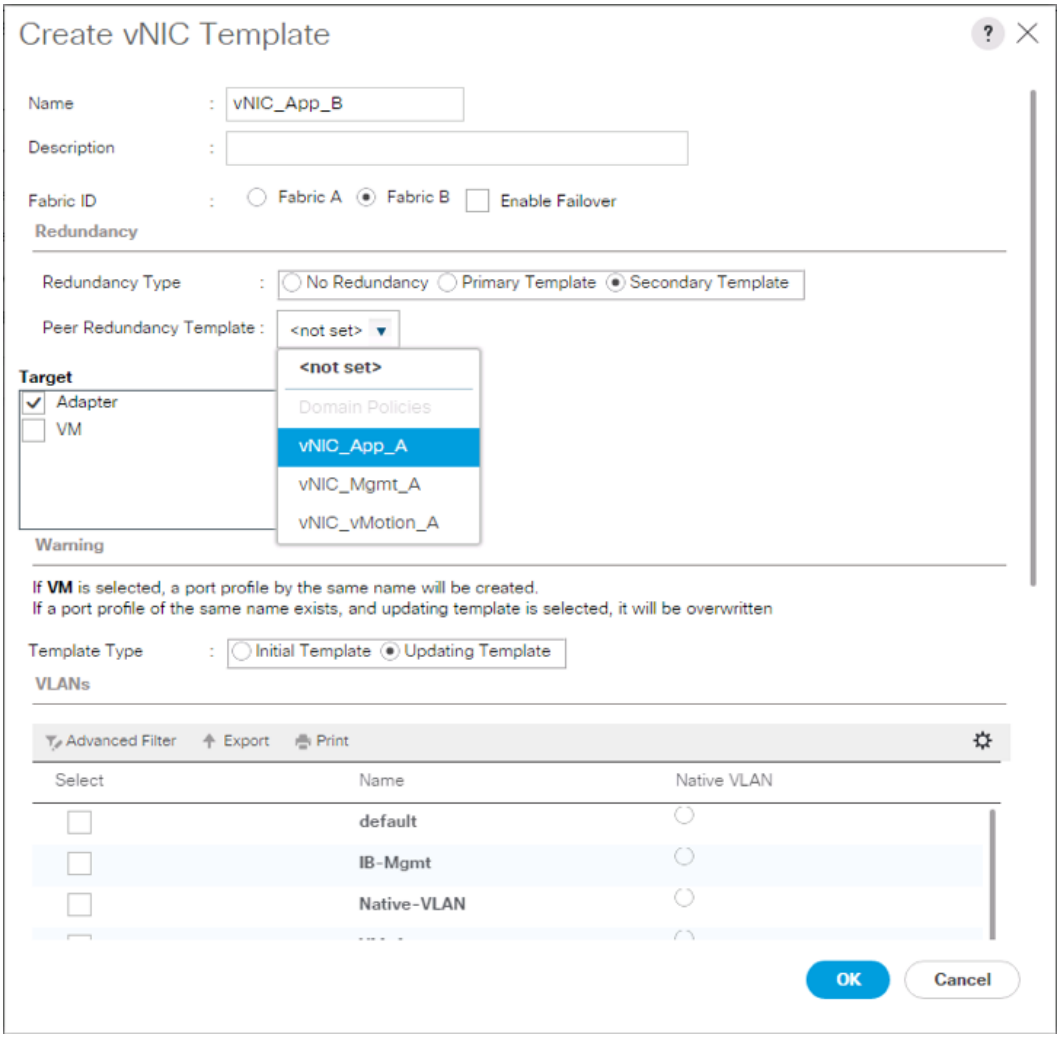
For the vNIC_App_B Templates, complete the following steps:

1. In the navigation pane, select the LAN tab.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template
5. Enter `vNIC_App_B` as the vNIC template name.
6. Select Fabric B.
7. Select Secondary Template for Redundancy Type.

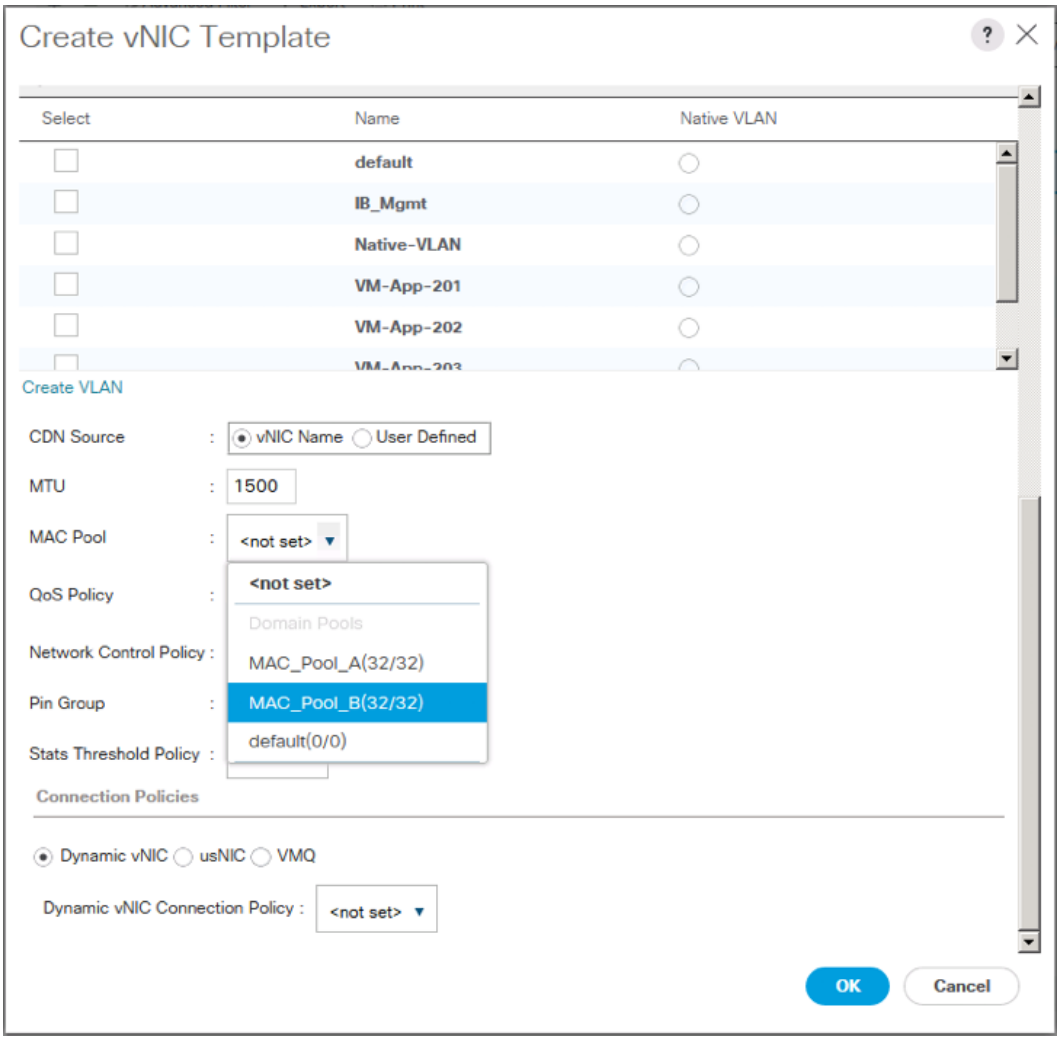
8. For the Peer Redundancy Template drop-down, select vNIC_App_A.

With Peer Redundancy Template selected, MAC Pool will be the main configuration option left for this vNIC template.

9. Under Target, make sure the VM checkbox is not selected.



10. In the MAC Pool list, select `MAC_Pool_B`.



11. Click OK to create the vNIC template.

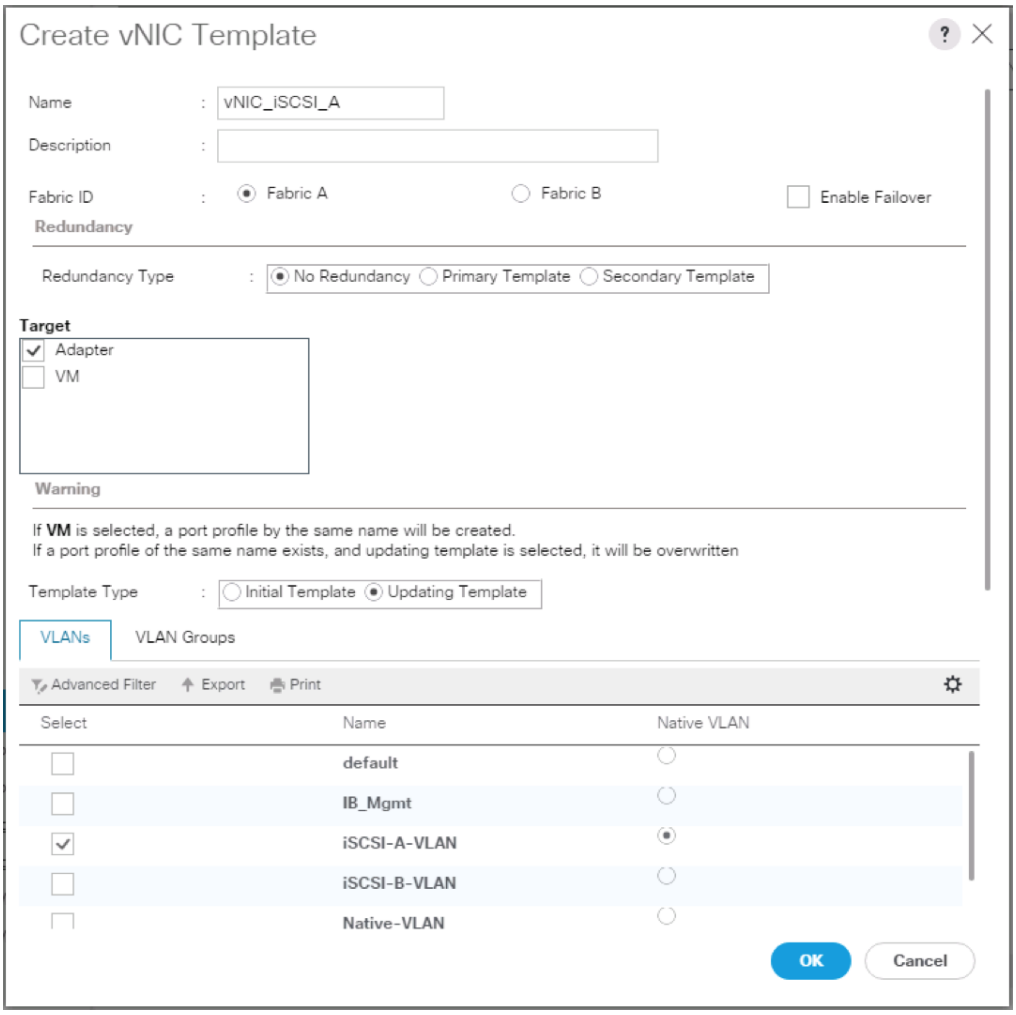
12. Click OK.

Create iSCSI vNICs

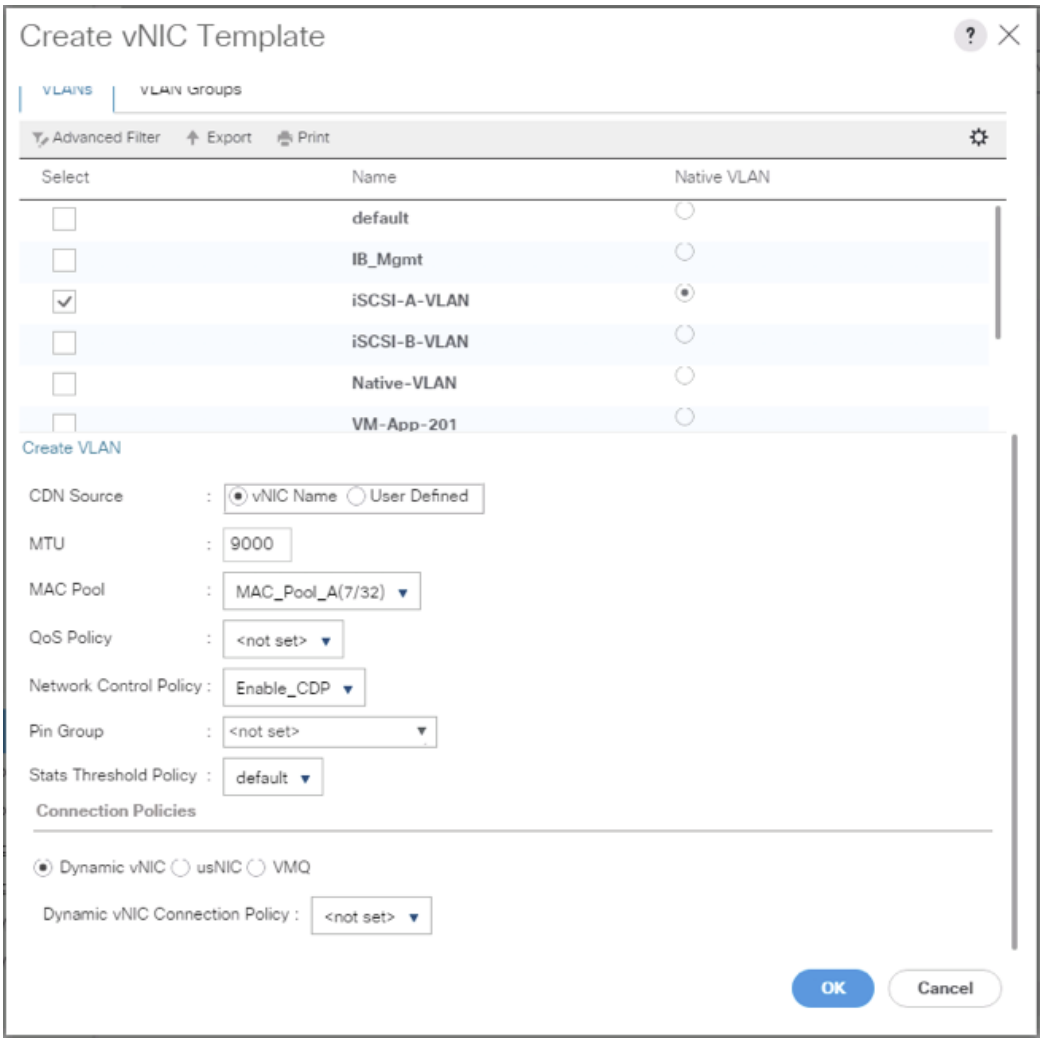
In Cisco UCS Manager, click the LAN tab in the navigation pane.

1. Select Policies > root.
2. Right-click vNIC Templates.
3. Select Create vNIC Template.
4. Enter `vNIC_iSCSI_A` as the vNIC template name.
5. Keep Fabric A selected.
6. Do not select the Enable Failover checkbox.

7. Keep the No Redundancy options selected for the Redundancy Type.
8. Under Target, make sure that the Adapter checkbox is selected.
9. Select Updating Template as the Template Type.
10. Under VLANs, select iSCSI-A-VLAN as the only VLAN and set it as the Native VLAN.



11. For MTU, enter 9000.
12. In the MAC Pool list, select MAC_Pool_A.
13. In the Network Control Policy list, select Enable_CDP.

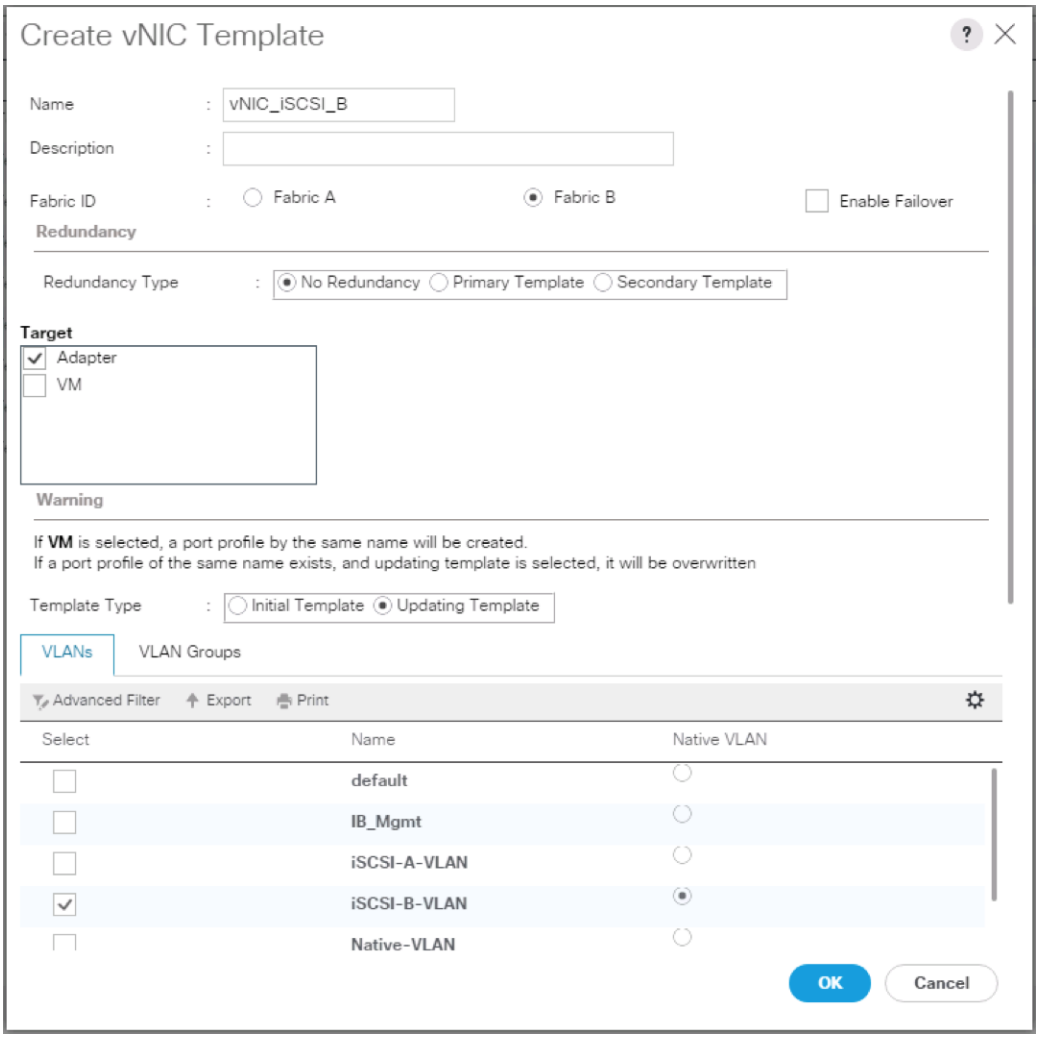


14. Click OK to create the vNIC template.
15. Click OK.

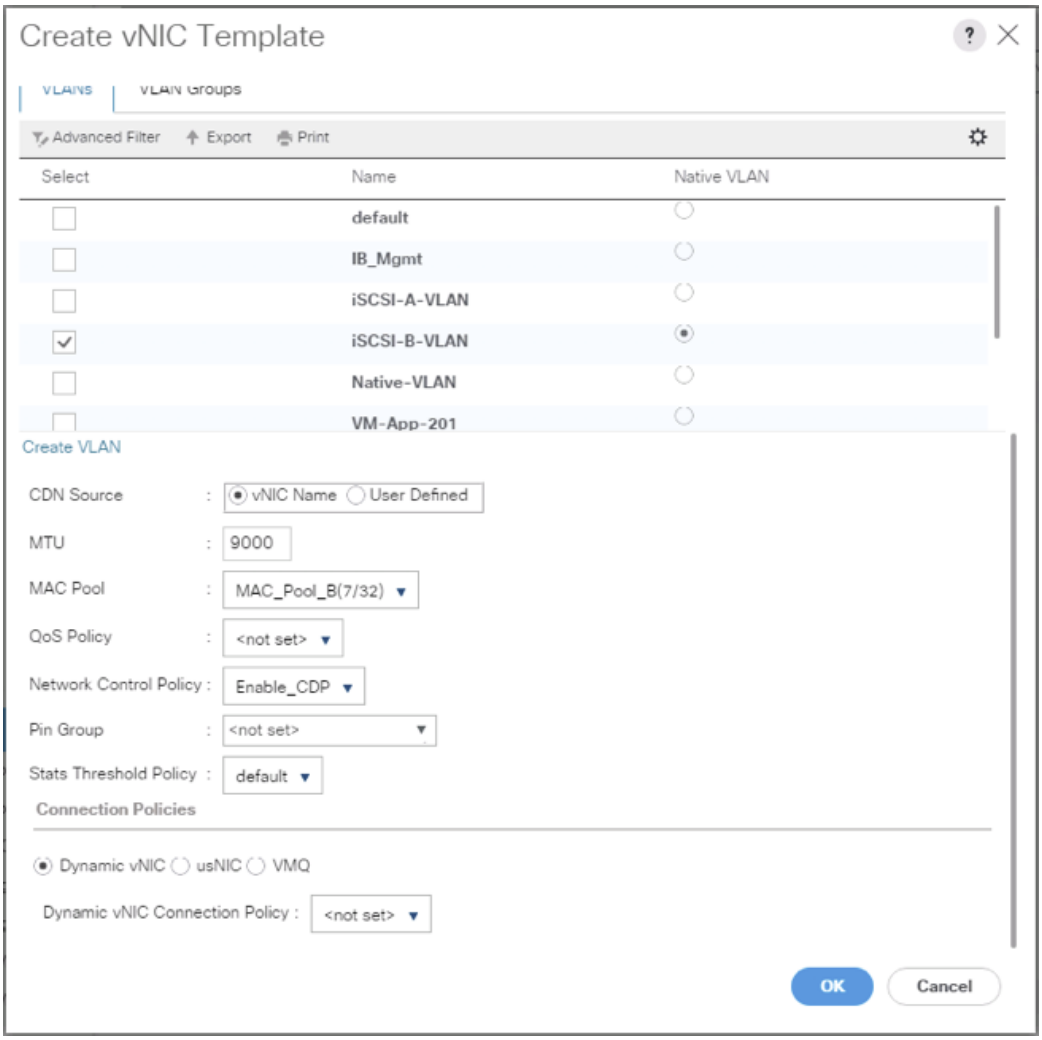
For the vNIC_iSCSI_B Template, complete the following steps:

1. In the navigation pane, select the LAN tab.
2. Select Policies > root.
3. Right-click vNIC Templates.
4. Select Create vNIC Template.
5. Enter `vNIC_iSCSI_B` as the vNIC template name.
6. Keep Fabric B selected.
7. Do not select the Enable Failover checkbox.

8. Keep the No Redundancy options selected for the Redundancy Type.
9. Under Target, make sure that the Adapter checkbox is selected.
10. Select Updating Template as the Template Type.
11. Under VLANs, select iSCSI-B-VLAN as the only VLAN and set it as the Native VLAN.



12. For MTU, enter 9000.
13. In the MAC Pool list, select MAC_Pool_A.
14. In the Network Control Policy list, select Enable_CDP.



15. Click OK to create the vNIC template.

16. Click OK.

Set Jumbo Frames in Cisco UCS Fabric

To configure jumbo frames and enable quality of service in the Cisco UCS fabric, complete the following steps:

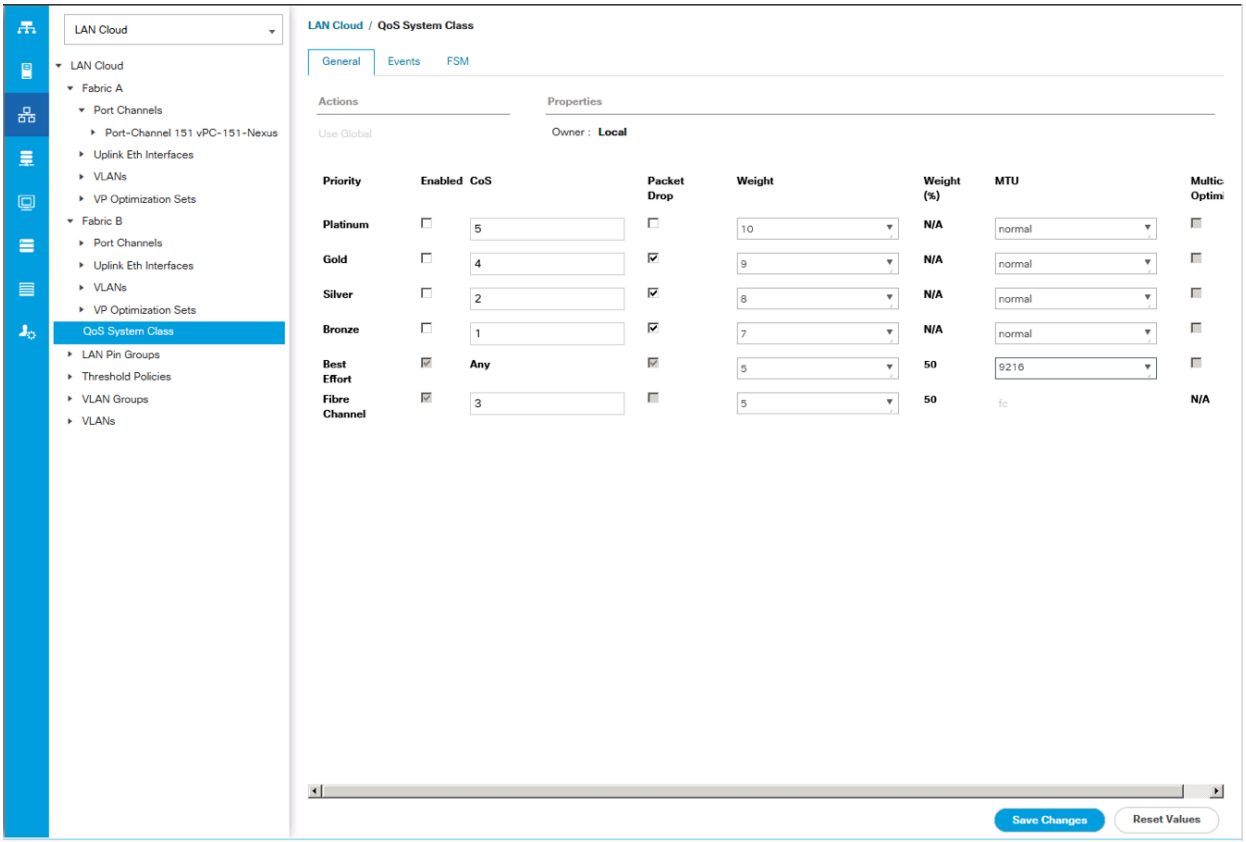
1. In Cisco UCS Manager, click the LAN tab in the navigation pane.

2. Select LAN > LAN Cloud > QoS System Class.

3. In the right pane, click the General tab.

4. On the Best Effort row, enter `9216` in the box under the MTU column.

5. Click Save Changes in the bottom of the window.



6. Click OK

Create LAN Connectivity Policy

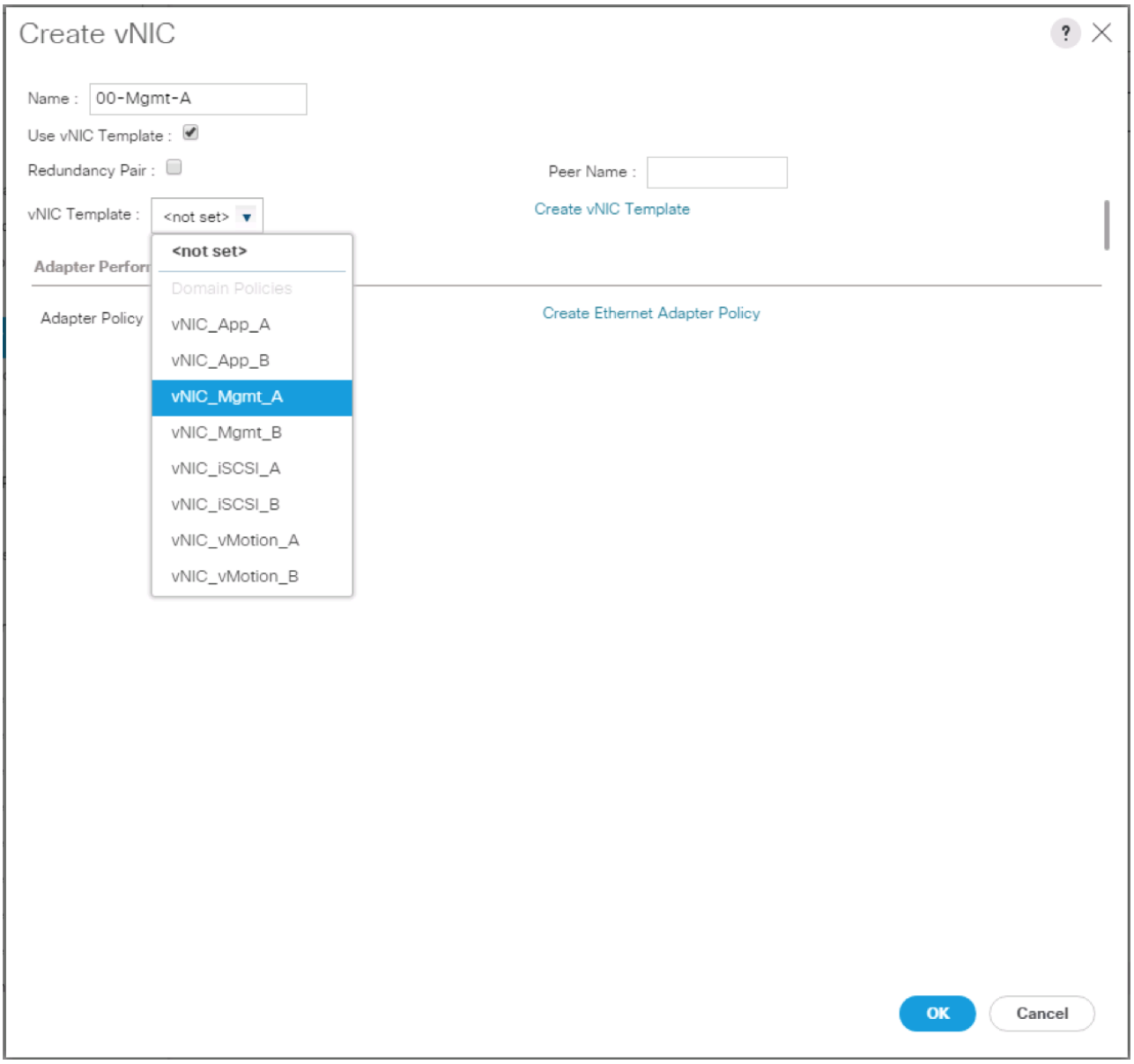
To configure the necessary iSCSI Infrastructure LAN Connectivity Policy, complete the following steps:

1. In Cisco UCS Manager, click LAN on the left.
2. Select LAN > Policies > root.
3. Right-click LAN Connectivity Policies.
4. Select Create LAN Connectivity Policy.
5. Enter `iSCSI-LAN-Policy` as the name of the policy.
6. Click the upper Add button to add a vNIC.
7. In the Create vNIC dialog box, enter `00-Mgmt-A` as the name of the vNIC.

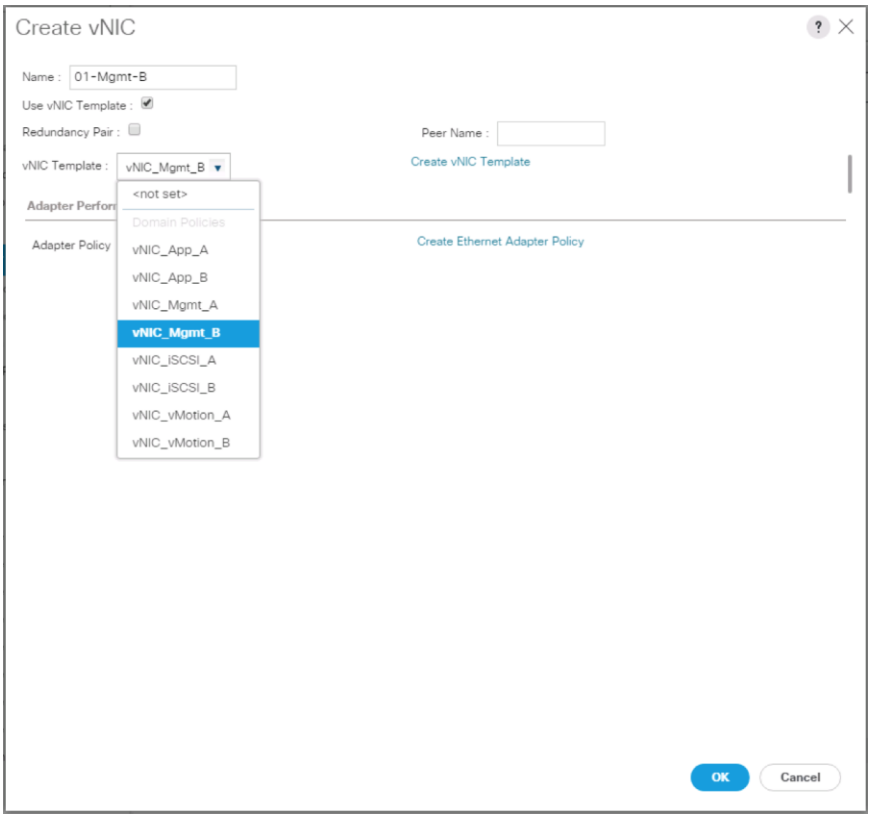
The numeric prefix of "00-" and subsequent increments on the later vNICs are used in the vNIC naming to force the device ordering through Consistent Device Naming (CDN). Without this, some operating systems might not respect the device ordering that is set within Cisco UCS.

8. Select the Use vNIC Template checkbox.

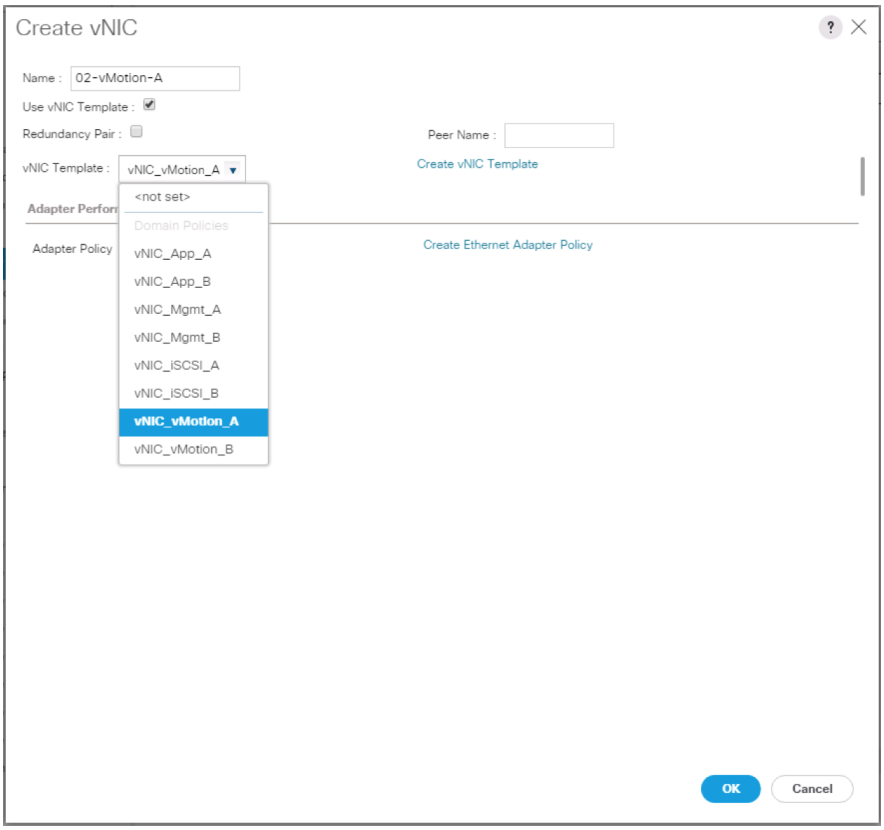
9. In the vNIC Template list, select 00-Mgmt-A.
10. In the Adapter Policy list, select VMWare.
11. Click OK to add this vNIC to the policy.



12. Click the upper Add button to add another vNIC to the policy.
13. In the Create vNIC box, enter `01-Mgmt-B` as the name of the vNIC.
14. Select the Use vNIC Template checkbox.
15. In the vNIC Template list, select 01-Mgmt-B.
16. In the Adapter Policy list, select VMWare.



17. Click OK to add the vNIC to the policy.
18. Click the upper Add button to add a vNIC.
19. In the Create vNIC dialog box, enter `02-vMotion-A` as the name of the vNIC.
20. Select the Use vNIC Template checkbox.
21. In the vNIC Template list, select vNIC_vMotion_A.
22. In the Adapter Policy list, select VMWare.
23. Click OK to add this vNIC to the policy.



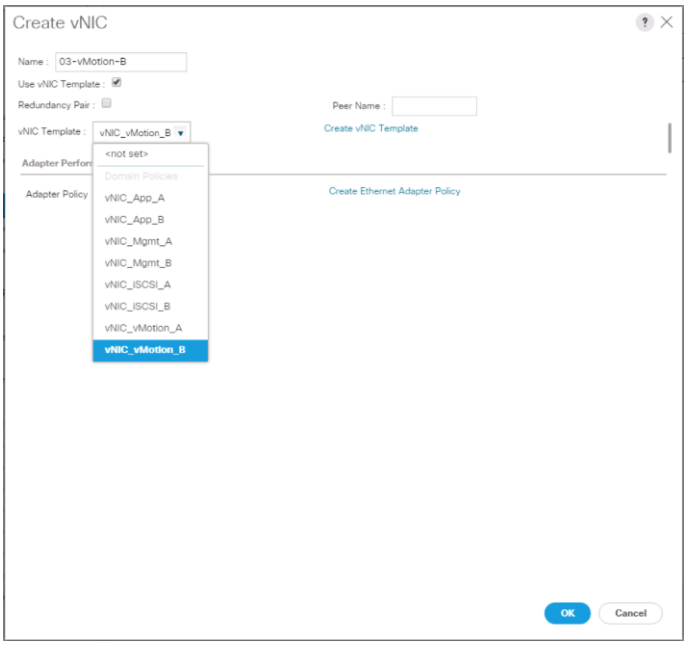
24. Click the upper Add button to add a vNIC to the policy.

25. In the Create vNIC dialog box, enter `03-vMotion-B` as the name of the vNIC.

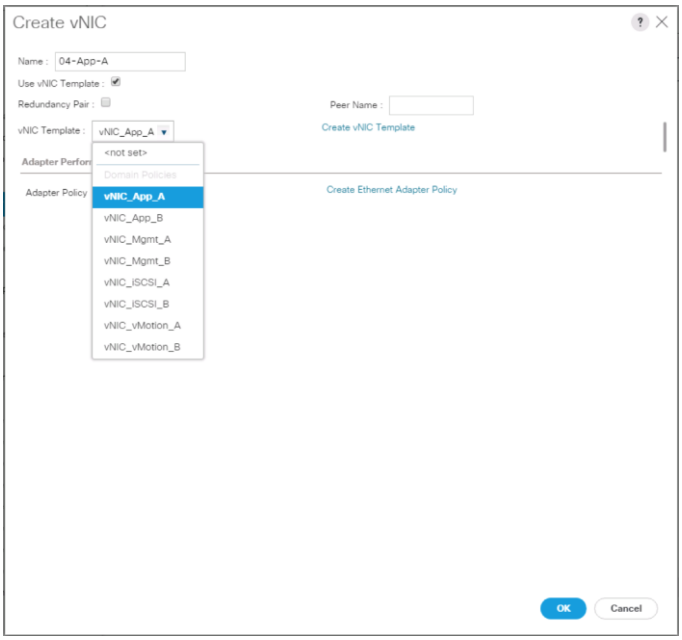
26. Select the Use vNIC Template checkbox.

27. In the vNIC Template list, select vNIC_vMotion_B.

28. In the Adapter Policy list, select VMWare.



29. Click OK to add this vNIC to the policy.
30. Click the upper Add button to add a vNIC.
31. In the Create vNIC dialog box, enter `04-App-A` as the name of the vNIC.
32. Select the Use vNIC Template checkbox.
33. In the vNIC Template list, select vNIC_App_A.
34. In the Adapter Policy list, select VMWare.
35. Click OK to add this vNIC to the policy.



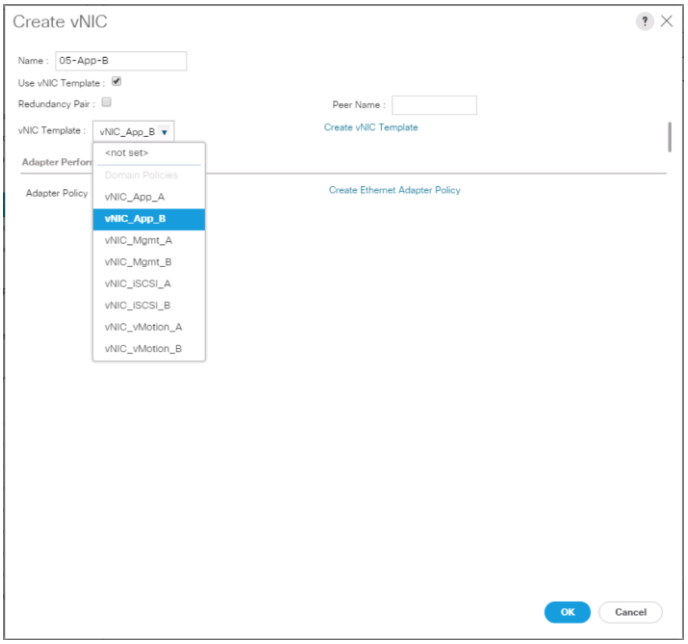
36. Click the upper Add button to add a vNIC to the policy.

37. In the Create vNIC dialog box, enter 05-App-B as the name of the vNIC.

38. Select the Use vNIC Template checkbox.

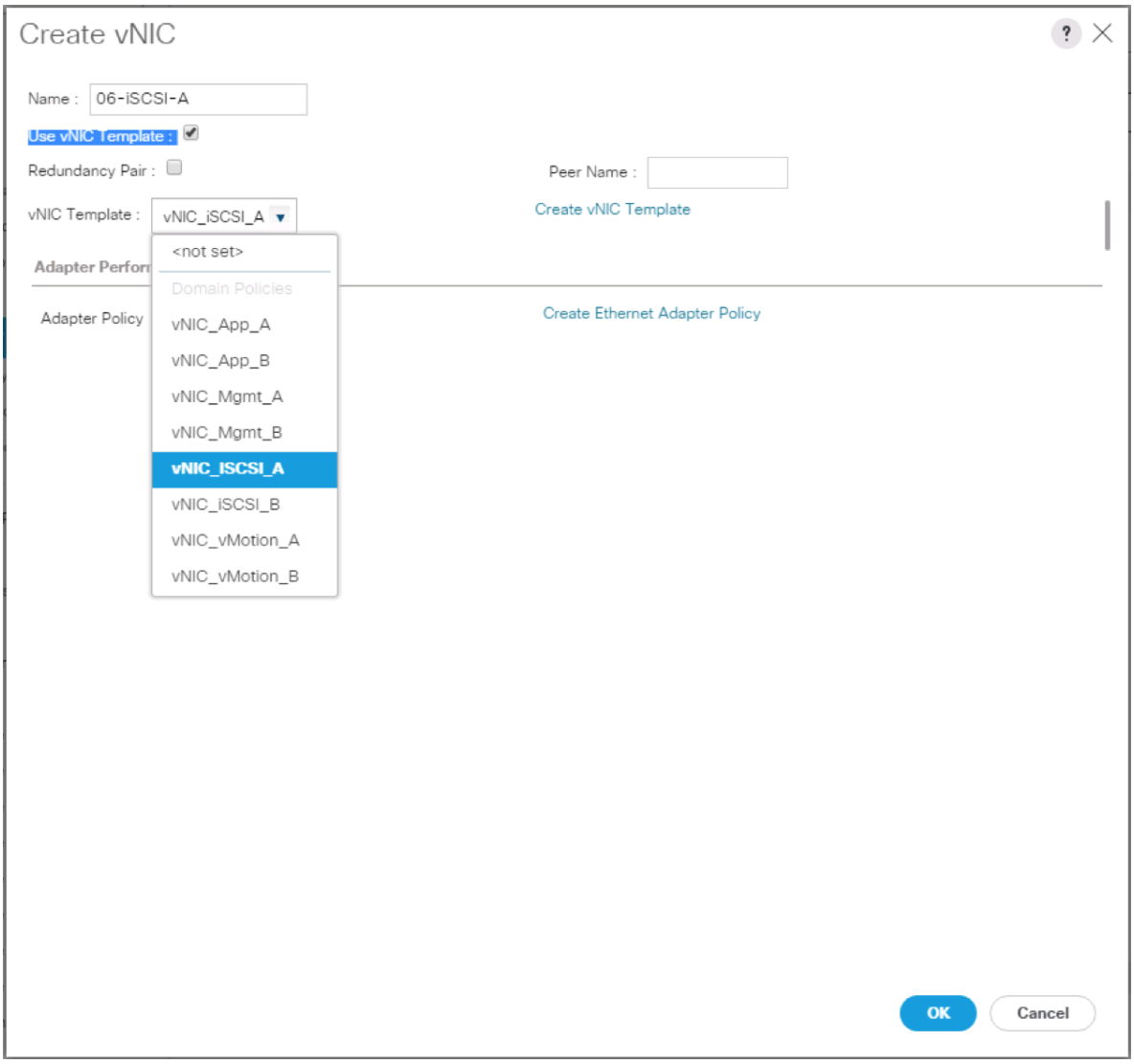
39. In the vNIC Template list, select vNIC_App_B.

40. In the Adapter Policy list, select VMWare.



41. Click OK to add this vNIC to the policy.

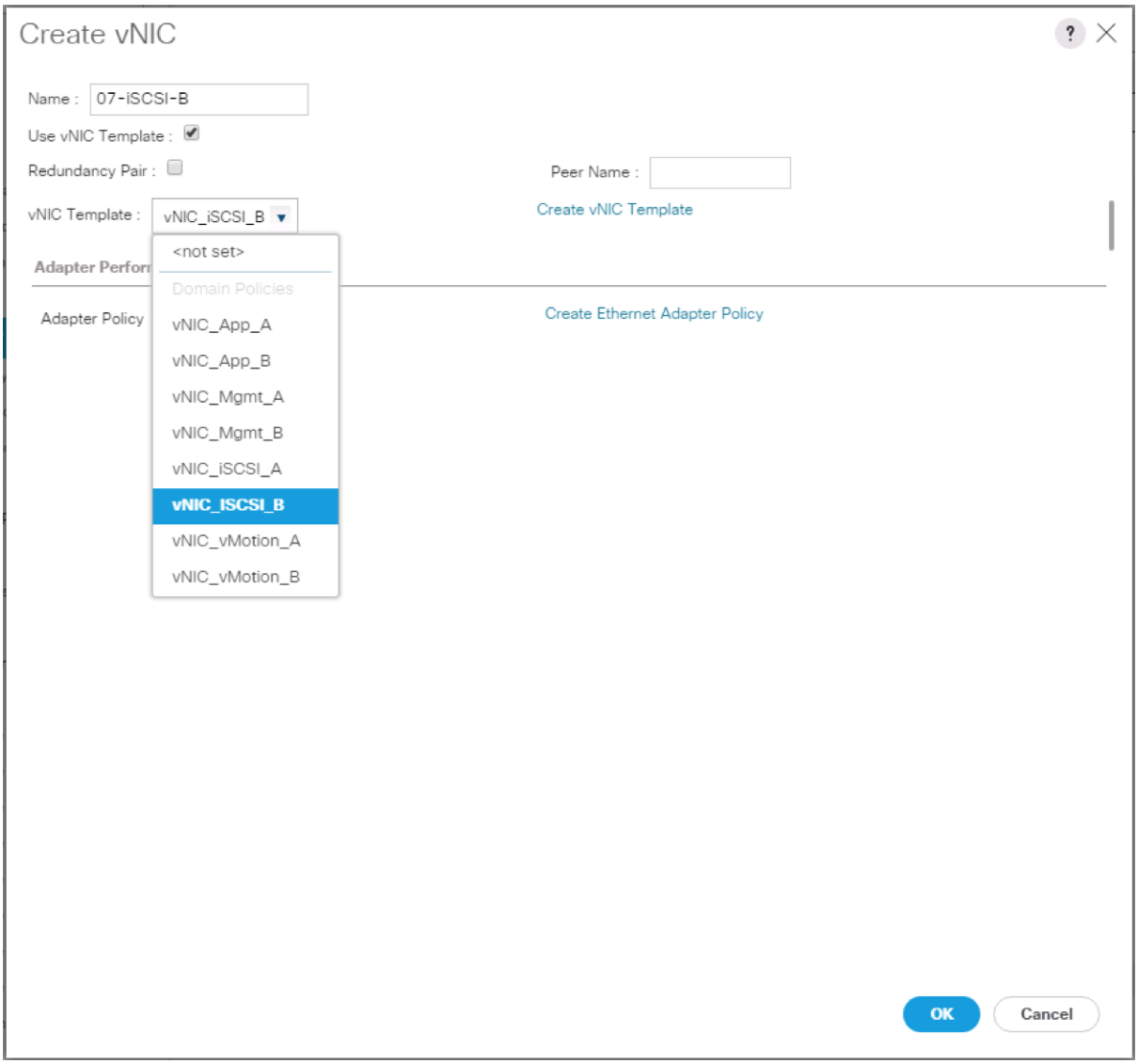
42. Click the upper Add button to add a vNIC.
43. In the Create vNIC dialog box, enter `06-iSCSI-A` as the name of the vNIC.
44. Select the Use vNIC Template checkbox.
45. In the vNIC Template list, select iSCSI-Template-A.
46. In the Adapter Policy list, select VMWare.



47. Click OK to add this vNIC to the policy.
48. Click the upper Add button to add a vNIC to the policy.
49. In the Create vNIC dialog box, enter `07-iSCSI-B` as the name of the vNIC.
50. Select the Use vNIC Template checkbox.

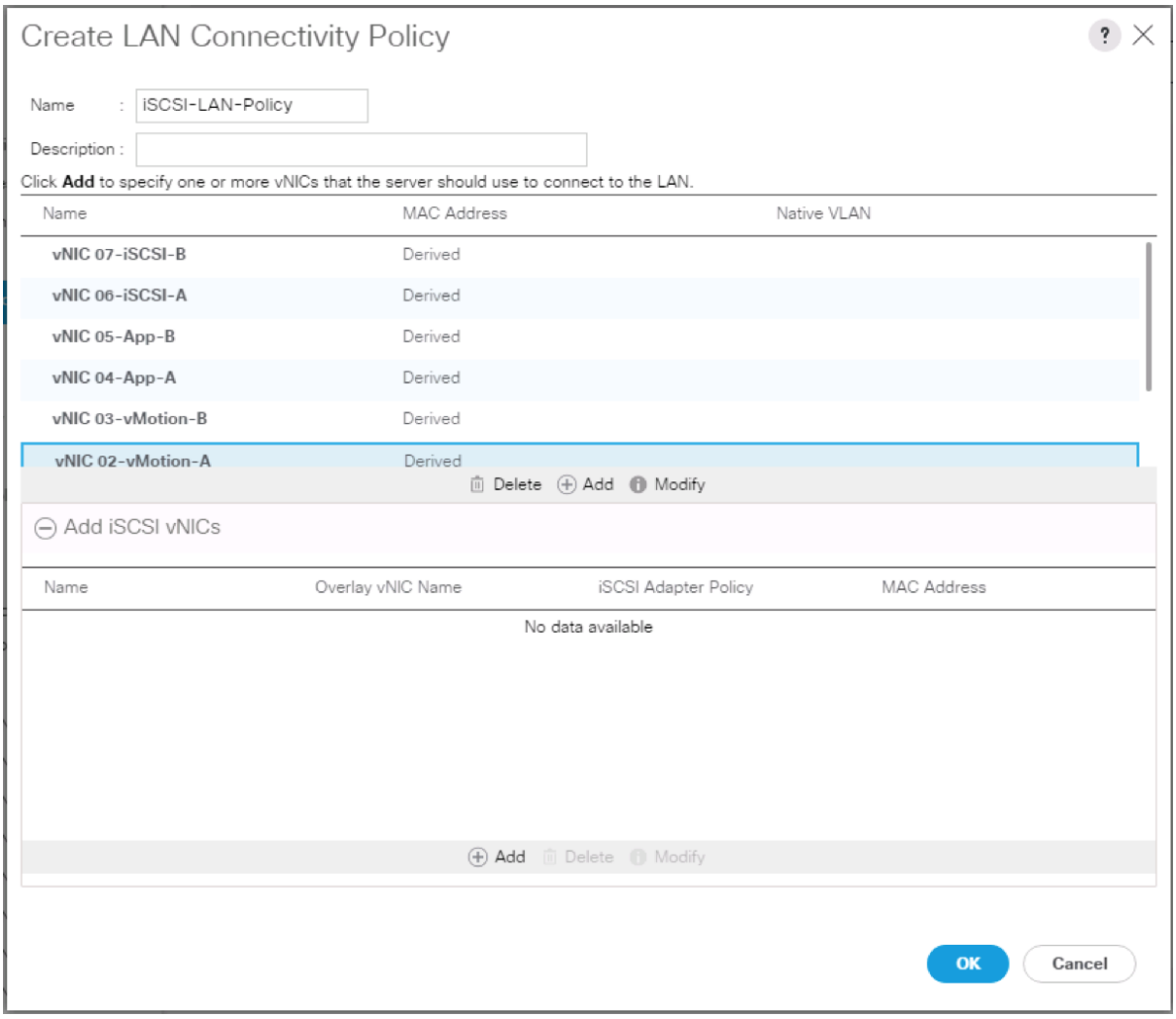
51. In the vNIC Template list, select iSCSI-Template-B.

52. In the Adapter Policy list, select VMWare.



53. Click OK to add this vNIC to the policy.

54. Expand the Add iSCSI vNICs.



55. Select Add in the Add iSCSI vNICs section.

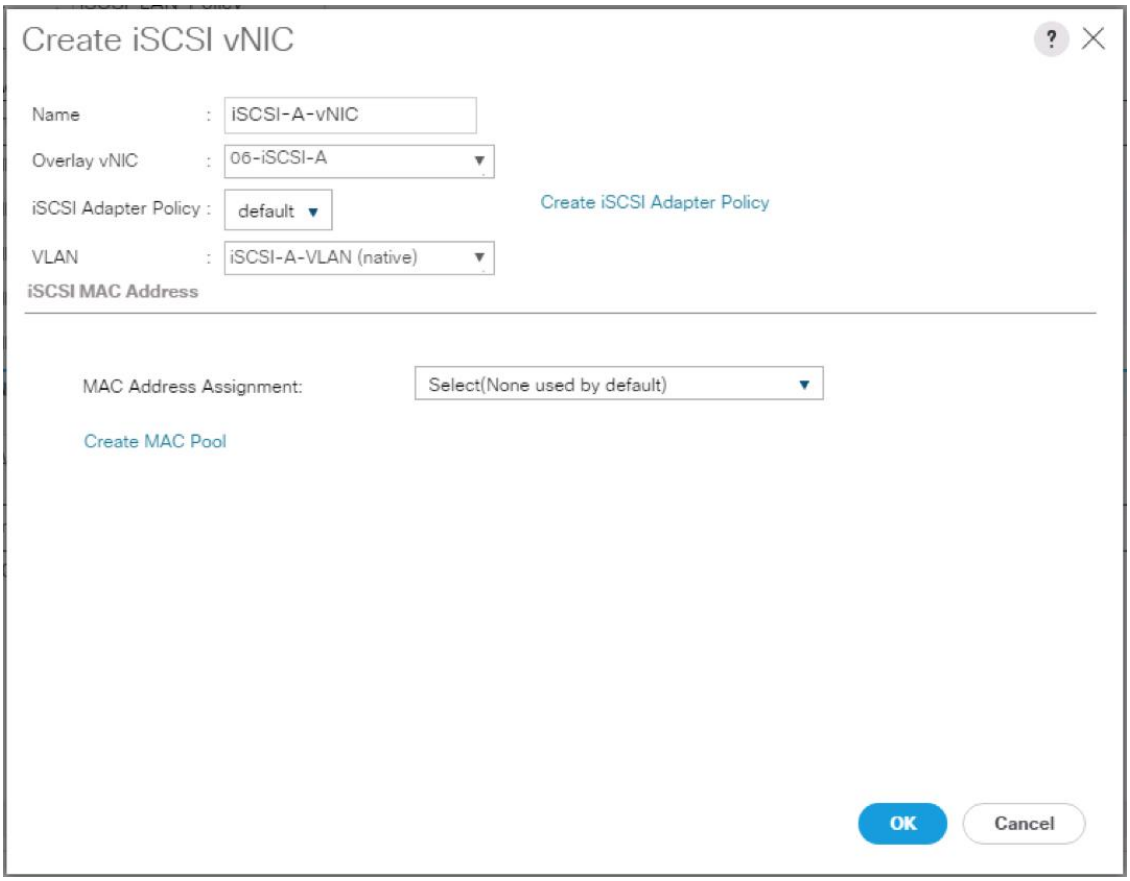
56. Set the name to iSCSI–A-vNIC.

57. Select the 06-iSCSI-A as Overlay vNIC.

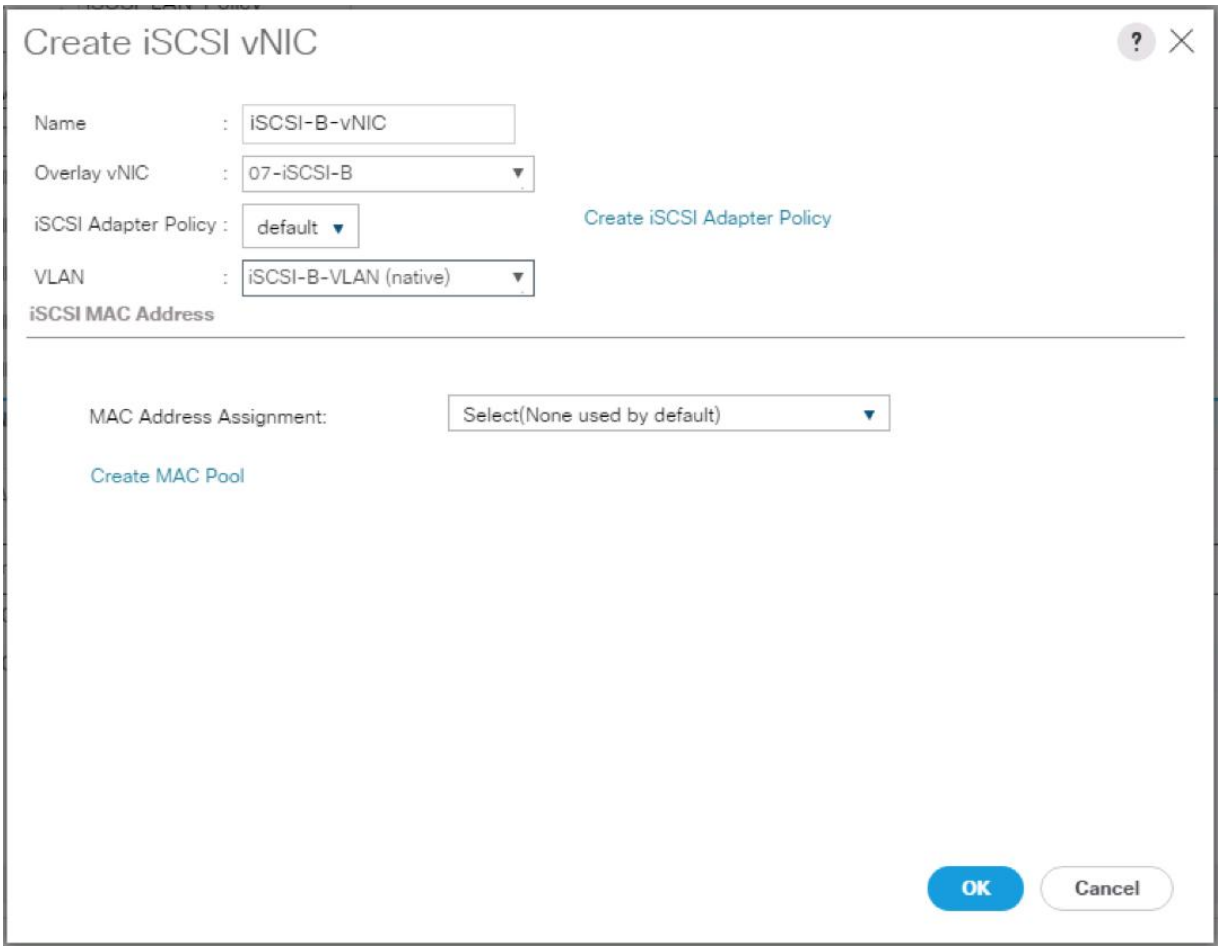
58. Set the VLAN to iSCSI-A-VLAN (native).

59. Set the iSCSI Adapter Policy to default

60. Leave the MAC Address set to None.



61. Click OK.
62. Select Add in the Add iSCSI vNICs section.
63. Set the name to iSCSI-B-vNIC.
64. Select the 07-iSCSI-A as Overlay vNIC.
65. Set the VLAN to iSCSI-B-VLAN.
66. Set the iSCSI Adapter Policy to default.
67. Leave the MAC Address set to None.



68. Click OK, then click OK again to create the LAN Connectivity Policy.

Create Boot Policy

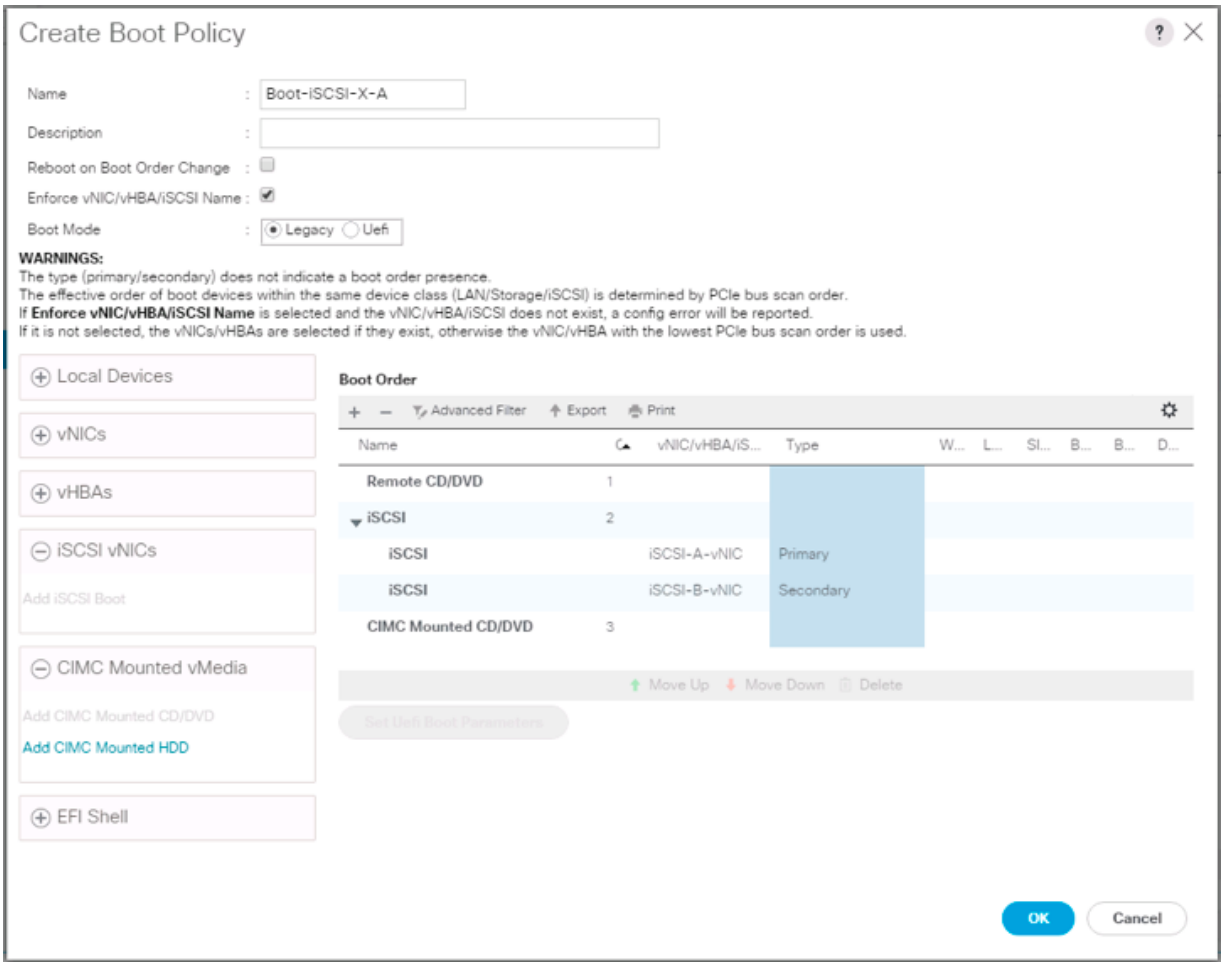
This procedure creates a boot policy for iSCSI boot off of the FlashArray//X pointing to the two iSCSI interfaces on controller 1 (ct0.eth8 and ct0.eth9) and the two iSCSI interfaces on controller 2 (ct1.eth8 and ct1.eth9).

To create a boot policy for the Cisco UCS environment, complete the following steps:

1. In Cisco UCS Manager, click Servers on the left.
2. Select Policies > root.
3. Right-click Boot Policies.
4. Select Create Boot Policy.
5. Enter `Boot-iSCSI-X-A` as the name of the boot policy.
6. Optional: Enter a description for the boot policy.

Do not select the Reboot on Boot Order Change checkbox.

7. Keep the Reboot on Boot Order Change option cleared.
8. Expand the Local Devices drop-down menu and select `Add Remote CD/DVD`.
9. Expand the iSCSI vNICs drop-down menu and select Add iSCSI Boot.
10. In the Add iSCSI Boot dialog box, enter `iSCSI-A-vNIC`.
11. Click OK.
12. Select Add iSCSI Boot.
13. In the Add iSCSI Boot dialog box, enter `iSCSI-B-vNIC`.
14. Click OK.
15. Expand CIMC Mounted Media and select Add CIMC Mounted CD/DVD.



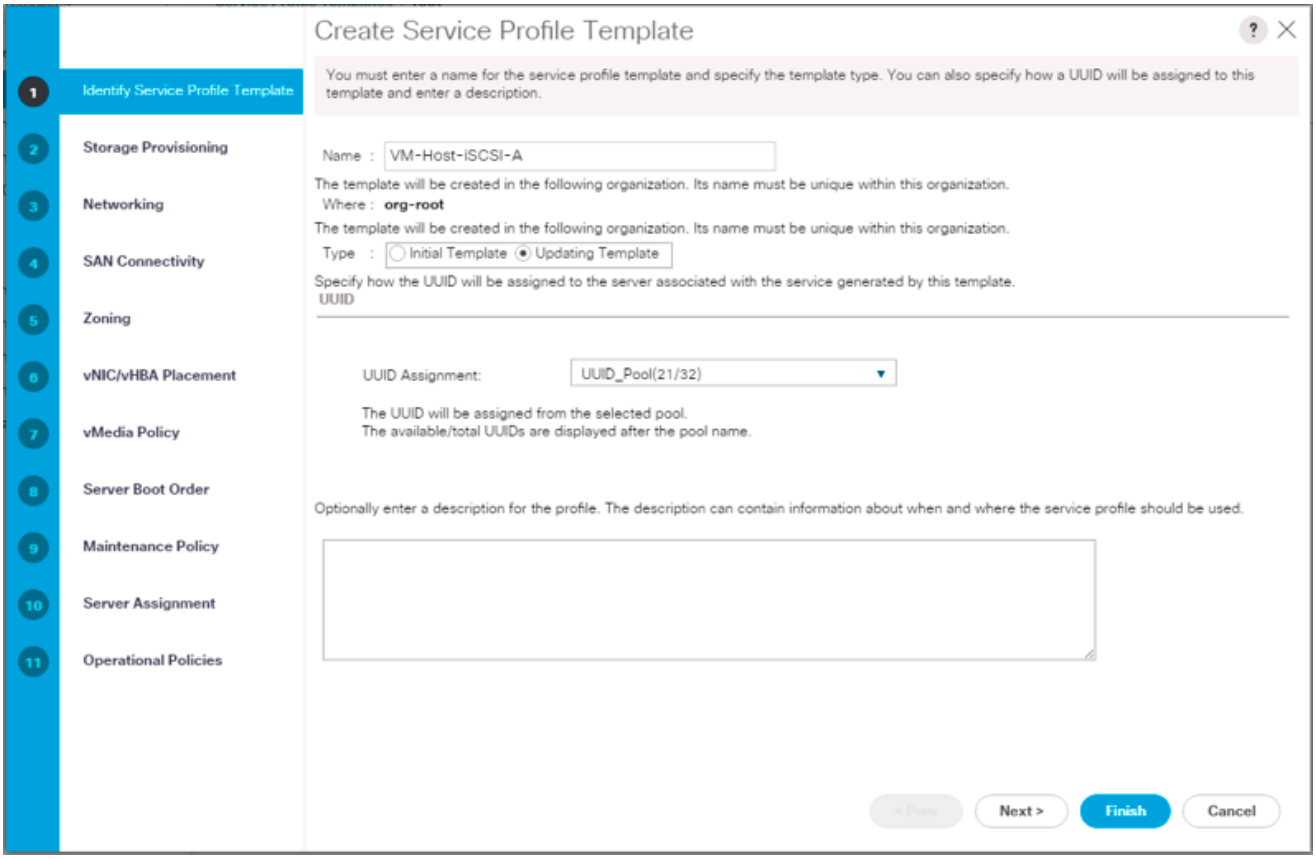
16. Click OK to create the policy.

Create Service Profile Template

In this procedure, one service profile template for Infrastructure ESXi hosts is created for iSCSI A boot.

To create the service profile template, complete the following steps:

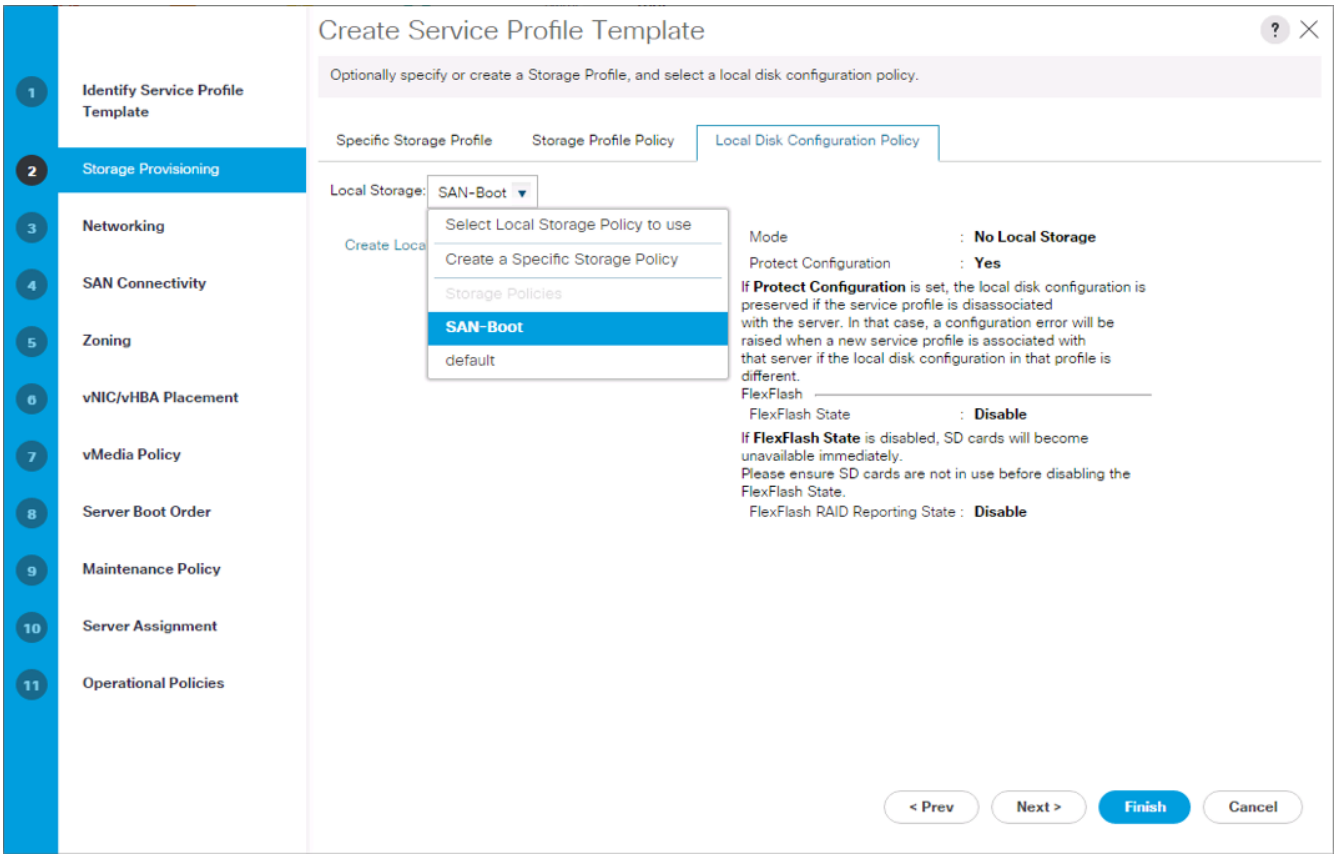
1. In Cisco UCS Manager, click the Servers tab in the navigation pane.
2. Select Service Profile Templates > root.
3. Right-click root.
4. Select Create Service Profile Template to open the Create Service Profile Template wizard.
5. Enter `VM-Host-iSCSI-A` as the name of the service profile template. This service profile template is configured to boot from FlashArray//X controller 1 on fabric A.
6. Select the “Updating Template” option.
7. Under UUID, select UUID_Pool as the UUID pool.



8. Click Next.

Configure Storage Provisioning

1. If you have servers with no physical disks, click the Local Disk Configuration Policy tab and select the SAN-Boot Local Storage Policy. Otherwise, select the default Local Storage Policy.

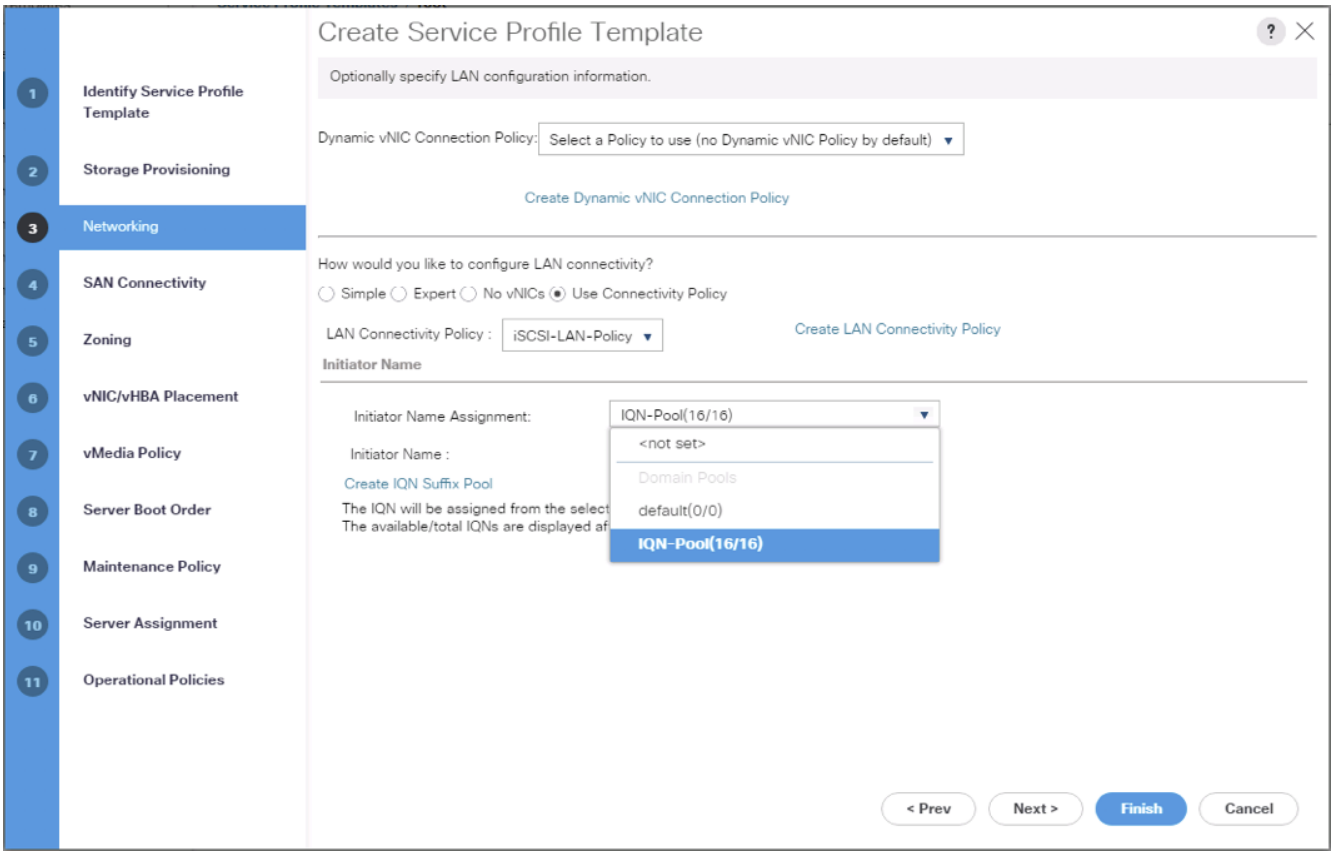


2. Click Next.

Configure Networking Options

To configure the network options, complete the following steps:

1. Keep the default setting for Dynamic vNIC Connection Policy.
2. Select the “Use Connectivity Policy” option to configure the LAN connectivity.
3. Select Infra-LAN-Policy from the LAN Connectivity Policy pull-down.
4. Select IQN_Pool in Initiator Name Assignment.



5. Click Next.

Configure Storage Options

1. Select the No vHBA option for the “How would you like to configure SAN connectivity?” field.
2. Click Next.

Configure Zoning Options

1. Leave Zoning configuration unspecified, and click Next.

Configure vNIC/HBA Placement

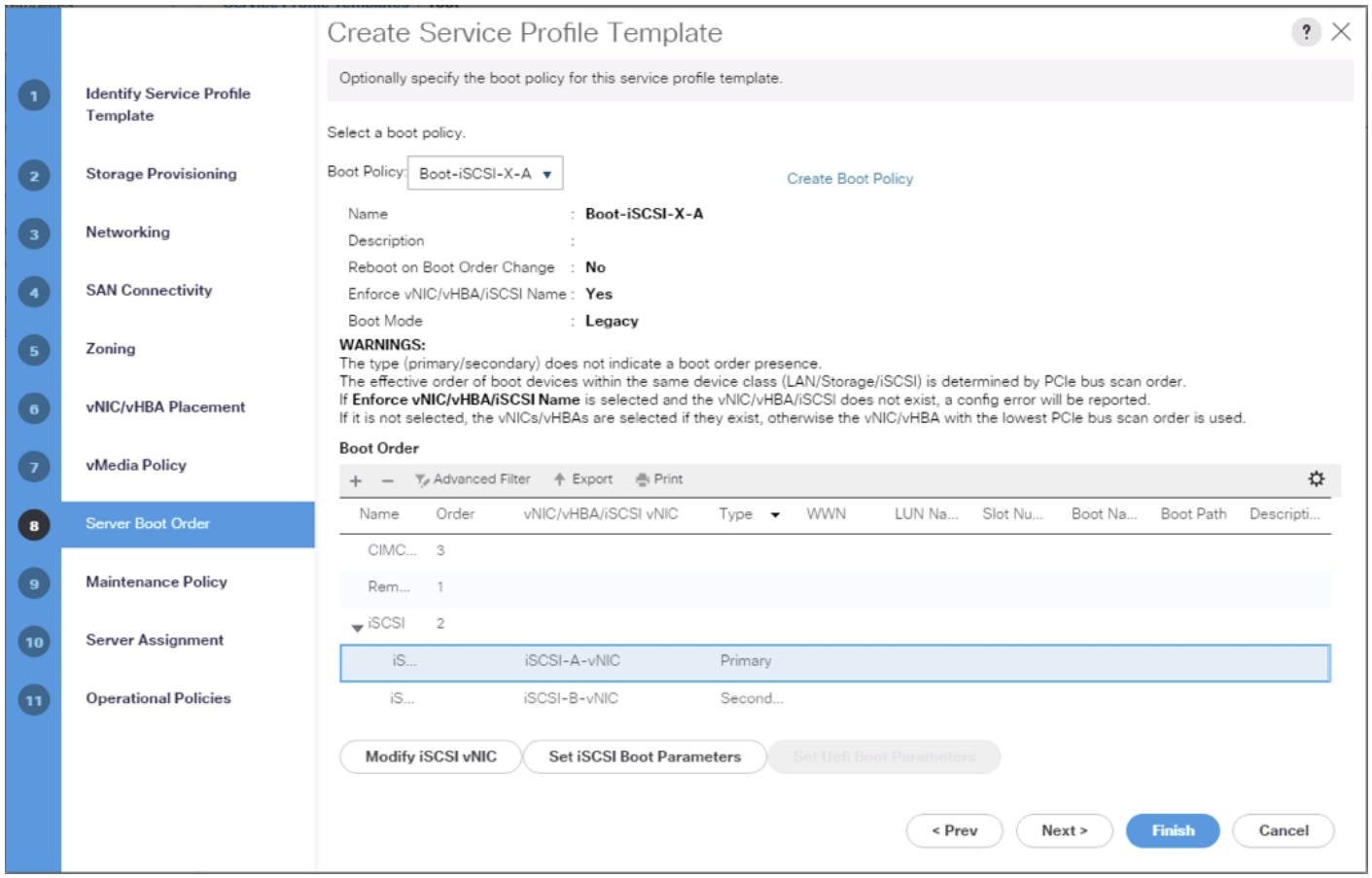
1. In the “Select Placement” list, leave the placement policy as “Let System Perform Placement”.
2. Click Next.

Configure vMedia Policy

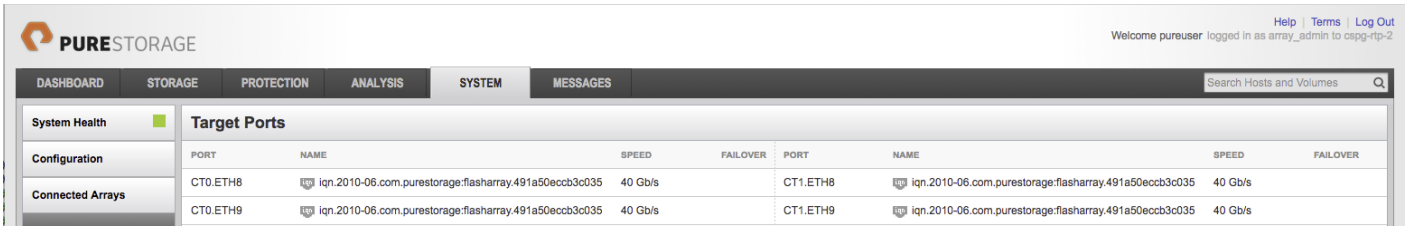
1. Do not select a vMedia Policy.
2. Click Next.

Configure Server Boot Order

1. Select `Boot-iSCSI-X-A` for Boot Policy.



2. In the Boor order, select iSCSI-A-vNIC.
3. Click Set iSCSI Boot Parameters button.
4. In the Set iSCSI Boot Parameters pop-up, leave Authentication Profile to <not set> unless you have independently created one appropriate to your environment.
5. Leave the “Initiator Name Assignment” dialog box <not set> to use the single Service Profile Initiator Name defined in the previous steps.
6. Set iSCSI_IP_Pool_A as the “Initiator IP address Policy”.
7. Select iSCSI Static Target Interface option.
8. Click Add.
9. Enter the iSCSI Target Name for ct0.eth8. To get the iSCSI target name of the FlashArray//X, login to the Pure Web console and navigate to SYSTEM -> Connections -> Target Ports.



10. Or find the targets from connecting to the controller via ssh using the pureuser login and run the pureport list command.

```
pureuser@cspg-rtp-2> pureport list
Name      WWN                       Portal               IQN
Failover
CT0.ETH8  -                         10.164.101.41:3260   iqn.2010-
06.com.purestorage:flasharray.491a50eccb3c035  -
CT0.ETH9  -                         10.164.102.41:3260   iqn.2010-
06.com.purestorage:flasharray.491a50eccb3c035  -
CT0.FC0   52:4A:93:76:87:FF:47:00   -                    -
-
CT0.FC1   52:4A:93:76:87:FF:47:01   -                    -
-
CT0.FC2   52:4A:93:76:87:FF:47:02   -                    -
-
CT0.FC3   52:4A:93:76:87:FF:47:03   -                    -
-
CT0.FC6   52:4A:93:76:87:FF:47:06   -                    -
-
CT0.FC7   52:4A:93:76:87:FF:47:07   -                    -
-
CT1.ETH8  -                         10.164.101.42:3260   iqn.2010-
06.com.purestorage:flasharray.491a50eccb3c035  -
CT1.ETH9  -                         10.164.102.42:3260   iqn.2010-
06.com.purestorage:flasharray.491a50eccb3c035  -
CT1.FC0   52:4A:93:76:87:FF:47:10   -                    -
-
CT1.FC1   52:4A:93:76:87:FF:47:11   -                    -
-
CT1.FC2   52:4A:93:76:87:FF:47:12   -                    -
-
CT1.FC3   52:4A:93:76:87:FF:47:13   -                    -
-
CT1.FC6   52:4A:93:76:87:FF:47:16   -                    -
-
CT1.FC7   52:4A:93:76:87:FF:47:17   -                    -
-
```

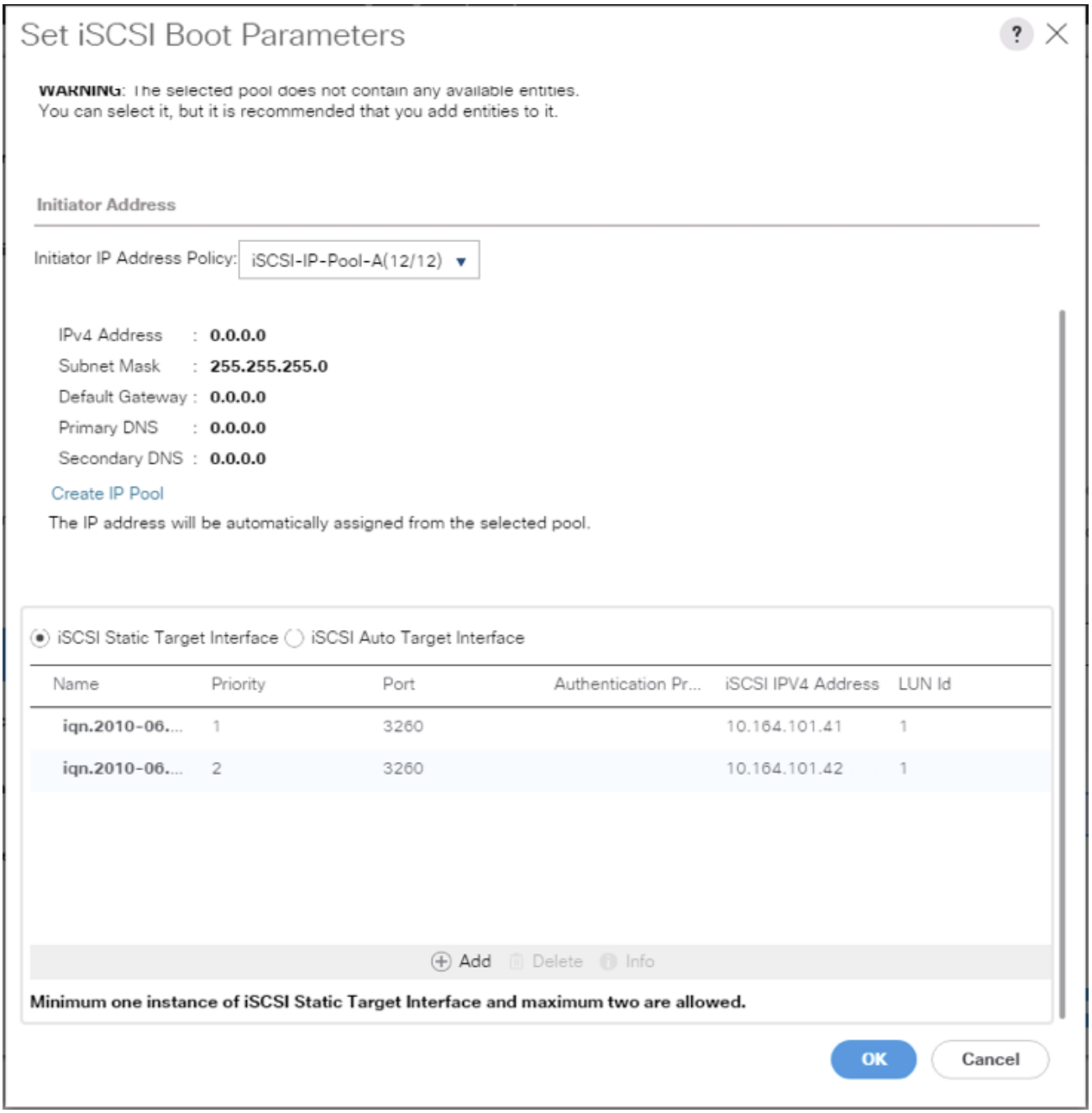
11. Leave the Port set to 3260, Authentication Profile as <not set>, provide the appropriate IPv4 Address configured to ct0.eth8, and set the LUN ID to 1.

12. Click OK to add the iSCSI Static Target.

13. Click Add again to add another iSCSI Target for the iSCSI-A-vNIC that will associate with ct1.eth8.

14. Enter the same iSCSI Target Name, leave the Port set to 3260, the Authentication Profile as <not set>, provide the appropriate IPv4 Address configured to ct1.eth8, and set the LUN ID to 1.

15. Click OK to add the iSCSI Static Target.



16. Click OK to set the iSCSI-A-vNIC ISCSI Boot Parameters.

17. In the Boor order, select iSCSI-B-vNIC.

18. Click Set iSCSI Boot Parameters button.

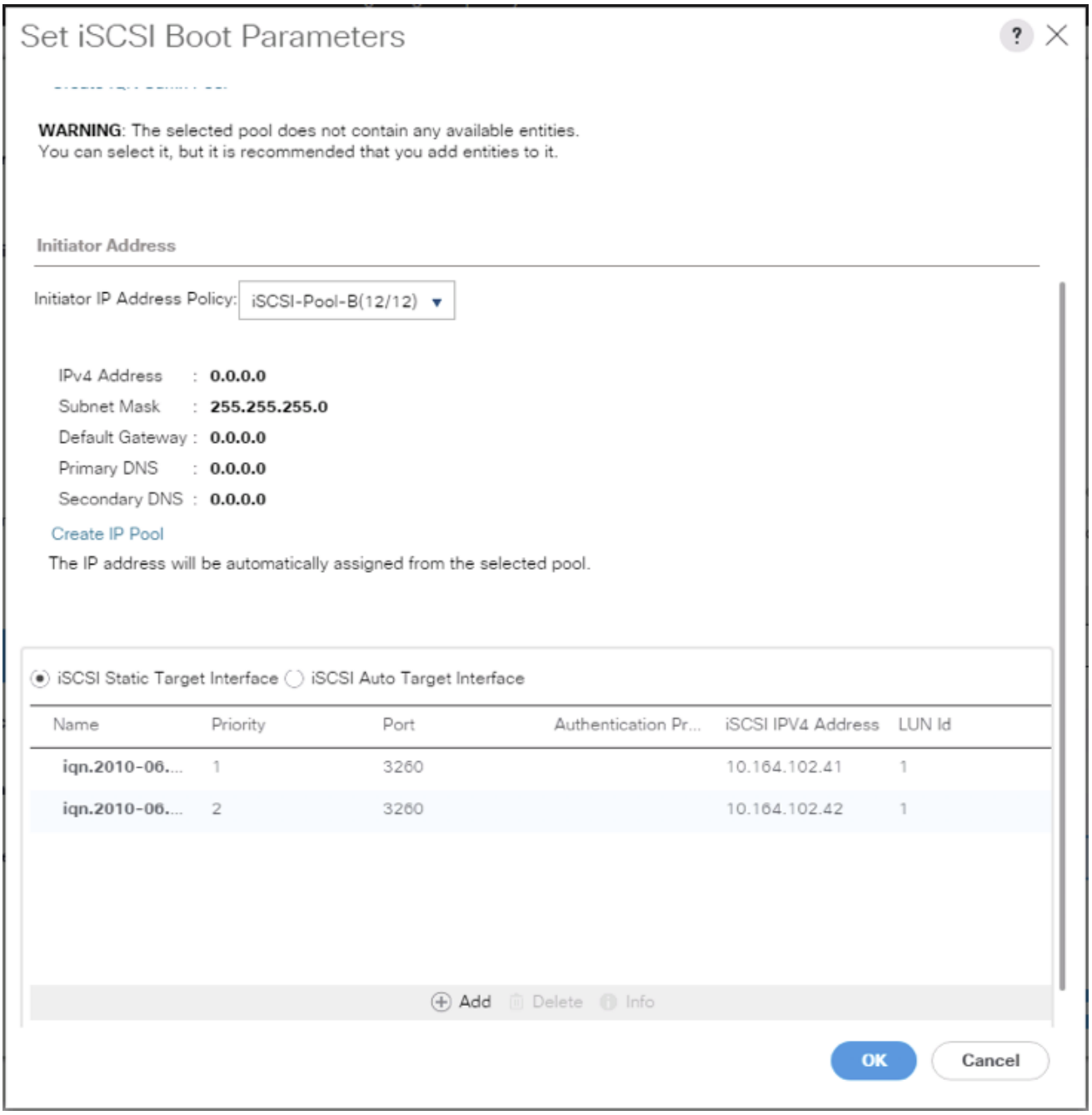
19. In the Set iSCSI Boot Parameters pop-up, leave Authentication Profile to <not set> unless you have independently created one appropriate to your environment.

20. Leave the “Initiator Name Assignment” dialog box <not set> to use the single Service Profile Initiator Name defined in the previous steps.

21. Set iSCSI_IP_Pool_B as the “Initiator IP address Policy”.
22. Select iSCSI Static Target Interface option.
23. Click Add.
24. Enter the same iSCSI Target Name, leave the Port set to 3260, the Authentication Profile as <not set>, provide the appropriate IPv4 Address configured to ct0.eth9, and set the LUN ID to 1.

25. Click OK to add the iSCSI Static Target.
26. Click Add again to add another iSCSI Target for the iSCSI-B-vNIC that will associate with ct1.eth9.
27. Enter the same iSCSI Target Name, leave the Port set to 3260, the Authentication Profile as <not set>, provide the appropriate IPv4 Address configured to ct1.eth9, and set the LUN ID to 1.

28. Click OK to add the iSCSI Static Target.

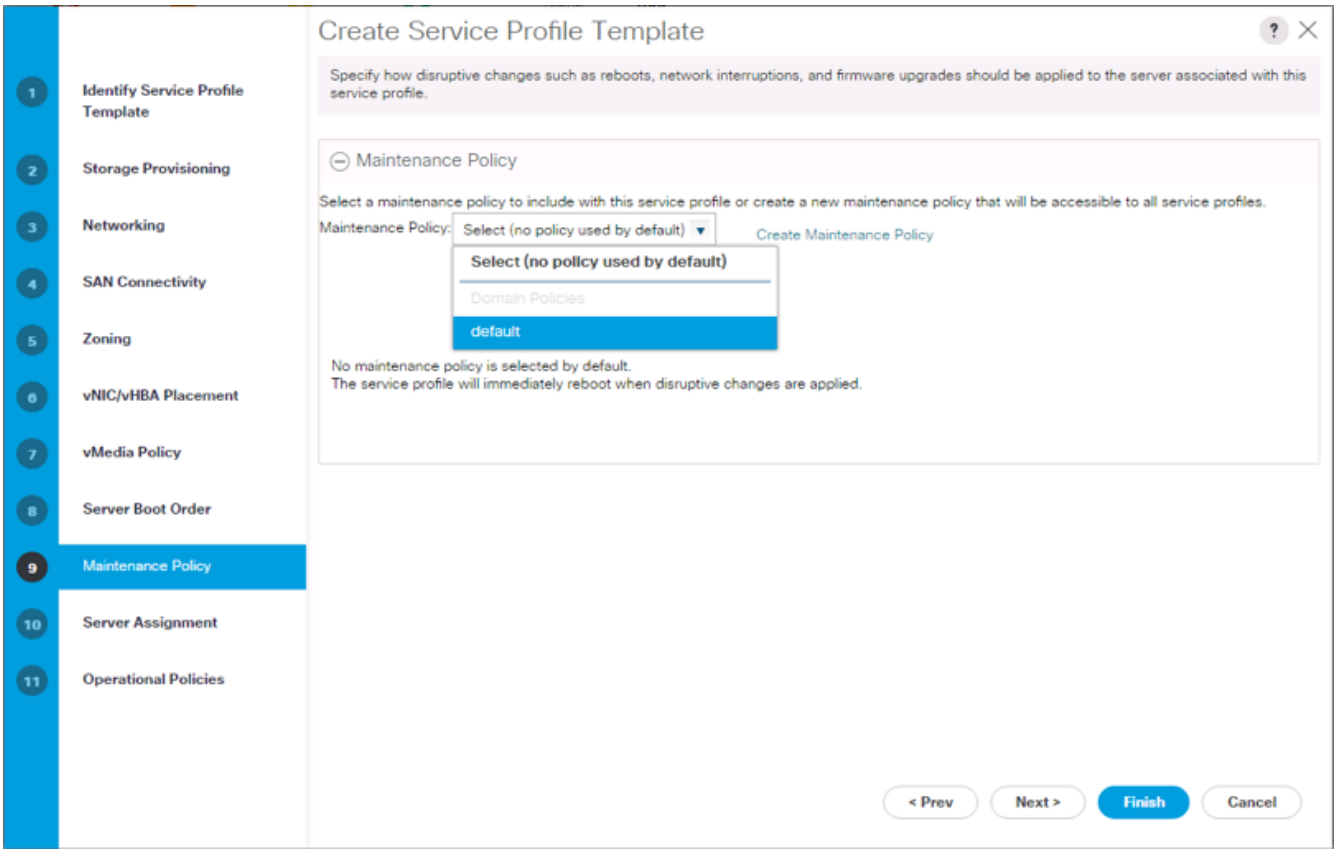


29. Click OK to set the iSCSI-B-vNIC ISCSI Boot Parameters.

30. Click Next to continue to the next section.

Configure Maintenance Policy

1. Change the Maintenance Policy to default.



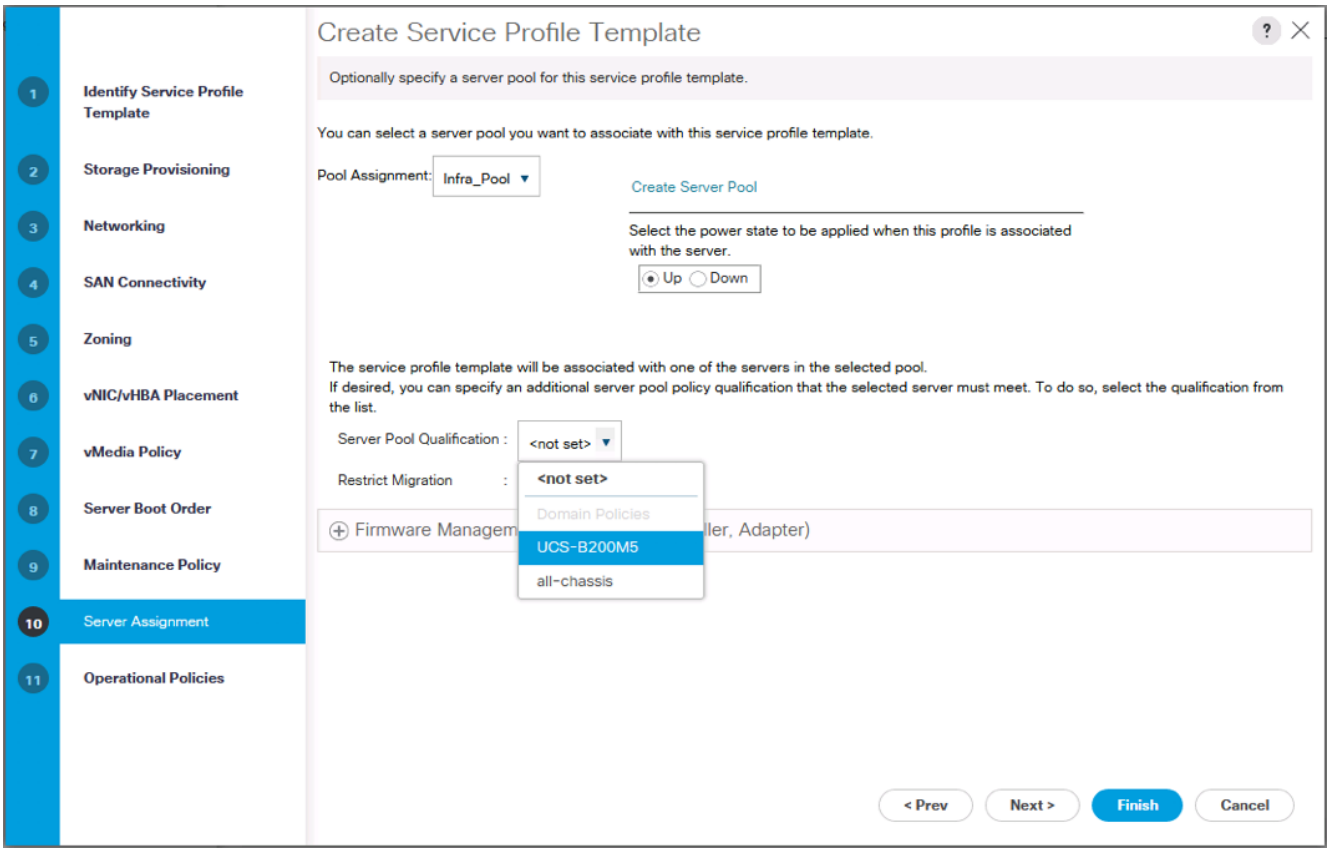
2. Click Next.

Configure Server Assignment

To configure server assignment, complete the following steps:

1. In the Pool Assignment list, select `Infra_Pool`.
2. Optional: Select a Server Pool Qualification policy.
3. Select Down as the power state to be applied when the profile is associated with the server.
4. Optional: Select “UCS-B200M5” for the Server Pool Qualification.

Firmware Management at the bottom of the page can be left alone as it will use default from the Host Firmware list.

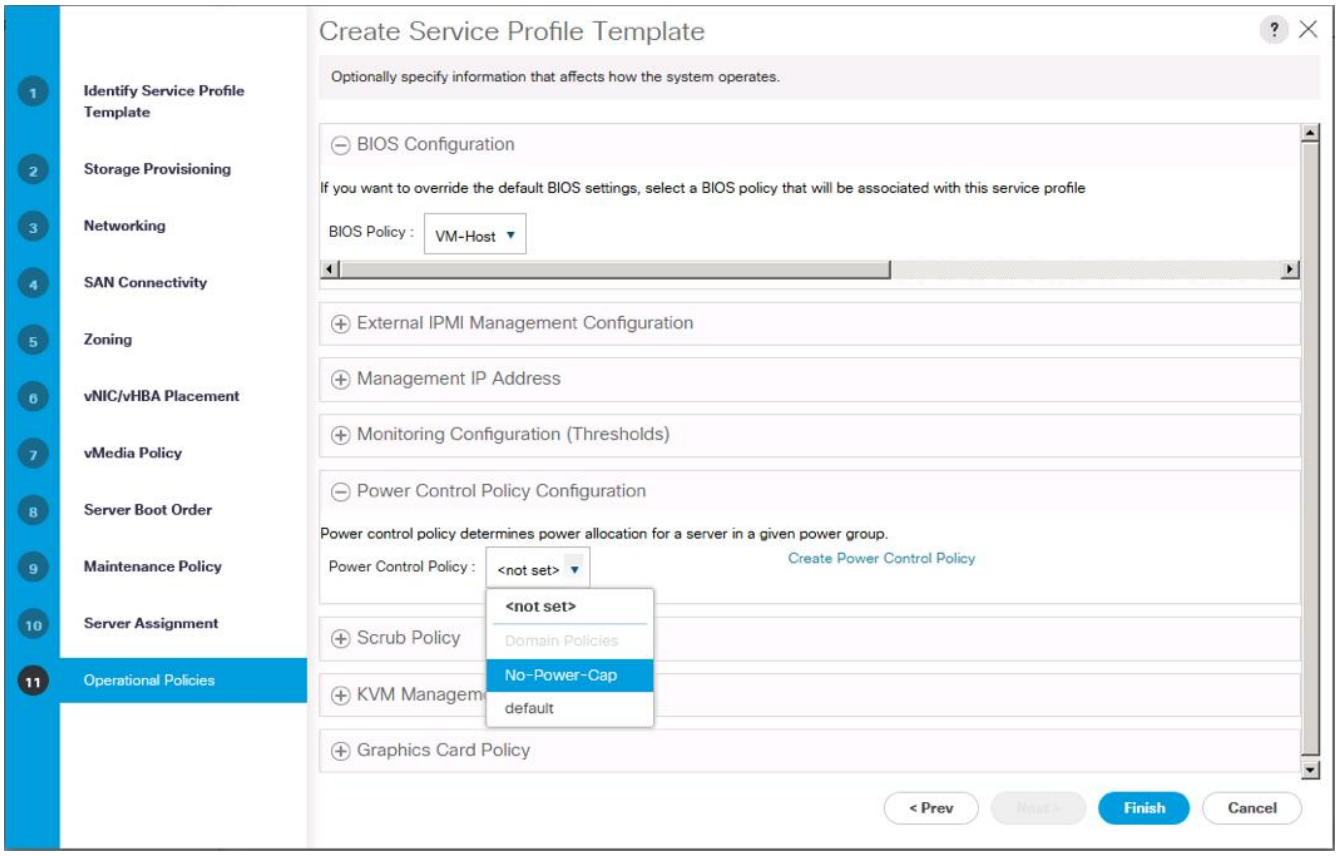


5. Click Next.

Configure Operational Policies

To configure the operational policies, complete the following steps:

1. In the BIOS Policy list, select VM-Host.
2. Expand Power Control Policy Configuration and select No-Power-Cap in the Power Control Policy list.



3. Click Finish to create the service profile template.

4. Click OK in the confirmation message.

Create vMedia Service Profile Template

If the optional ESXi 6.5 U1 vMedia Policy is being used, a clone of the created service profile template will be made to reference this vMedia Policy. The clone of the service profile template will have the vMedia Policy configured for it, and service profiles created from it, will be unbound and re-associated to the original service profile template after ESXi installation. To create a clone of the VM-Host-iSCSI-A service profile template, and associate the vMedia Policy to it, complete the following steps:

1. Connect to UCS Manager, click Servers on the left.

2. Select Service Profile Templates > root > Service Template VM-Host-iSCSI-A.

3. Right-click Service Template VM-Host-iSCSI-A and select Create a Clone.

4. Name the clone VM-Host-iSCSi-A-vM and click OK.

5. Select Service Template VM-Host-iSCSi-A-vM.

6. In the right pane, select the vMedia Policy tab.

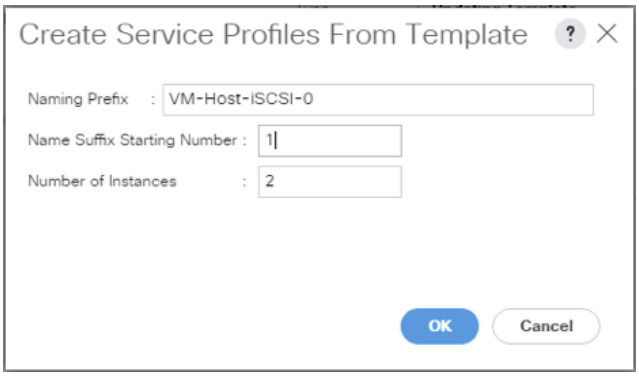
7. Under Actions, select Modify vMedia Policy.

8. Using the drop-down, select the ESXi-6.5U1-HTTP vMedia Policy.
9. Click OK then OK again to complete modifying the Service Profile Template.

Create Service Profiles

To create service profiles from the service profile template, complete the following steps:

1. Connect to the UCS 6332-16UP Fabric Interconnect UCS Manager, click the Servers tab in the navigation pane.
2. Select Service Profile Templates > root > Service Template VM-Host-iSCSI-A-vM.
3. Right-click `VM-Host-iSCSI-A-vM` and select Create Service Profiles from Template.
4. Enter `VM-Host-iSCSI-0` as the service profile prefix.
5. Leave `1` as “Name Suffix Starting Number.”
6. Leave `2` as the “Number of Instances.”
7. Click OK to create the service profiles.



8. Click OK in the confirmation message to provision two FlashStack Service Profiles.

When VMware ESXi 6.5 U1 has been installed on the hosts, the host Service Profiles can be unbound from the VM-Host-iSCSI-A-vM and rebound to the VM-Host-iSCSI-A Service Profile Template to remove the vMedia mapping from the host, to prevent issues at boot time if the HTTP source for the ESXi ISO is somehow not available.

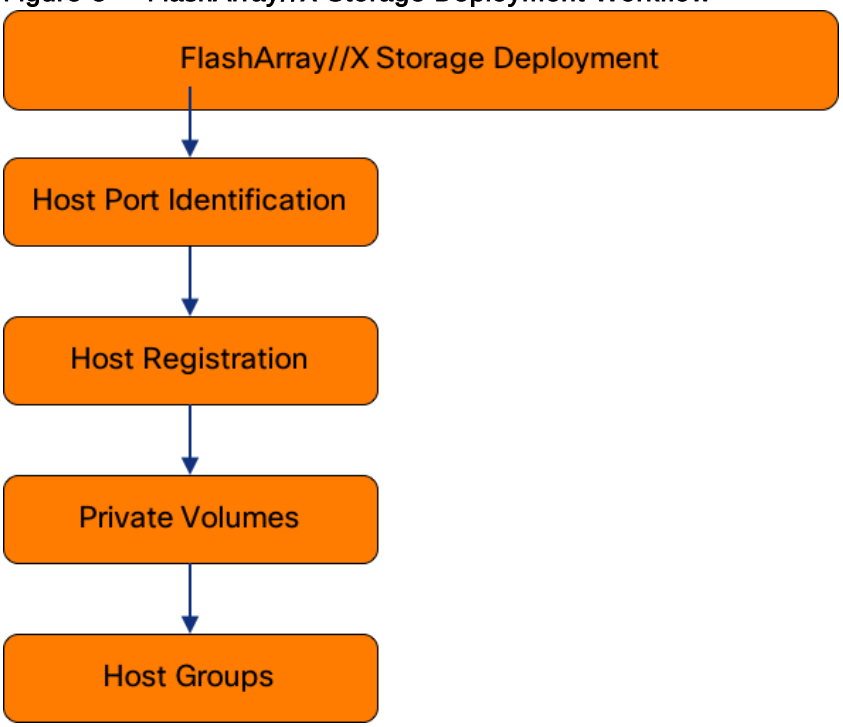
FlashArray Storage Deployment

The Pure Storage FlashArray//X is accessible to the FlashStack, but no storage has been deployed at this point. The storage to be deployed will include:

- ESXi iSCSI Boot LUNs
- VMFS Datastores

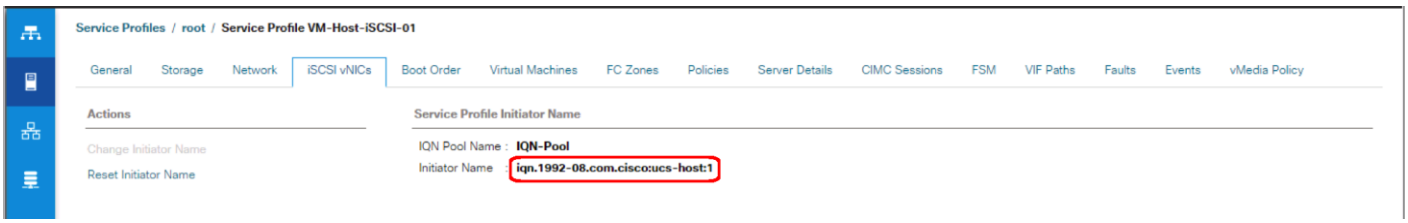
The iSCSI Boot LUNs will need to be setup from the Pure Storage Web Portal, and the VMFS datastores will be directly provisioned from the vSphere Web Client after the Pure Storage vSphere Web Client Plugin has later on been registered with the vCenter.

Figure 5 FlashArray//X Storage Deployment Workflow



Host Port Identification

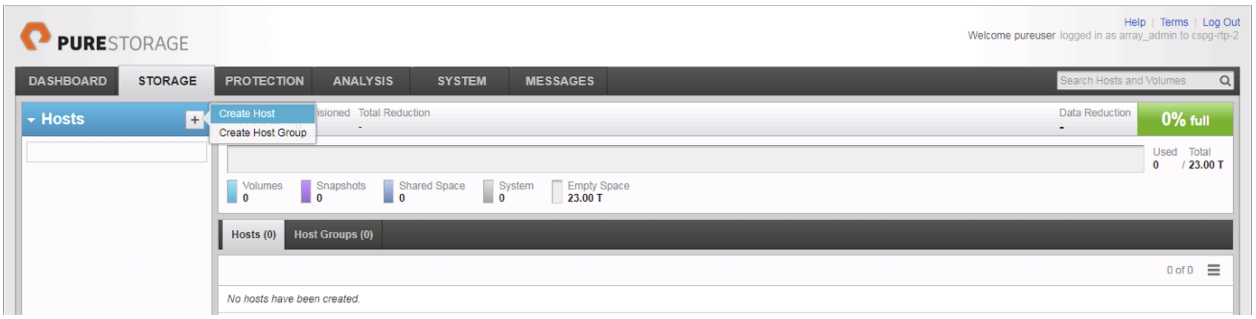
iSCSI Boot LUNs will be mapped by the filer using the assigned Initiator Name to the provisioned service profiles. This information can be found within the service profile located within the iSCSI vNICs tab:



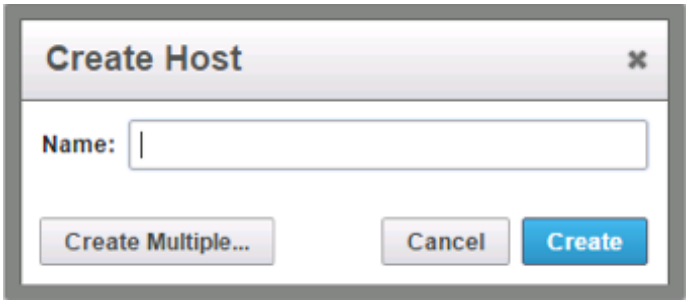
Host Registration

For Host registration, complete the following steps:

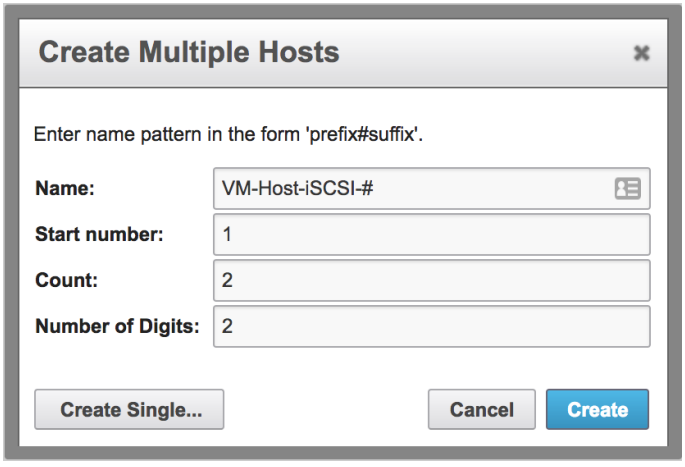
1. Host entries can be made from the Pure Storage Web Portal from the STORAGE tab, by selecting the + box next to Hosts appearing in the left side column.



2. After clicking the Create Host option, a pop-up will appear to create an individual host entry on the FlashArray.

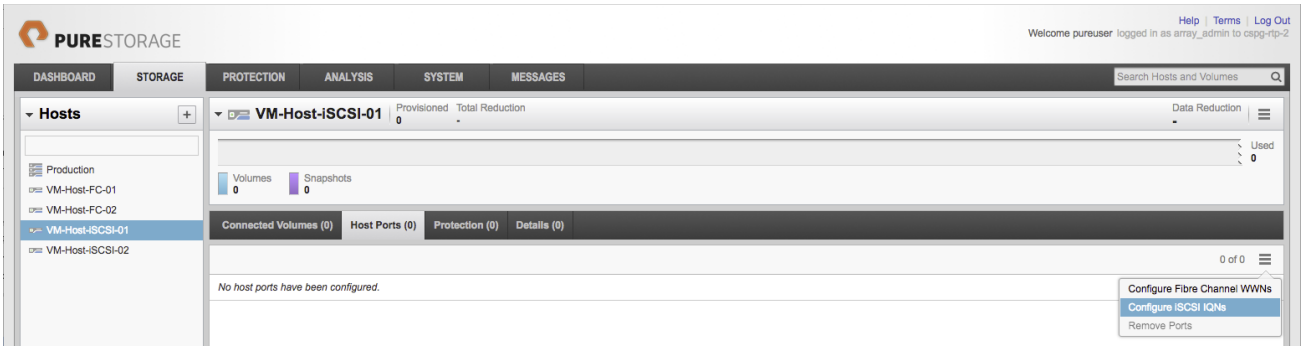


3. To create more than one host entry, click the Create Multiple... option, filling in the Name, Start Number, Count, and Number of Digits, with a “#” appearing in the name where an iterating number will appear:

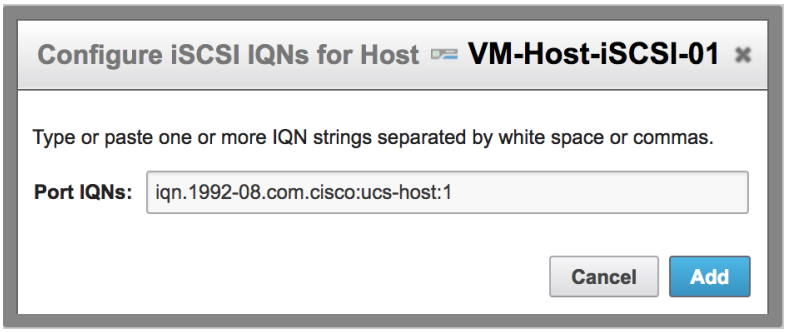


4. Click Create to add the hosts.

5. For each host created, select the host from within the STORAGE tab, and click the Host Ports tab within the individual host view. From the Host Ports tab select the gear icon pull-down and select Configure iSCSI IQNs:



6. A pop-up will appear for Configure iSCSI IQNs for Host <host being configured>. Within this pop-up, enter the IQN Initiator Name found within the service profile for the host being configured:

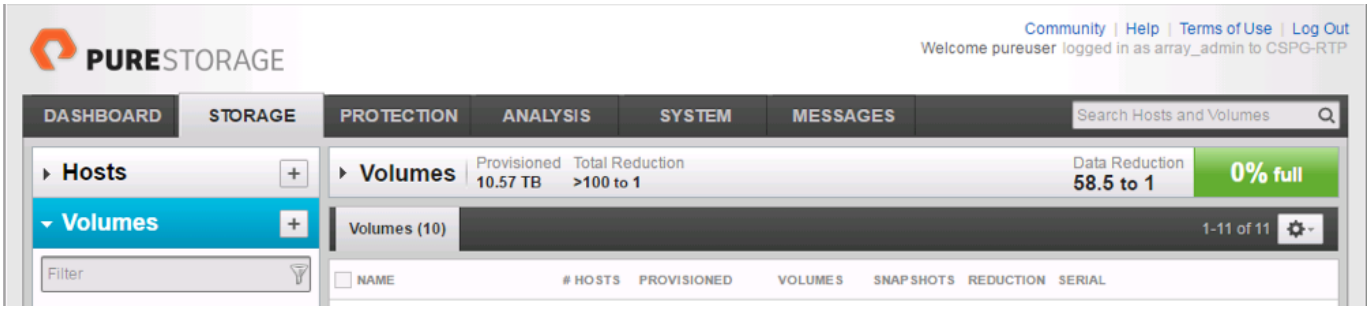


7. After adding the IQN, click Confirm to add the Host Ports. Repeat these steps for each host created.

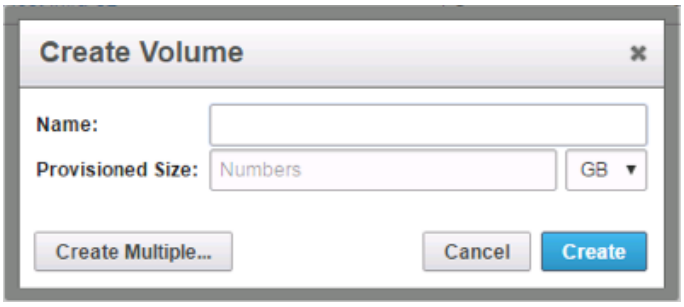
Private Volumes for each ESXi Host

To create private volumes for each ESXi host, complete the following steps:

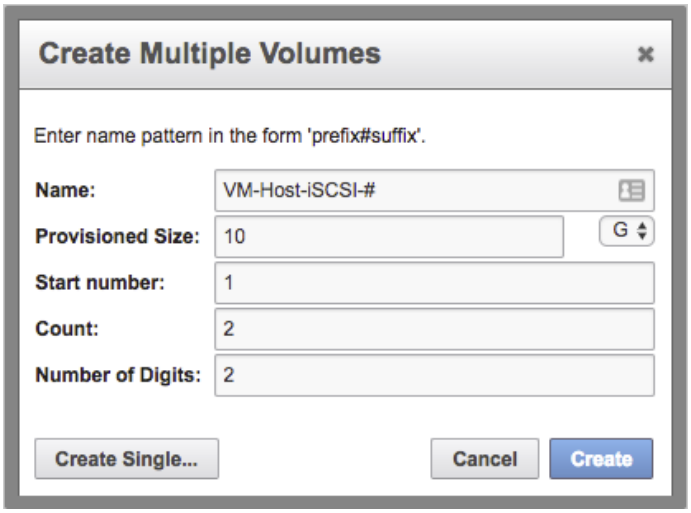
1. Volumes can be provisioned from the Pure Storage Web Portal from the STORAGE tab, by clicking the + box next to Volumes appearing in the left side column.



2. A pop-up will appear to create a volume on the FlashArray.

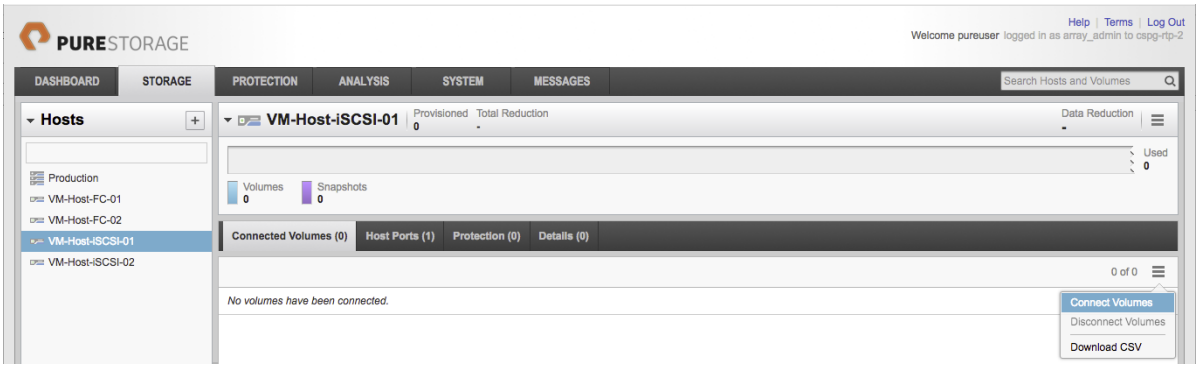


3. To create more than one volume, click the Create Multiple... option, filling in the Name, Provisioned Size, Staring Number, Count, and Number of Digits, with a “#” appearing in the name where an iterating number will appear.

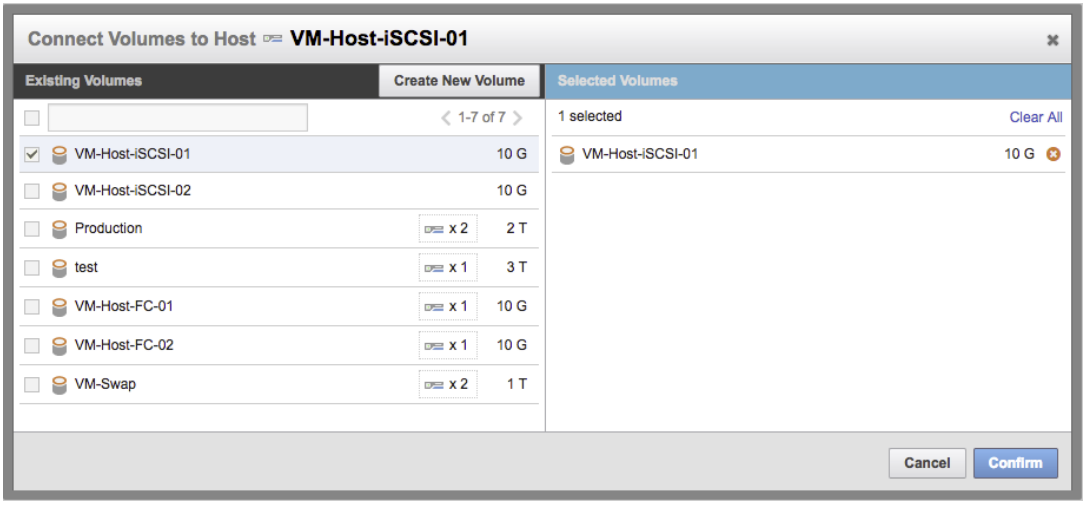


4. Click Create to provision the volumes to be used as iSCSI boot LUNs.

5. Go back to the Hosts section under the STORAGE tab. Click one of the hosts and select the gear icon pull-down within the Connected Volumes tab within that host.



6. Within the drop-down of the gear icon, select Connect Volumes, and a pop-up will appear.



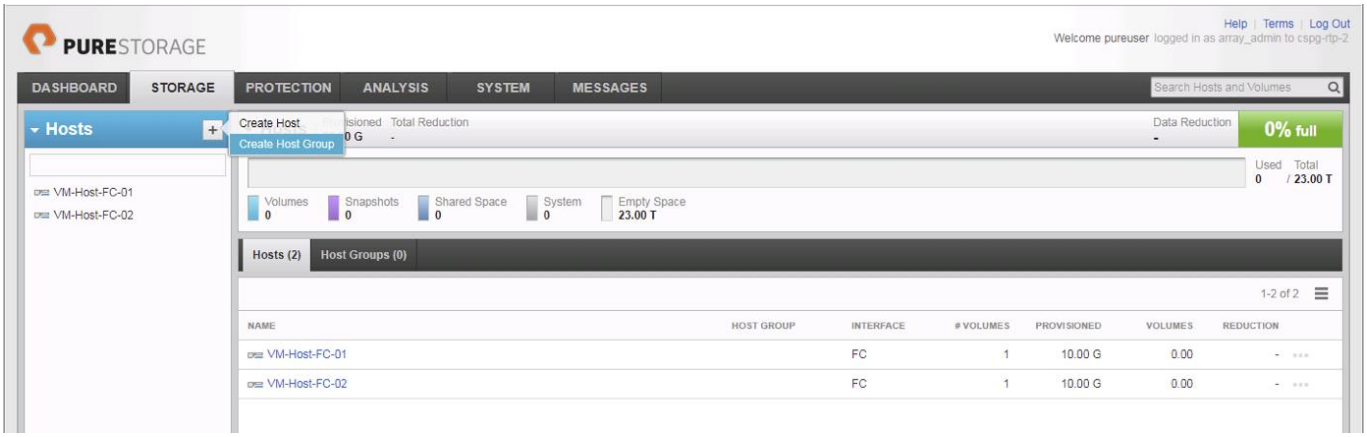
7. Select the volume that has been provisioned for the host, click the + next to the volume and select Confirm to proceed. Repeat the steps for connecting volumes for each of the host/volume pairs configured.

Host Groups

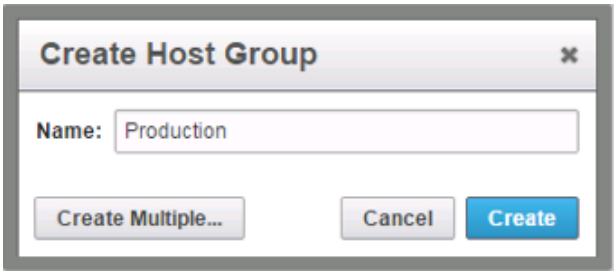
The Host entries allow for the individual boot LUNs to associate to each ESXi host, but the shared volumes to use as VM datastores need Host Groups to have those volumes shared amongst multiple hosts.

To create a Host Group in the Pure Storage Web Portal, complete the following steps:

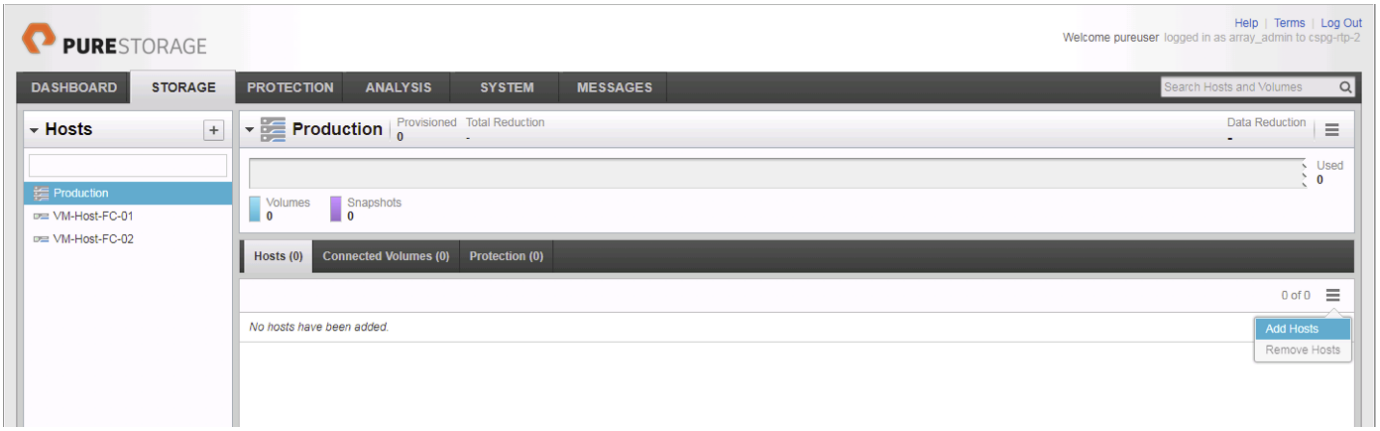
1. Select the STORAGE tab and click the + box next to Hosts appearing in the left side column.



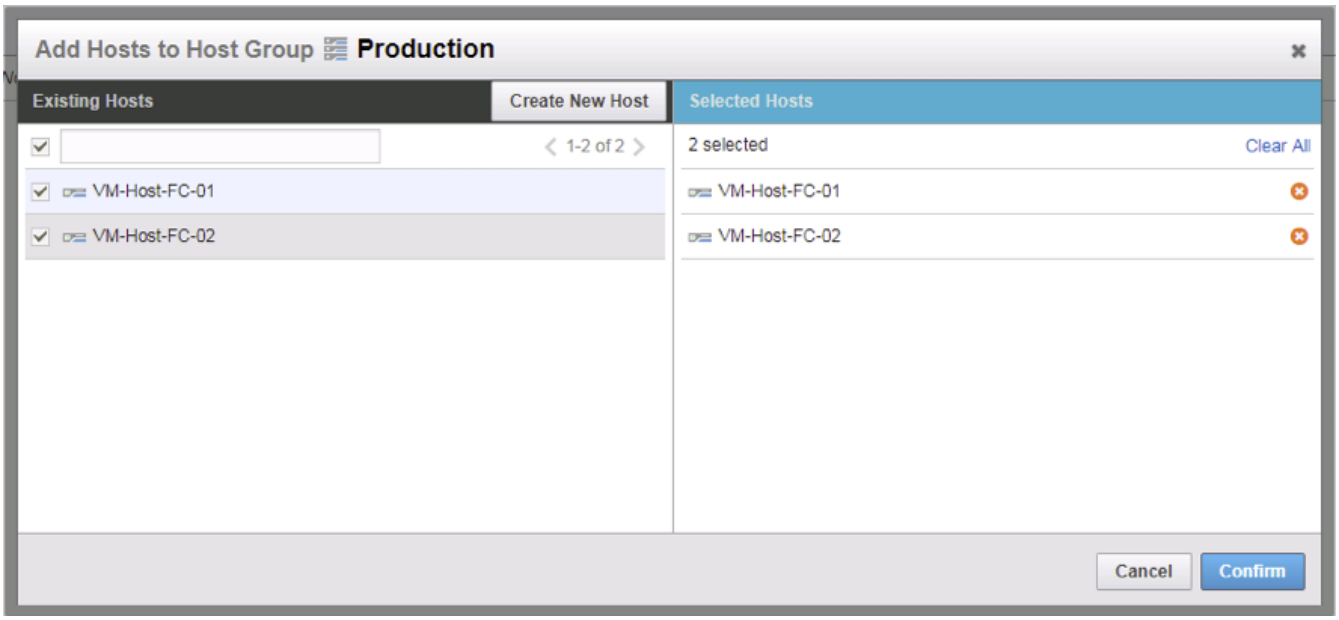
2. Select the Create Host Group option and provide a name for the Host Group to be used by the ESXi cluster:



3. With Hosts still selected within the STORAGE tab, click the gear icon drop-down within the Hosts tab of the Host Group created and select Add Hosts:



4. Select the + icon next to each host and click Confirm to add them to the Host Group:

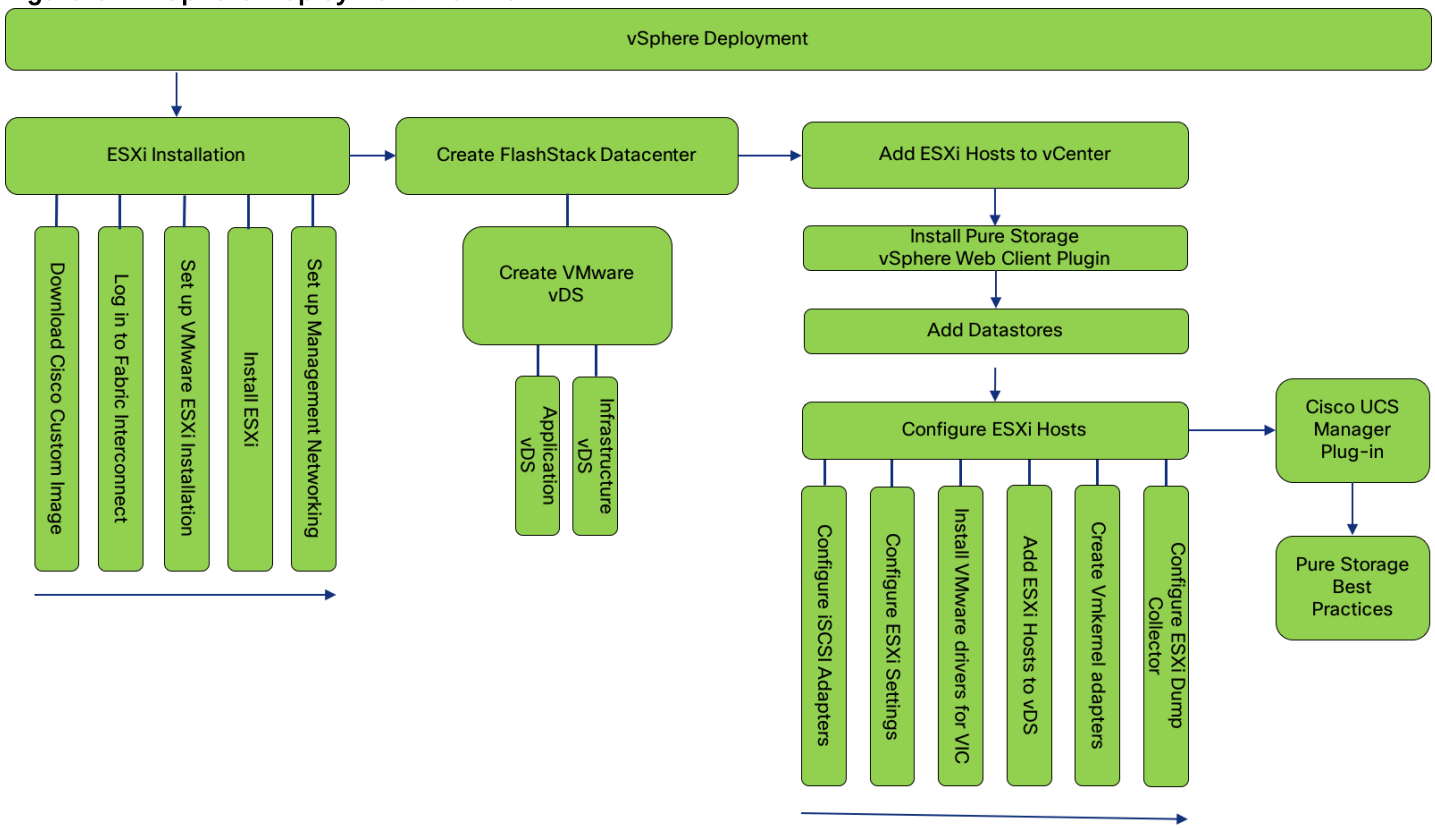


vSphere Deployment

ESXi Installation

This section provides detailed instructions to install VMware ESXi 6.5 U1 in a FlashStack environment. After the procedures are completed, the iSCSI SAN booted ESXi hosts will be configured.

Figure 6 vSphere Deployment Workflow



Several methods exist for installing ESXi in a VMware environment. These procedures focus on how to use the built-in keyboard, video, mouse (KVM) console and virtual media features in Cisco UCS Manager to map remote installation media to individual servers and connect to their boot logical unit numbers (LUNs).

Download Cisco Custom Image for ESXi 6.5 U1

The VMware Cisco Custom Image will be needed for use during installation by manual access to the Cisco UCS KVM vMedia, or through a vMedia Policy covered in a previous subsection. If the Cisco Custom Image was not downloaded during the vMedia Policy setup, download it now by completing the following steps:

1. Click the following link: VMware vSphere Hypervisor Cisco Custom Image (ESXi) 6.5 U1.
2. You will need a user id and password on vmware.com to download this software.
3. Download the .iso file.

Log in to Cisco UCS 6332-16UP Fabric Interconnect

The IP KVM enables the administrator to begin the installation of the operating system (OS) through remote media. It is necessary to log in to the Cisco UCS environment to run the IP KVM.

To log in to the Cisco UCS environment, complete the following steps:

1. Open a web browser to https:// <<var_ucs_mgmt_vip>>
2. Select the Launch UCS Manager Section in the HTML section to pull up the UCSM HTML5 GUI.
3. Enter `admin` for the Username, and provide the password used during setup.
4. Within the UCSM select Servers -> Service Profiles, and pick the first host provisioned as `VM-Host-iSCSI-01`.
5. Click the KVM Console option within Actions, and accept the KVM server certificate in the new window or browser tab that is spawned for the KVM session.
6. Click the link within the new window or browser tab to load the KVM client application.

Set Up VMware ESXi Installation

 Skip this step if you are using vMedia policies. ISO file will already be connected to KVM.

To prepare the server for the OS installation, complete the following steps on each ESXi host:

1. In the KVM window, click Virtual Media icon  in the upper right of the screen.
2. Click Activate Virtual Devices
3. Click Virtual Media again and select Map CD/DVD.
4. Browse to the ESXi installer ISO image file and click Open.
5. Click Map Device.
6. Click the KVM tab to monitor the server boot.
7. Boot the server by selecting Boot Server and clicking OK, then click OK again.

Install ESXi

To install VMware ESXi to the iSCSI bootable LUN of the hosts, complete the following steps on each host:

1. On reboot, the machine detects the presence of the ESXi installation media. Select the ESXi installer from the boot menu that is displayed.
2. After the installer is finished loading, press Enter to continue with the installation.

3. Read and accept the end-user license agreement (EULA). Press F11 to accept and continue.
4. Select the LUN that was previously set up as the installation disk for ESXi and press Enter to continue with the installation.
5. Select the appropriate keyboard layout and press Enter.
6. Enter and confirm the root password and press Enter.
7. The installer issues a warning that the selected disk will be repartitioned. Press F11 to continue with the installation.
8. After the installation is complete, if using locally mapped Virtual Media, click the Virtual Media tab and clear the ✓ mark next to the ESXi installation media. Click Yes.

The ESXi installation image must be unmapped to make sure that the server reboots into ESXi and not into the installer. If using a vMedia Policy, this will be unnecessary as the vMedia will appear after the installed OS.

9. From the KVM window, press Enter to reboot the server.

Set Up Management Networking for ESXi Hosts

Adding a management network for each VMware host is necessary for managing the host. To add a management network for the VMware hosts, complete the following steps on each ESXi host:

To configure the ESXi host with access to the management network, complete the following steps:

1. After the server has finished rebooting, press F2 to customize the system.
2. Log in as `root`, enter the corresponding password, and press Enter to log in.
3. Select the Configure the Management Network option and press Enter.
4. Select Network Adapters option leave vmnic0 selected, arrow down to vmnic1 and press space to select vmnic1 as well and press Enter.
5. Select the VLAN (Optional) option and press Enter.
6. Enter the `<<var_ib_mgmt_vlan_id>>` and press Enter.
7. From the Configure Management Network menu, select IPv4 Configuration and press Enter.
8. Select the Set Static IP Address and Network Configuration option by using the space bar.
9. Enter `<<var_vm_host_iscsi_01_ip>>` for the IPv4 Address for managing the first ESXi host.
10. Enter `<<var_ib_mgmt_vlan_netmask_length>>` for the Subnet Mask for the first ESXi host.
11. Enter `<<var_ib_mgmt_gateway>>` for the Default Gateway for the first ESXi host.

12. Press Enter to accept the changes to the IPv4 configuration.
13. Select the DNS Configuration option and press Enter.

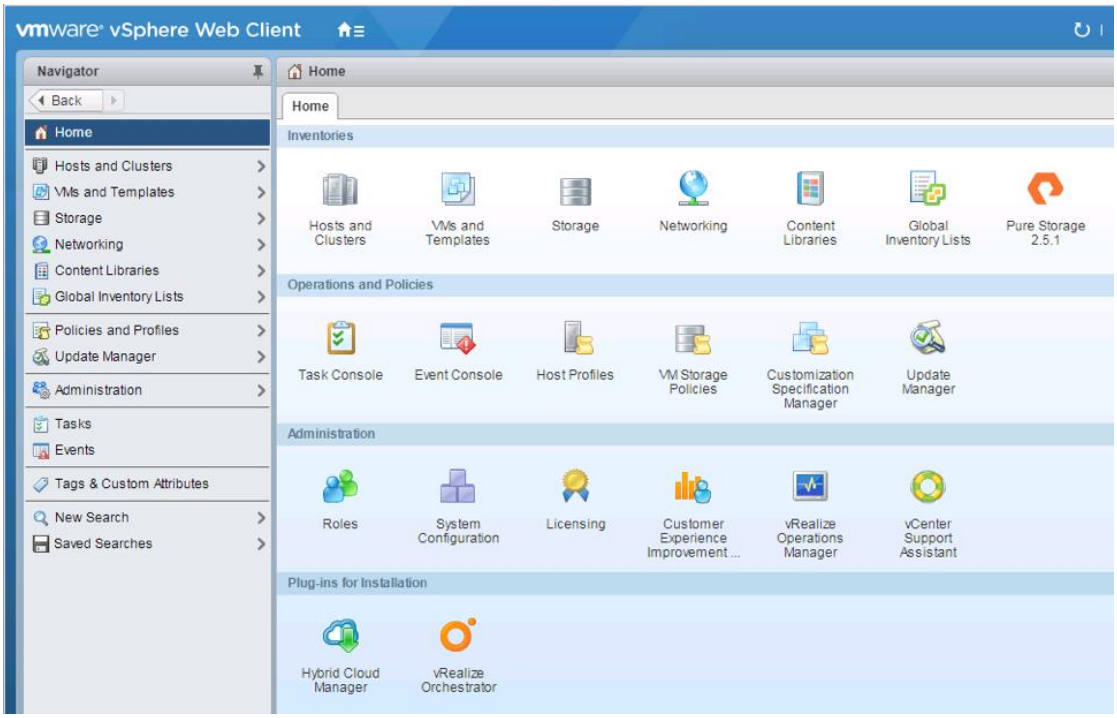
Because the IP address is assigned manually, the DNS information must also be entered manually.

14. Enter the IP address of <<var_nameserver_ip>> for the Primary DNS Server.
15. Optional: Enter the IP address of the Secondary DNS Server.
16. Enter the fully qualified domain name (FQDN) for the first ESXi host.
17. Press Enter to accept the changes to the DNS configuration.
18. Select the IPv6 Configuration option and press Enter.
19. Using the spacebar, select Disable IPv6 (restart required) and press Enter.
20. Press Esc to exit the Configure Management Network submenu.
21. Press Y to confirm the changes and return to the main menu.
22. The ESXi host reboots. After reboot, press F2 and log back in as root.
23. Select Test Management Network to verify that the management network is set up correctly and press Enter.
24. Press Enter to run the test.
25. Press Enter to exit the window, and press Esc to log out of the VMware console.
26. Repeat steps 1-47 for additional hosts provisioned, using appropriate values.

Create FlashStack Datacenter

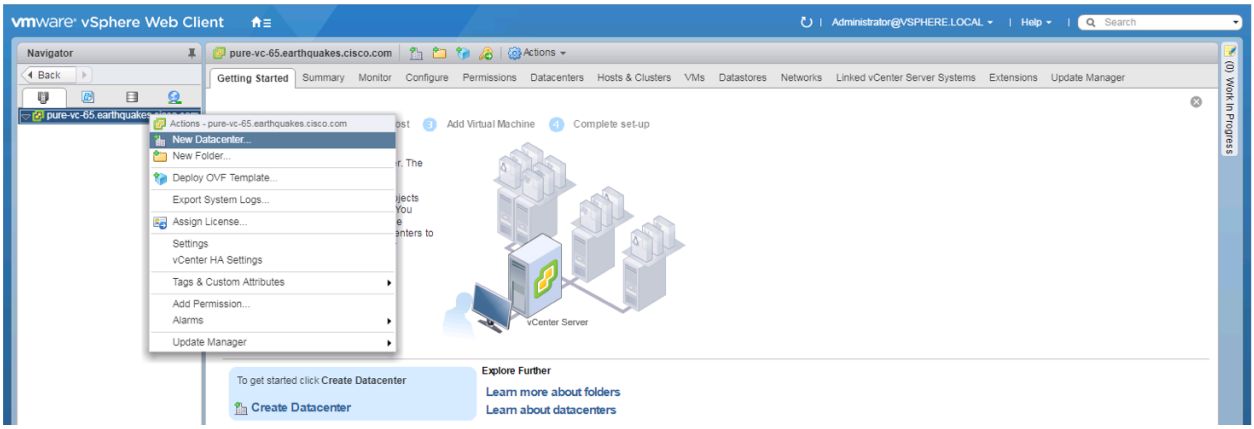
If a new Datacenter is needed for the FlashStack, complete the following steps on the vCenter:

1. Connect to the vSphere Web Client and click Hosts and Clusters from the left side Navigator window or the Hosts and Clusters icon from the Home center window.

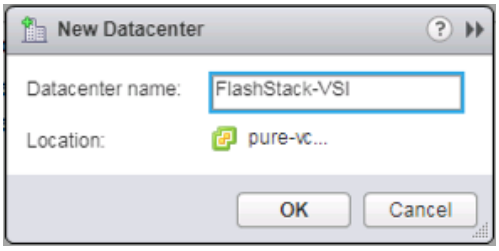


2. From Hosts and Clusters:

   a. Right-click the vCenter icon, and select New Datacenter... from the drop-down options.



   b. From the New Datacenter pop-up dialogue enter in a Datacenter name and click OK.



Create VMware vDS for Infrastructure and Application Traffic

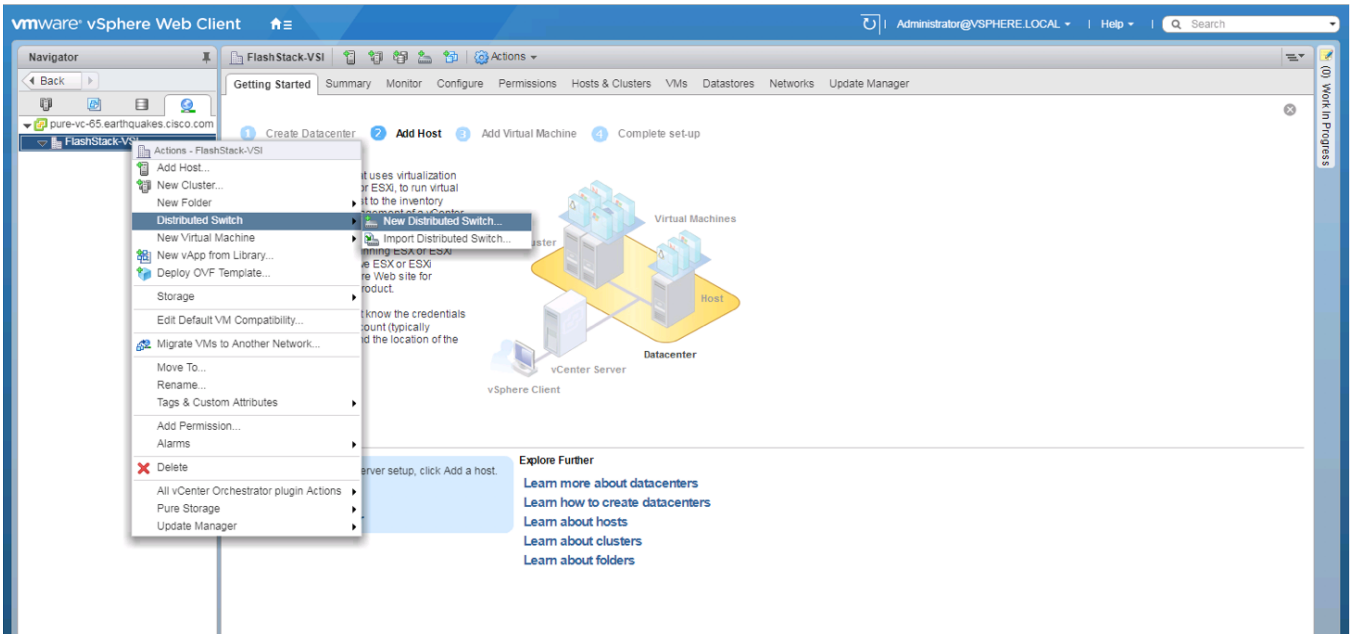
The VMware vDS setup will consist of two vDS that are separated for Infrastructure use versus Application traffic.

FlashStack Infrastructure vDS

To configure the first VMware vDS, complete the following steps:

1. Connect to the vSphere Web Client and click Networking from the left side Navigator window or the Networking icon from the Home center window.

2. Right-click the FlashStack-VSI datacenter and select Distributed Switch > New Distributed Switch...

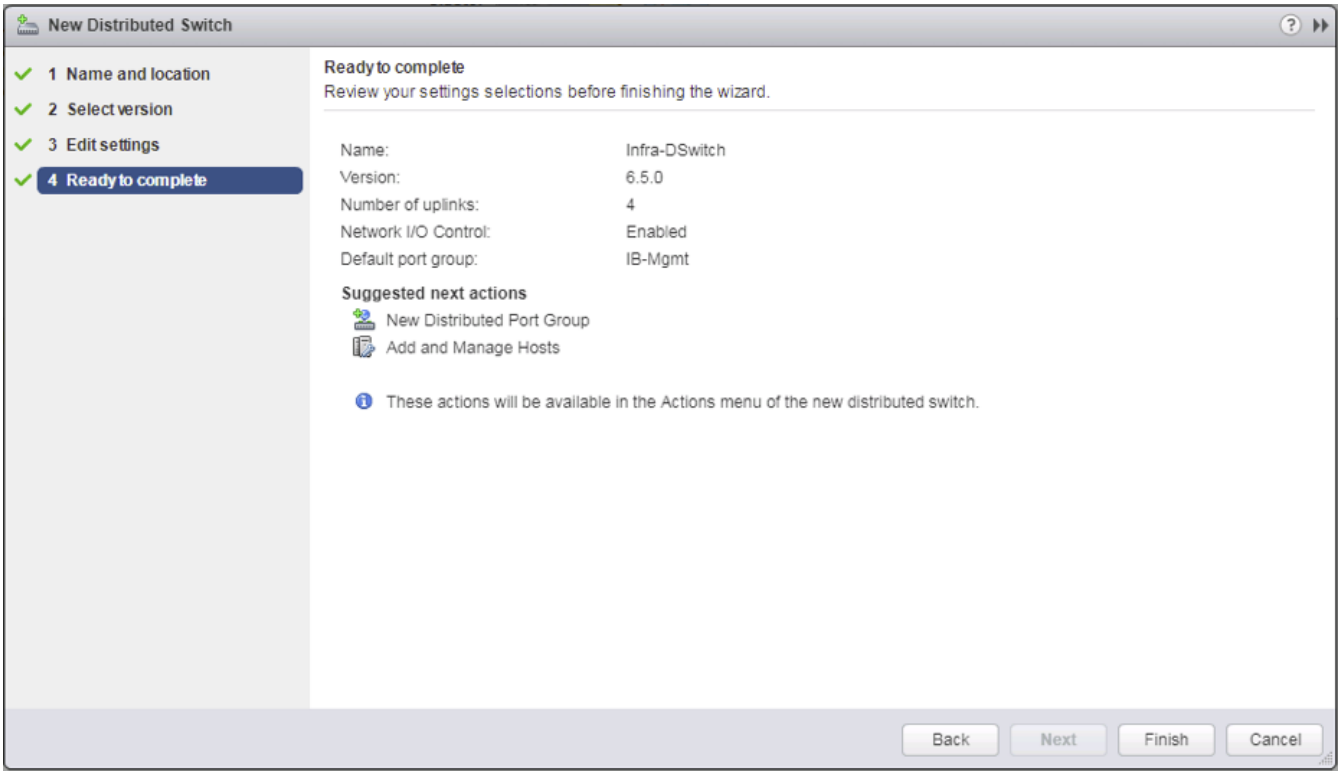


3. Give the Distributed Switch a descriptive name and click Next.

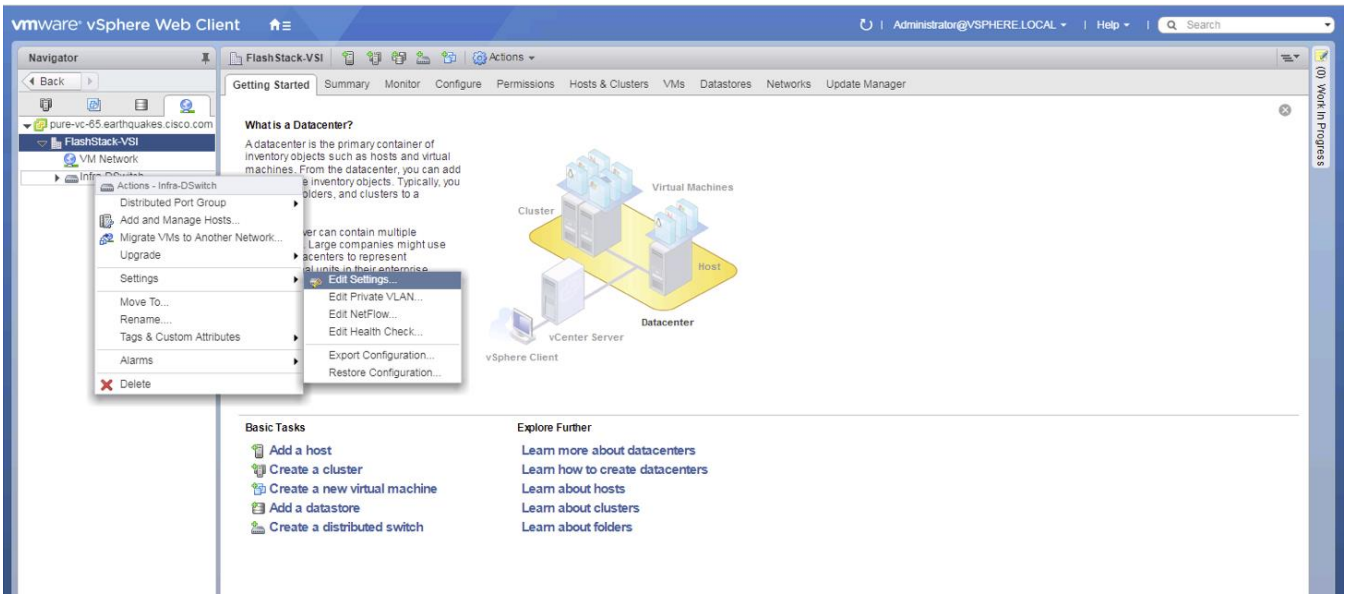
4. Make sure Distributed switch: 6.5.0 is selected and click Next.

5. Leave the Number of uplinks at 4. If VMware Network I/O Control is to be used for Quality of Service, leave Network I/O Control Enabled. Otherwise, Disable Network I/O Control. Enter IB-Mgmt for the name of the default Port group to be created. Click Next.

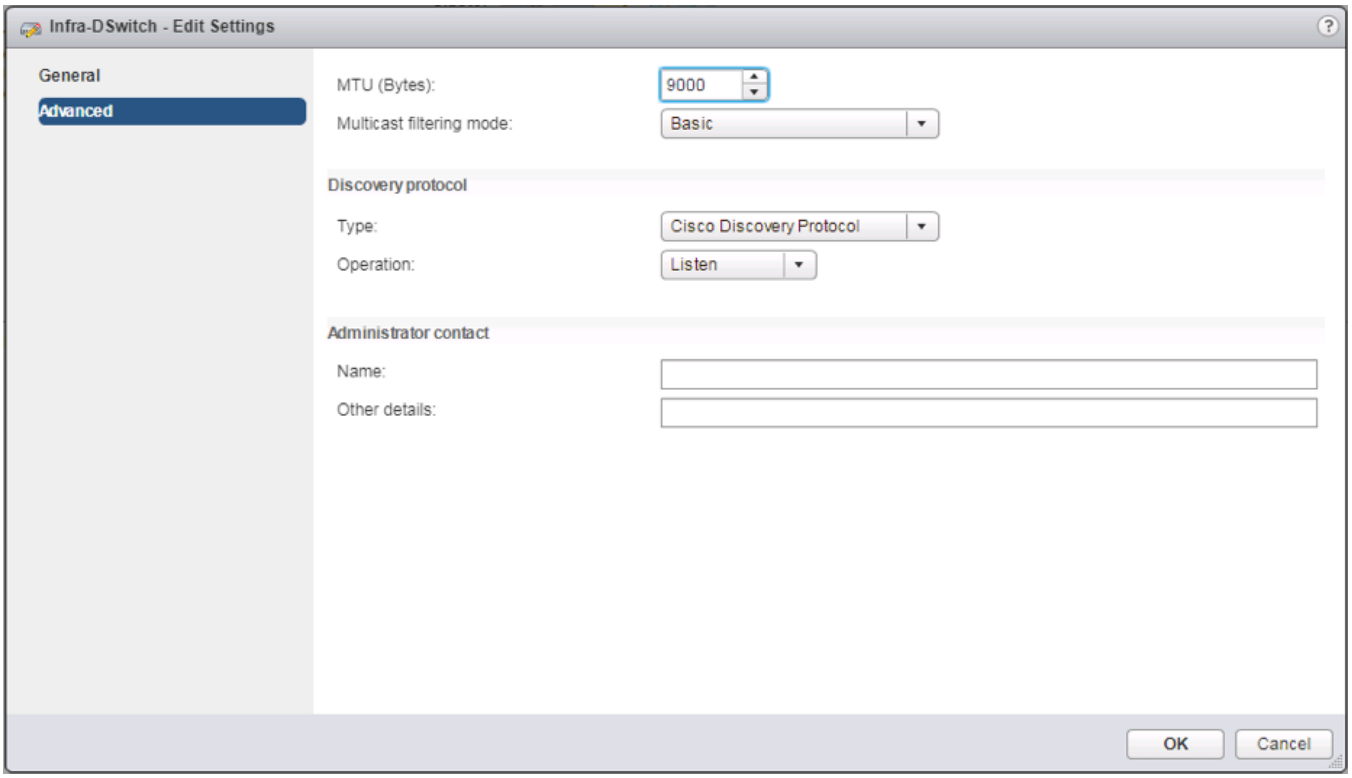
6. Review the information and click Finish to complete creating the vDS.



7. Right-click the newly created vDS on the left, and select Settings -> Edit Settings...



8. Click the Advanced option on the left side of the Edit Settings window and adjust the MTU from 1500 to 9000.



9. Click OK to save the changes.

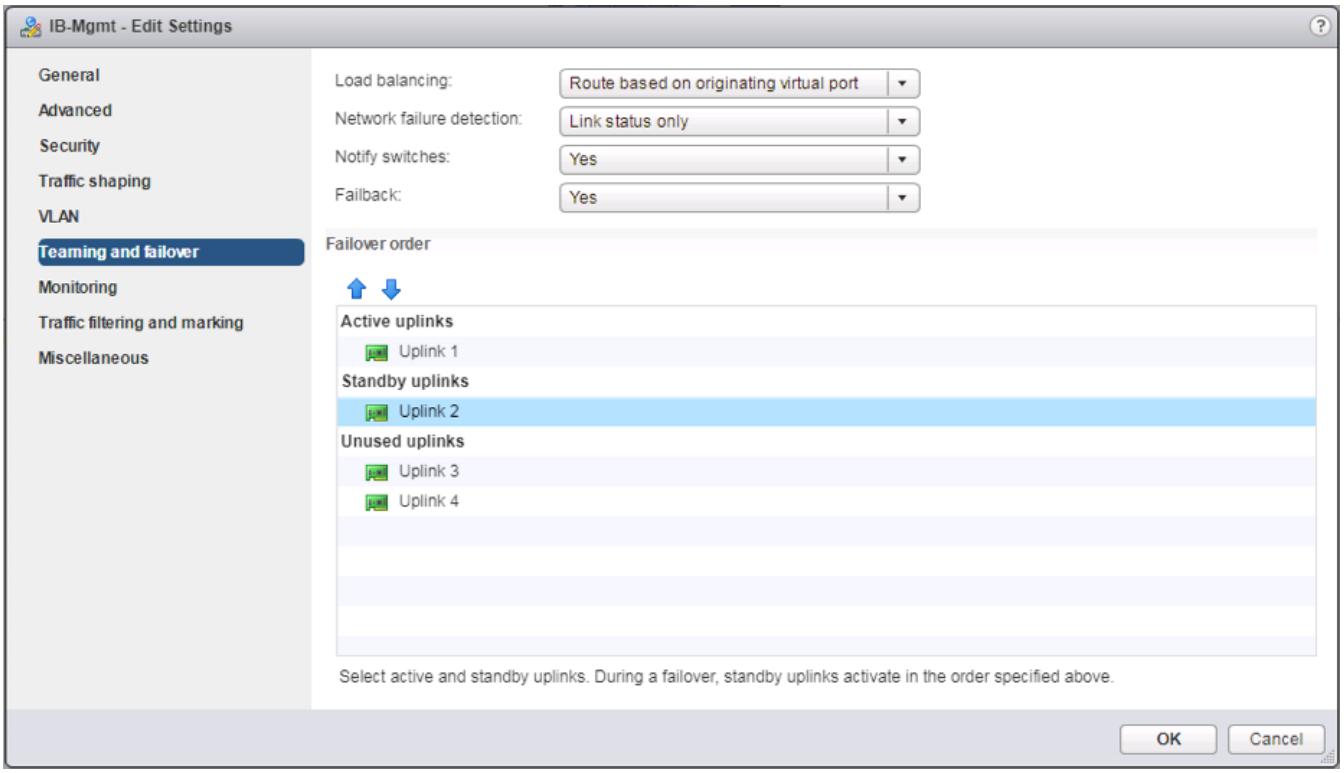
10. On the left, expand the FlashStack VSI datacenter and the newly created vDS.

11. Right-click the IB-Mgmt Distributed Port Group, and select Edit Settings...

12. Click VLAN, changing VLAN type from None to VLAN, and enter in the appropriate VLAN number for the IB-Mgmt network.

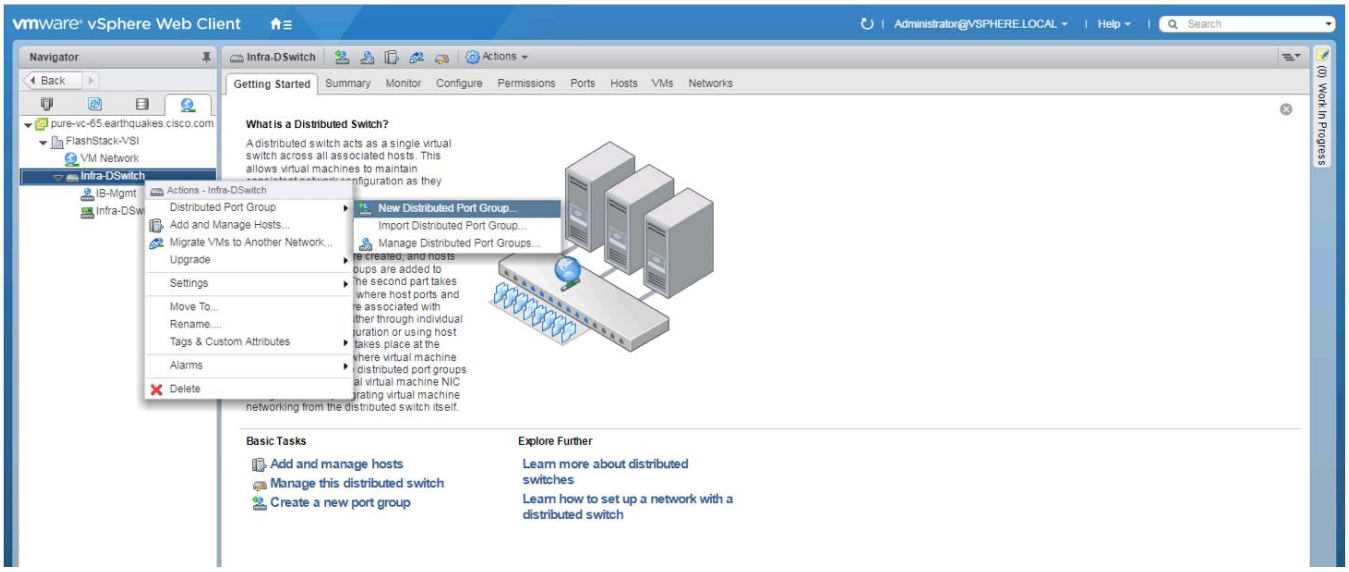
13. Click the Teaming and Failover and move the Uplinks 3 and 4 to the Unused uplinks state, and move the Uplink 2 to the Standby uplinks state.

The movement of Uplink 2 to standby is guiding Management traffic to stay within the A side fabric contained within Uplink 1 to prevent unnecessary traffic hops up into the Nexus switch to traverse between fabrics. Uplinks 3 and 4 are set as unused as these are the vMotion vNICs and will be used by the other Distributed Port Group in this vDS.



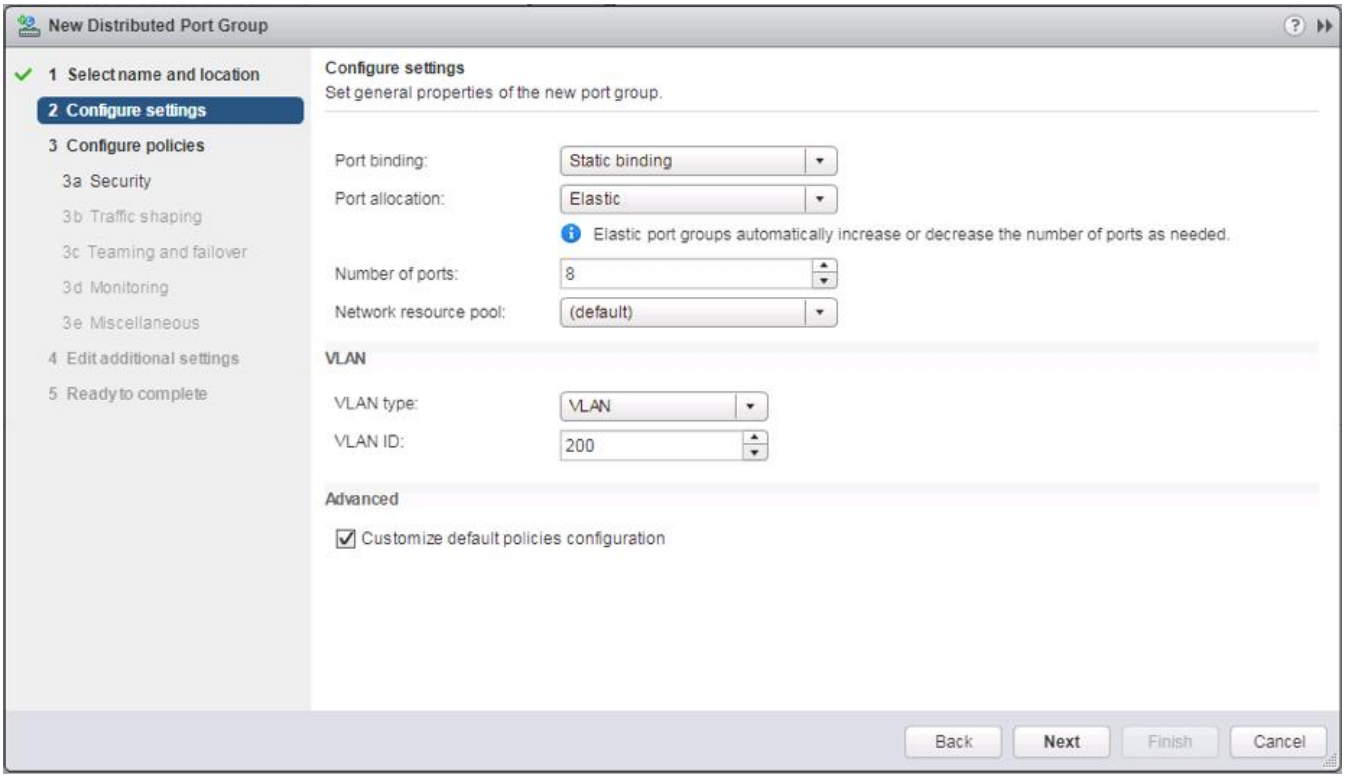
14. Click OK to save the changes.

15. Right-click the infrastructure vDS (Infra-DSwitch), and select Distributed Port Group -> New Distributed Port Group...



16. Name the new Port Group vMotion and click Next.

17. Change the VLAN type from None to VLAN, select the VLAN ID appropriate for your vMotion traffic, and select the Customize default policies configuration check box under the Advanced section.

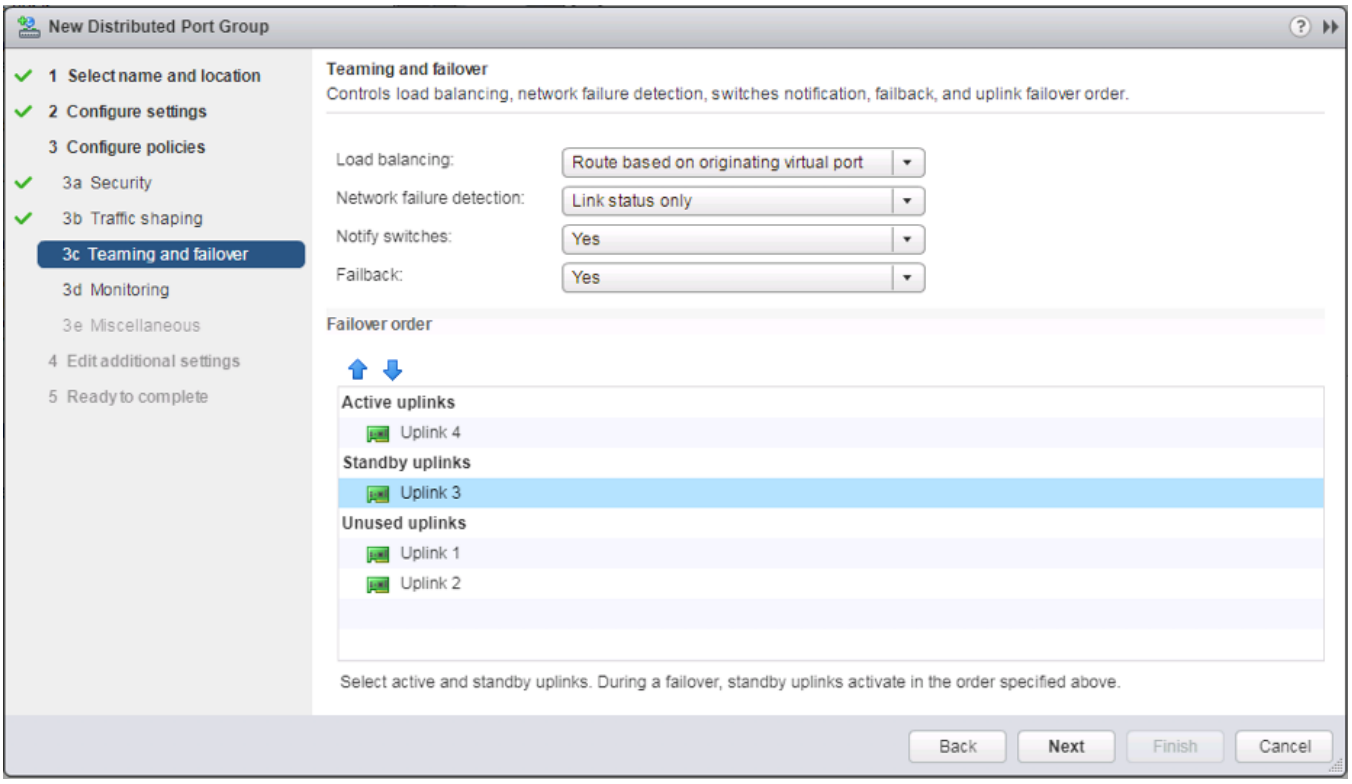


18. Click Next.

19. Click Next through the Security and Traffic Shaping sections.

20. Within the Teaming and failover section, move Uplinks 1 & 2 to the Unused uplinks section, and move Uplink 3 to the Standby uplinks section.

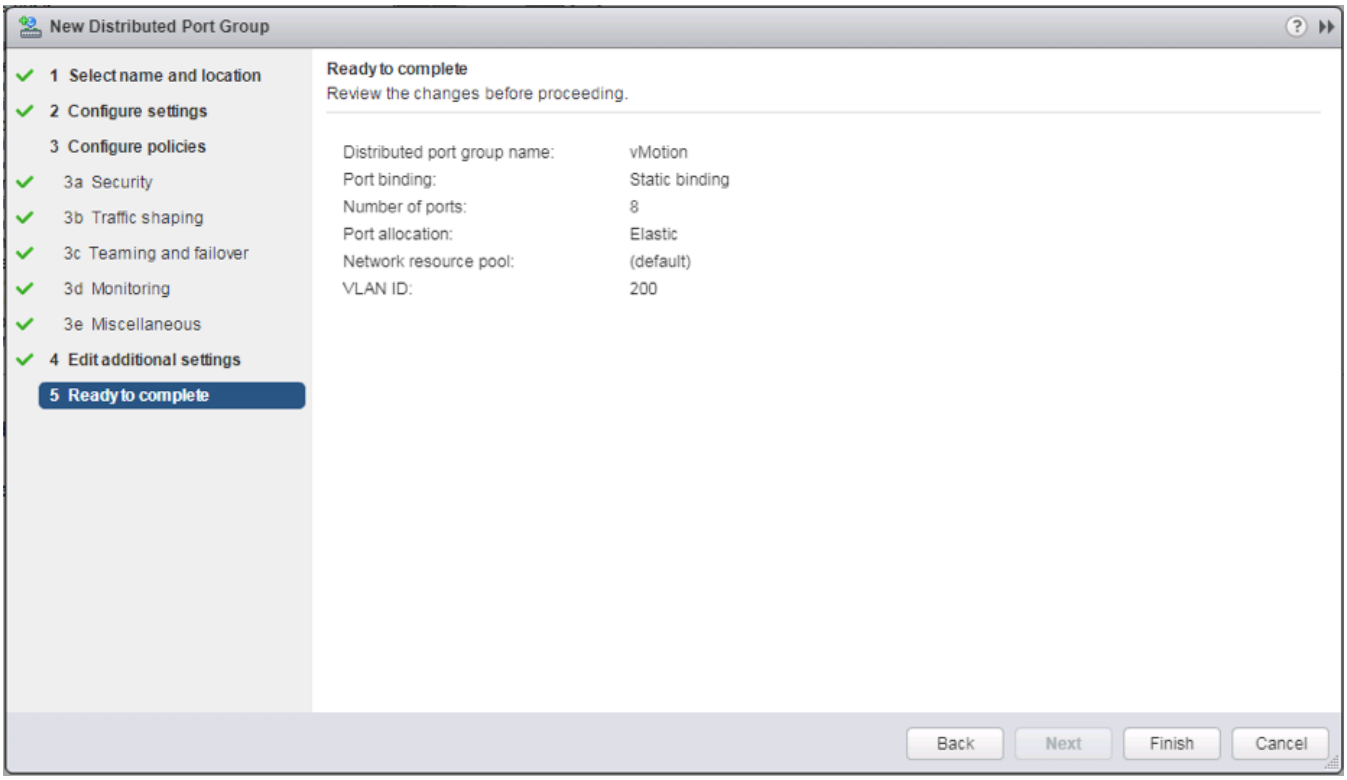
Teaming for the vMotion Distributed Port Group will be a mirror of teaming on the Infrastructure Distributed Port group. Uplinks 1 and 2 are unused because they are used by the Infrastructure Distributed Port group, and Uplink 3 will be moved to standby to guide vMotion traffic to stay within the B side fabric contained within Uplink 4.



21. Click Next.

22. Click Next past Monitoring, Miscellaneous, and Edit additional settings sections.

23. Review the Ready to complete section.



24. Click Finish to create the Distributed Port Group.

FlashStack Application vDS

To configure the second VMware vDS, complete the following steps:

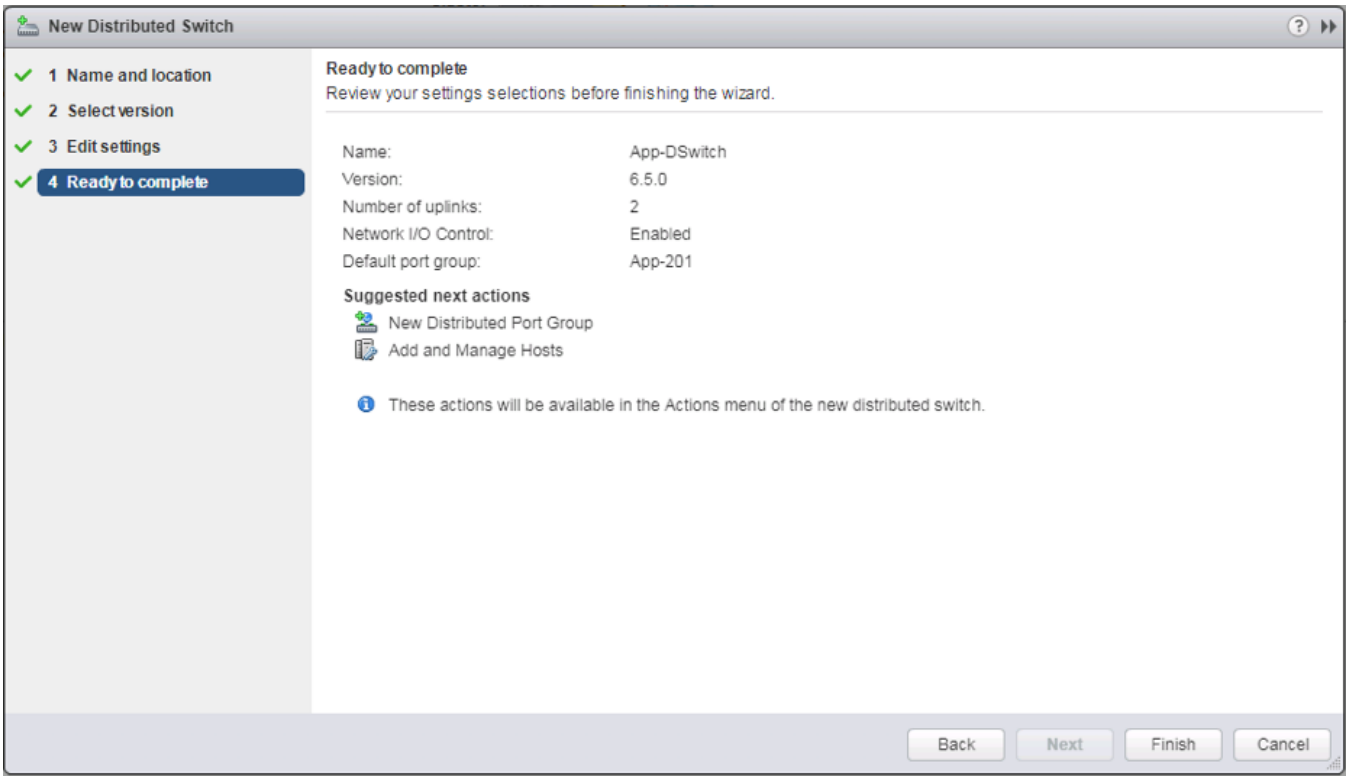
1. Right-click the FlashStack-VSI Datacenter and select Distributed Switch -> New Distributed Switch... to create the Application vDS.

2. Provide a name for the vDS (App-DSwitch), and click Next.

3. Make sure Distributed switch: 6.5.0 is selected and click Next.

4. Change the Number of uplinks to 2. If VMware Network I/O Control is to be used for Quality of Service, leave Network I/O Control Enabled. Otherwise, Disable Network I/O Control. Enter App-201 for the name of the default Port group to be created. Click Next.

5. Review the information and click Finish to complete creating the vDS.



6. Right-click the newly created App-DSwitch vDS, and select Settings -> Edit Settings...
7. Click the Advanced option for the Edit Settings window and change the MTU from 1500 to 9000.
8. Click OK to save the changes.
9. Right-click the App-201 Distributed Port Group, and select Edit Settings...
10. Click VLAN, changing VLAN type from None to VLAN, and enter in the appropriate VLAN number for the first application network.

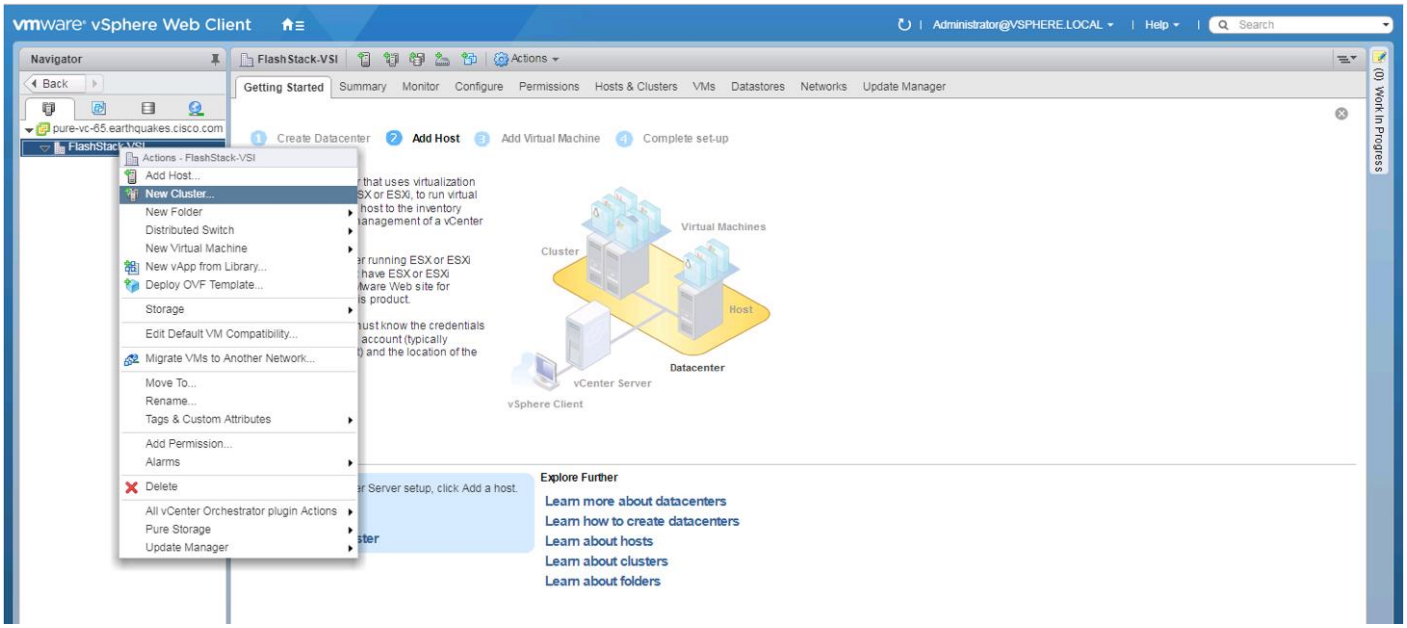
The application Distributed Port Groups will not need to adjust their NIC Teaming as they will be Active/Active within the two vNICs uplinks associated to the App-DSwitch, using the default VMware Route based on originating virtual port load balancing algorithm.

11. Click OK to save the changes.
12. Right-Click the App-DSwitch, selecting Distributed Port Group -> New Distributed Port Group... for any additional application networks to be created, setting the appropriate VLAN for each new Distributed Port Group.

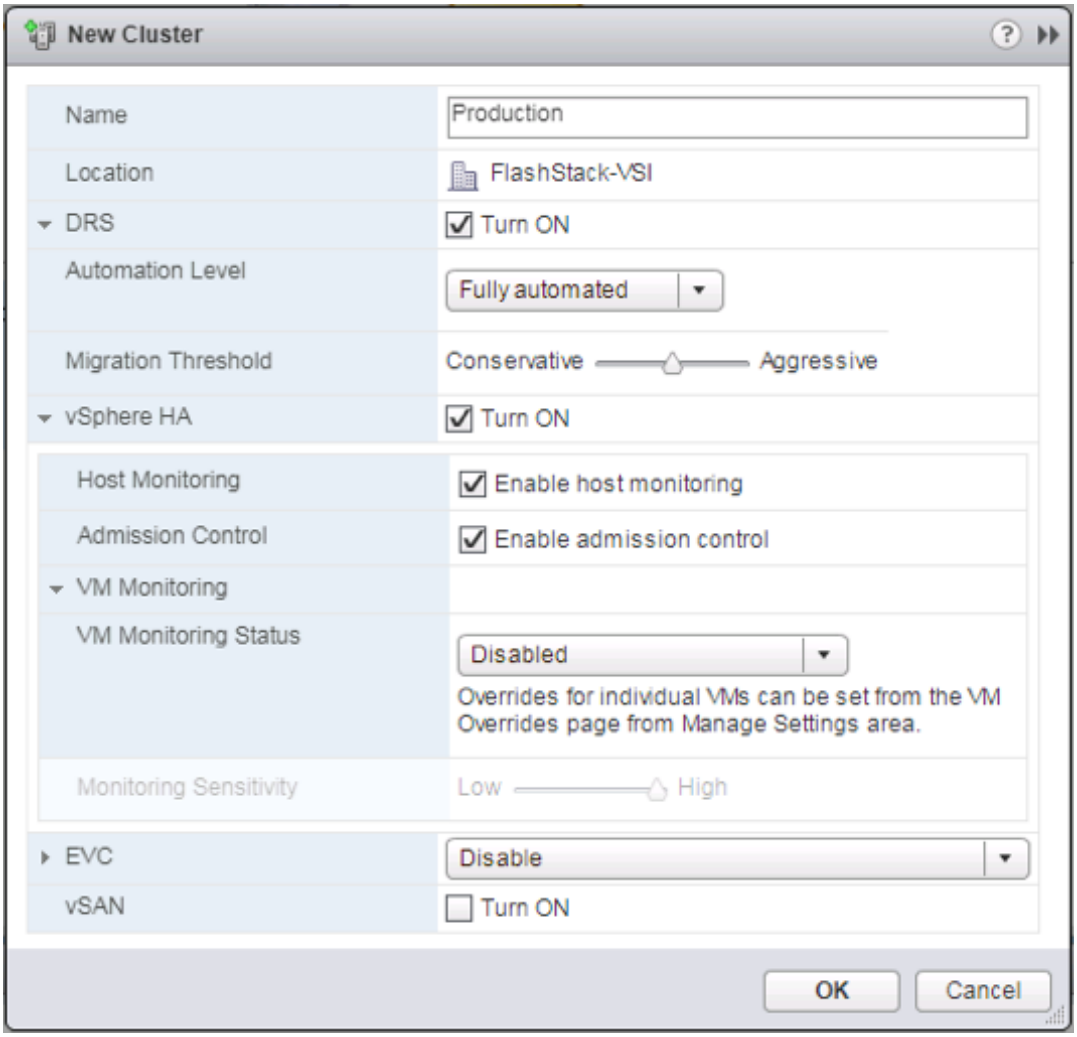
Add the VMware ESXi Hosts Using the VMware vSphere Web Client

To add the VMware ESXi Hosts using the VMware vSphere Web Client, complete the following steps:

1. From the Hosts and Clusters tab, right-click the new or existing Datacenter within the Navigation window, and select **New Cluster...** from the drop-down options.

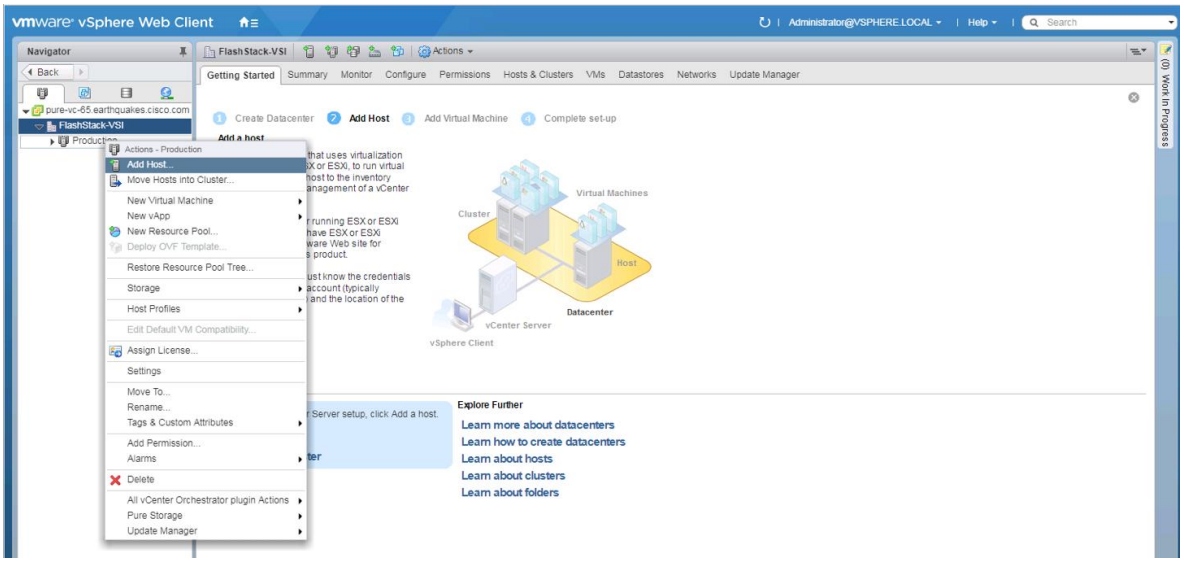


2. Enter a name for the new cluster, select the DRS and HA checkmark boxes, leaving all other options with defaults.

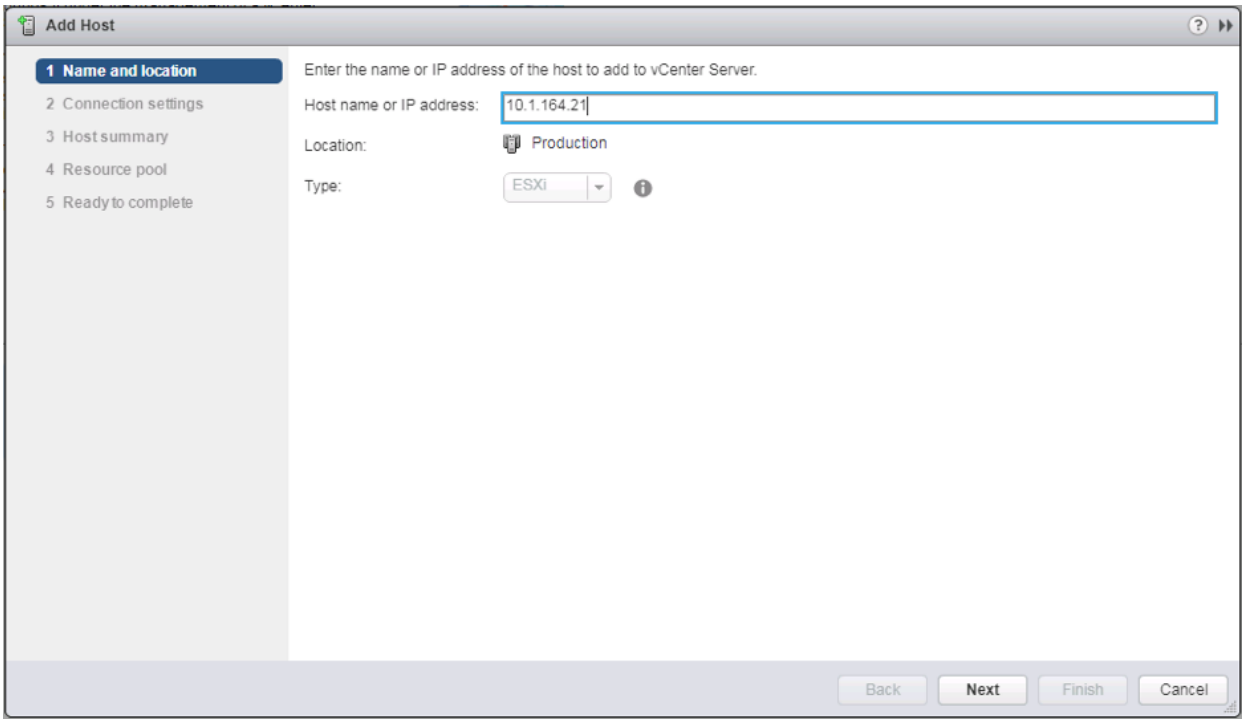


3. Click OK to create the cluster.

4. Right-click the newly created cluster and select the **Add Host...** drop-down option.



5. Enter the IP or FQDN of the first ESXi host and click Next.



6. Enter `root` for the User Name, provide the password set during initial setup and click Next.

7. Click Yes in the Security Alert pop-up to confirm the host's certificate.

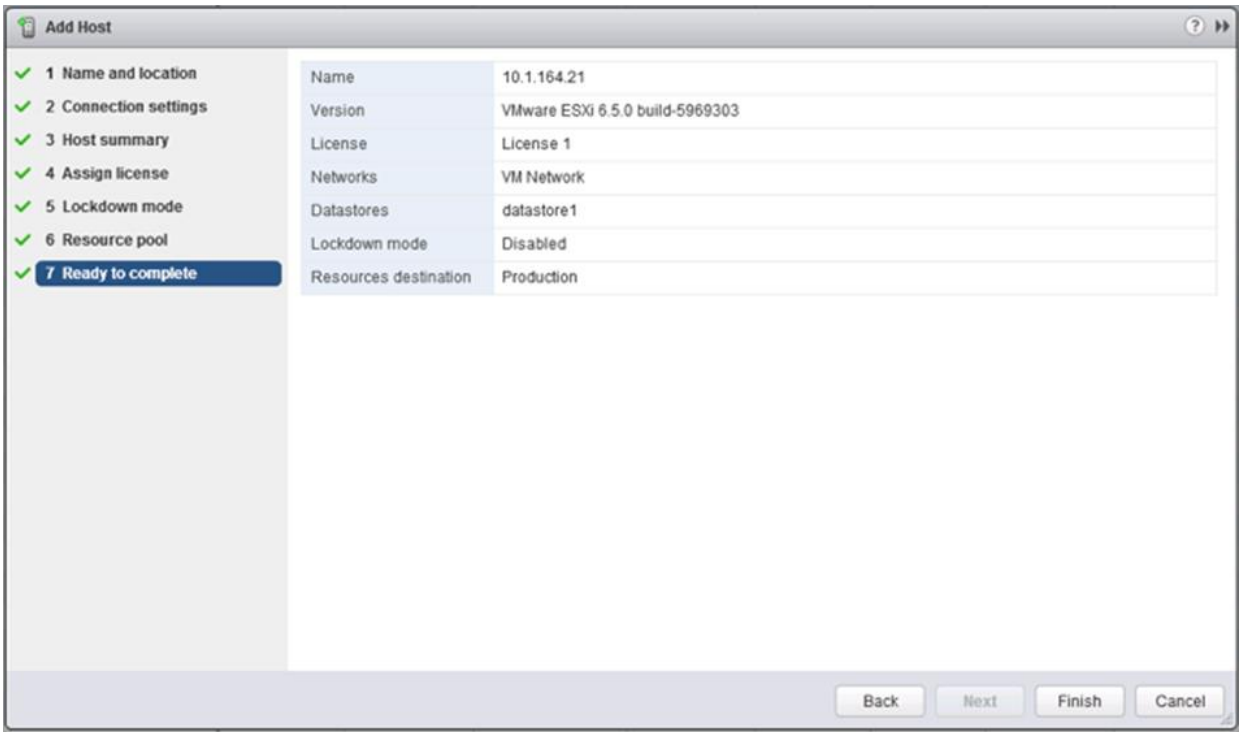
8. Click Next past the Host summary dialogue.

9. Provide a license by clicking the green + icon under the License title, select an existing license, or skip past the Assign license dialogue by clicking Next.

10. Leave lockdown mode Disabled within the Lockdown mode dialogue window and click Next.

11. Skip past the Resource pool dialogue by clicking Next.

12. Confirm the Summary dialogue and add the ESXi host to the cluster by clicking Next.



13. Repeat these steps for each ESXi host to be added to the cluster.

Pure Storage vSphere Web Client Plugin

The Pure Storage vSphere Web Client Plugin will be accessible through the vSphere Web Client after registration through the Pure Storage Web Portal.

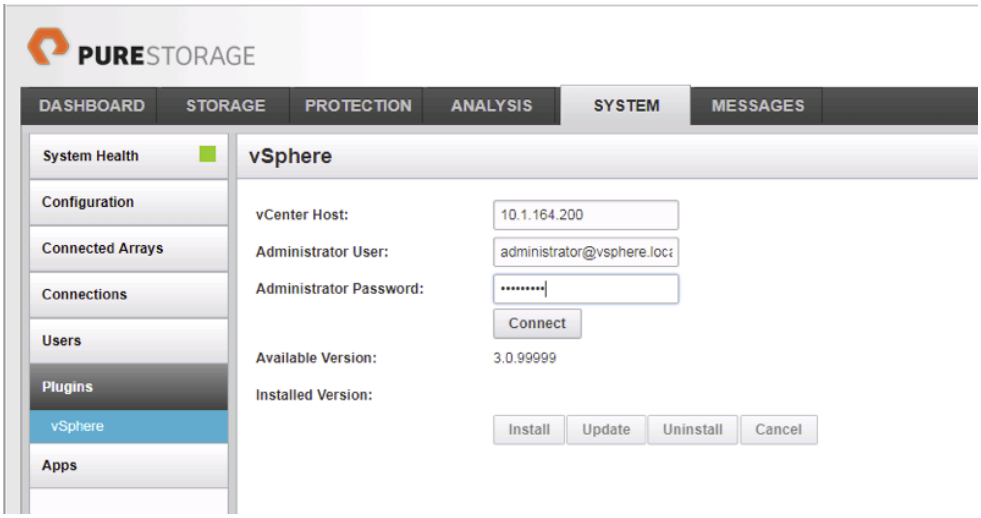
The Purity 4.10.5 release comes with the 2.5.1 version of the plugin, which will work, but will not allow provisioning of VMFS-6 datastores. The example below shows an early release of the 3.0 plugin, which can be installed to the FlashArray by submitting a support request with Pure Support asking for the plugin upgrade. This is not a requirement, but in the absence of the upgraded plugin, LUNs would need to be manually provisioned through the Purity Web Console, and VMFS-6 datastore would be created from the LUNs within vCenter.

The vCenter server for this environment should be in place on an independent management cluster that is accessible to the In-Band management network the ESXi hosts will be deployed to.

If a new dedicated vCenter server is required for your environment, please follow the instructions from VMware found at: https://docs.vmware.com/en/VMware-vSphere/6.5/vsphere-esxi-vcenter-server-65-installation-setup-guide.pdf.

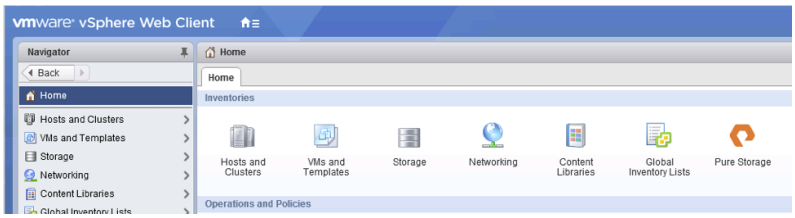
To access the Pure Storage vSphere Web Client Plugin, complete the following steps:

1. Go to System -> Plugins -> vSphere:

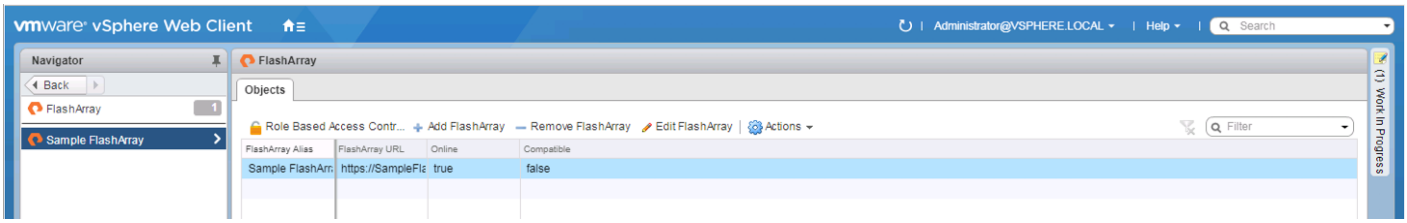


2. Enter the vCenter Host IP or FQDN, the Administrator User to connect with, the password for the Administrator User, and click Connect. Once connected, select the Install button to register the plugin.

3. With the plugin registered, connect to the vSphere Web Client and select the Pure Storage Plugin from the Home page:

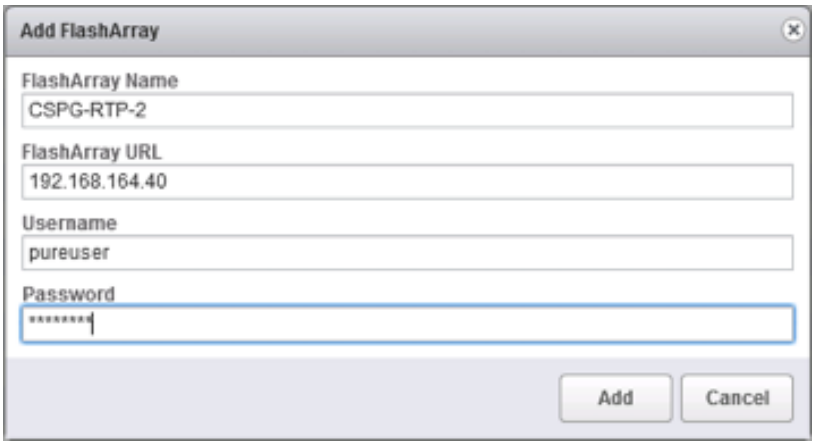


4. Click Add FlashArray within the options under the Object tab.



The Sample FlashArray entry can optionally be removed.

5. Enter the FlashArray Name, FlashArray URL, Username and Password in the Add FlashArray pop-up window.



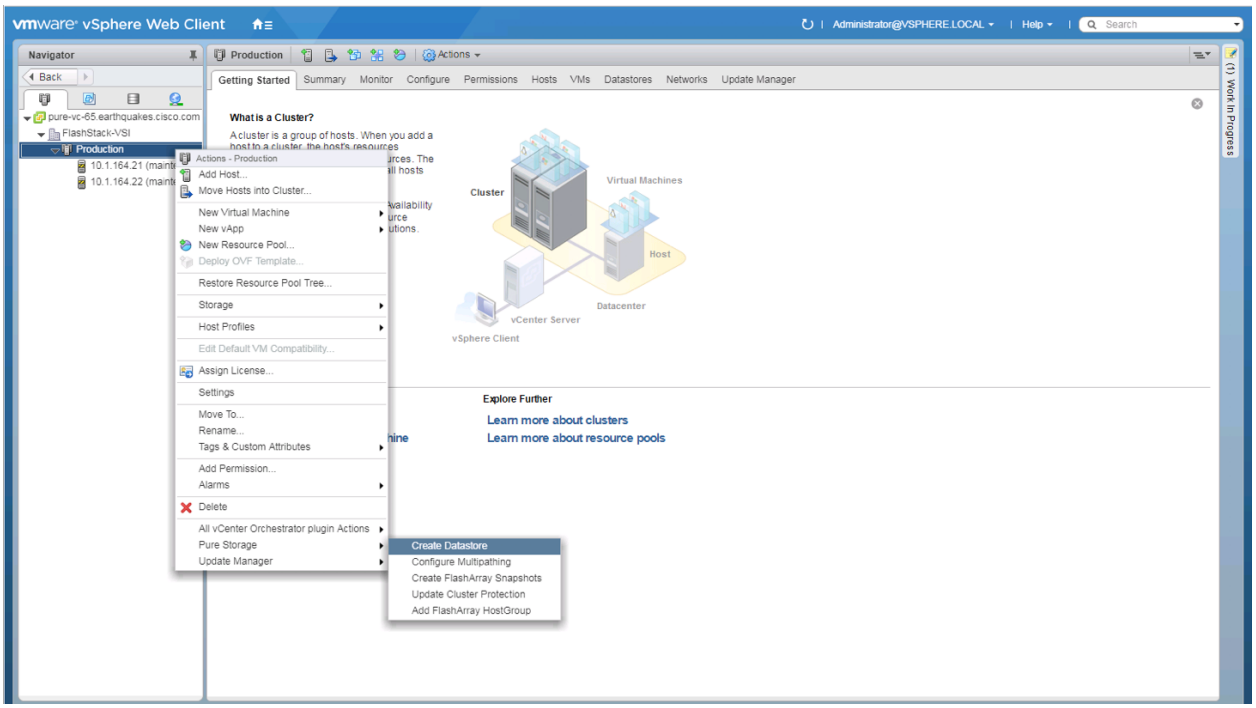
6. Click Add to register the FlashArray//X within the plugin.

Add Datastores

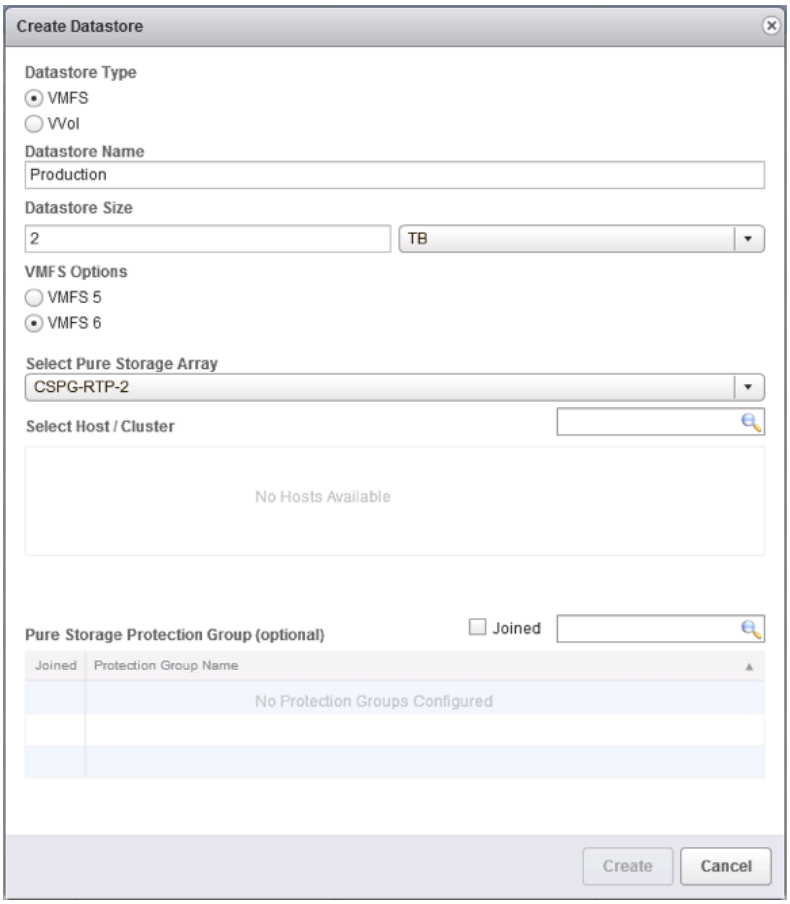
This section details the steps to add a datastore to place VMs on the FlashArray//X and optionally a second datastore for keeping their swapfiles.

A dedicated swapfile location will not provide a performance increase over the existing all flash datastores created from the FlashArray//X, but can be useful to have these files in a separate location to have them excluded from snapshots and backups.

1. Right-click the cluster and select the Pure Storage -> Create Datastore option from the drop-down.



2. Give the Datastore Name a value appropriate for VM store in the environment, select a starting size for the Datastore Size, click the VMFS 6 selection under VMFS Options, and click Create to provision the volume.
3. Optionally, repeat these similar steps to create a swap datastore to be used by the ESXi hosts. Right-click the cluster and select the Pure Storage -> Create Datastore option from the drop-down.
4. Give the Datastore Name a value appropriate for VM swapfiles on the ESXi host, select a starting size for the Datastore Size, click the VMFS 6 selection under VMFS Options, and click Create to provision the volume.



Configure ESXi Hosts in the Cluster

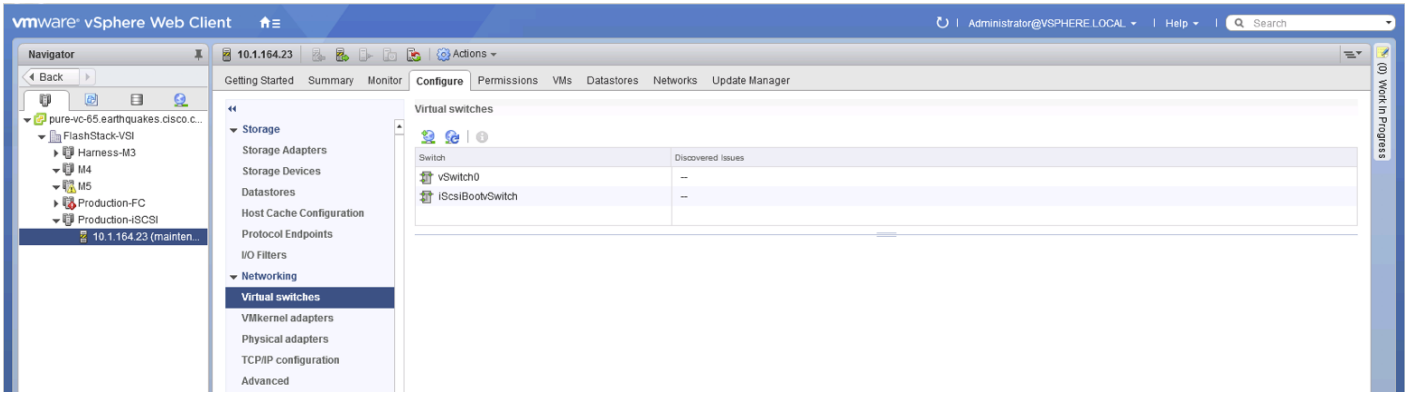
With the hosts added and the base vCenter configuration complete, some additional configurations will be needed for each ESXi host provisioned for the FlashStack.

Configure iSCSI Adapters

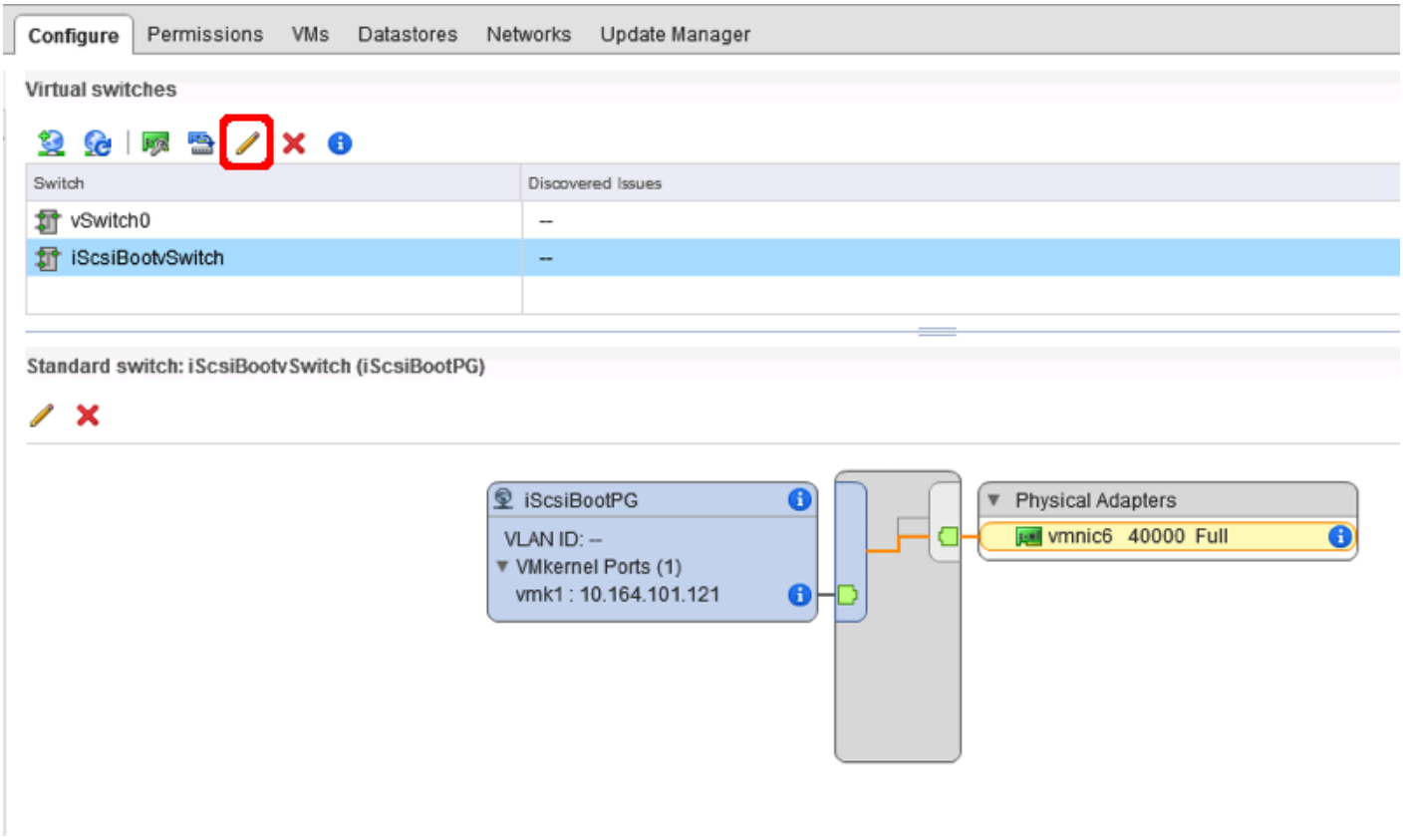
The base installation will set up one vmkernel adapter for the iSCSI boot, with a generated vSwitch named iScsiBootvSwitch. vSwitch changes will be needed, as well as the creation of a second vmkernel adapter used for the B side iSCSI boot. To make the vSwitch changes and create the vmkernel adapter, complete the following steps for each host:

Adjust iSCSI A vSwitch MTU

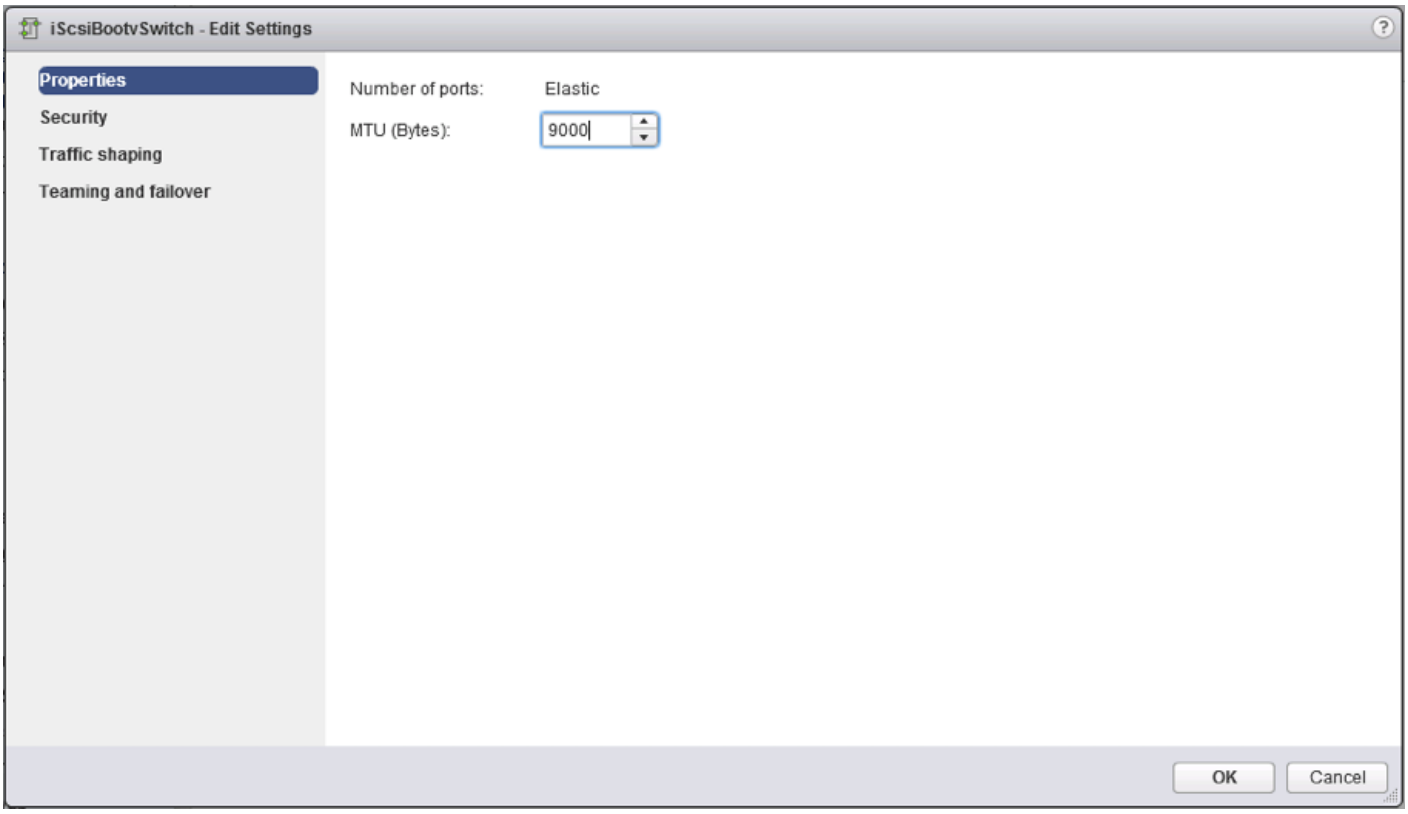
1. From the vSphere Web Client, select the installed iSCSI host, click the Configure tab, and select the Virtual switches section from the Networking section on the left.



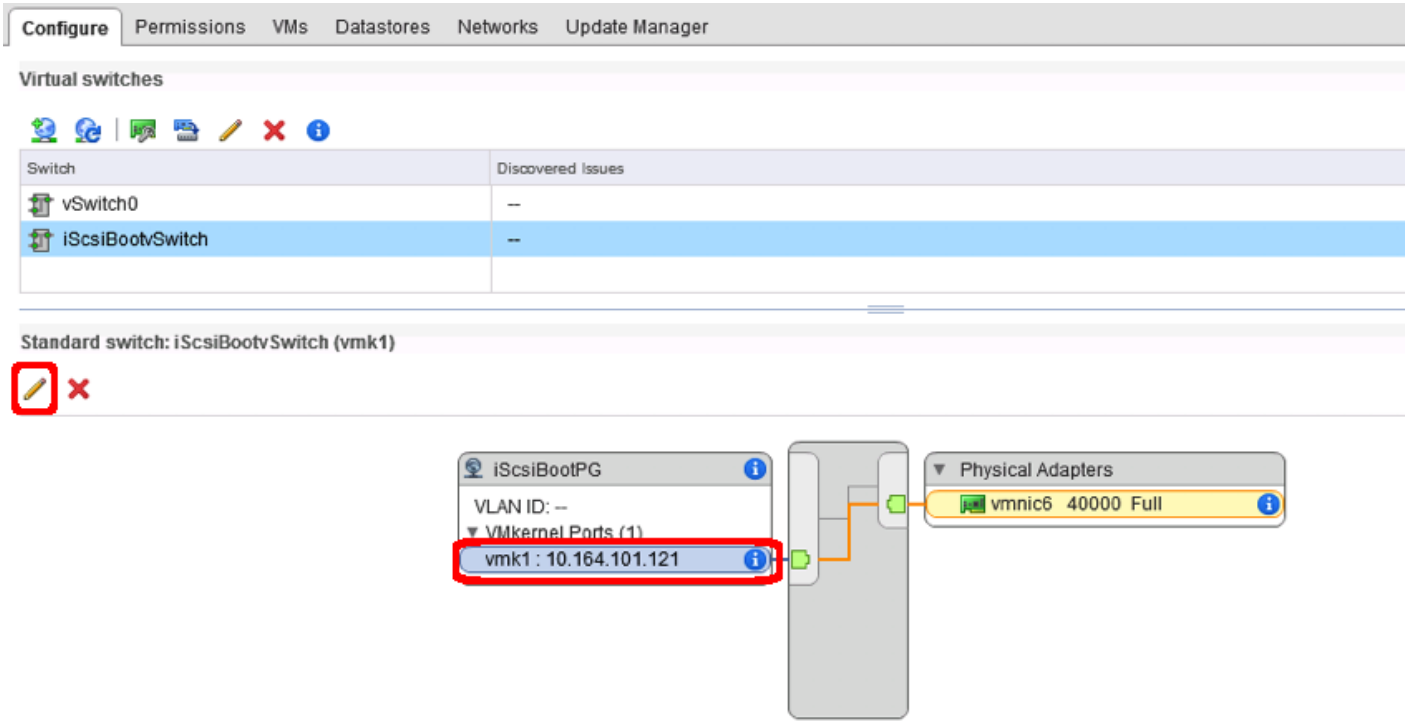
2. Select the iScsiBootvSwitch and click the pencil icon to open up Edit settings for the vSwitch.



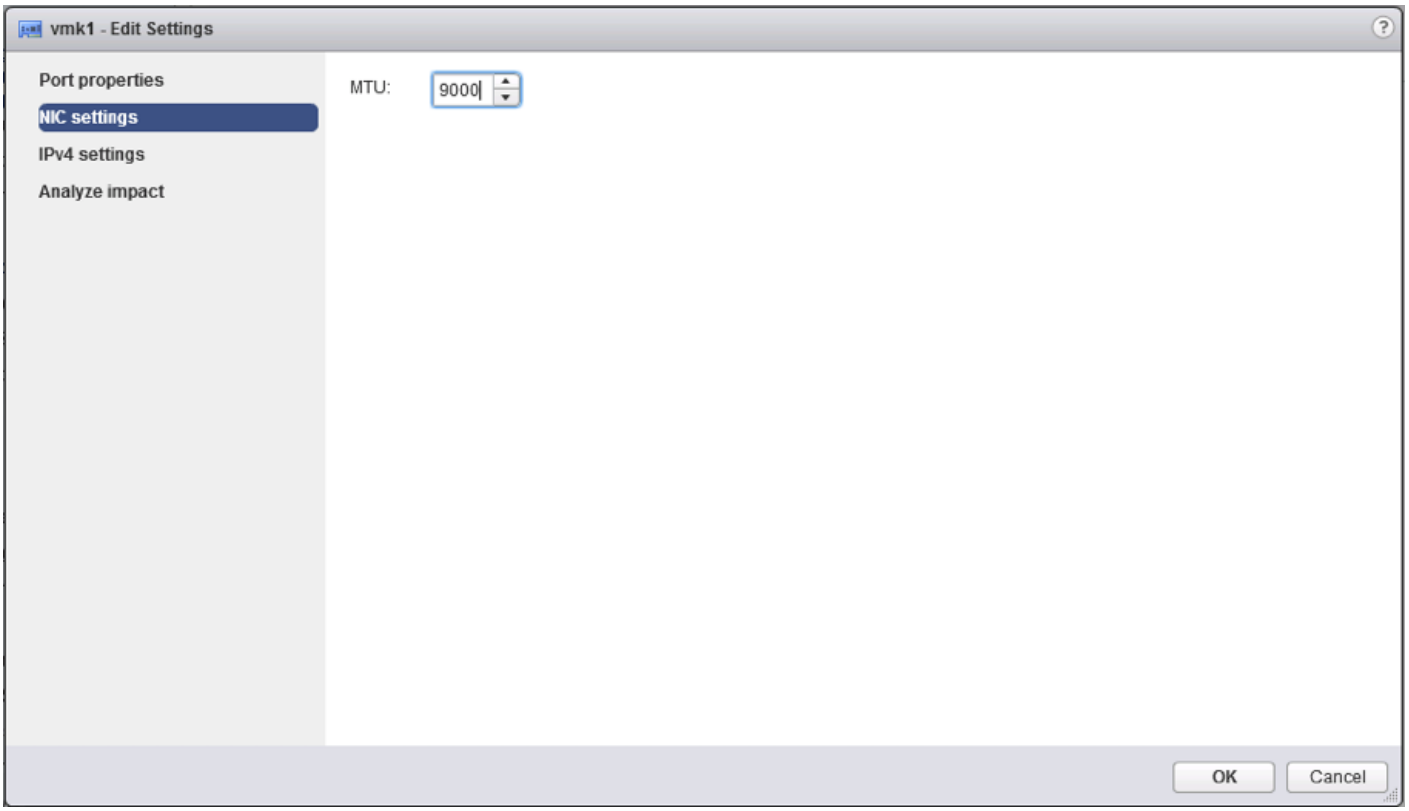
3. Within the Properties section, change the MTU from 1500 to 9000 and click OK to save the changes.



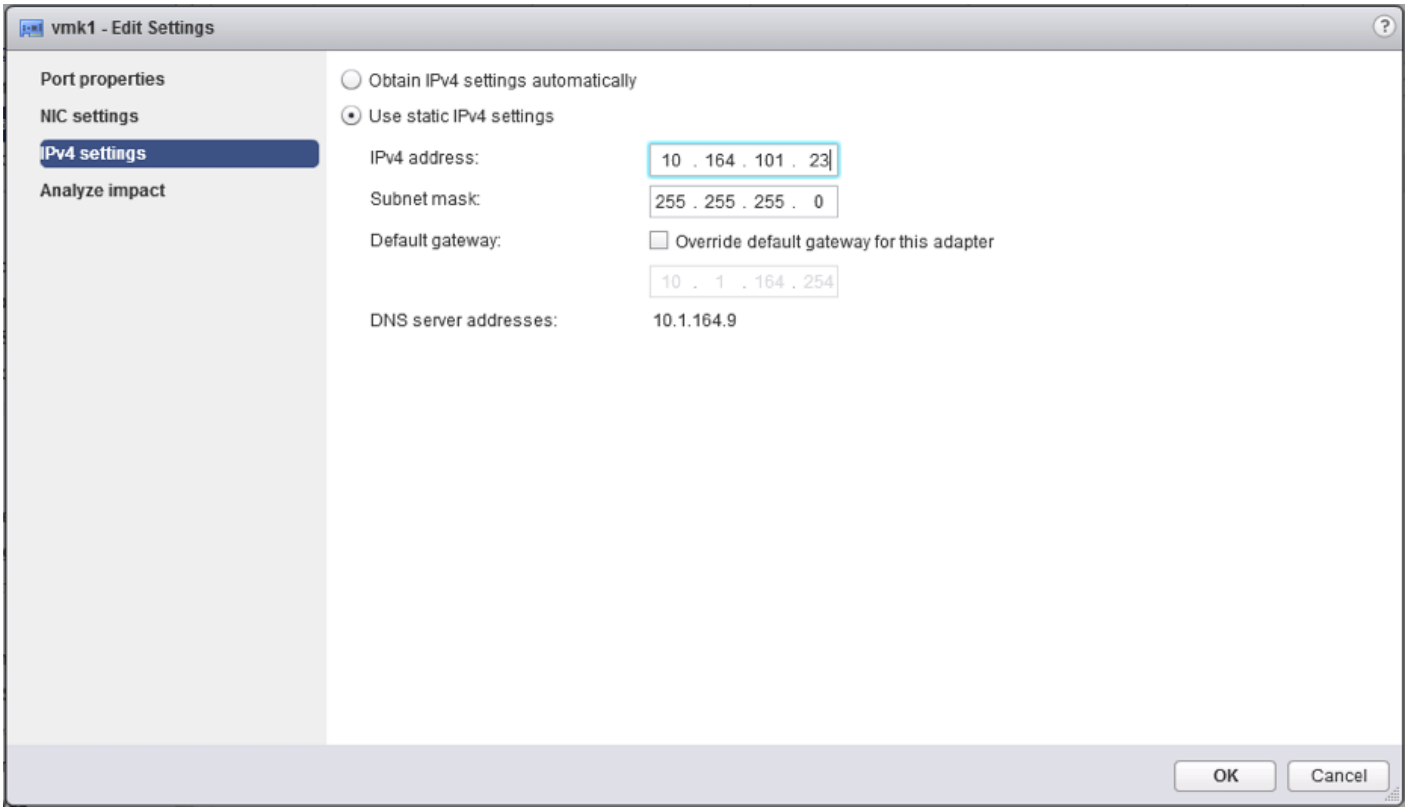
4. Click the vmk1 entry within the iScsiBootPG and select the pencil icon on the left to edit the settings of the vmkernel adapter.



5. Select NIC settings on the left side of the Edit Settings window and adjust the MTU from 1500 to 9000.



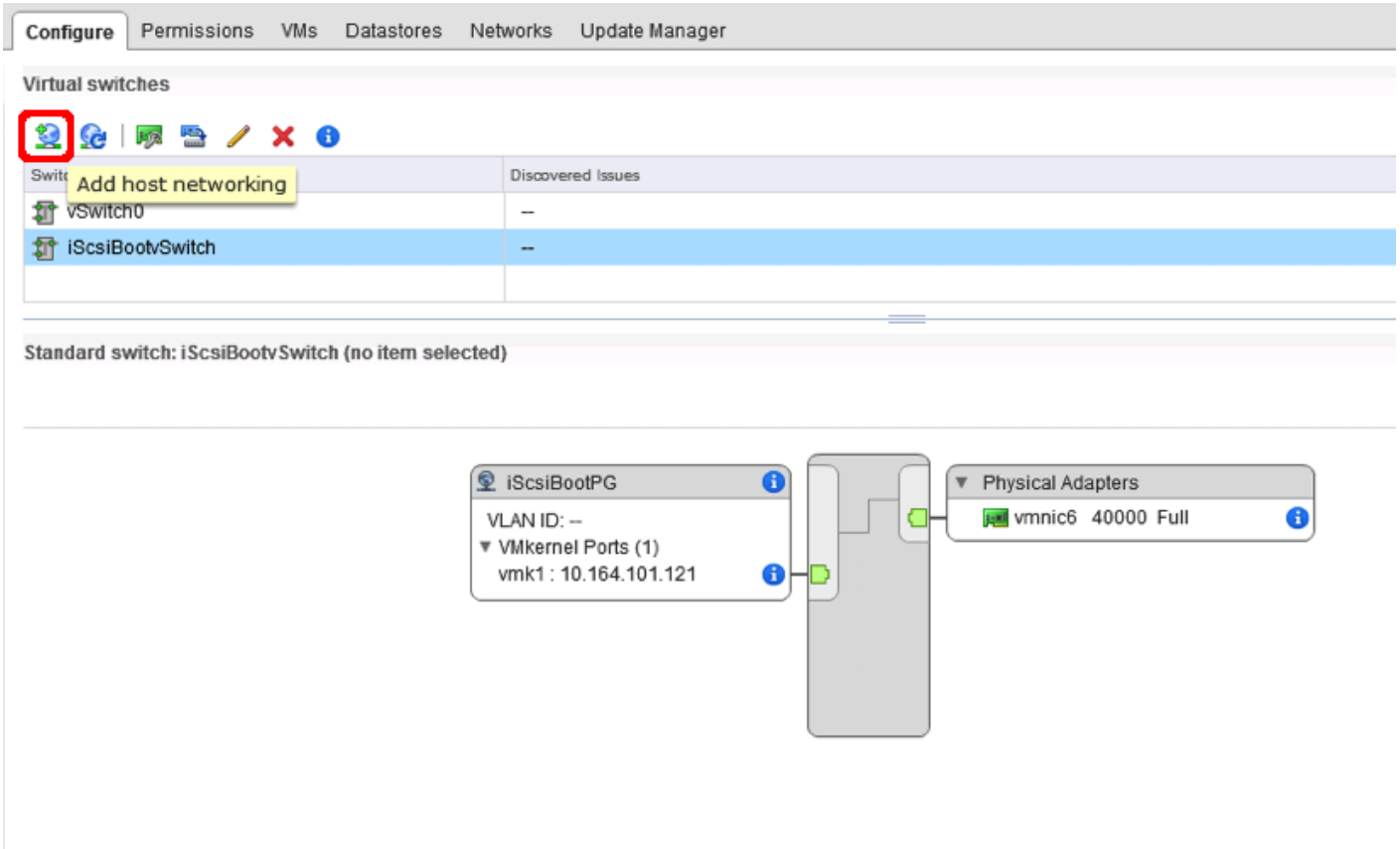
6. Click the IPv4 settings for vmk1, and change the IPv4 settings from the Cisco UCS Manager iSCSI-A-Pool assigned IP to one that is not in the IP block.



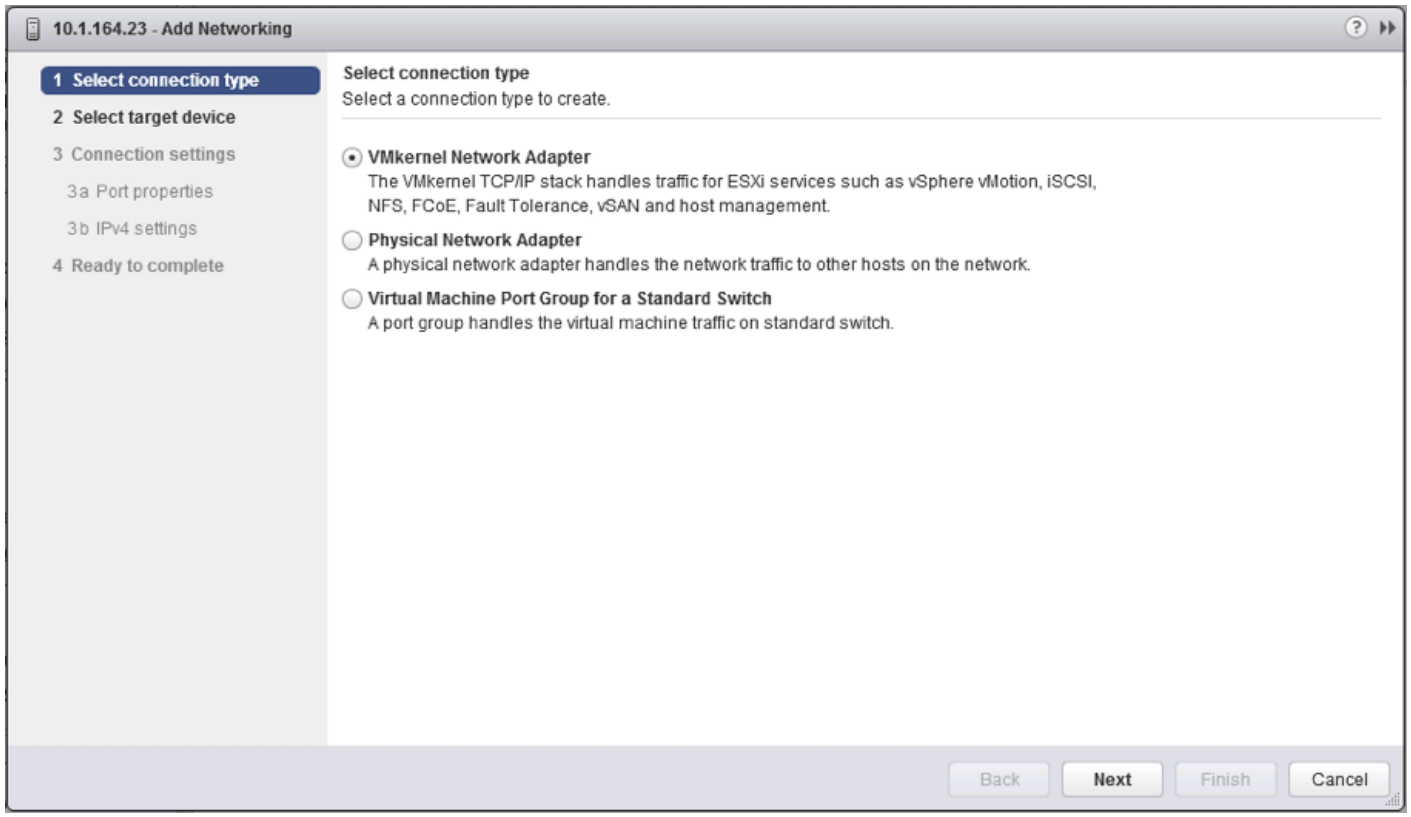
7. Click OK to apply the changes to the vmkernel adapter.

Create iSCSI B vSwitch and vmkernel Adapter

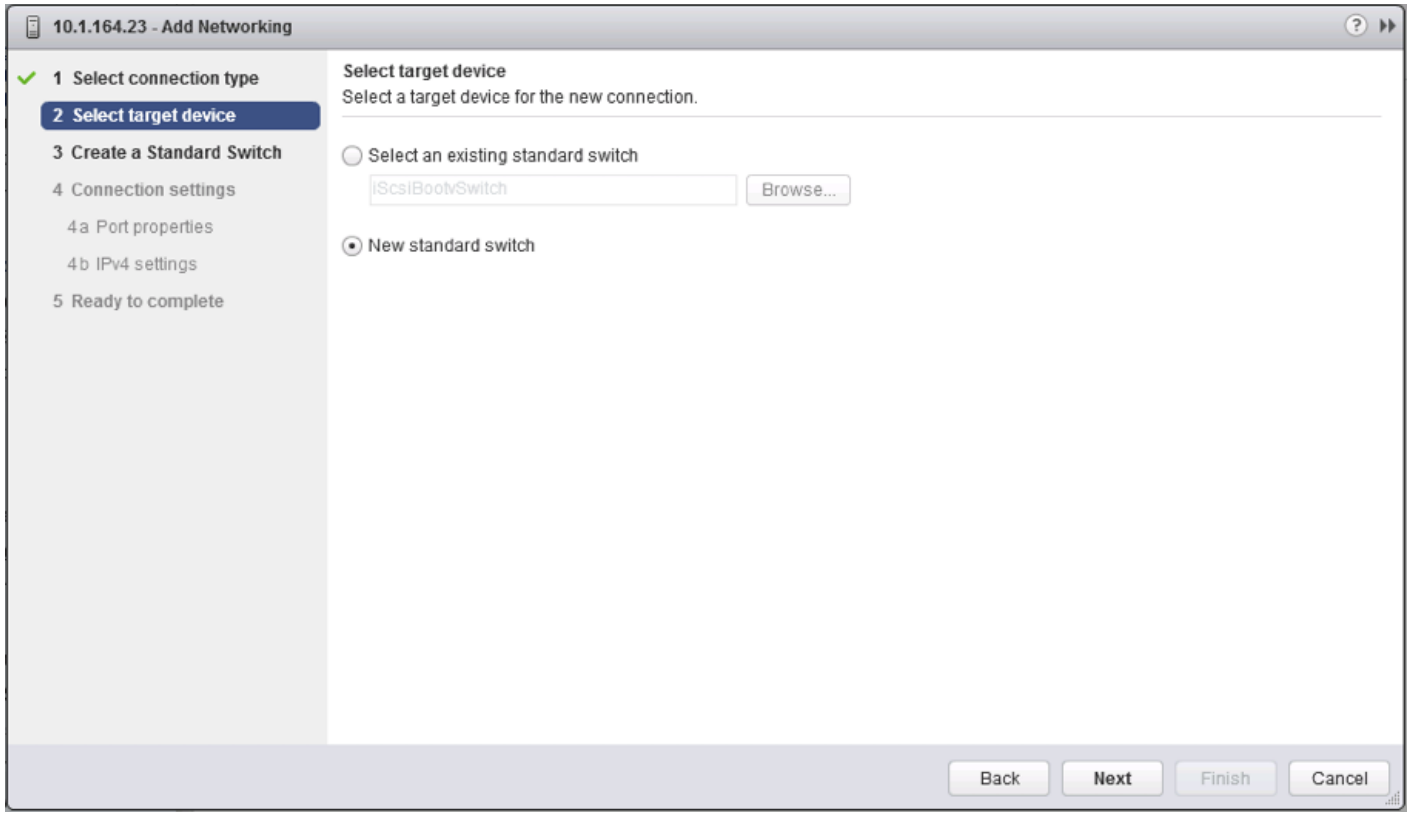
1. Click the Add host networking icon under Virtual switches.



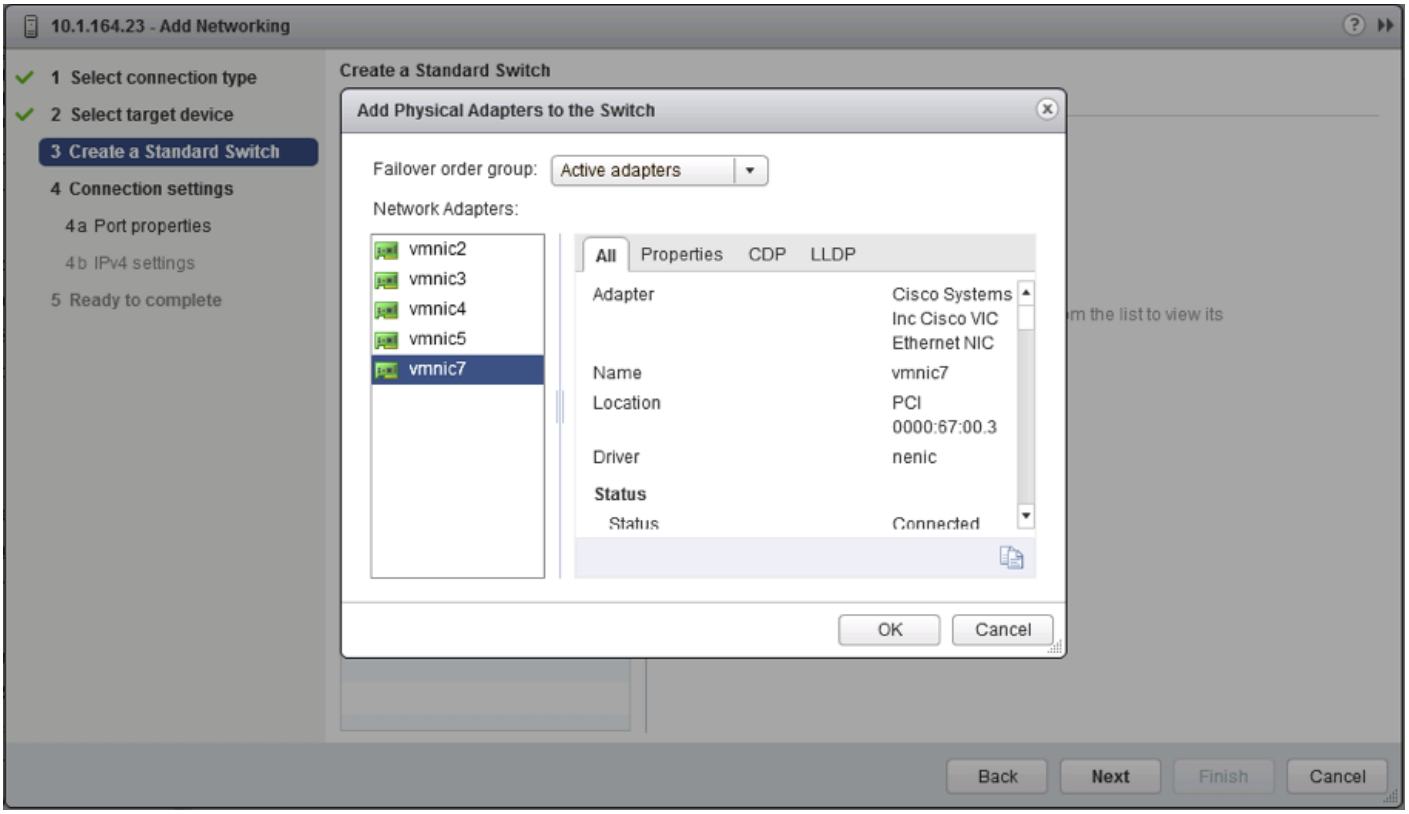
2. Leave VMkernel Network Adapter selected and click Next.



3. Change the Select target device option to New standard switch and click Next.

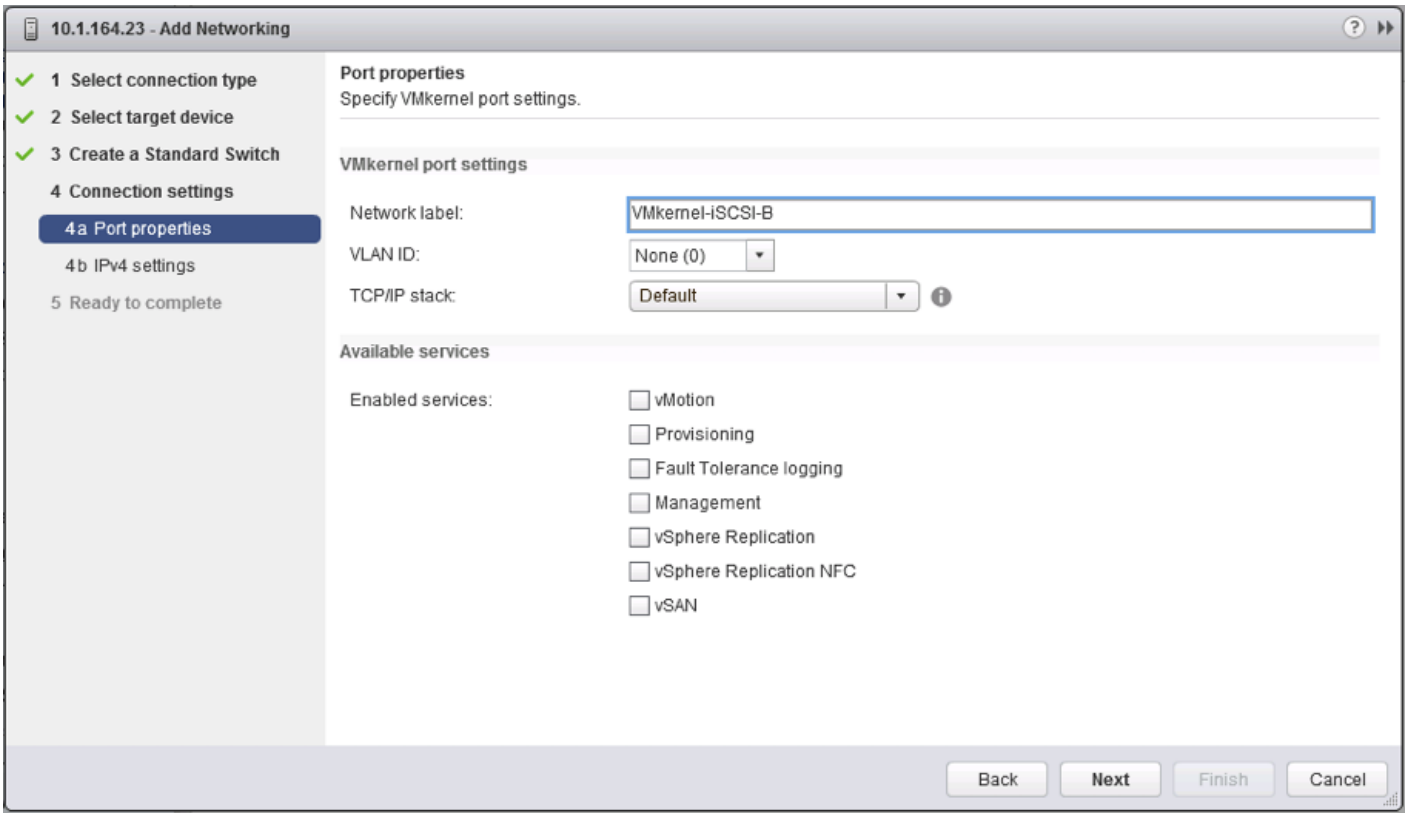


4. Click the green plus icon under Assigned adapters and select vmnic7 from the listed adapters in the resulting window.



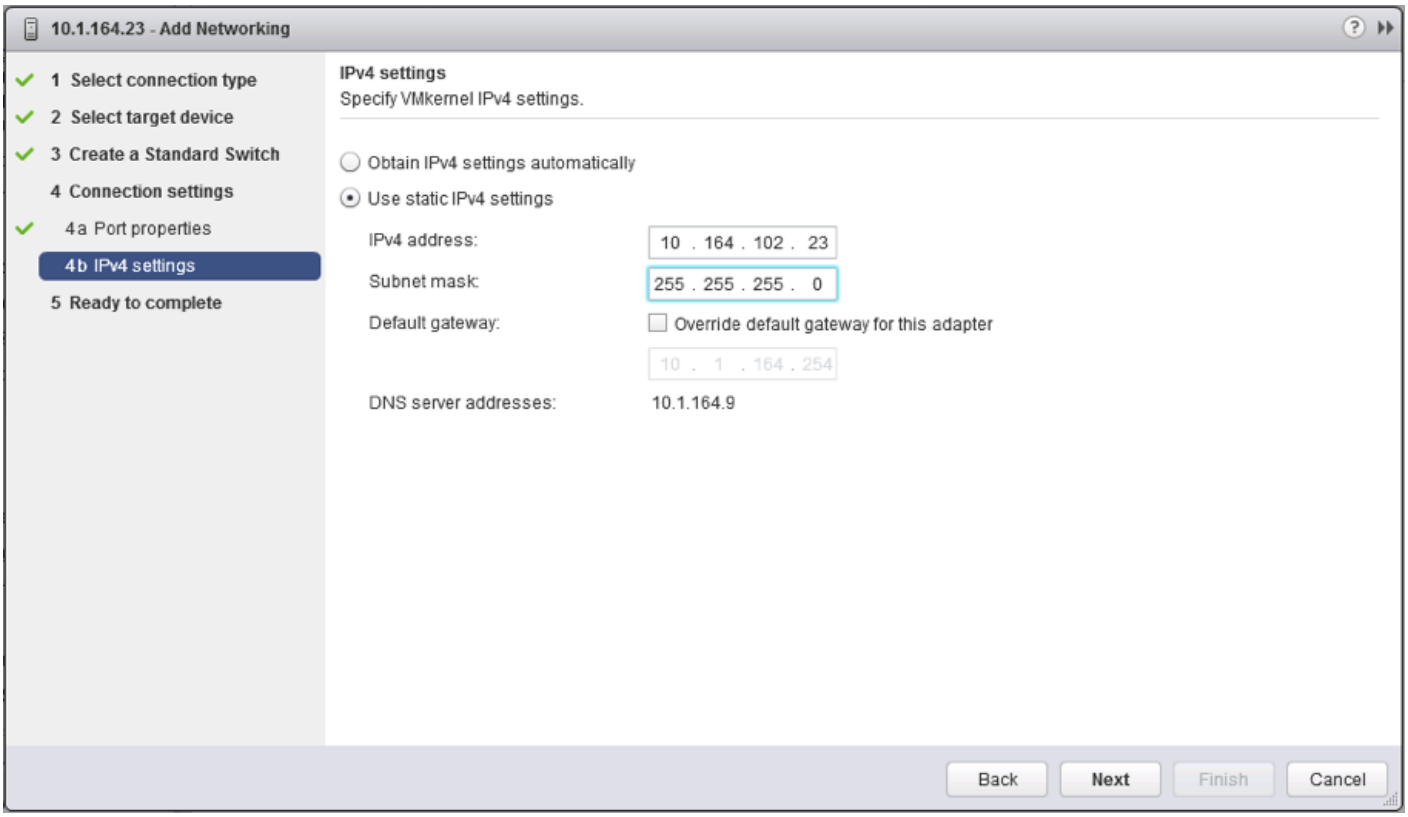
5. Click OK to add the vmnic to the vSwitch and click Next.

6. (Optional) Enter a relevant name for the Network label.



7. Click Next.

8. Change the option for IPv4 settings to Use static IPv4 settings and enter valid IP and subnet mask information that is outside of the UCS iSCSI Pool B.

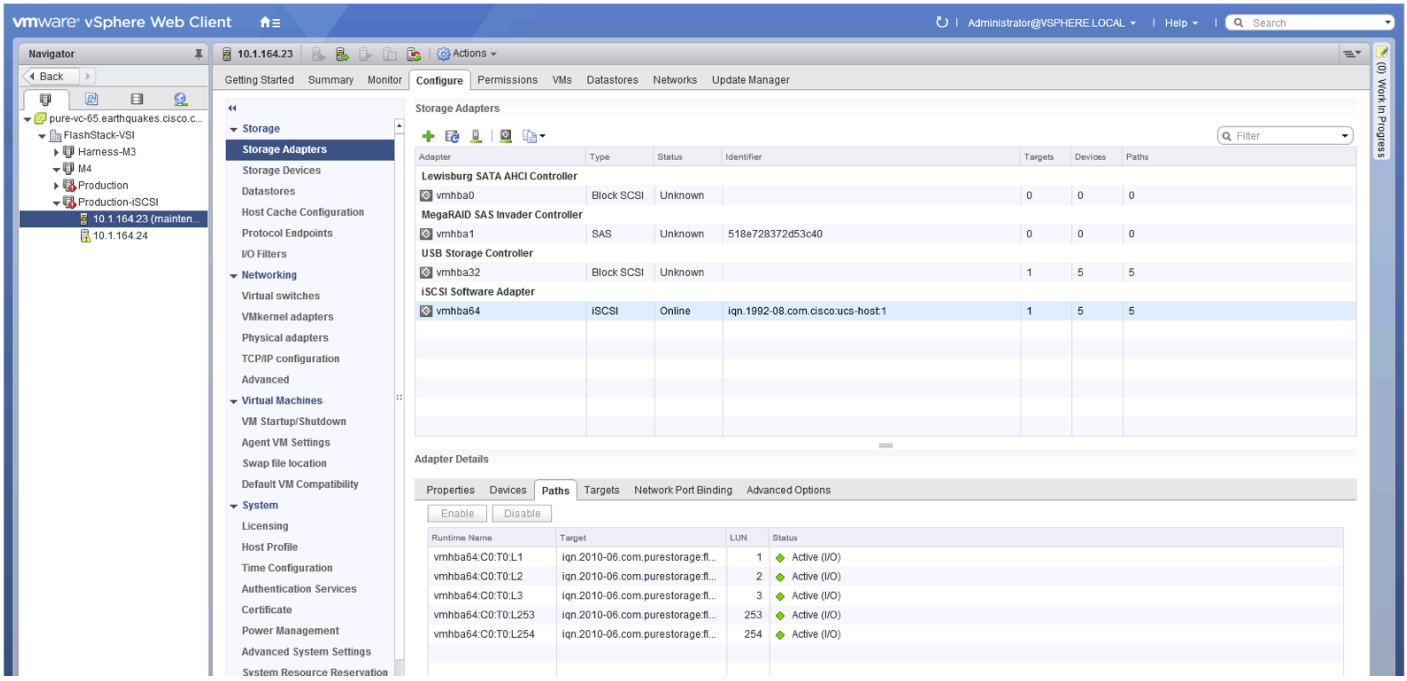


9. Click Next and click Finish in the resulting Summary window.

Setup iSCSI Multipathing

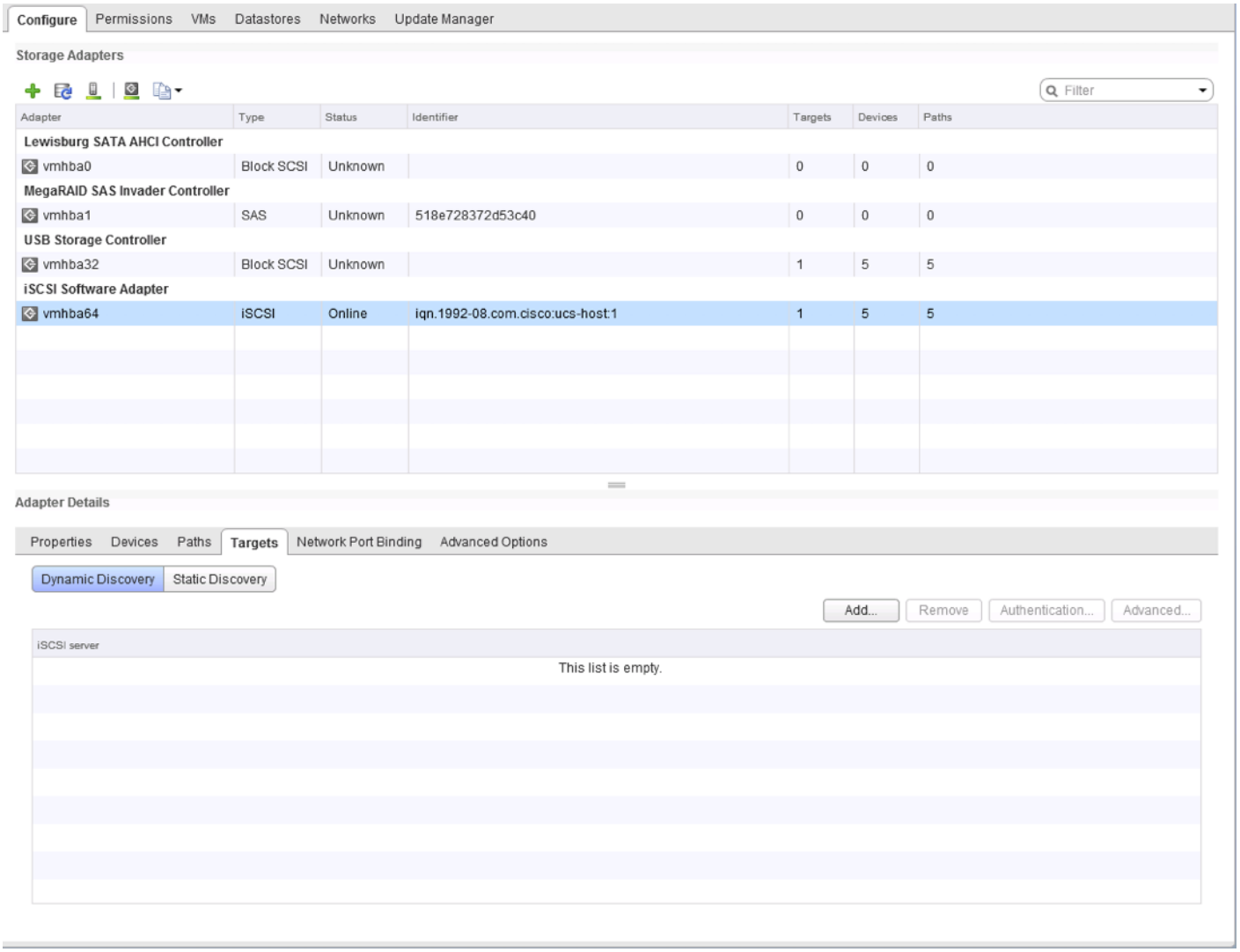
To setup the iSCSI multipathing on the ESXi hosts, complete the following steps:

1. From the vSphere Web Client, select the host and select the Configure tab within the host view.



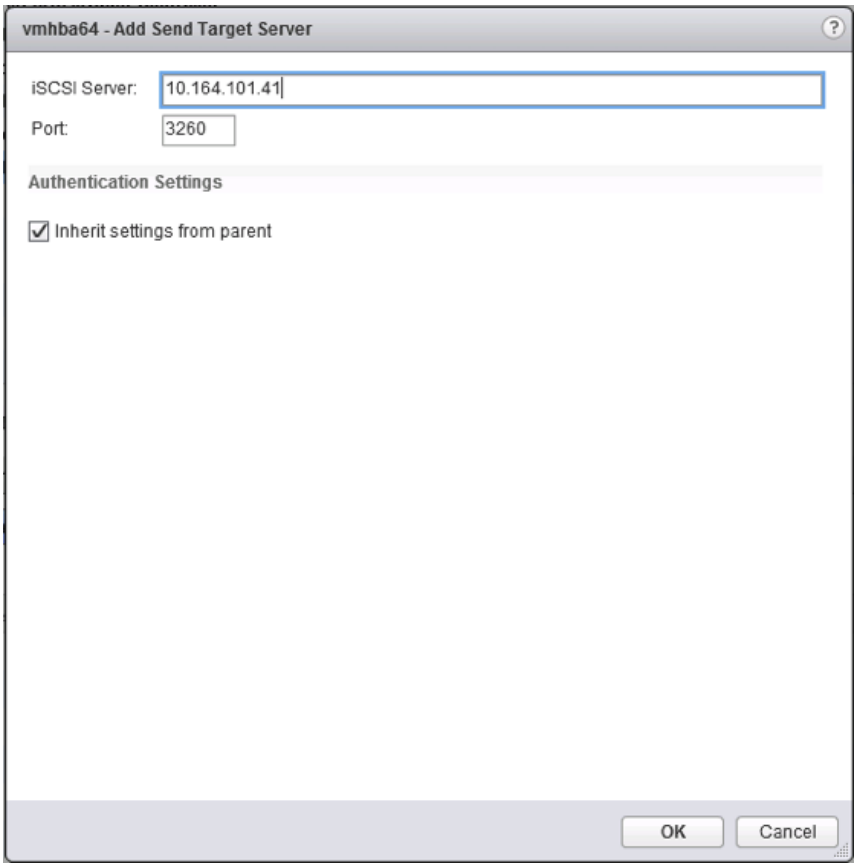
2. Select Storage Adapters from within the Storage section and vmhba64 under the iSCSI Software Adapter listing.

3. Select the Targets tab under the Adapter Details.

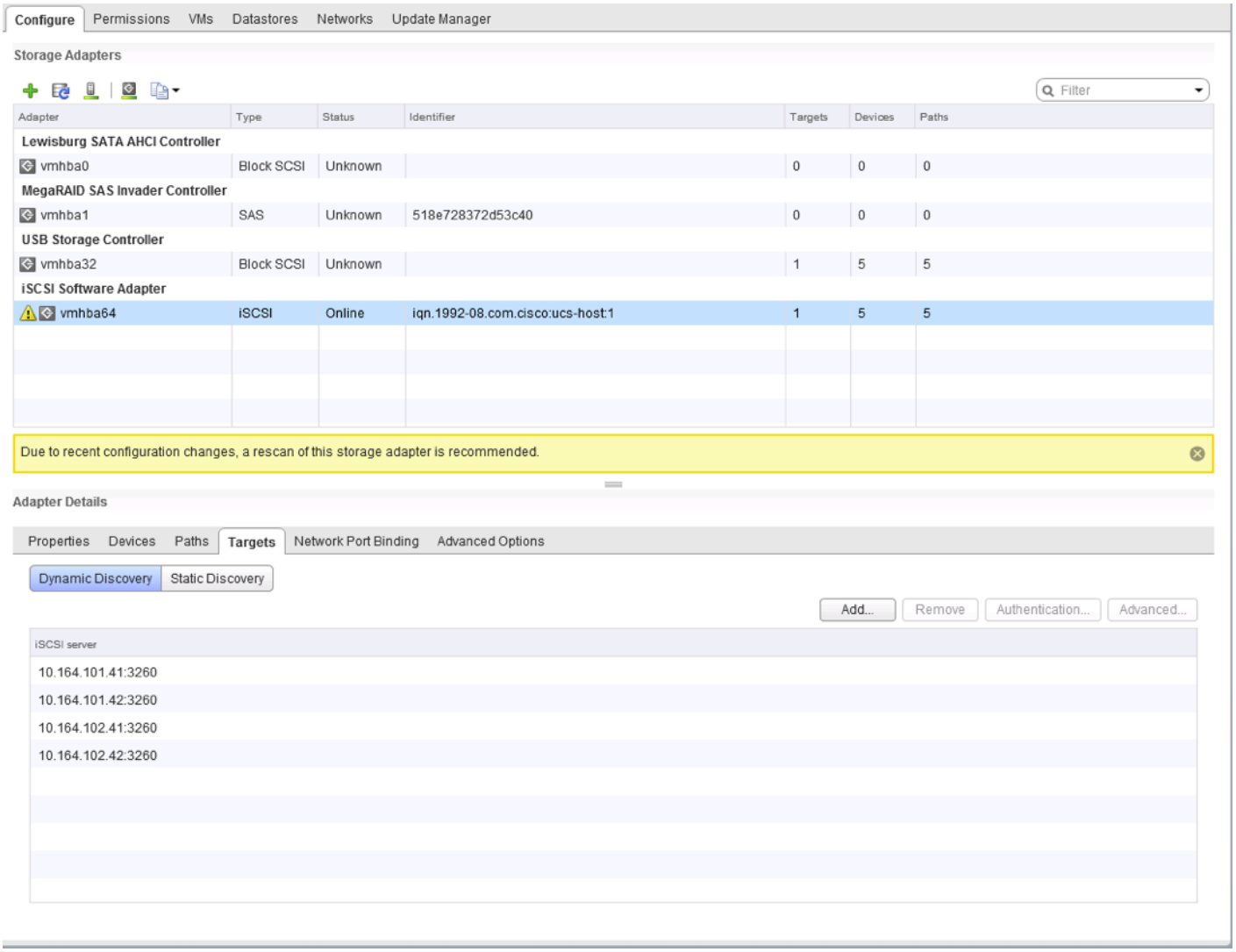


4. With Dynamic Discovery selected, click Add...

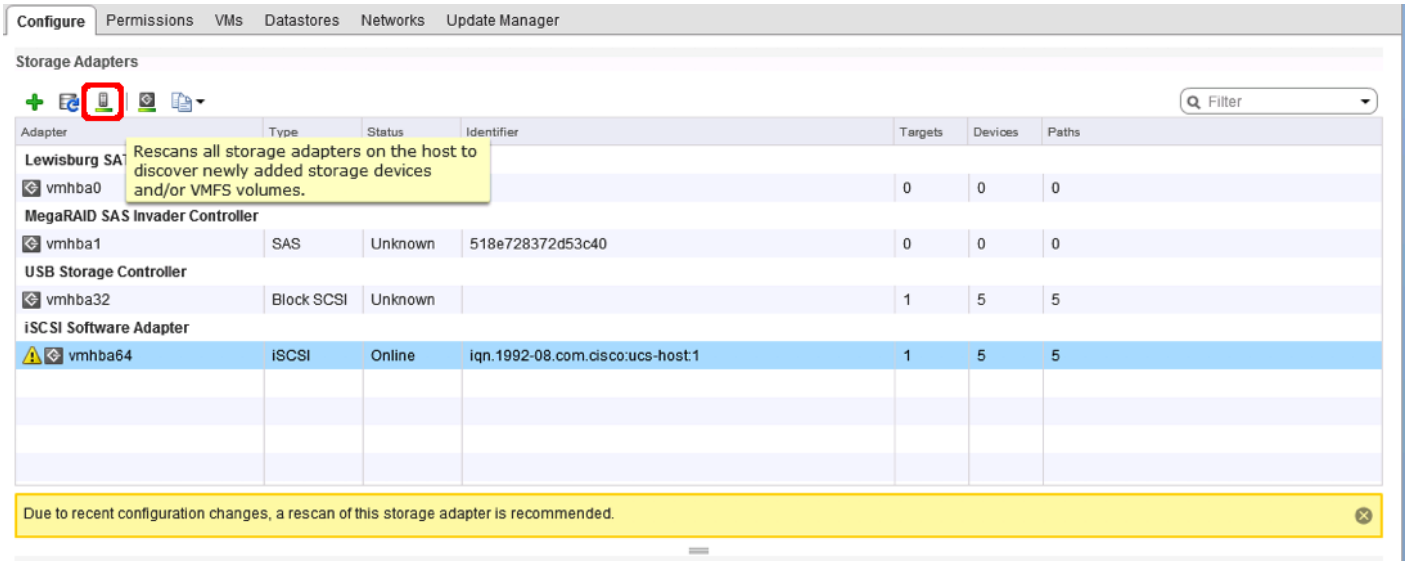
5. Enter the IP address configured to the first iSCSI adapter on the first FlashArray controller (ct0.eth8).



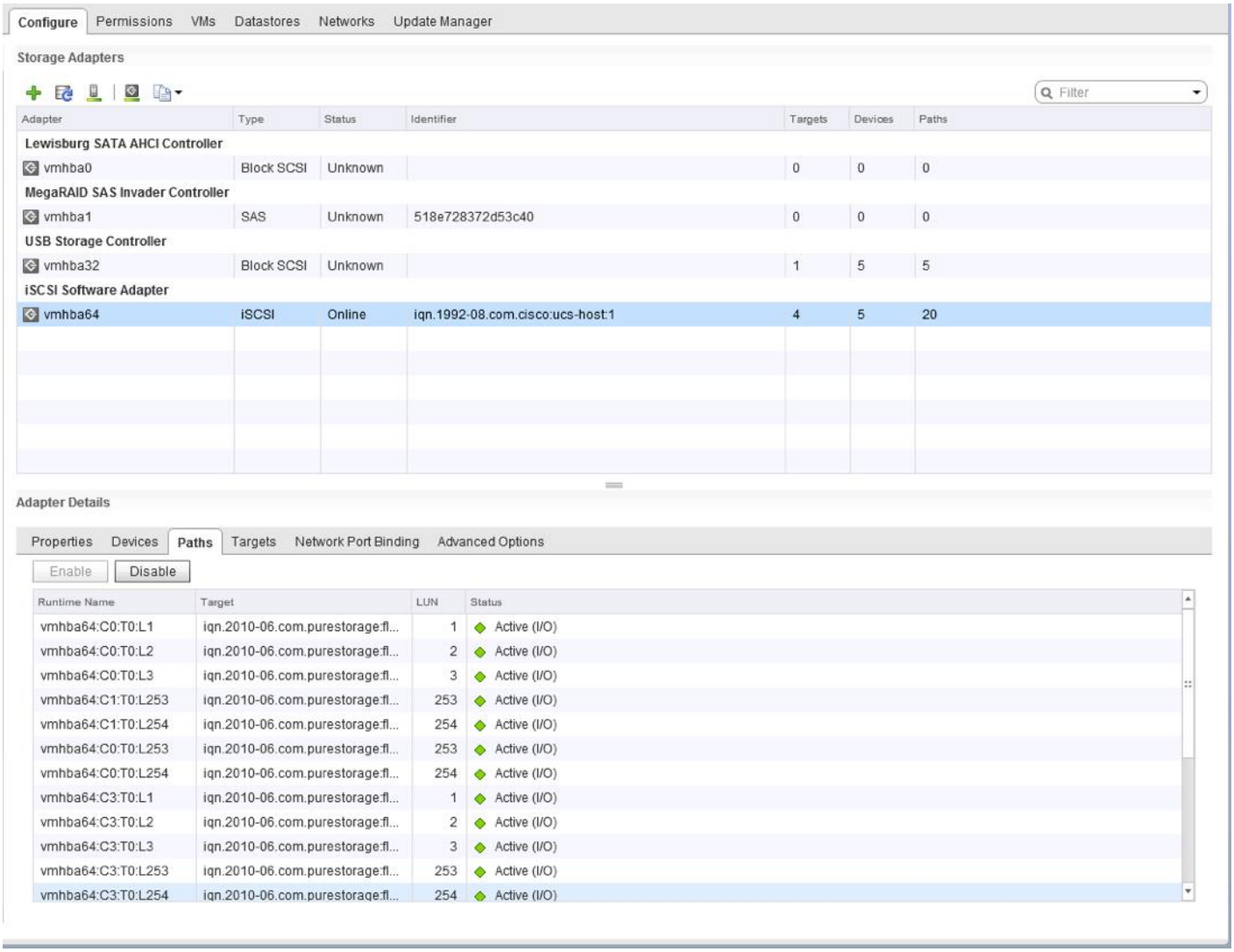
6. Click OK and repeat these additions for the IPs assigned to ct0.eth9, ct1.eth8, and ct1.eth9.



7. Rescan the storage adapters with the icon at the top of the page.



8. Observed Paths should now be four times what it previously was.



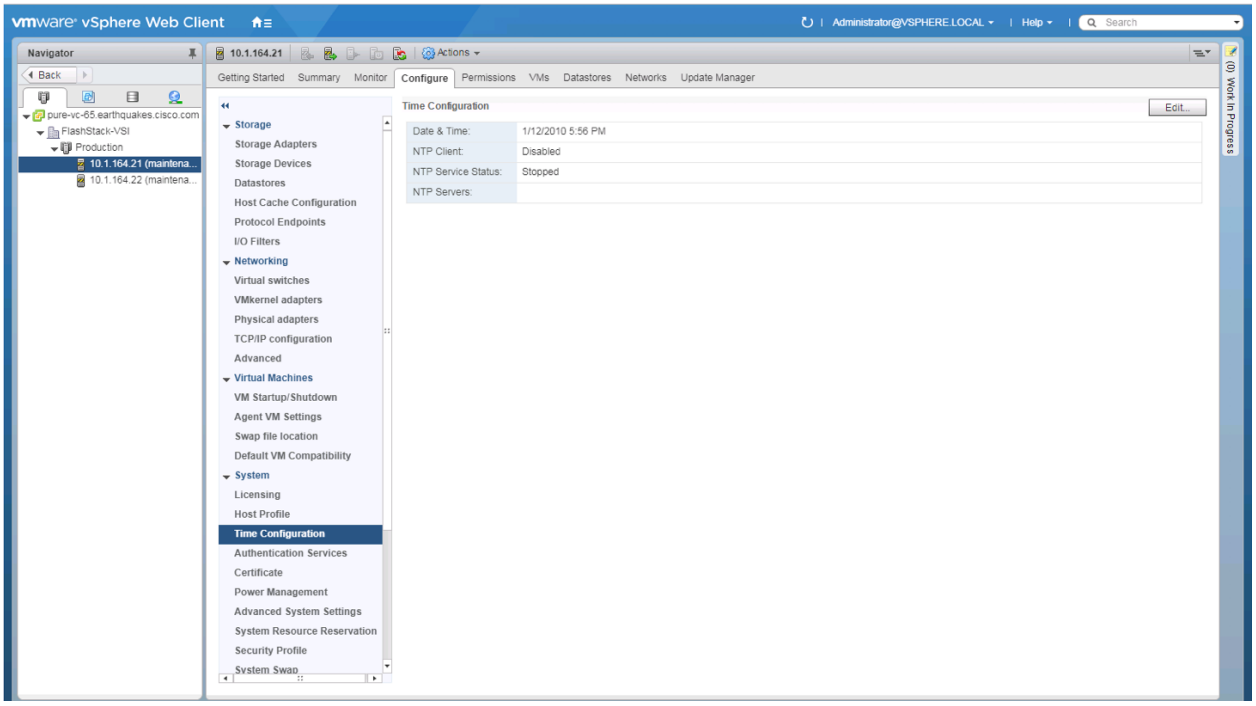
Configure ESXi Settings

A couple of base settings are needed for stability of the vSphere environment, as well as optional enablement of SSH connectivity to each host for the updating of drivers.

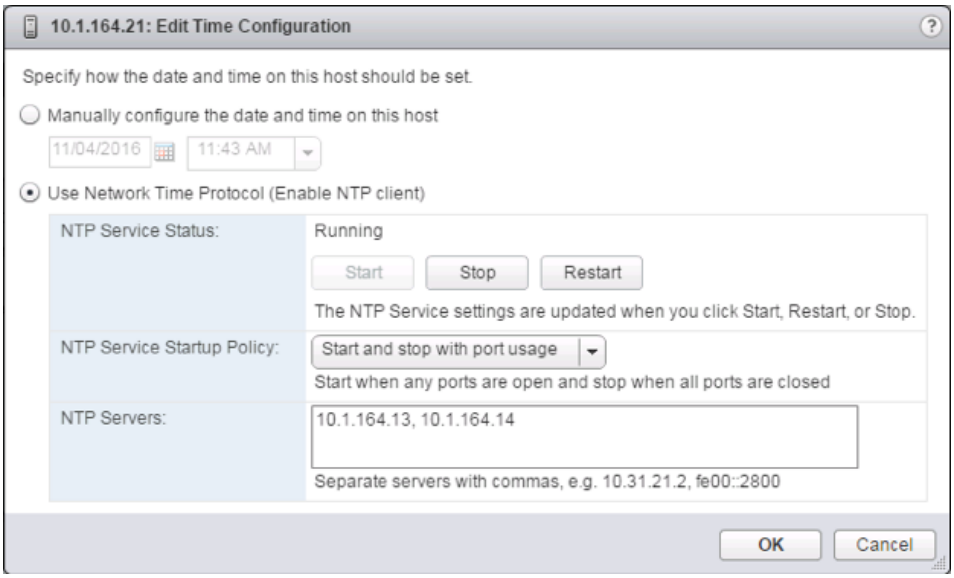
To configure ESXi settings, complete the following steps:

1. Select the first ESXi host to configure with standard settings.

2. Select the Configure tab and select Time Configuration within the options on the left under System, and click Edit within Time Configuration.

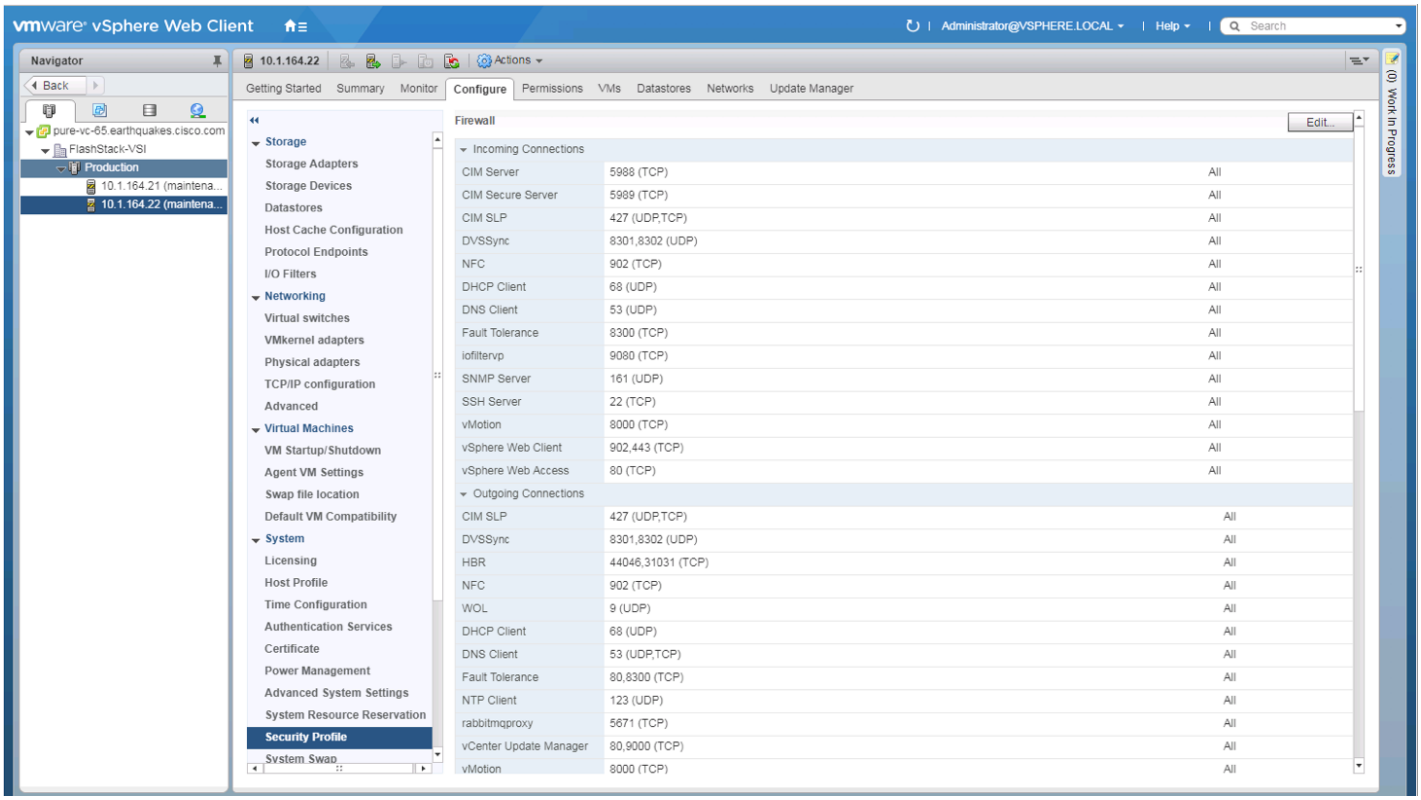


3. Select Use Network Time Protocol (Enable NTP client), enter <<var_nexus_A_ib_ip>>, <<var_nexus_A_ib_ip>> for the NTP Servers, select Start and stop with port usage for NTP Service Startup Policy, and click Start within NTP Service Status. Click OK to submit the changes.

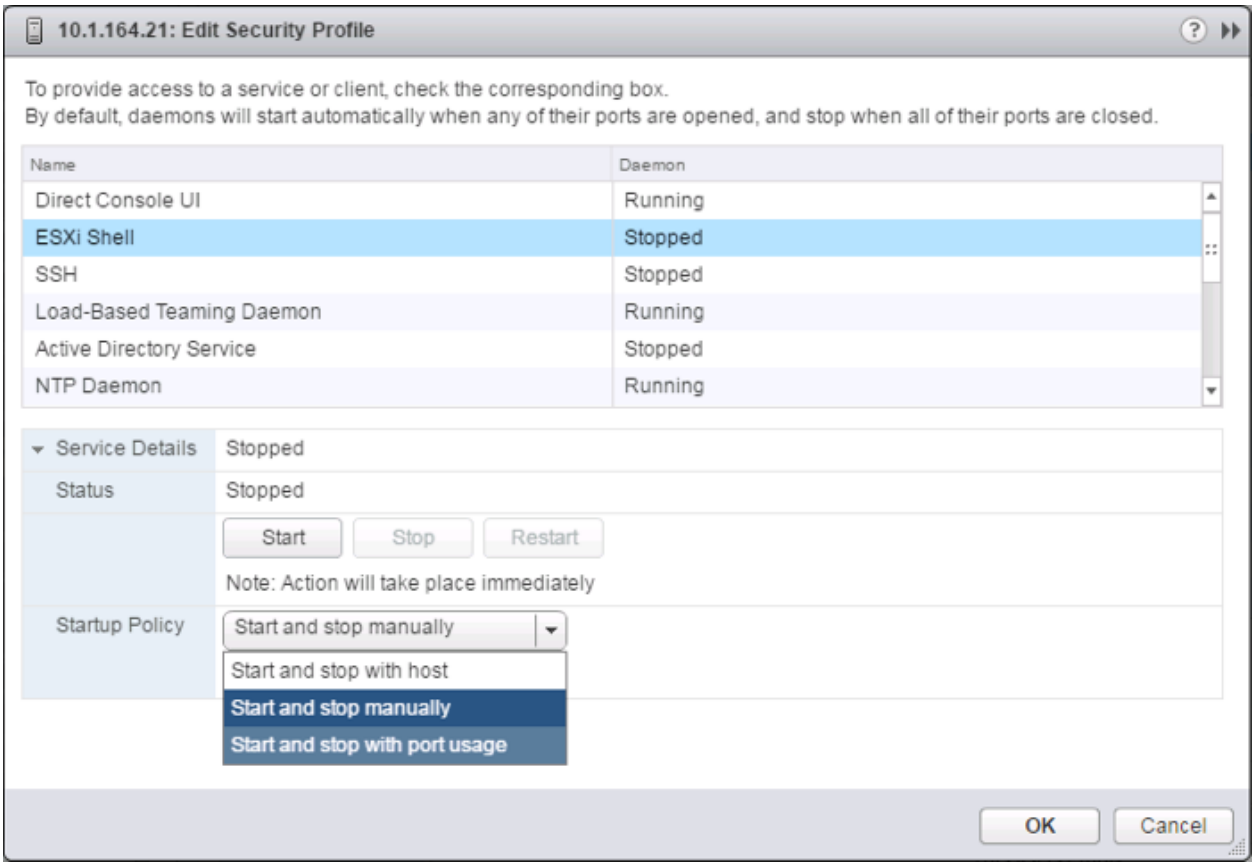


4. (Optional) Click Security Profile within the Configure tab under the System section for the host.

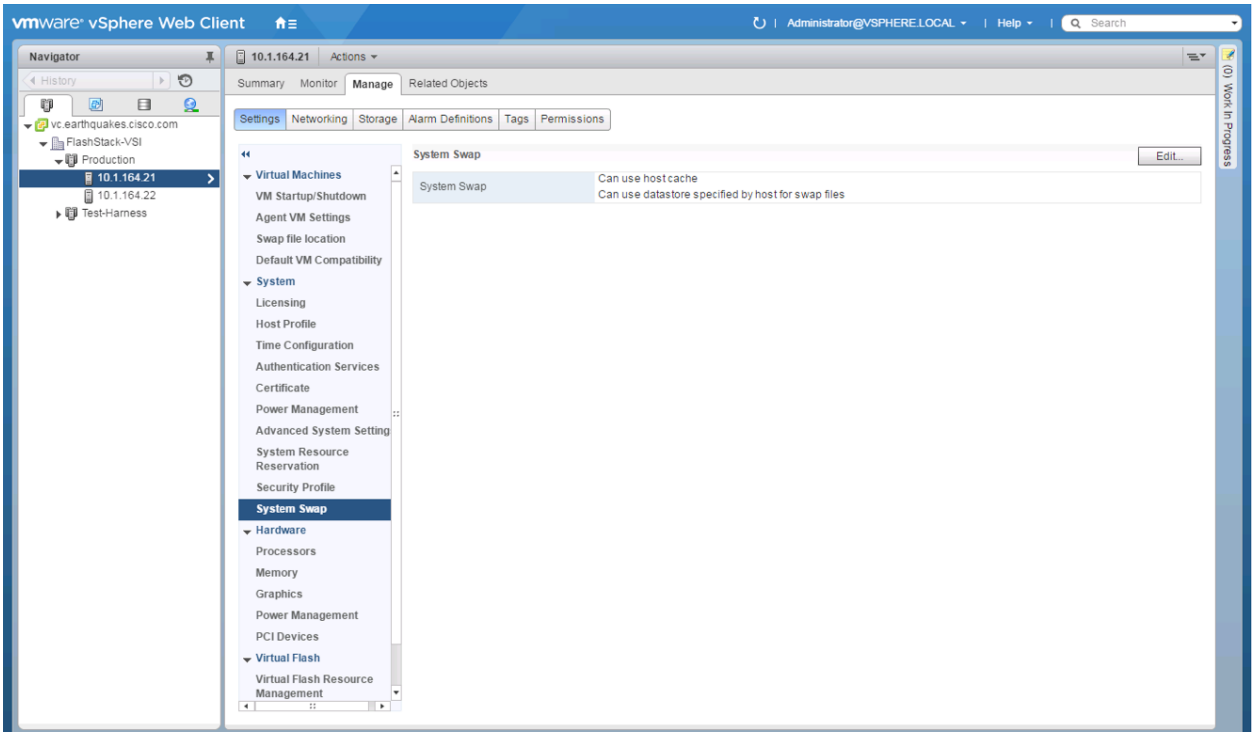
Security Profile settings of **ESXi Shell** and **SSH** are enabled for the potential update of the nenic driver later. These steps are unnecessary if using VMware Update Manager and these drivers are being handled by being included into a configured baseline. If SSH is enabled for updates, it is recommended to later disable this service if it is considered a security risk in the environment.



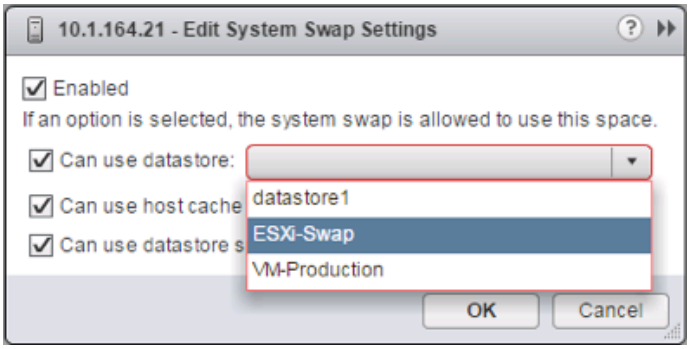
5. Scroll down to the Services section within Security Profile and click the Edit button.



6. Select the ESXi Shell entry, change the Startup Policy to Start and stop with port usage, and click Start. Repeat these steps for the SSH entry. Click OK.



7. If an optional ESXi swap datastore was configured earlier, click System Swap the System section within the Configure tab and click Edit.



8. Checkmark the Can use datastore option, and from the pull-down select the ESXi swap datastore that was configured. Click OK.

9. Repeat these steps on each ESXi host being added into the cluster.

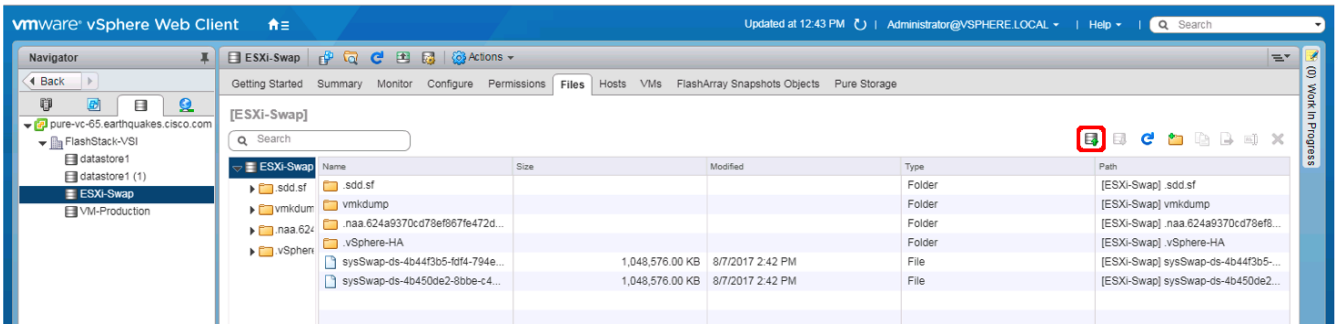
Install VMware Driver for the Cisco Virtual Interface Card (VIC)

The Cisco Custom Image for VMware vSphere 6.5 U1 comes with the currently specified nenic 1.0.6.0 for Ethernet traffic from the ESXi host, so it will not require updating at this time. For the most recent versions, please refer to Cisco UCS HW and SW Availability Interoperability Matrix. If a more recent driver is made available that is appropriate for VMware vSphere 6.5 U1, the following is an example of the steps that can be followed to update the drivers.

To install VMware VIC Drivers on the ESXi hosts, complete the following steps:

1. Download and extract either driver bundle (example nenic Driver version 1.0.6.0) to the system the vSphere Web Client is running from.

2. Within the vSphere Web Client, select one of the datastores common to all of the hosts.



3. Click the Upload a file to the Datastore button.

4. Select and upload the offline_bundle (VMW-ESX-6.5.0-nenic-1.0.6.0-offline_bundle-5894048.zip) from each of the extracted driver downloads.

5. Place all hosts in Maintenance mode requiring update.

6. Connect to each ESXi host through ssh from a shell connection or putty terminal.
7. Login as root with the root password.
8. Run the following command (substituting the appropriate datastore directory if needed) on each host:

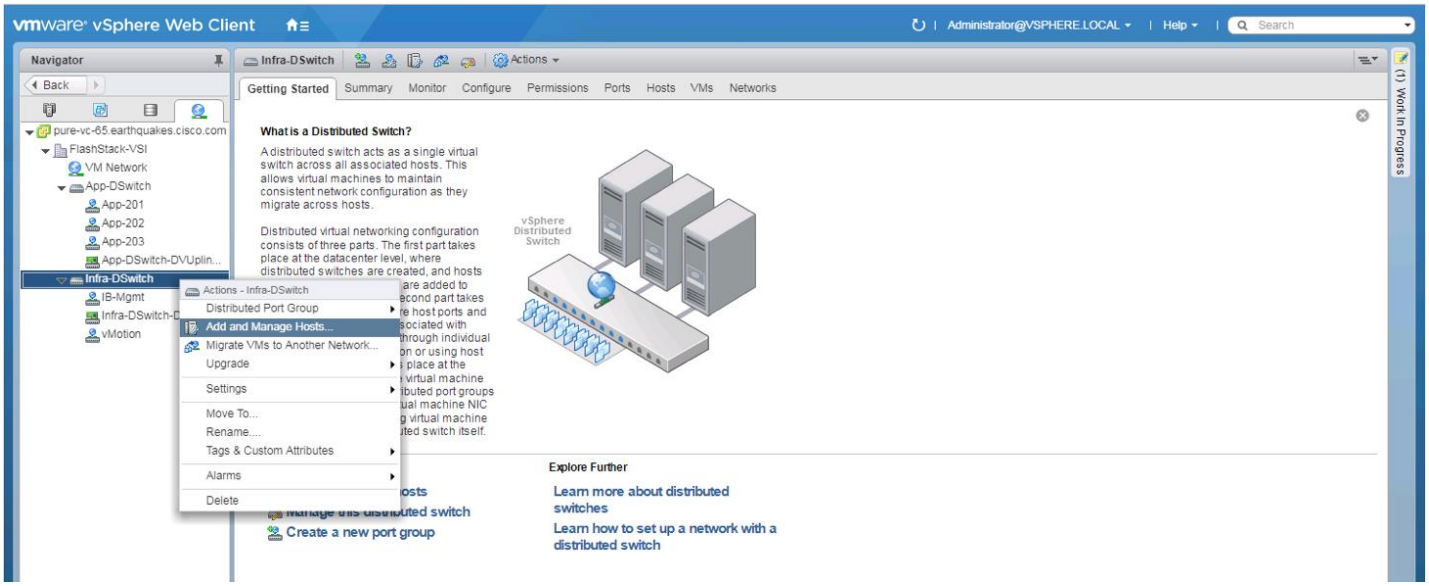
```
esxcli software vib update -d /vmfs/volumes/ESXi-Swap/VMW-ESX-6.5.0-nenic-1.0.6.0-offline_bundle-5894048.zip
```

9. Reboot each host by typing `reboot` from the SSH connection after the command has run.
10. Log into the Host Client on each host once reboot is complete.

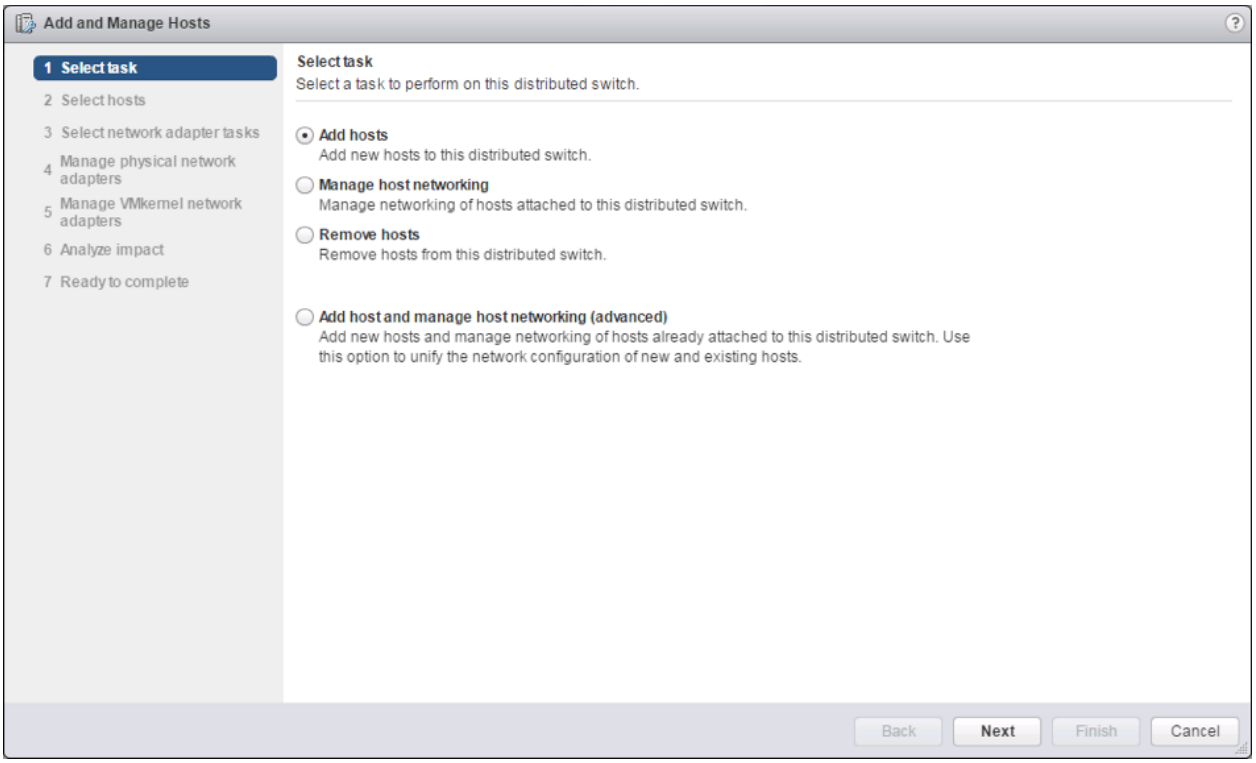
Add the ESXi hosts to the vDS

To Add the ESXi Hosts to each vDS, complete the following steps:

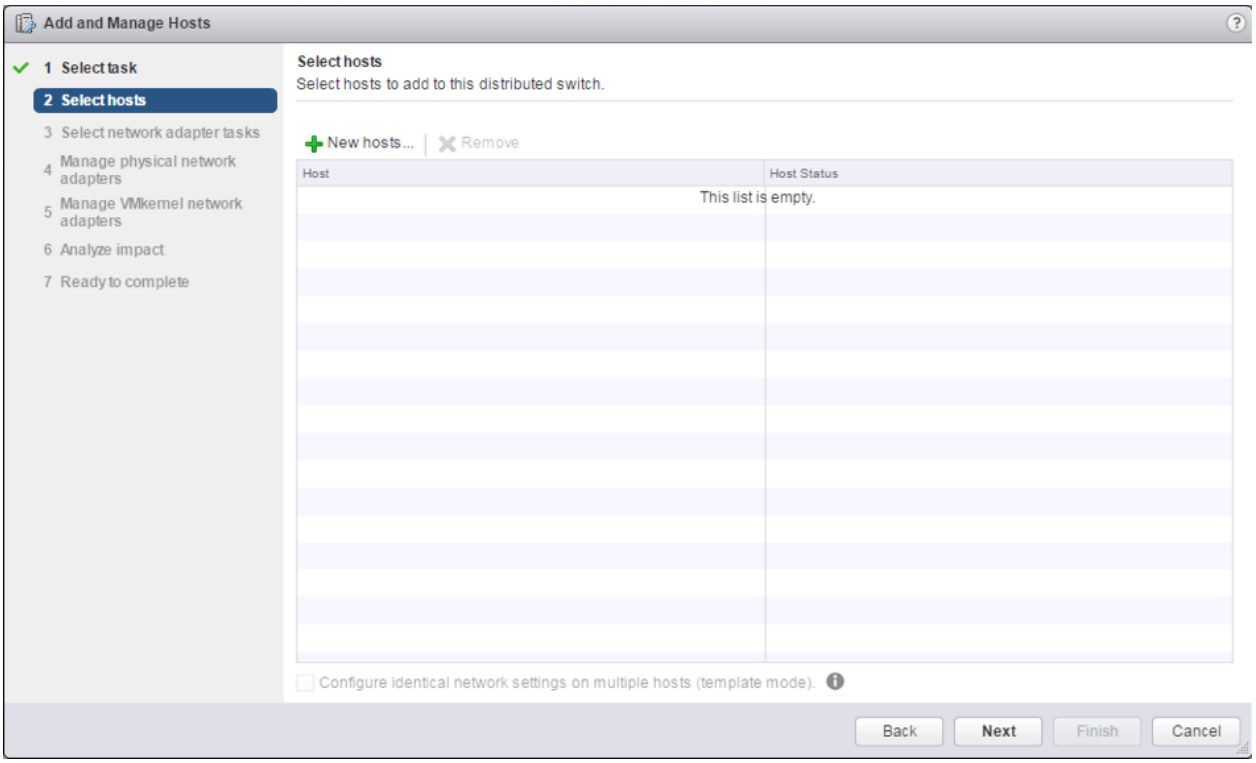
1. Within the Networking tab of the Navigator window, right-click the Infra-DSwitch vDS and select Add and Manage Hosts...



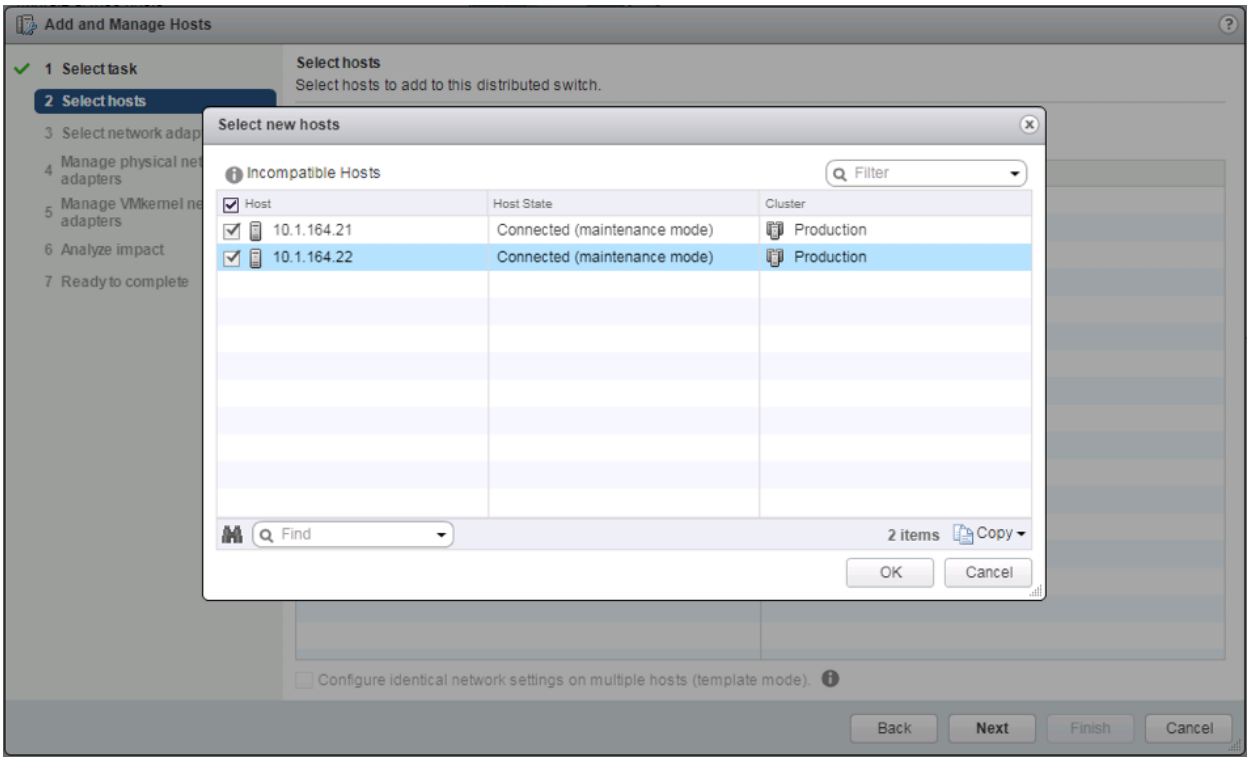
2. Leave Add hosts selected and click Next.



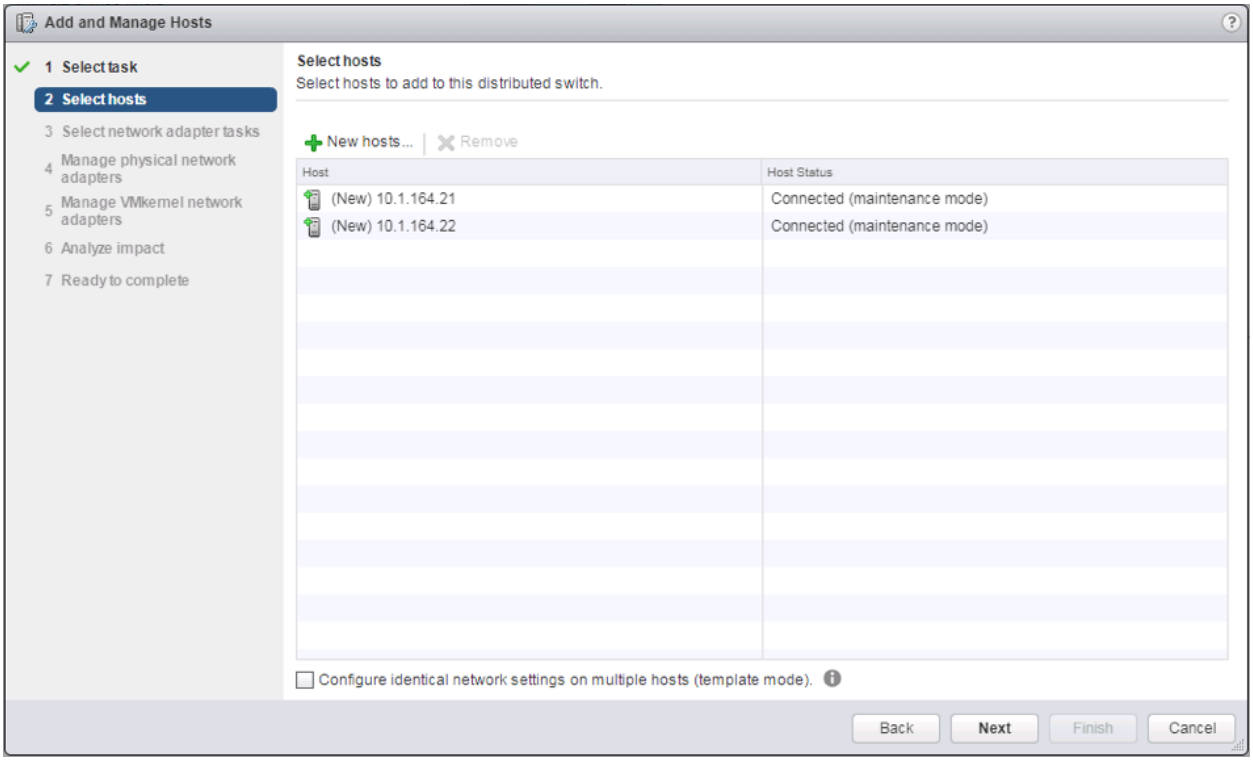
3. Click the green + icon next to New hosts...



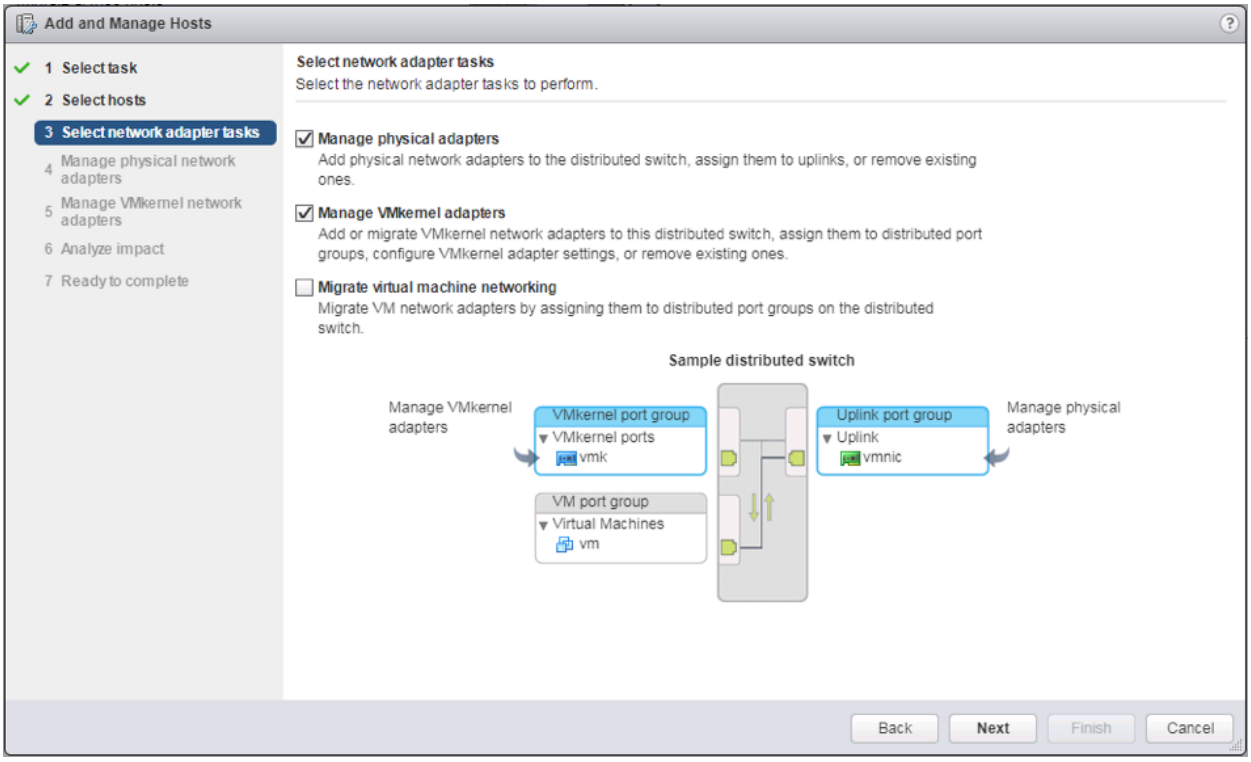
4. In the Select new hosts pop-up that appears, select the hosts to be added, and click OK to begin joining them to the vDS.



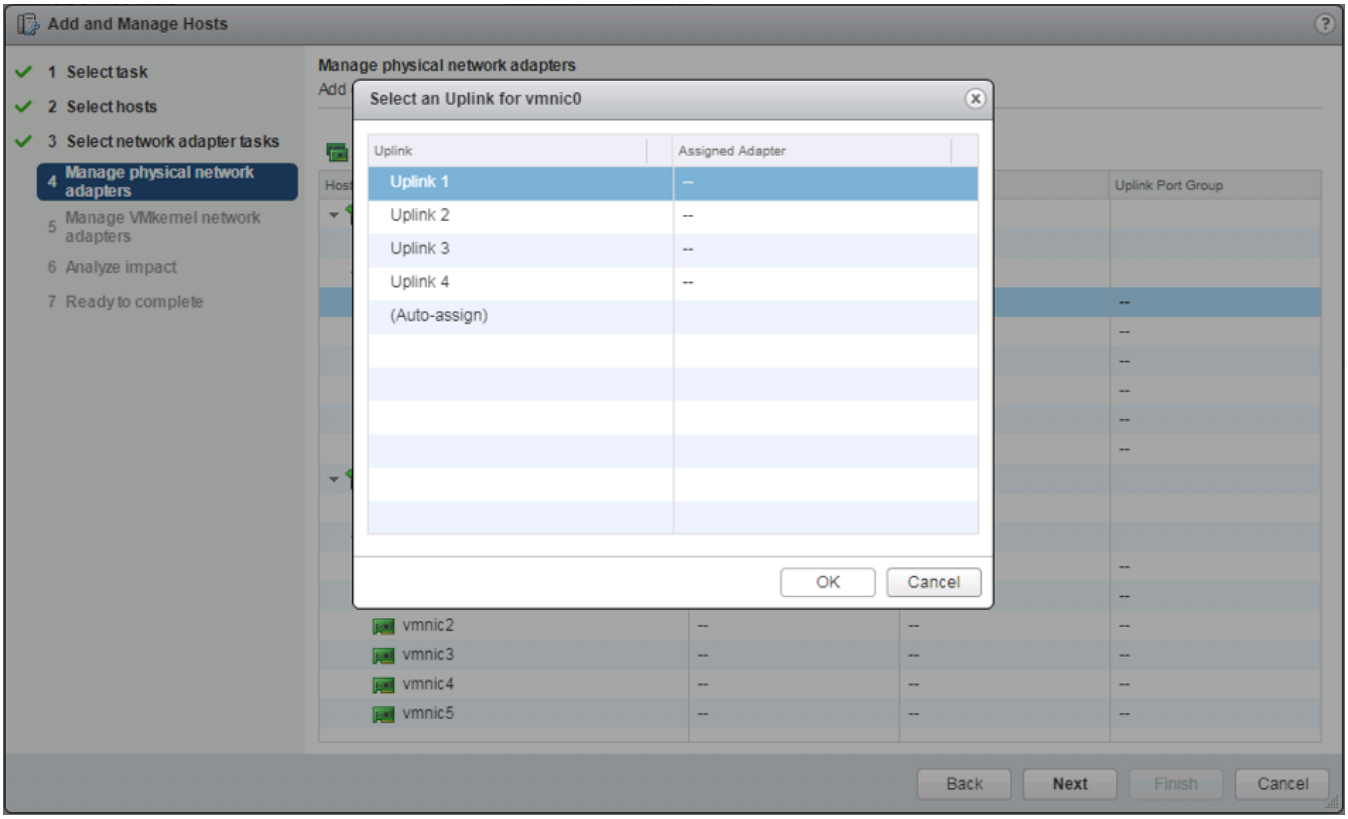
5. Click Next.



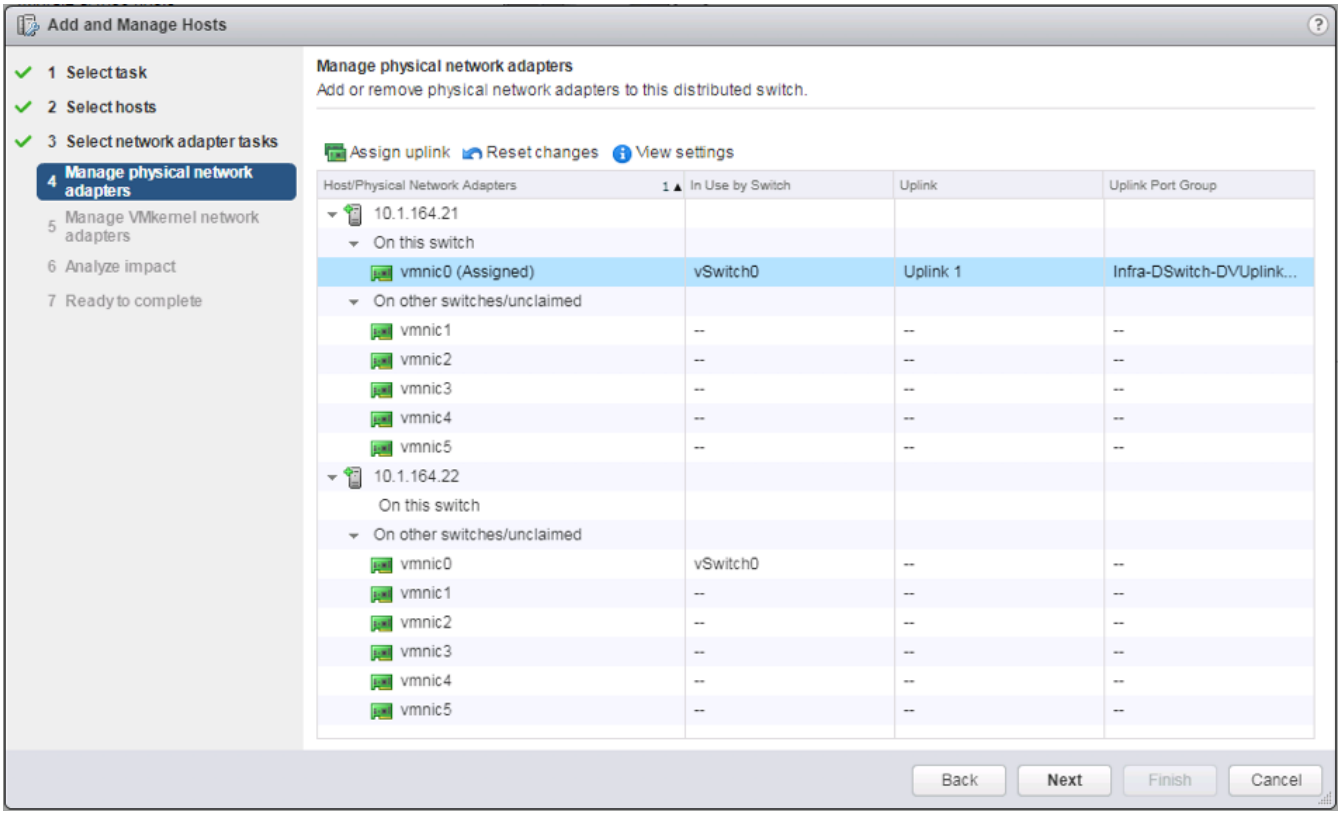
6. Leave Manage physical adapters and Manage VMkernel adapters both selected and click Next.



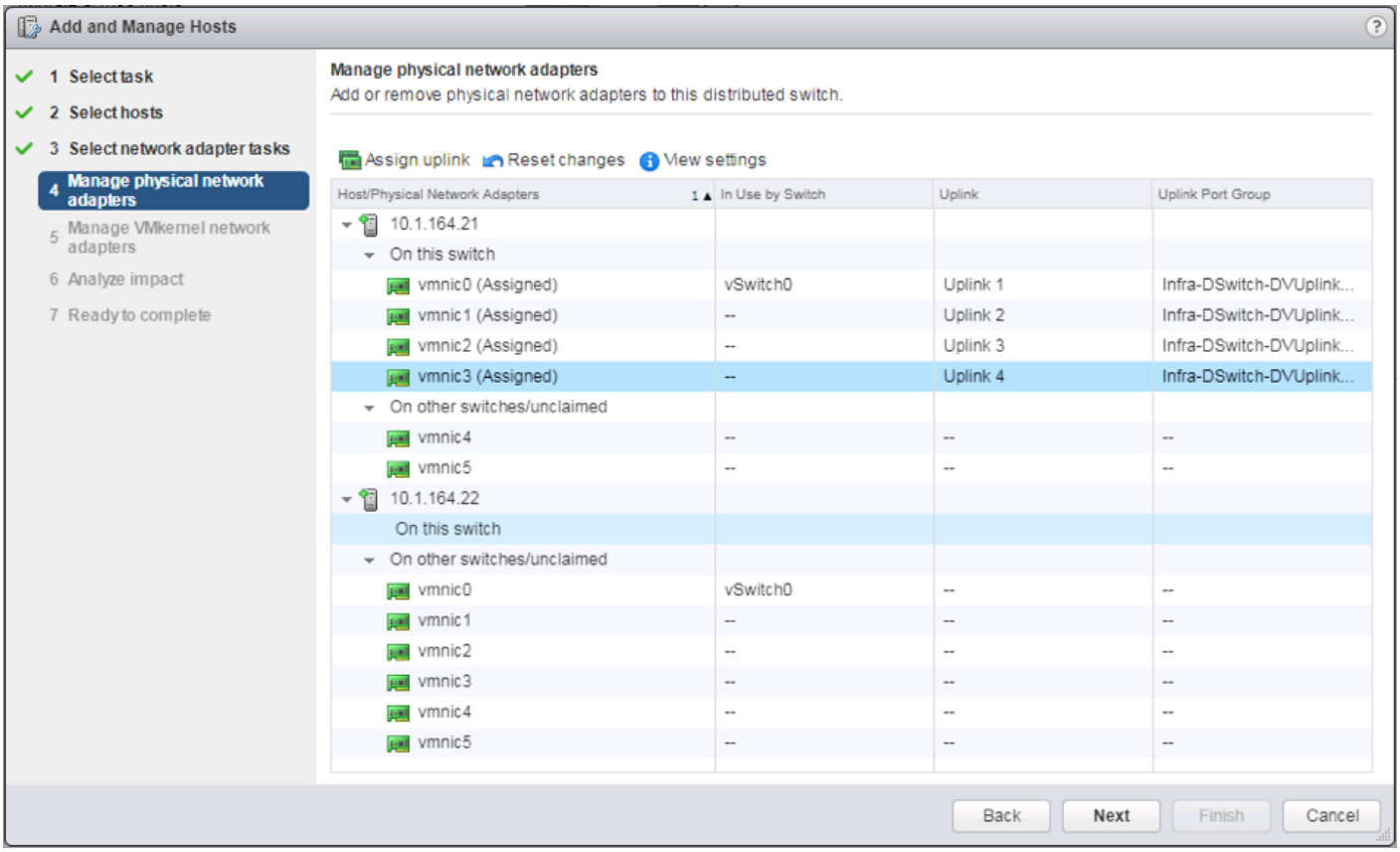
7. Select vmnic0 from the Host/Physical Network Adapters column and click the Assign uplink option.



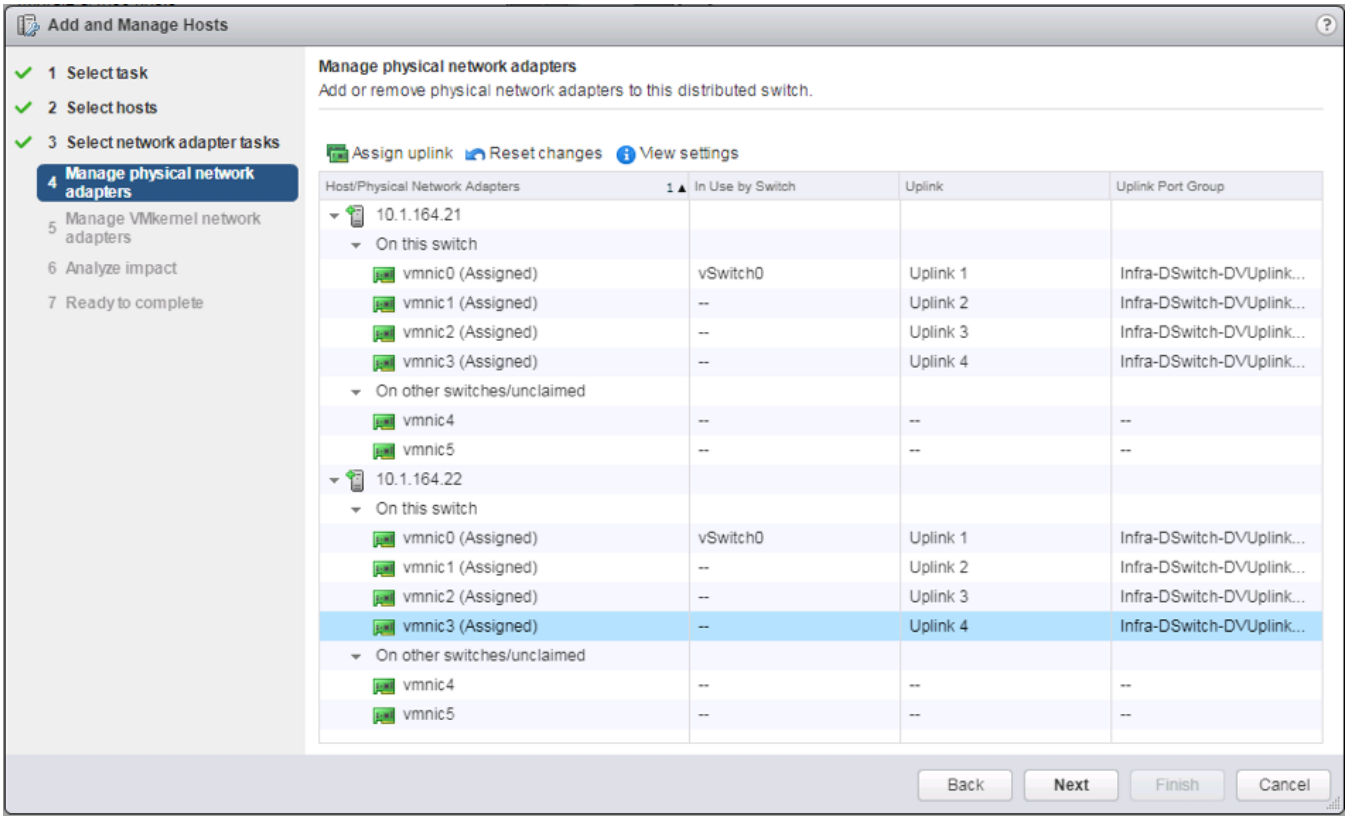
8. Leave Uplink 1 selected and click OK.



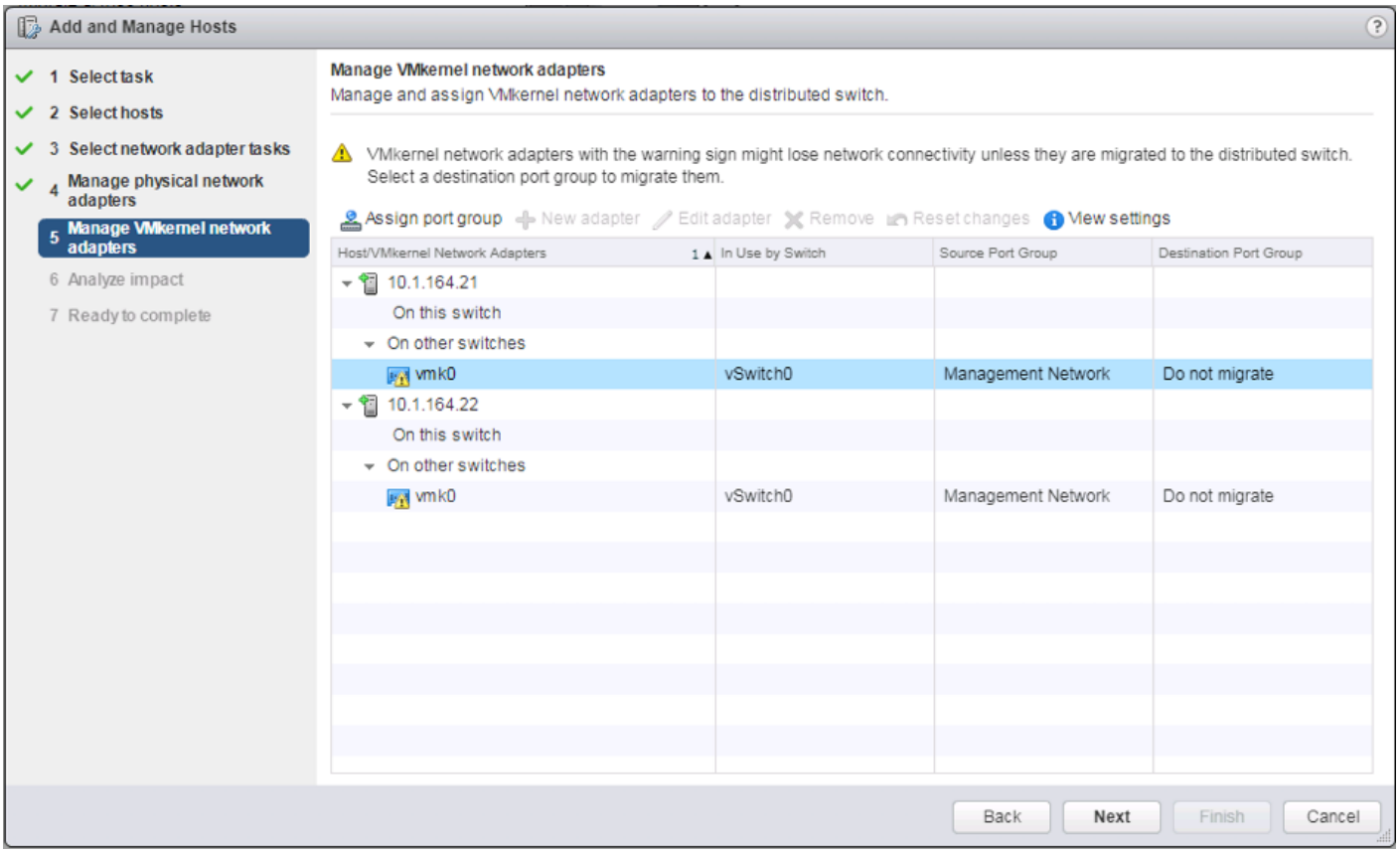
9. Repeat this step for vmnic1-3, assigning them to uplinks 2-4 in corresponding sequence.



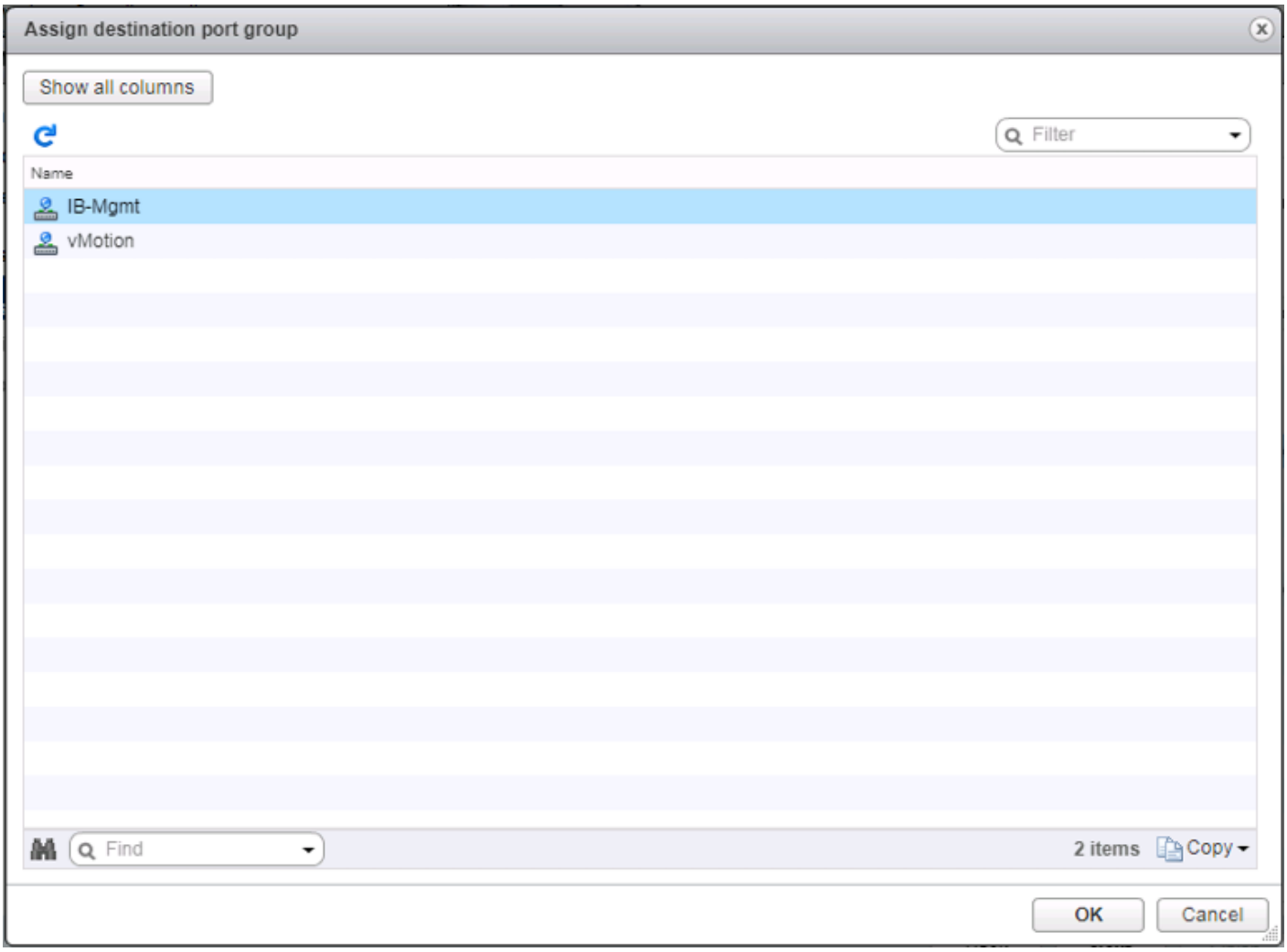
10. Repeat these assignment for all additional ESXi hosts being configured.



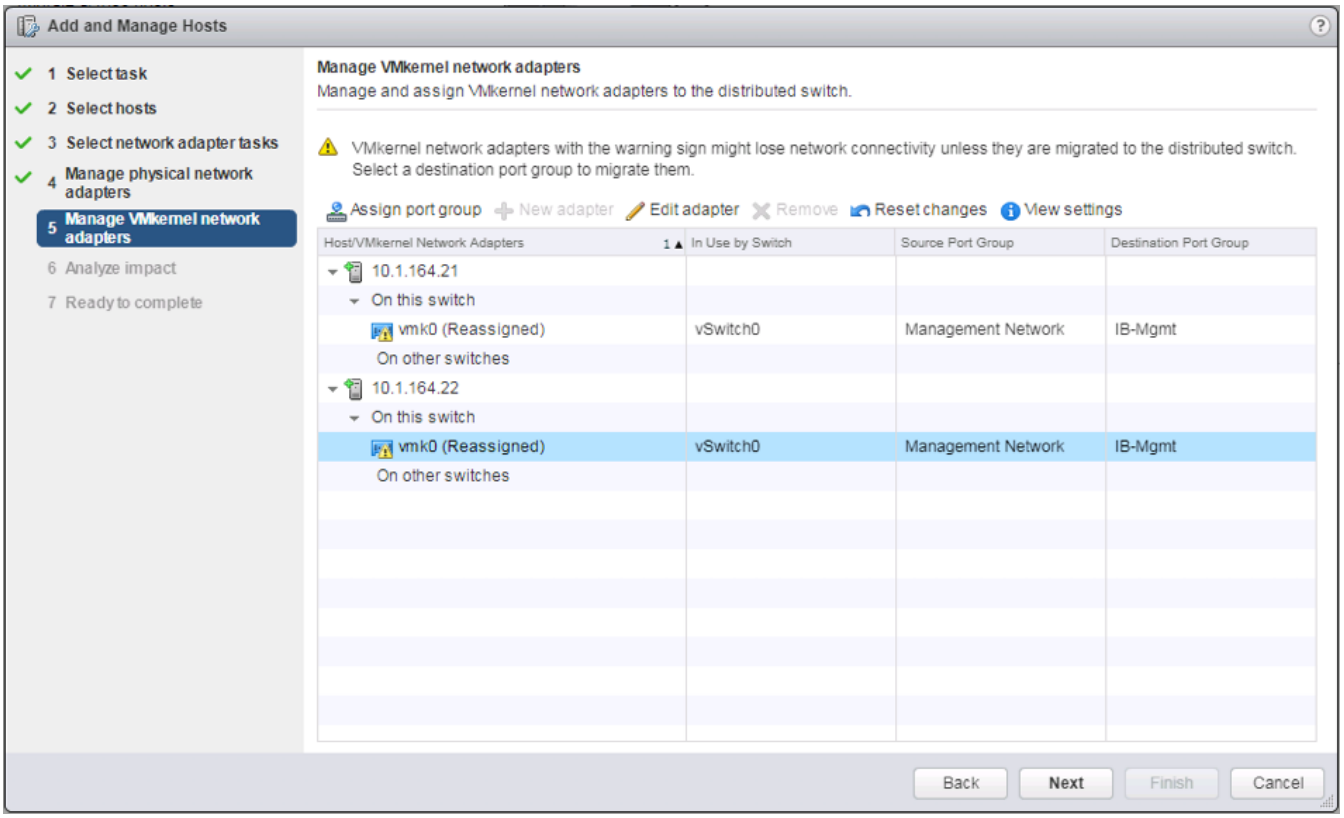
11. Click Next.



12. Select the vmk0 of the first host and click the Assign port group option.

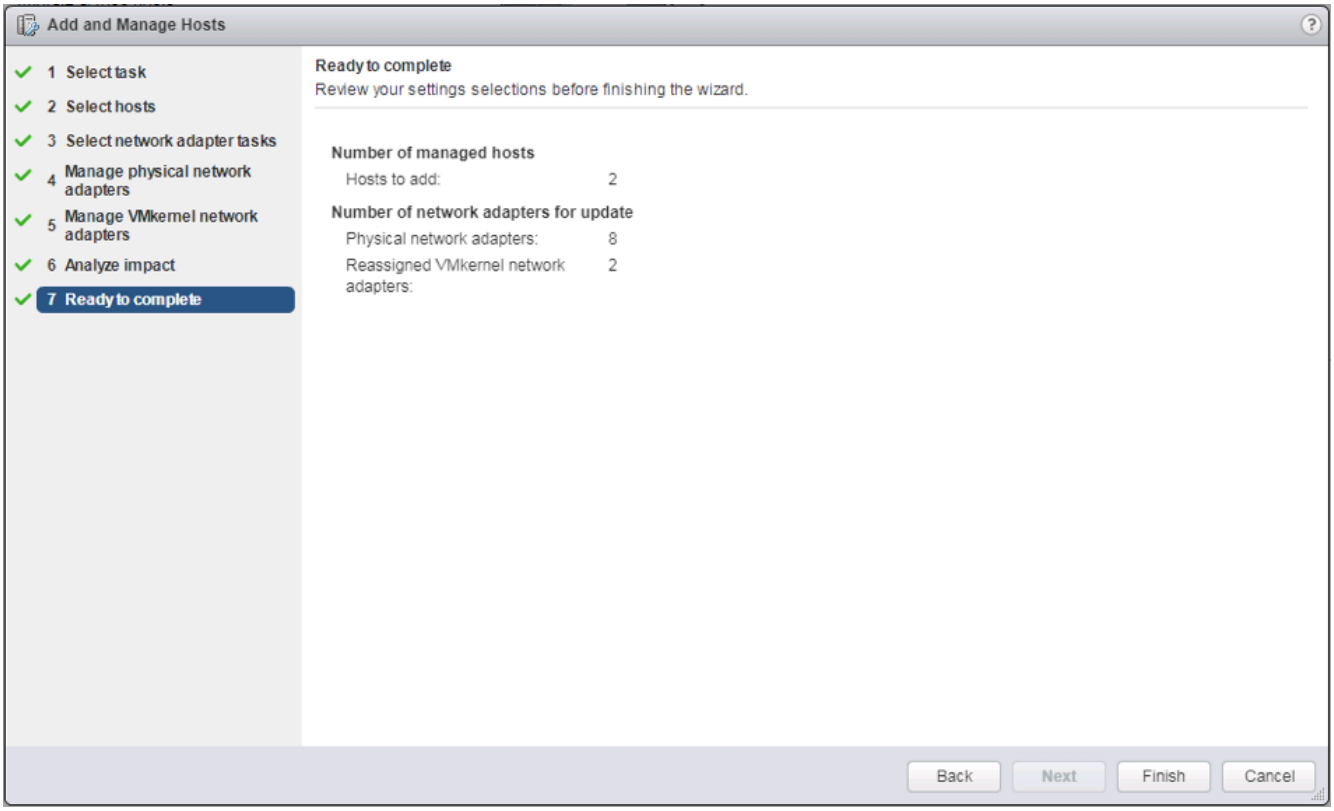


13. Select the IB-Mgmt destination port group and click OK.
14. Repeat this step for all additional hosts being configured.

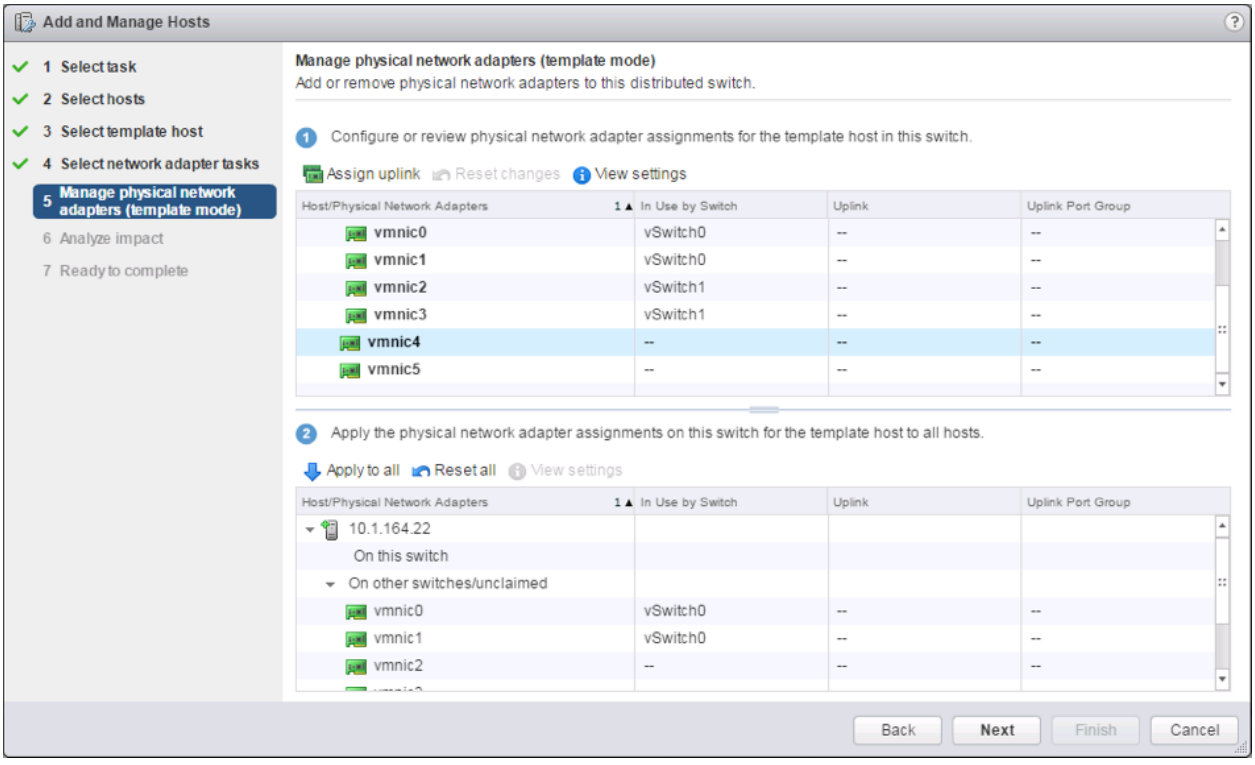


15. Click Next.

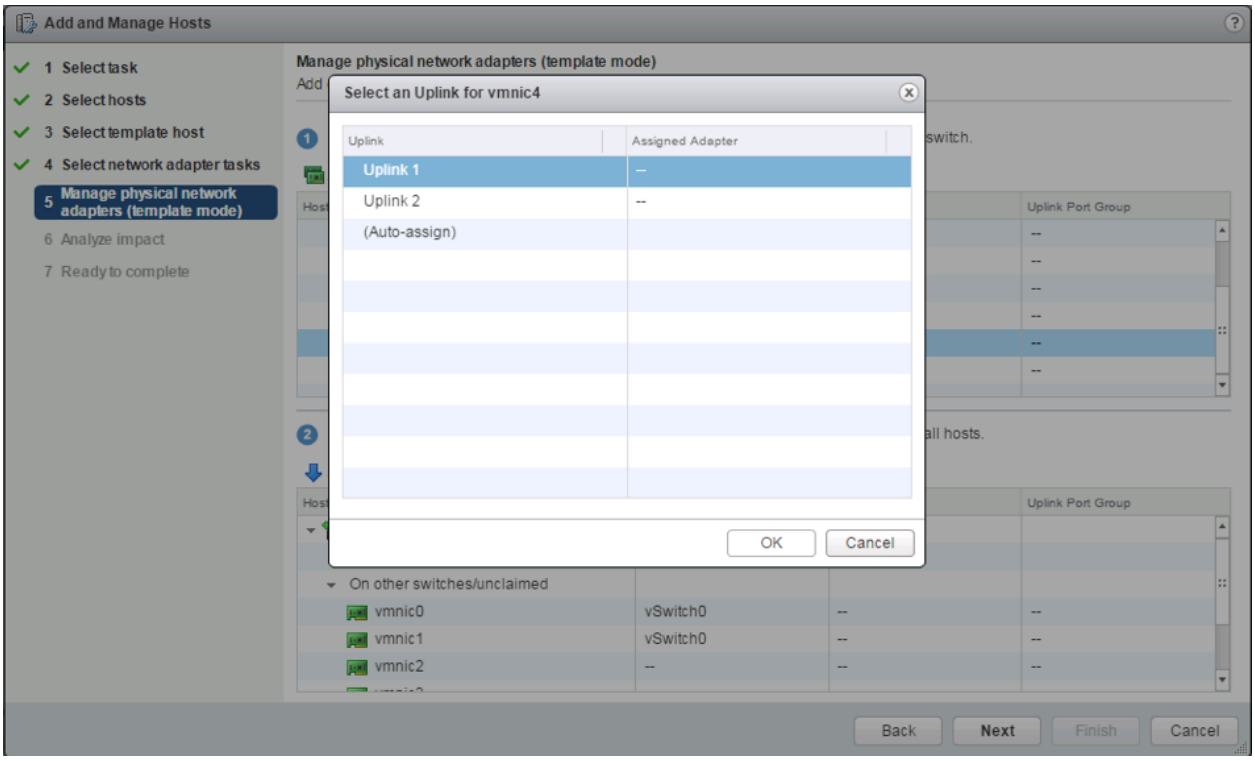
16. Click Next past Analyze impact.



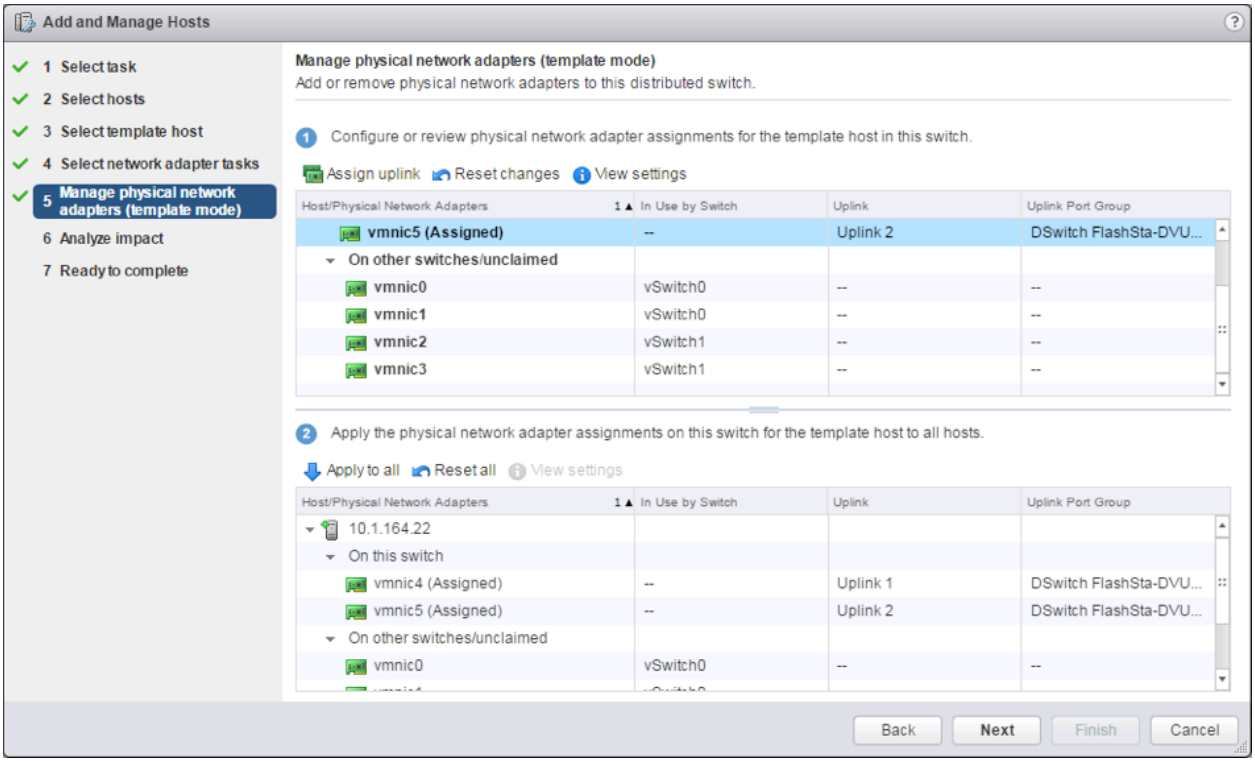
17. Review the settings and click Finish to apply.



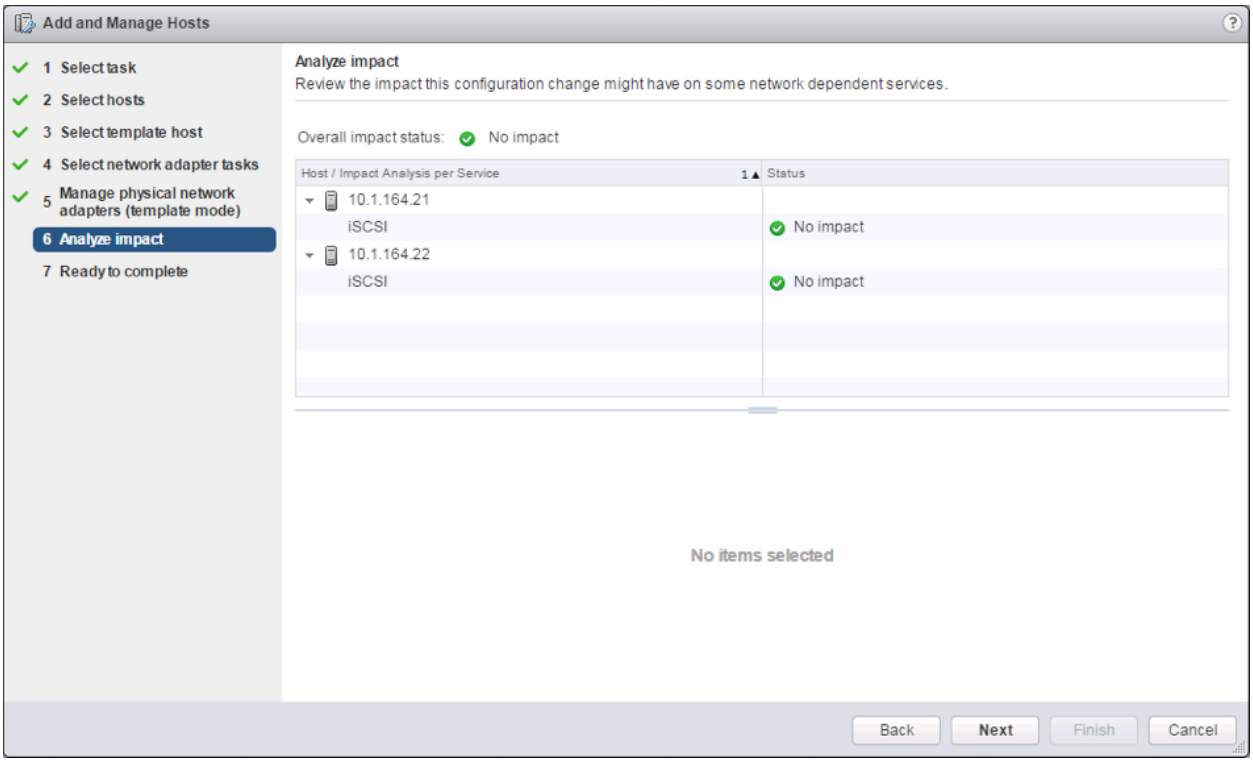
18. Assign the first to Uplink 1 and assign the second to Uplink 2.



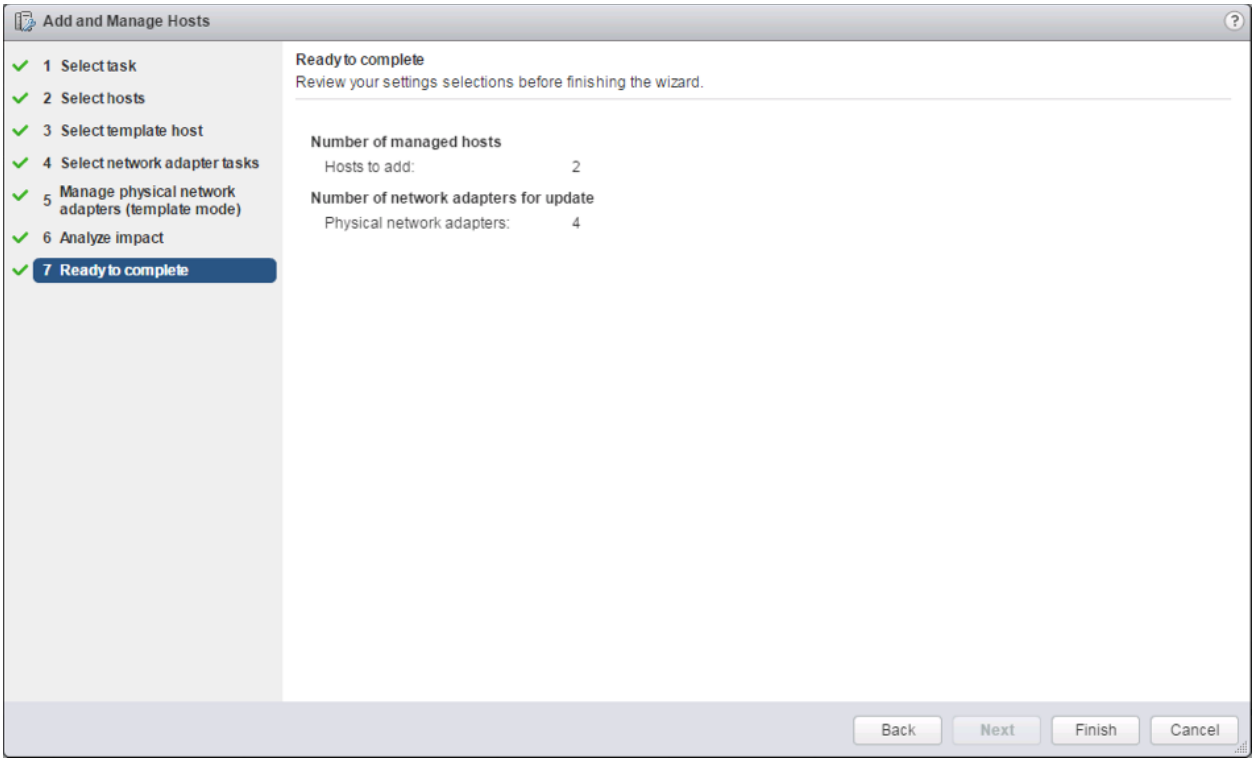
19. With both vmnics assigned, click Apply to all within the second part of this page, click OK in the Host Settings Not Applied pop-up that will appear, and click Next.



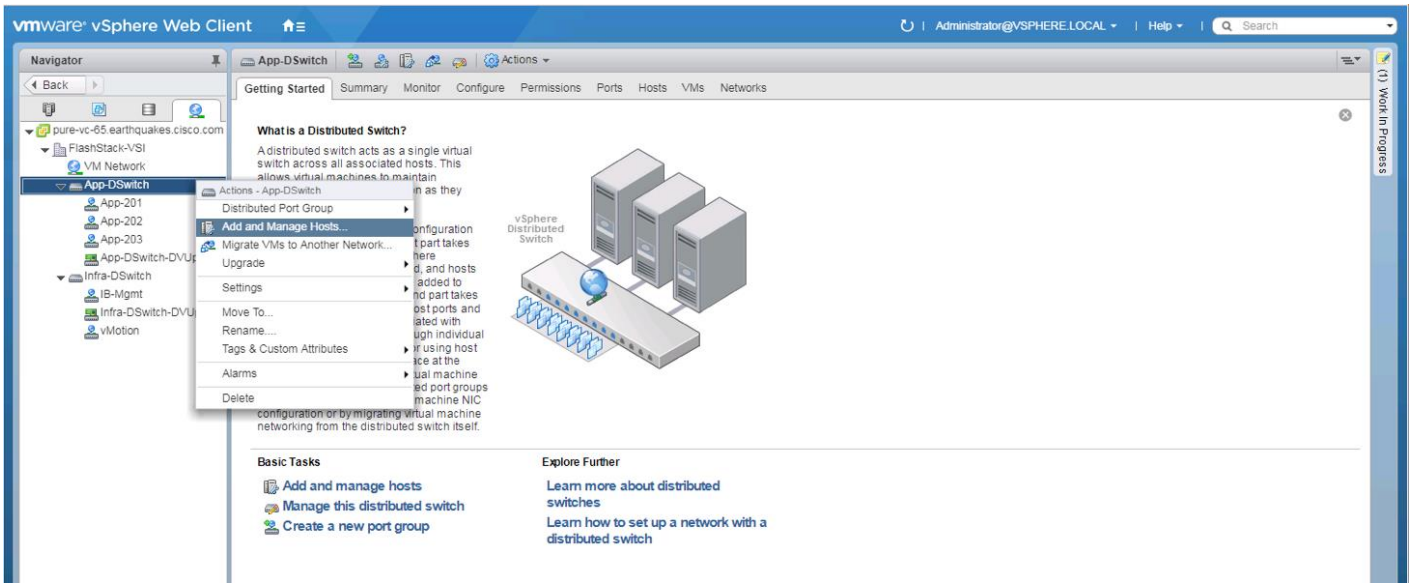
20. Proceed past the Analyze impact screen if no issues appear.



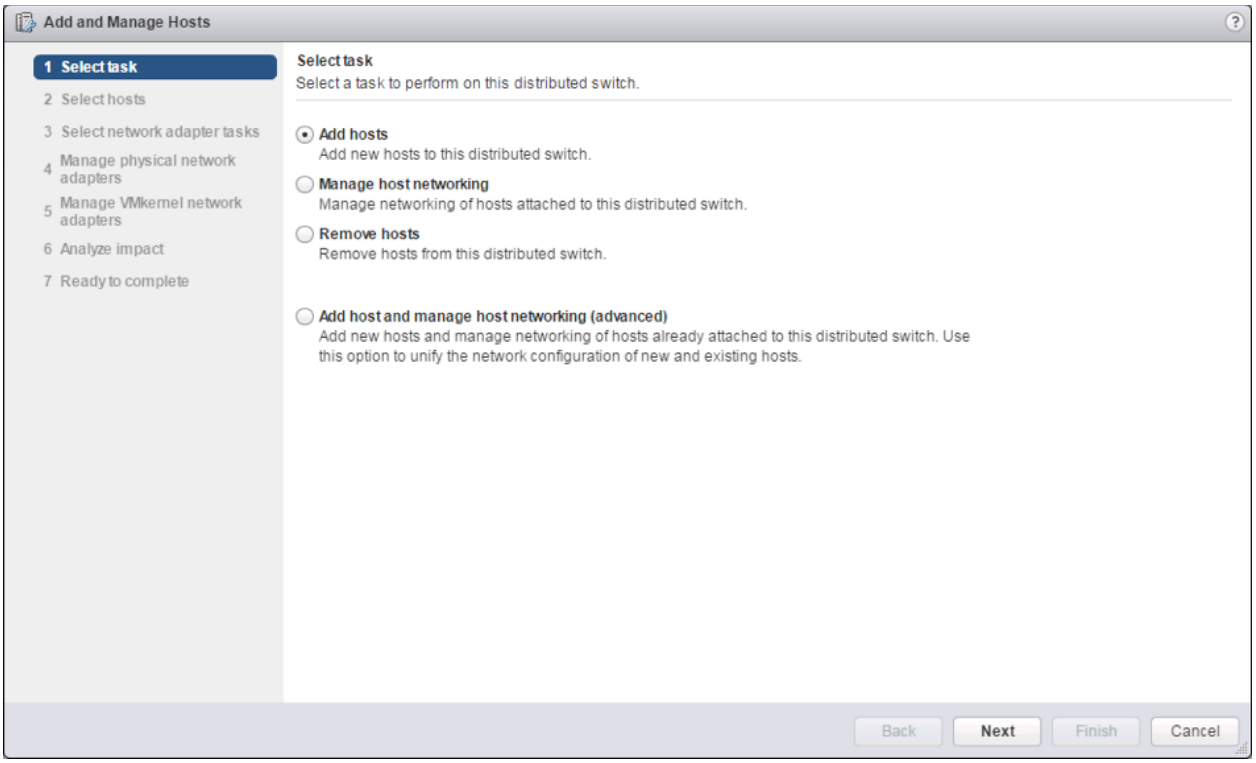
21. Review the Ready to complete summary and click Finish to add the hosts to the vDS.



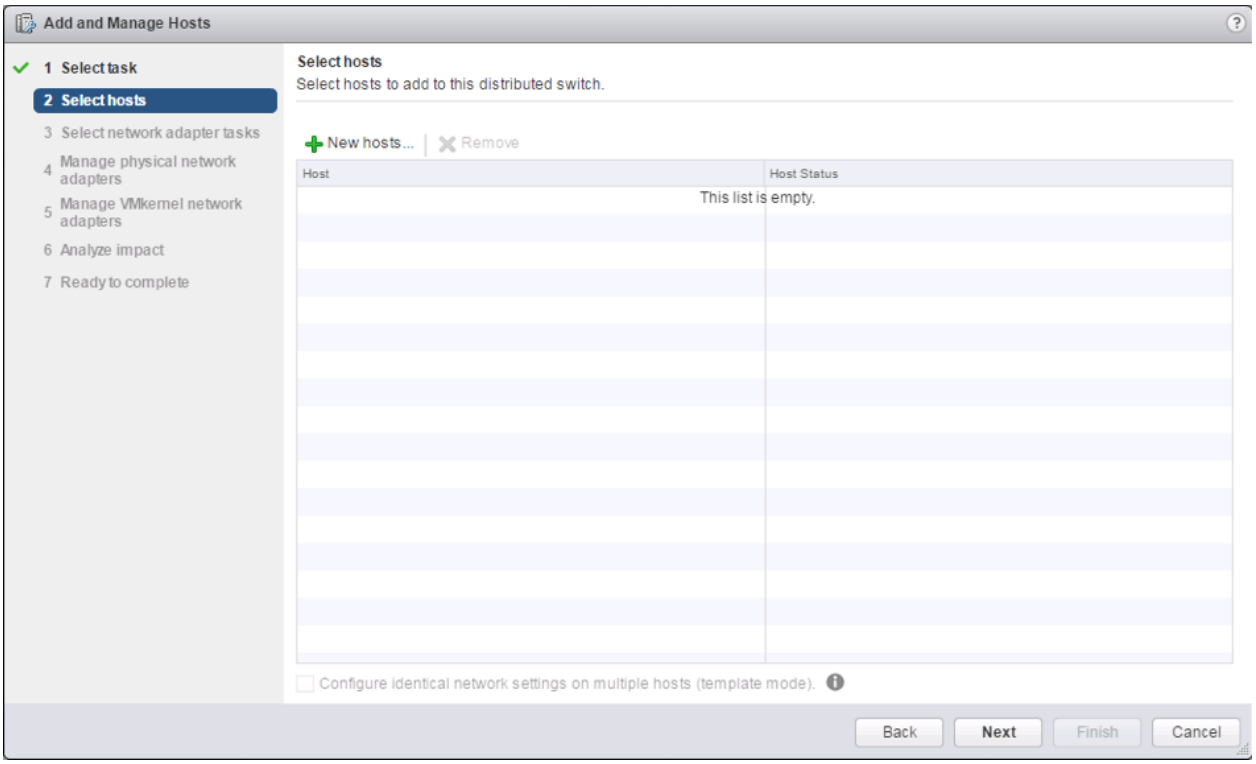
22. Similar to the steps followed for adding the Infra-DSwitch vDS, within the Networking tab of the Navigator window, right-click the App-DSwitch vDS and select Add and Manage Hosts...



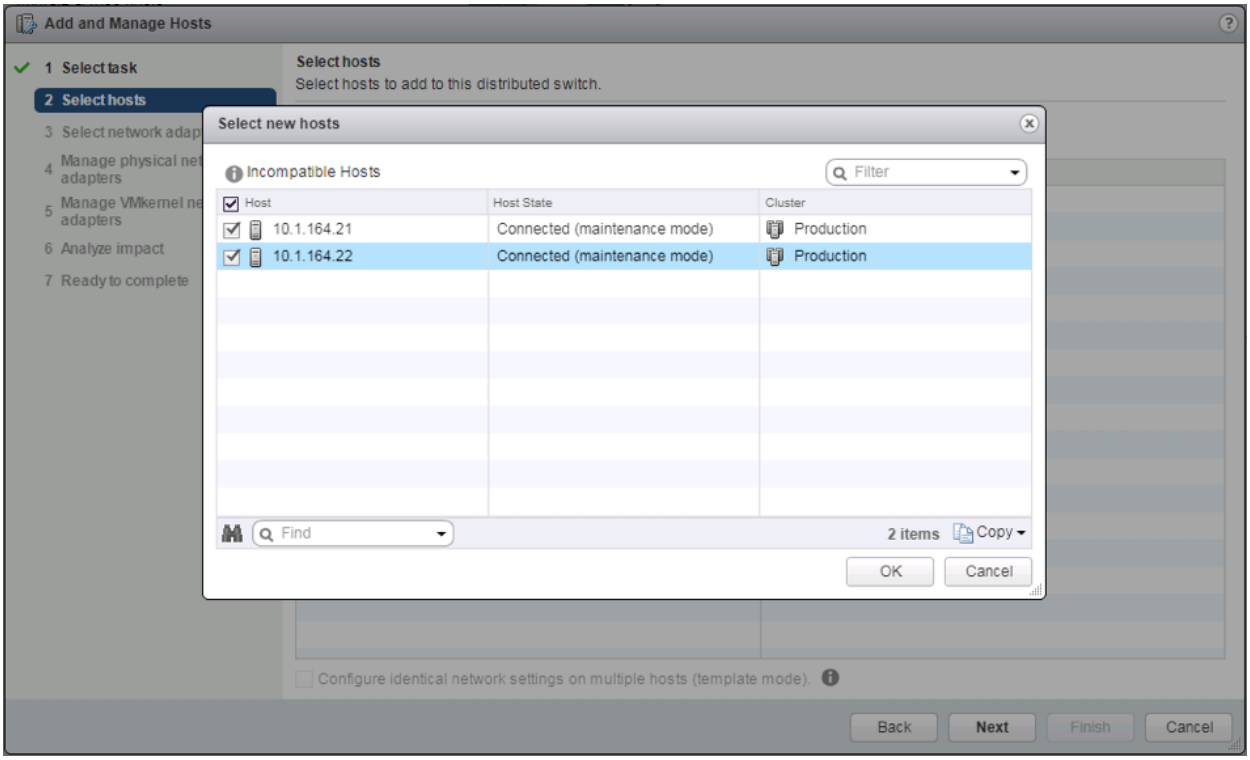
23. Leave Add hosts selected and click Next.



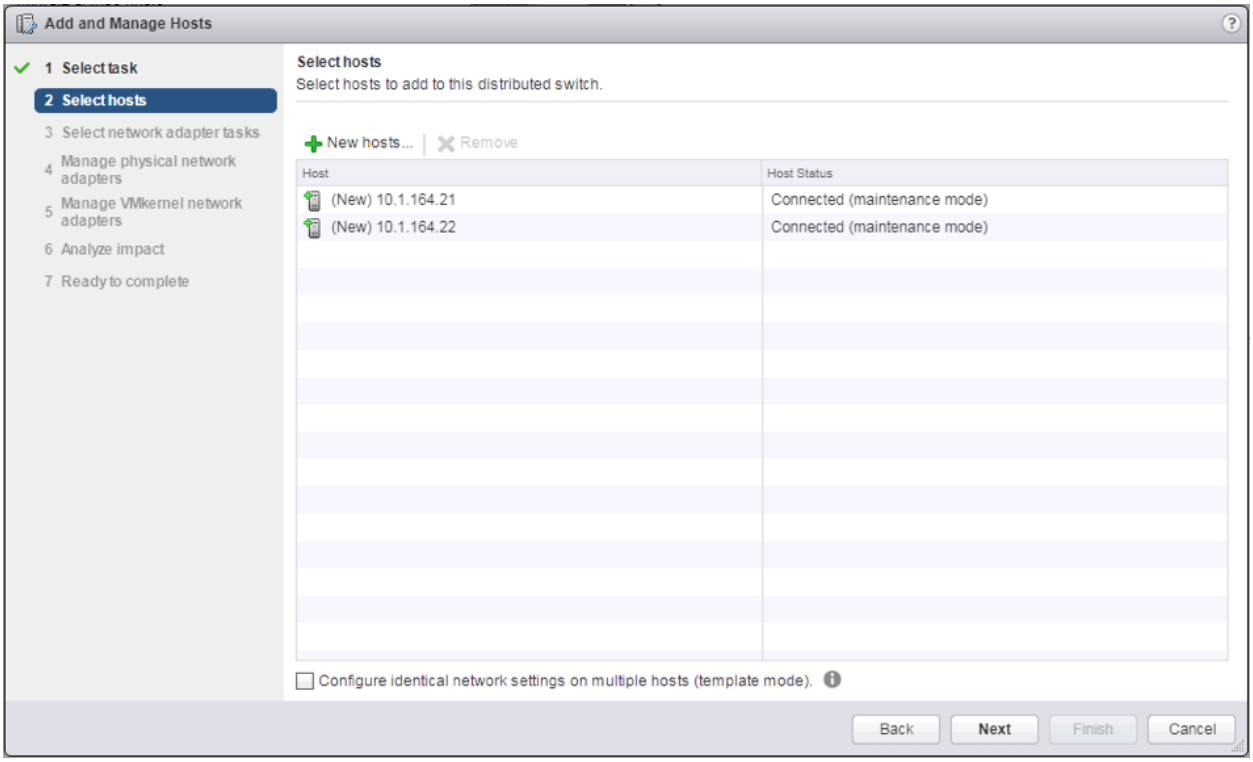
24. Click the green + icon next to New hosts...



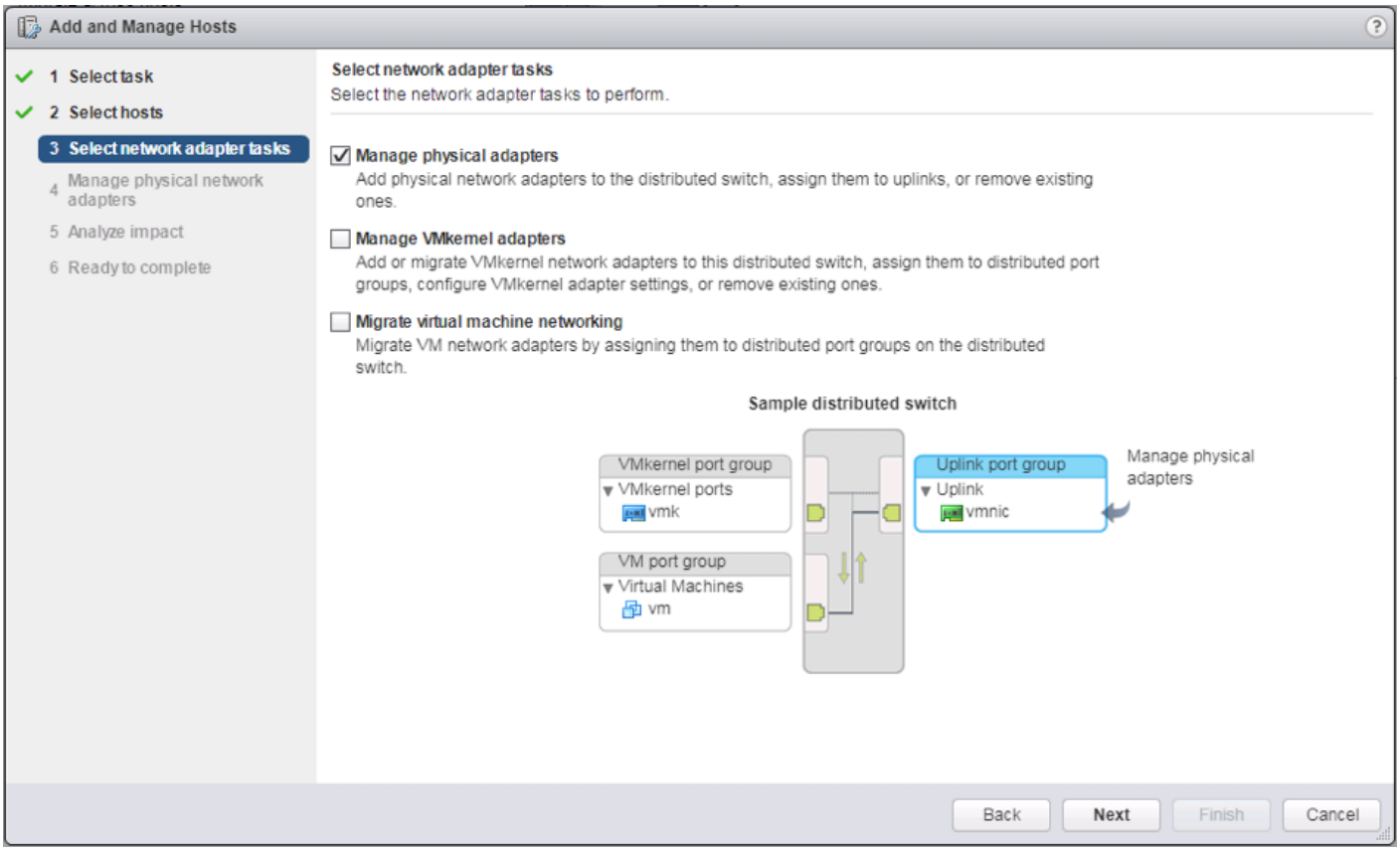
25. In the Select new hosts pop-up that appears, select the hosts to be added, and click OK to begin joining them to the vDS.



26. Click Next.

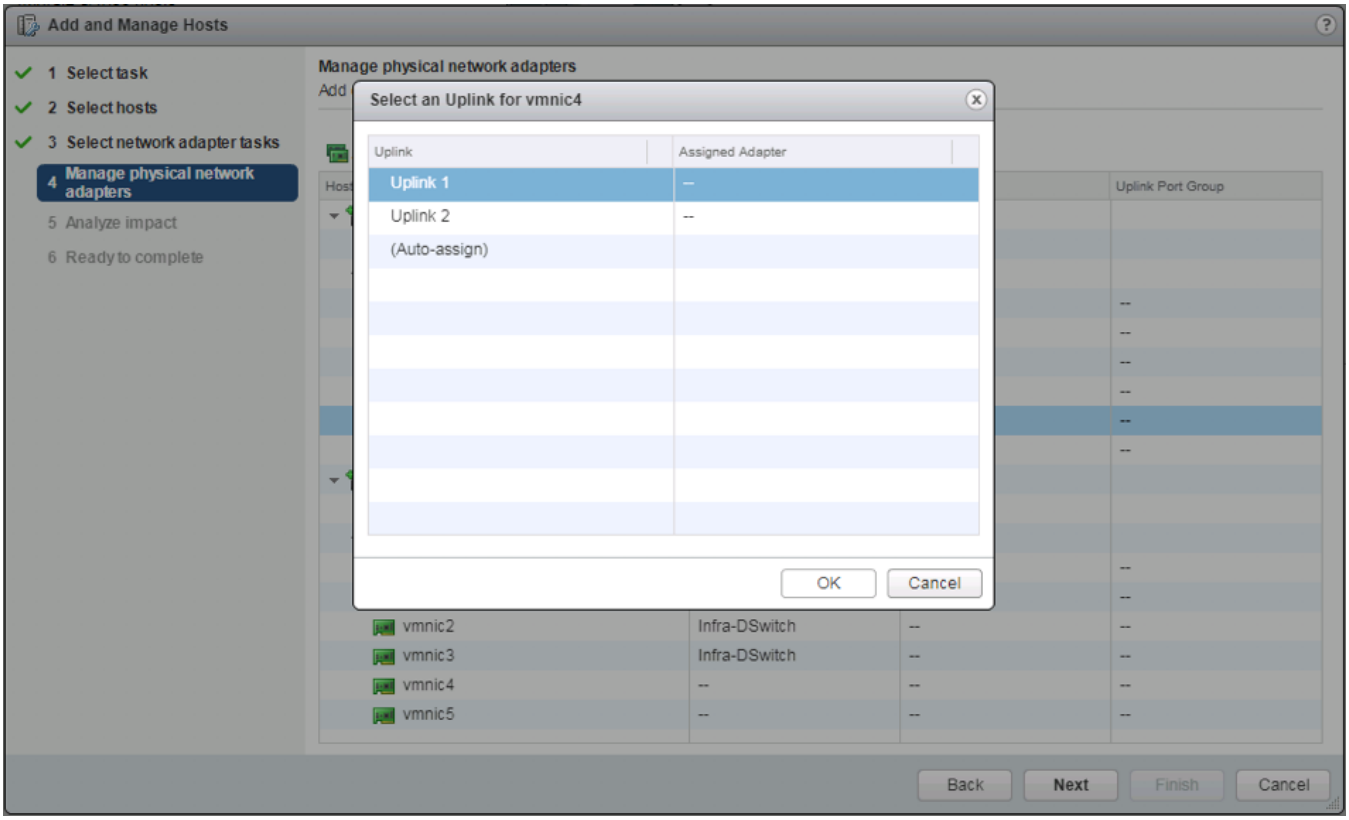


27. Leave Manage physical adapters selected and unselect Manage VMkernel adapters.

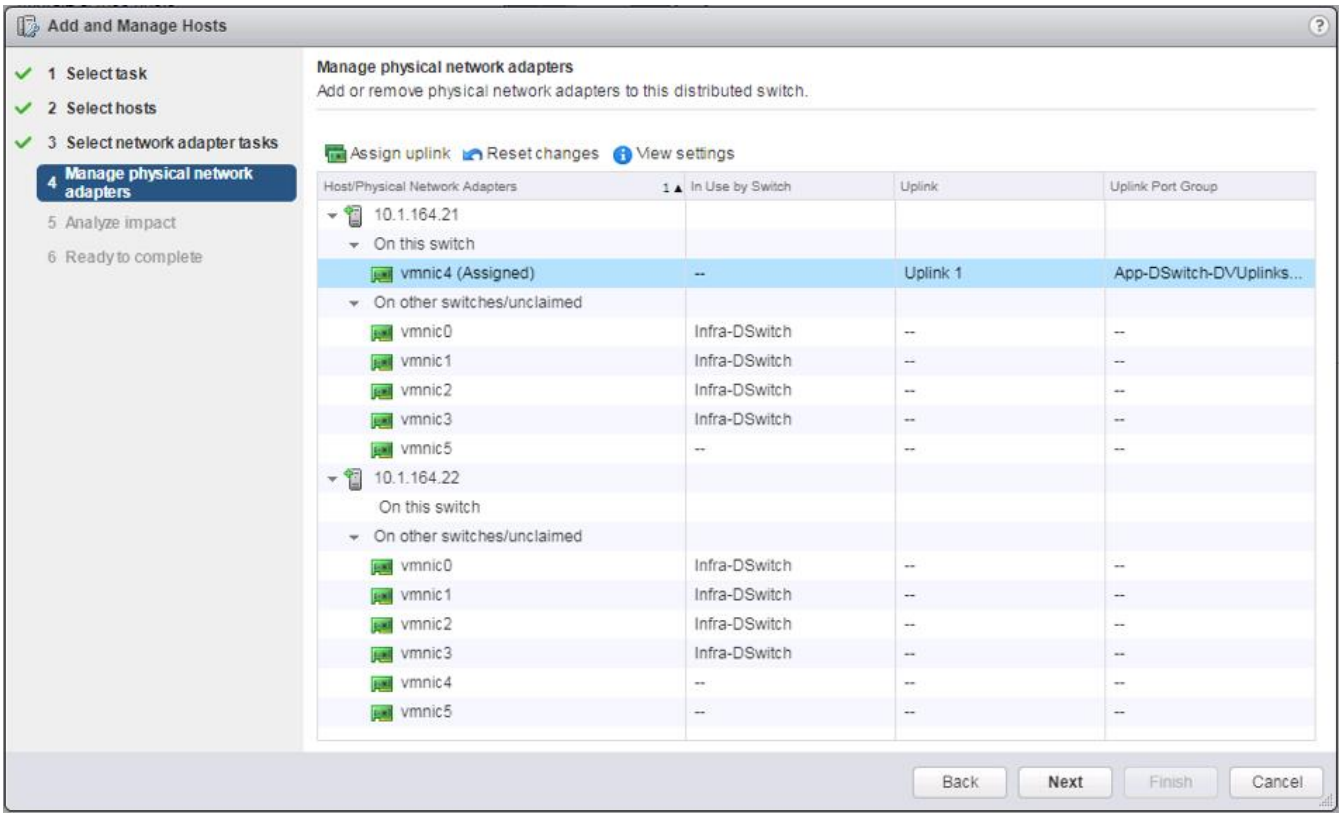


28. Click Next.

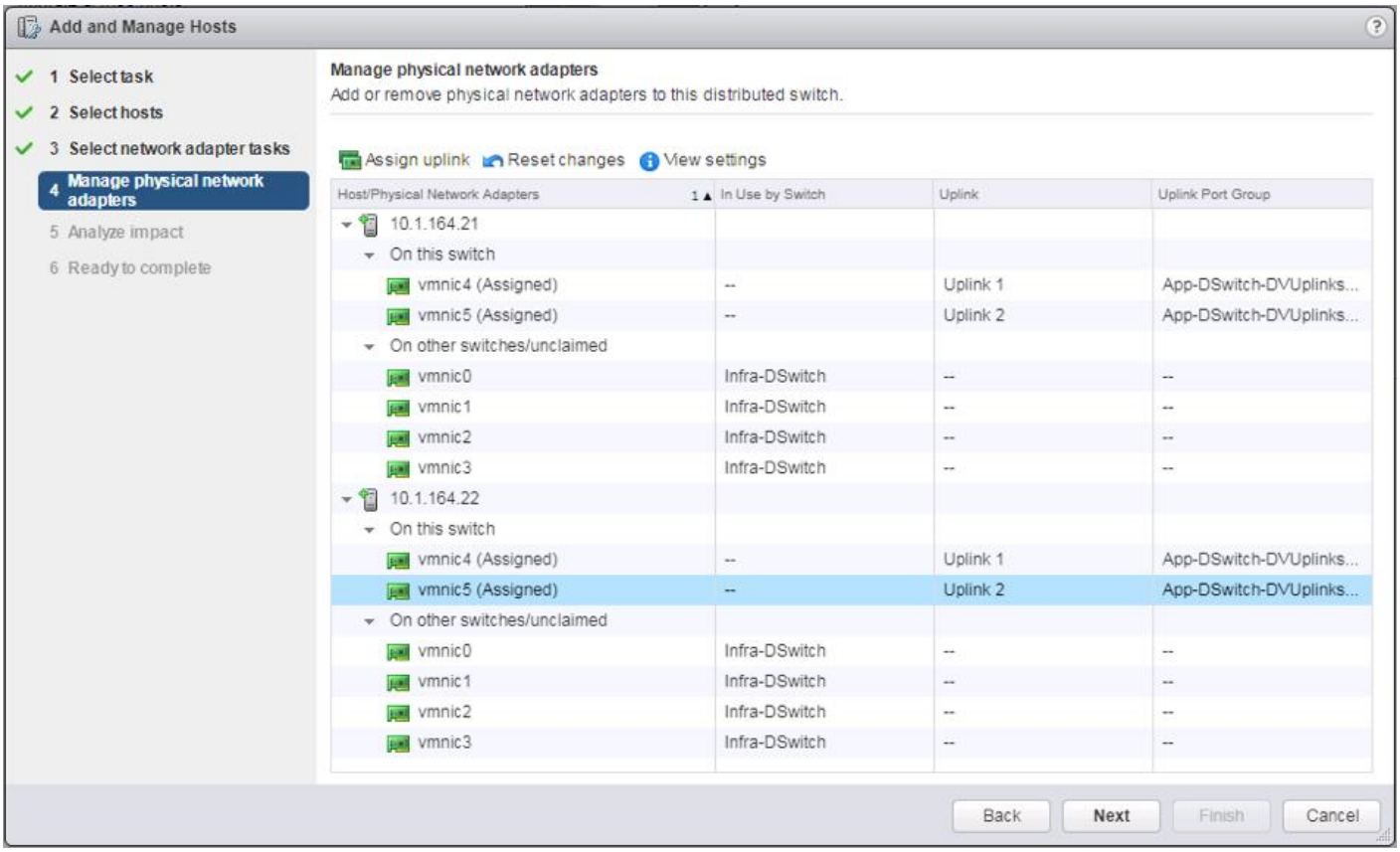
29. Select vmnic4 from the Host/Physical Network Adapters column and click the Assign uplink option.



30. Leave Uplink 1 selected and click OK.

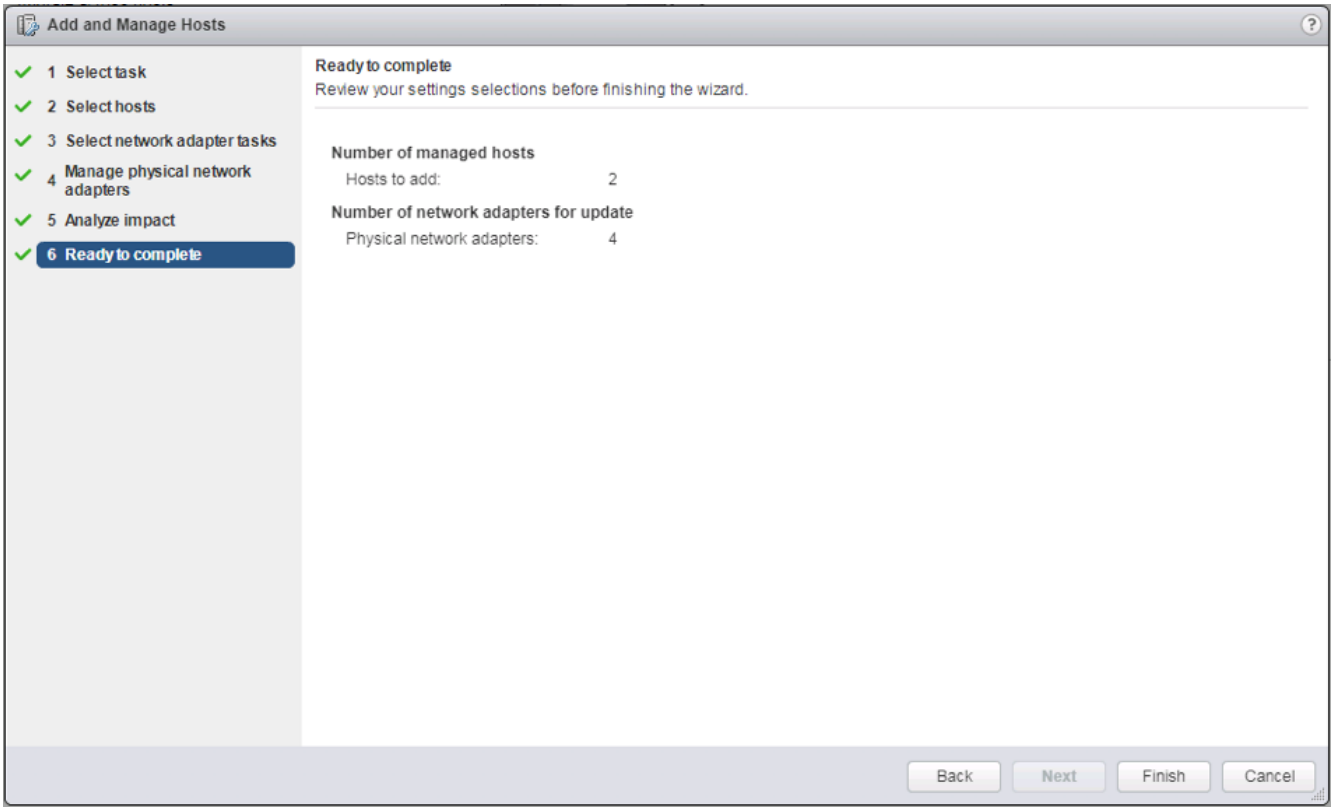


31. Repeat this step for vmnic5, assigning it to uplink 2, then perform these same steps for vmnic4 and vmnic5 for all remaining ESXi hosts to be configured.



32. Click Next.

33. Click Next past Analyze impact.



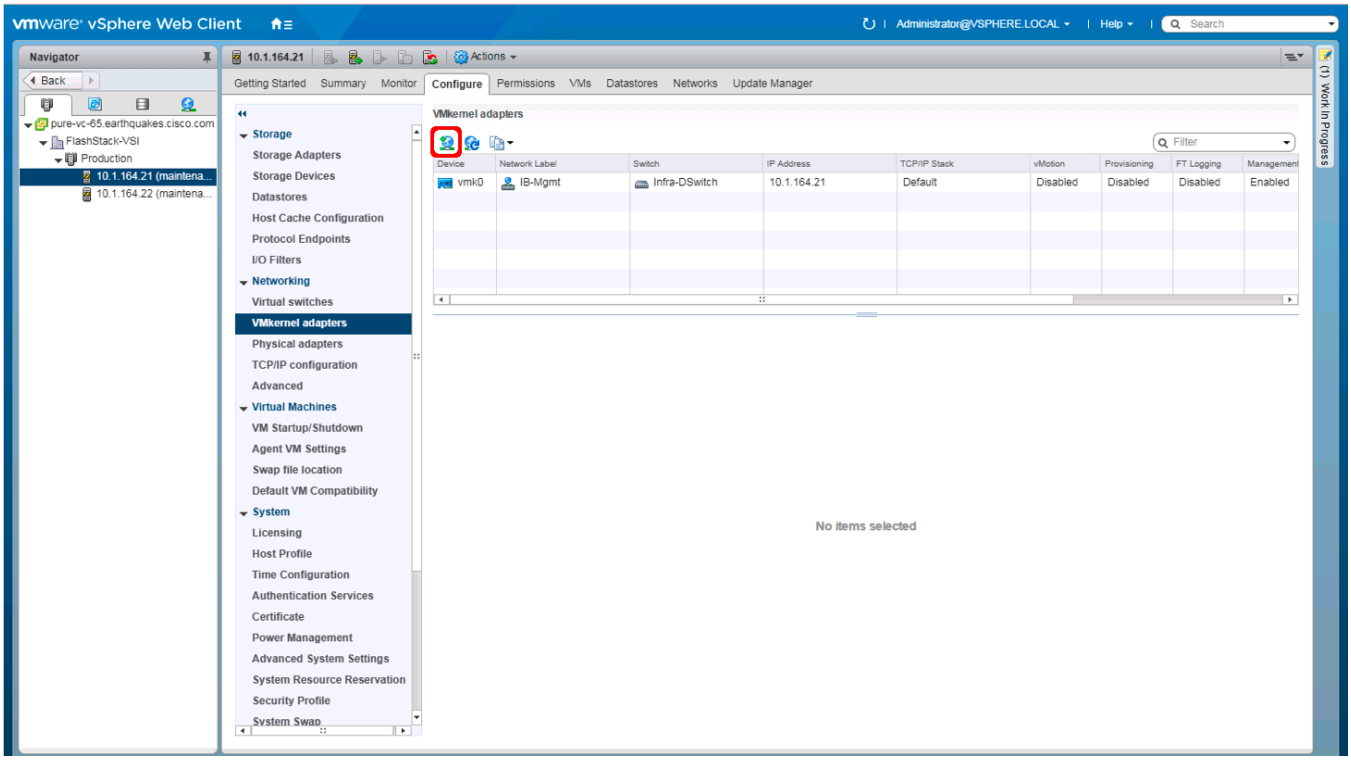
34. Review the settings and click Finish to apply.

Create vMotion VMkernel adapters

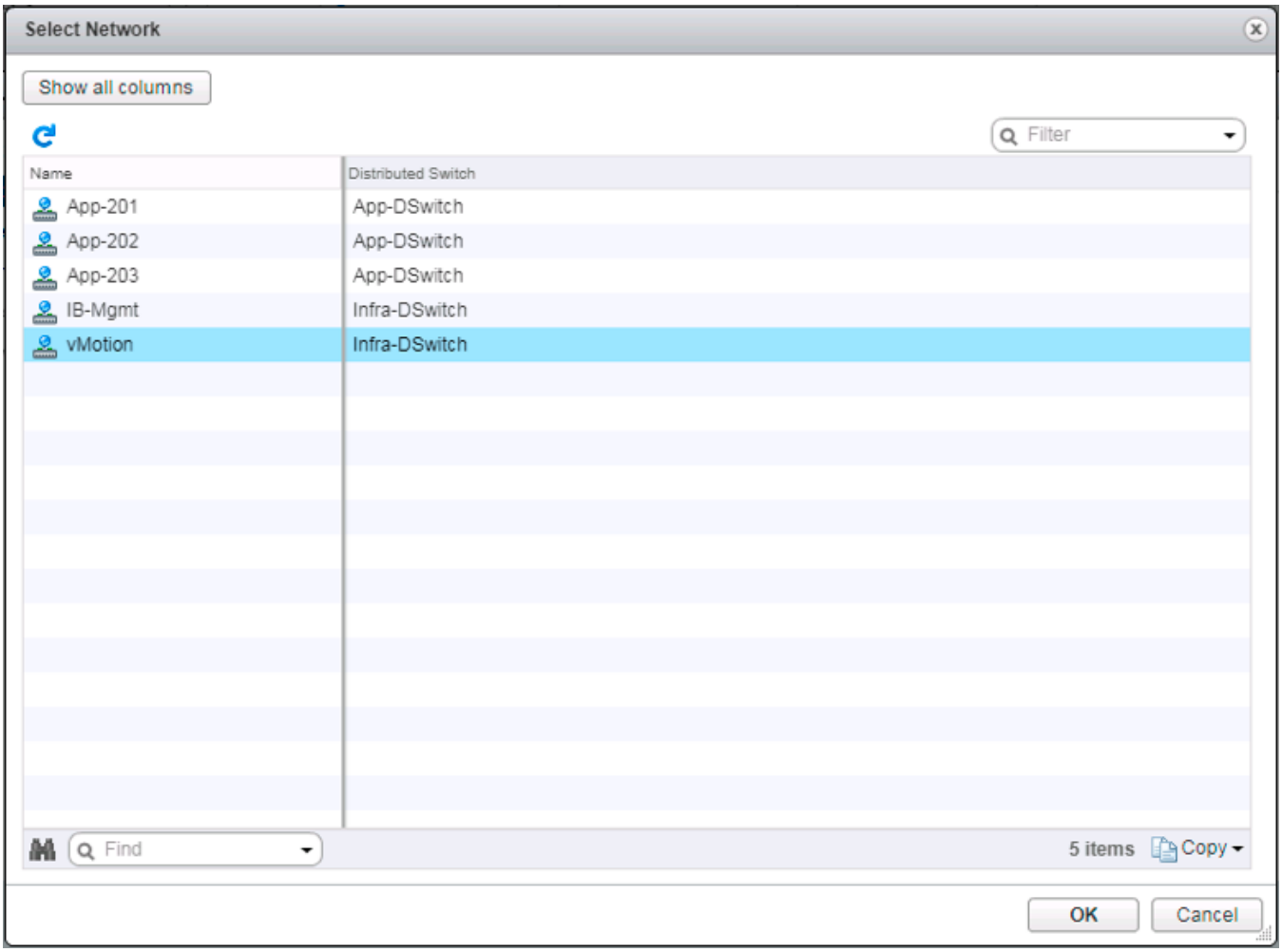
A vMotion VMkernel adapter will be created for FlashStack infrastructure to keep vMotion traffic independent of management traffic. To create the vMotion VMkernel adapters, complete the following steps:

1. From the Hosts and Clusters, drill down to the first host and select the Configure tab for that host.

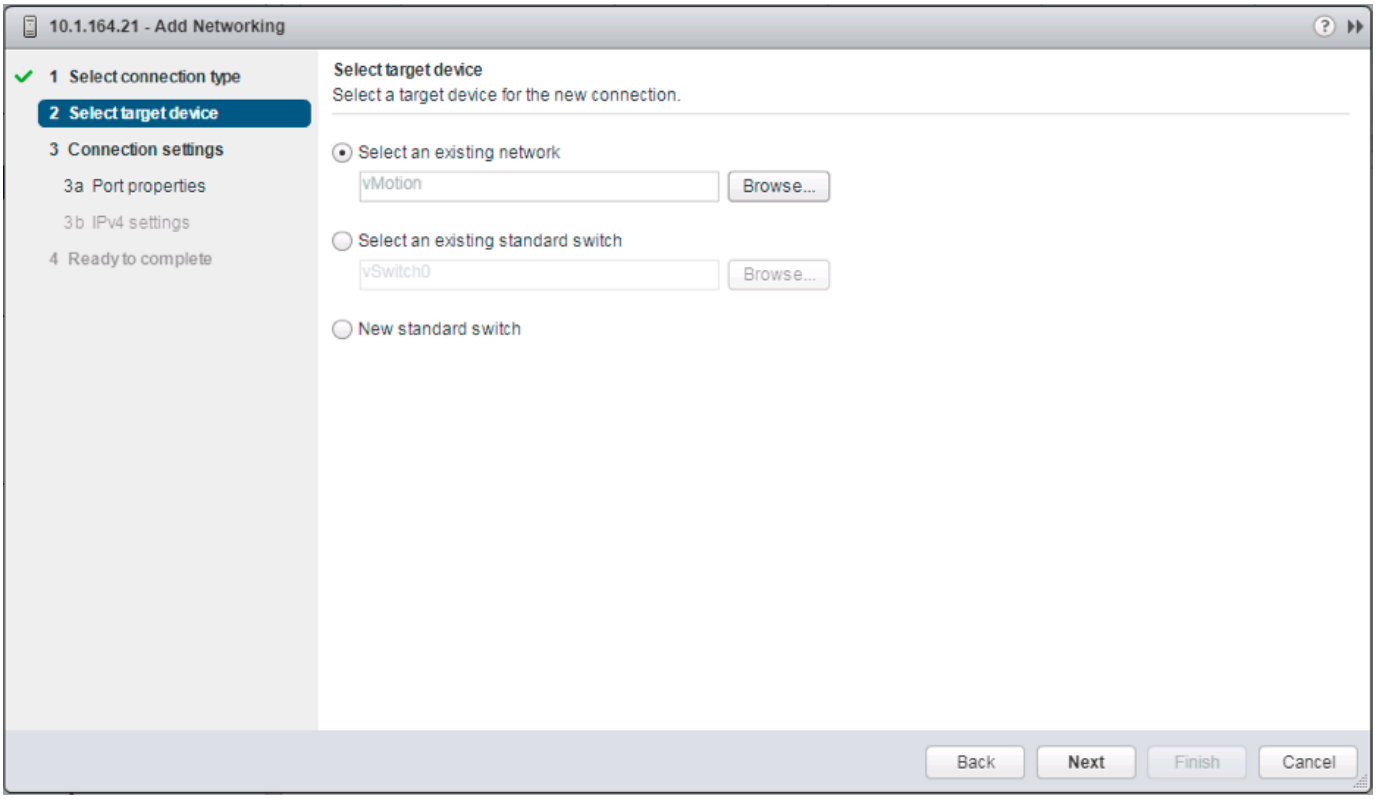
2. Select the VMkernel adapters option within the Networking section of Configure.



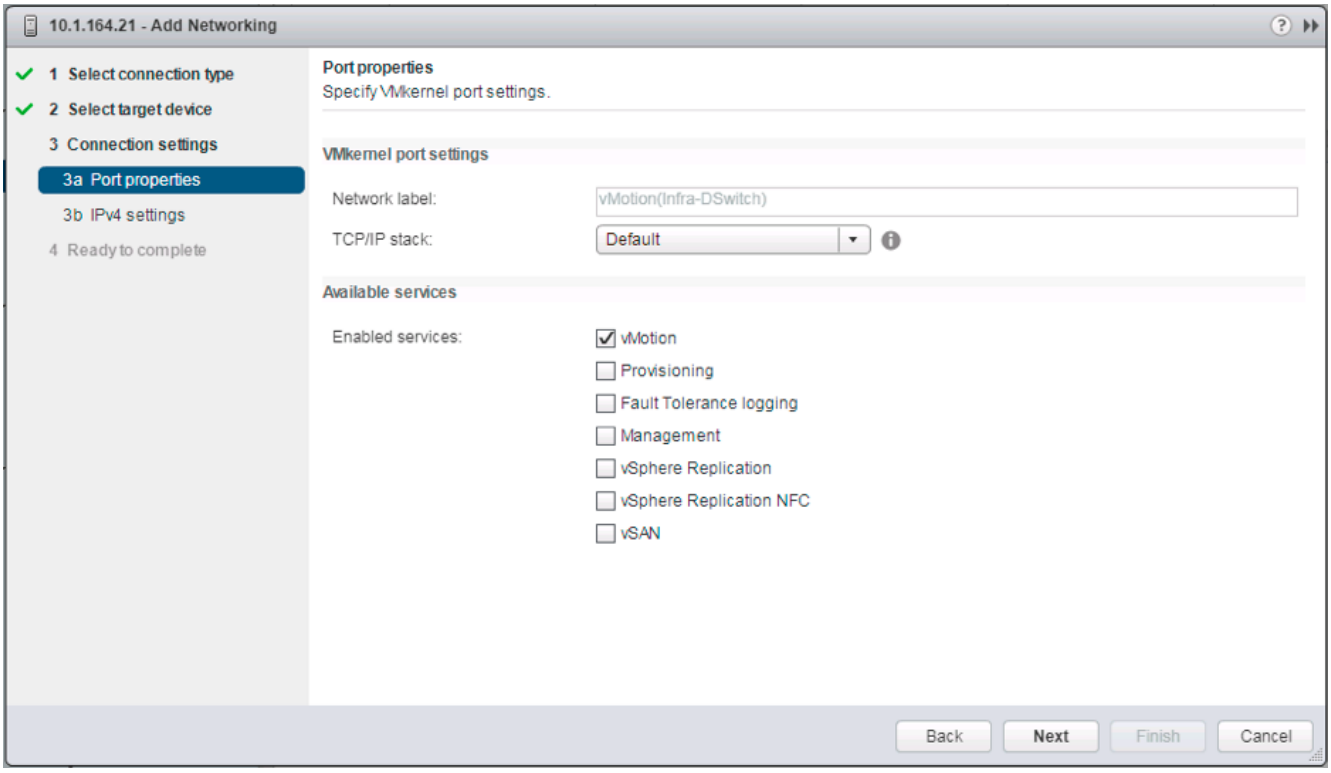
3. Click the first icon under VMkernel adapters to Add host networking.
4. Leave the connection type selected as VMkernel Network Adapter and click Next.
5. Select Browse with Select an existing network selected.



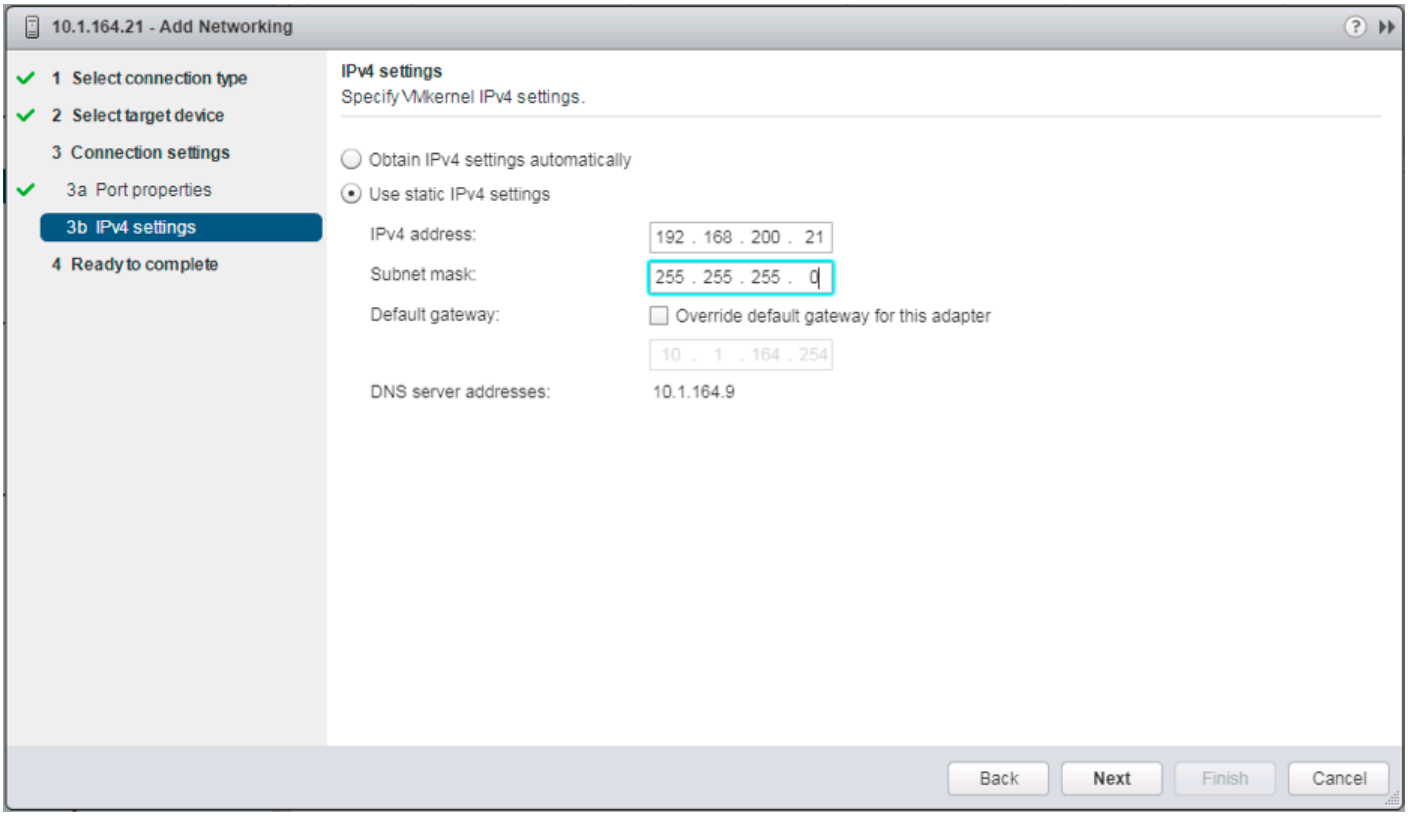
6. Pick the vMotion network from the list shown and click OK.



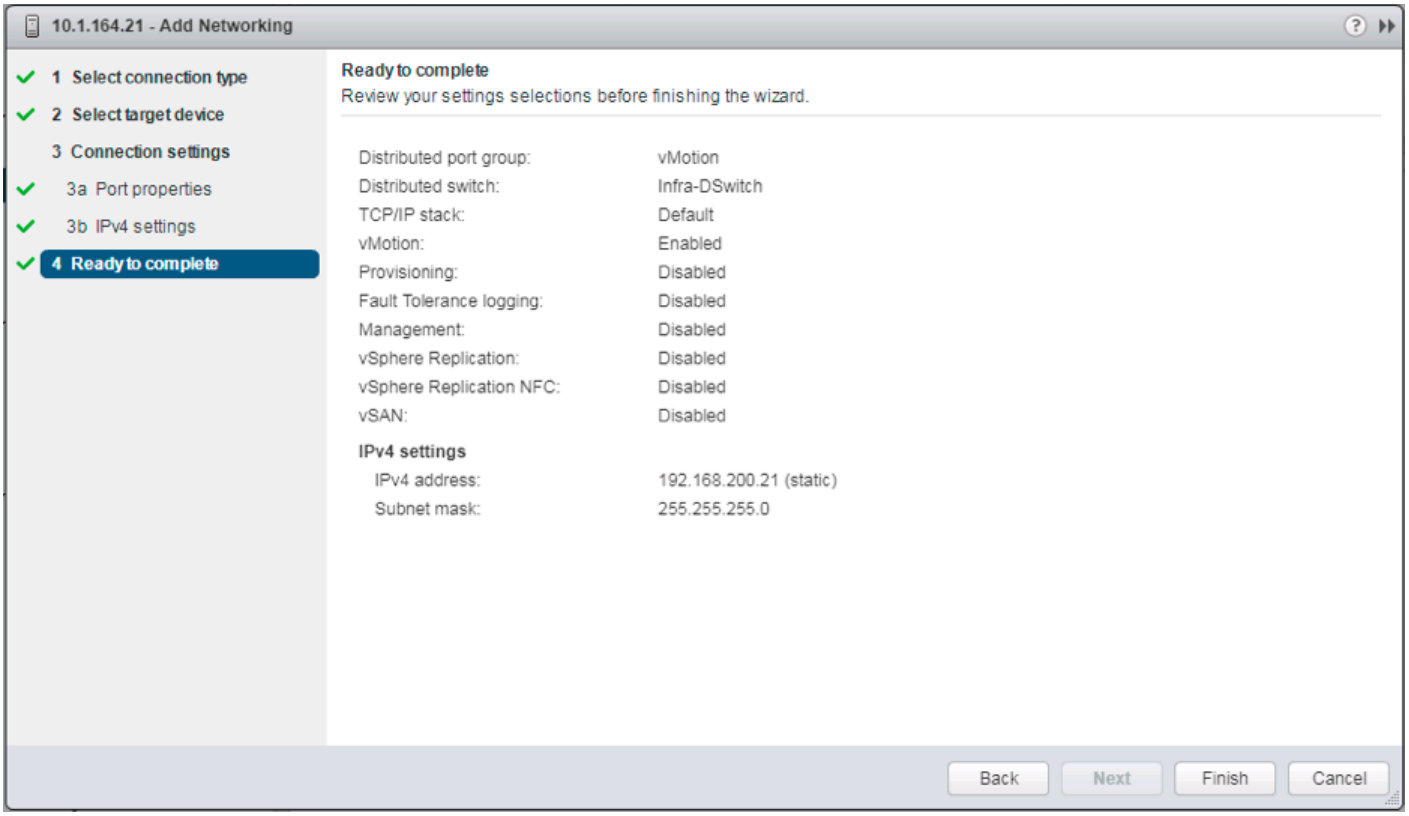
7. Click Next.



8. Select the vMotion from the Available services and click Next.

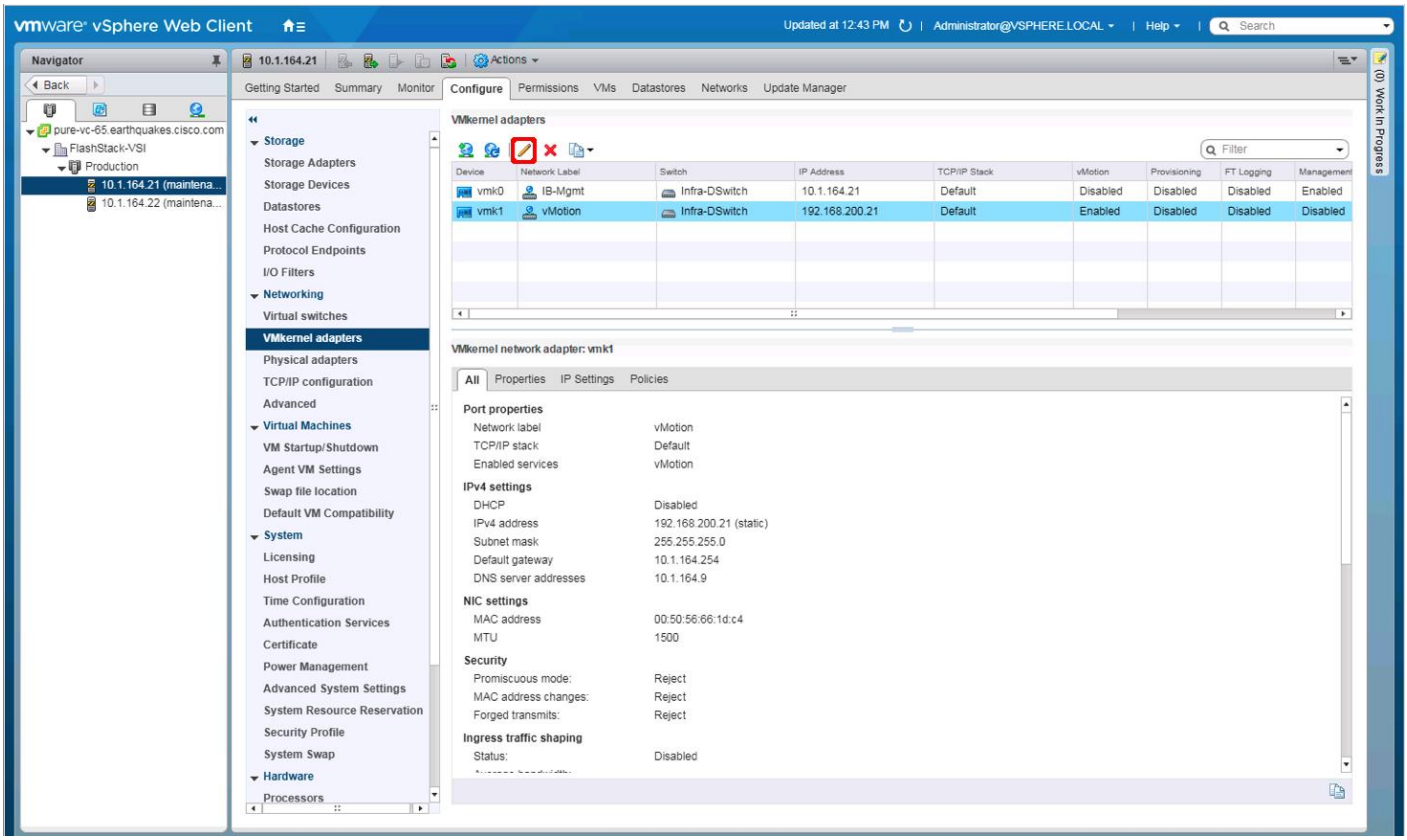


9. Provide and IP address and subnet mask within the vMotion network. Click Next.



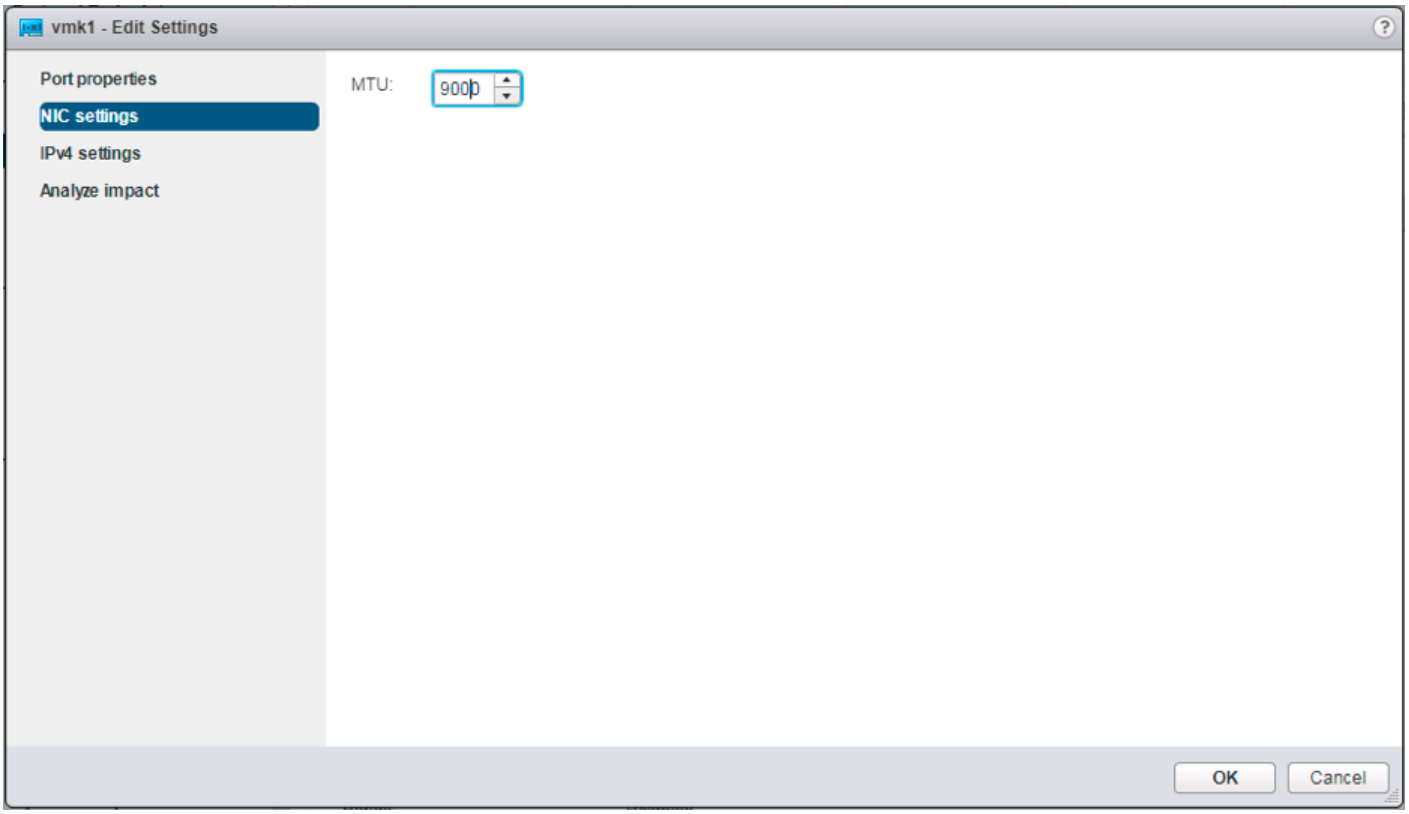
10. Review the settings and click Finish to create the VMkernel adapter.

11. Select the newly created vMotion VMkernel adapter.



12. Click the pencil icon to Edit settings for the VMkernel adapter.

13. Select the NIC Settings option, and change the MTU from 1500 to 9000.



14. Click OK to save the changes.

15. Repeat these steps to create and adjust vMotion VMkernel adapters for each additional ESXi host.

ESXi Dump Collector Setup for iSCSI-Booted Hosts

ESXi hosts booted with iSCSI using the VMware iSCSI software initiator need to be configured to do core dumps to the ESXi Dump Collector that is part of vCenter. The Dump Collector is not enabled by default on the vCenter Appliance. To setup the ESXi Dump Collector, complete the following steps:

1. In the vSphere web client, select Home.
2. In the center pane, click System Configuration under the Administration section.
3. In the left pane, select Services.
4. Under services, click VMware vSphere ESXi Dump Collector.
5. In the center pane, click the green start icon to start the service.
6. In the Actions menu, click Edit Startup Type.
7. Select Automatic.
8. Click OK.

9. Connect to each ESXi host via ssh as root

10. Run the following commands:

```
esxcli system coredump network set –v vmk0 –j <vcenter-ip>
esxcli system coredump network set –e true
esxcli system coredump network check
```

Cisco UCS Manager Plug-in for VMware vSphere Web Client

The Cisco UCS Manager Plug-in for VMware vSphere Web Client allows administration of UCS domains through the VMware's vCenter administrative interface. The capabilities of the plug-in include:

- View Cisco UCS physical hierarchy
- View inventory, installed firmware, faults, power and temperature statistics
- Map the ESXi host to the physical server
- Manage firmware for Cisco UCS B and C series servers
- Launch the Cisco UCS Manager GUI
- Launch the KVM consoles of UCS servers
- Switch the existing state of the locator LEDs

The installation is only valid for VMware vCenter 5.5 or higher and will require revisions of .NET Framework 4.5 and VMware PowerCLI 5.1 or greater.

Cisco UCS Manager Plug-in Installation

To begin the plug-in installation on a Windows system that meets the previously stated requirements, complete the following steps:

1. Download the plugin and registration tool from: https://software.cisco.com/download/release.html?mdfid=286282669&catid=282558030&softwareid=286282010&release=2.0.3

2. Place the downloaded ucs-vcplugin-2.0.3.zip file on an accessible web server previously used for hosting the VMware ESXi ISO.

3. Extract the Cisco_UCS_Plugin_Registration_Tool_1_1_3.zip and open the executable file within it.

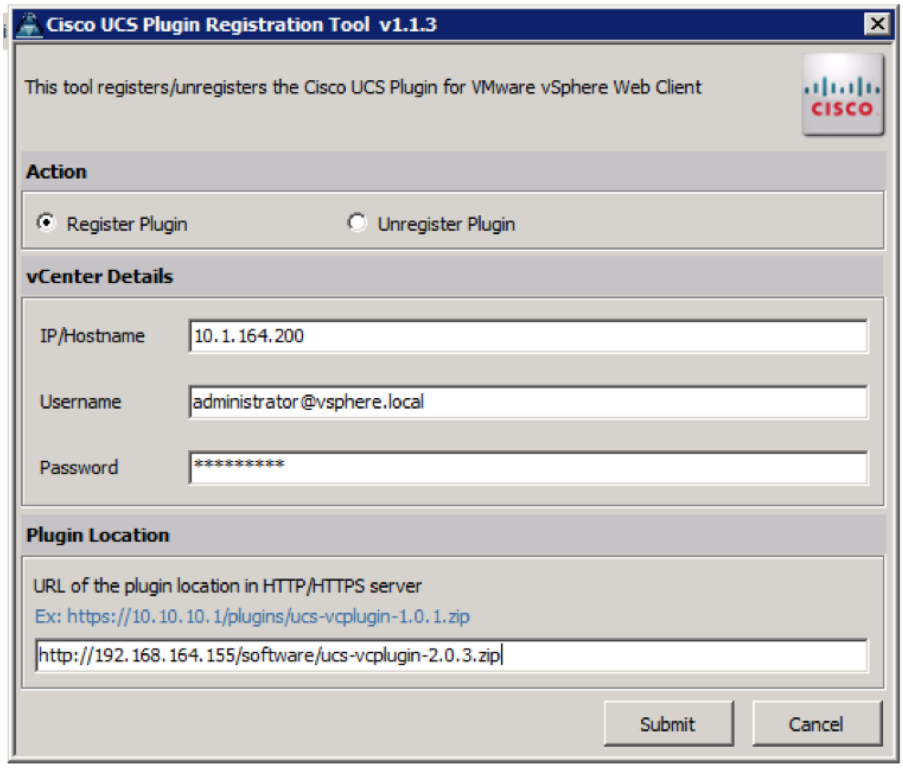
4. Leave Register Plugin selected for the Action and fill in:

    a. IP/Hostname

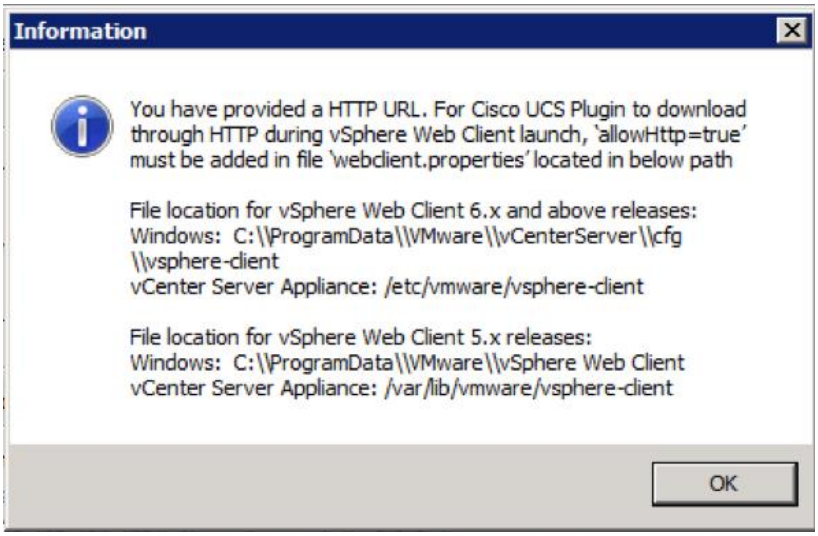
    b. Username

    c. Password

    d. URL that plugin has been uploaded to



5. A pop-up will appear explaining that 'allowHttp=true' will need to be added to the webclient.properties file on the VCSA in the /etc/vmware/vsphere-client directory.



6. Take care of this issue after the plugin has been registered, click OK to close the Information dialogue box.

7. Click Submit to register the plugin with the vCenter Server Appliance.

8. To resolve the change needed for the HTTP download of the vSphere Web Client launch, connect to the VCSA with ssh using the root account and edit /etc/vmware/vsphere-client/webclient.properties to add "allowHttp=true" or type:

```
echo 'allowHttp=true' >> /etc/vmware/vsphere-client/webclient.properties
```

This will add "allowHttp=true" to the end of the webclient.properties file. Make sure to use two greater than symbols ">>" to append to the end of the configuration file, a single greater than symbol will replace the entire pre-existing file with what has been sent with the echo command.

9. Reboot the VCSA.

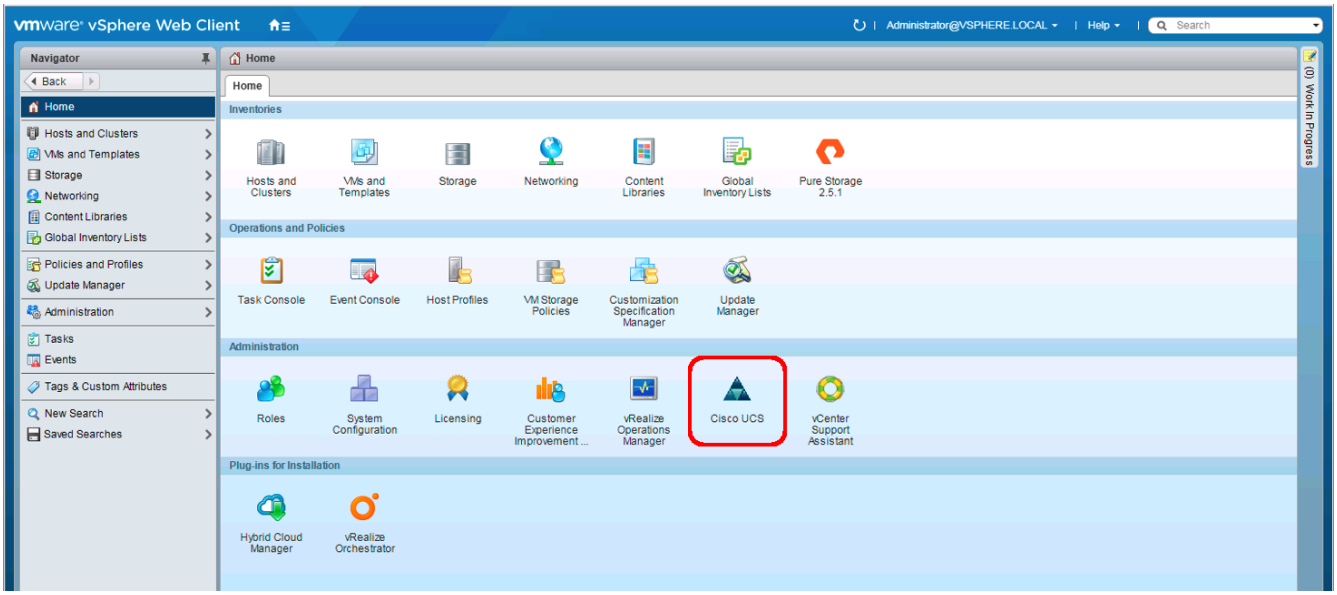
FlashStack UCS Domain Registration

Registration of the FlashStack UCS Domain can now be performed. The account used will correlate to the permissions allowed to the plugin, admin will be used in our example, but a read-only account could be used with the plugin if that was appropriate for the environment.

To register the UCS Domain, complete the following steps:

1. Opening up the vSphere Web Client.

2. Select the Home from the Navigator or pull-down options and double-click the Cisco UCS icon appearing in the Administration section.



3. Click the Register button and provide the following options in the Register UCS Domain dialogue box that appears:

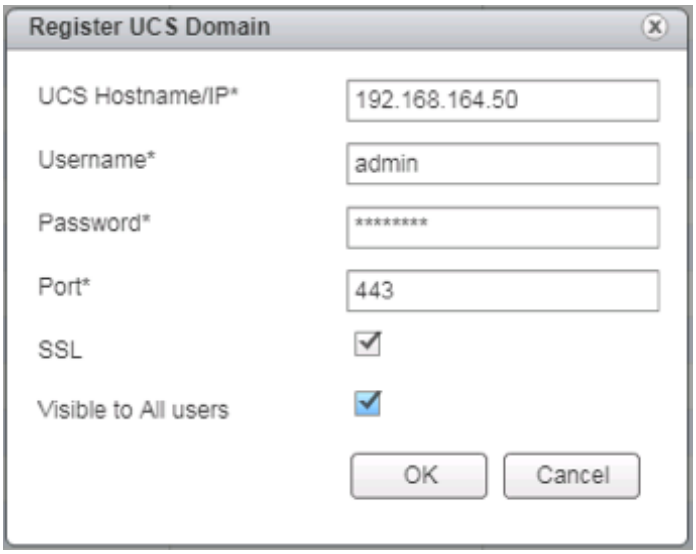
   a. UCS Hostname/IP

   b. Username

   c. Password

   d. Port (if different than 443)

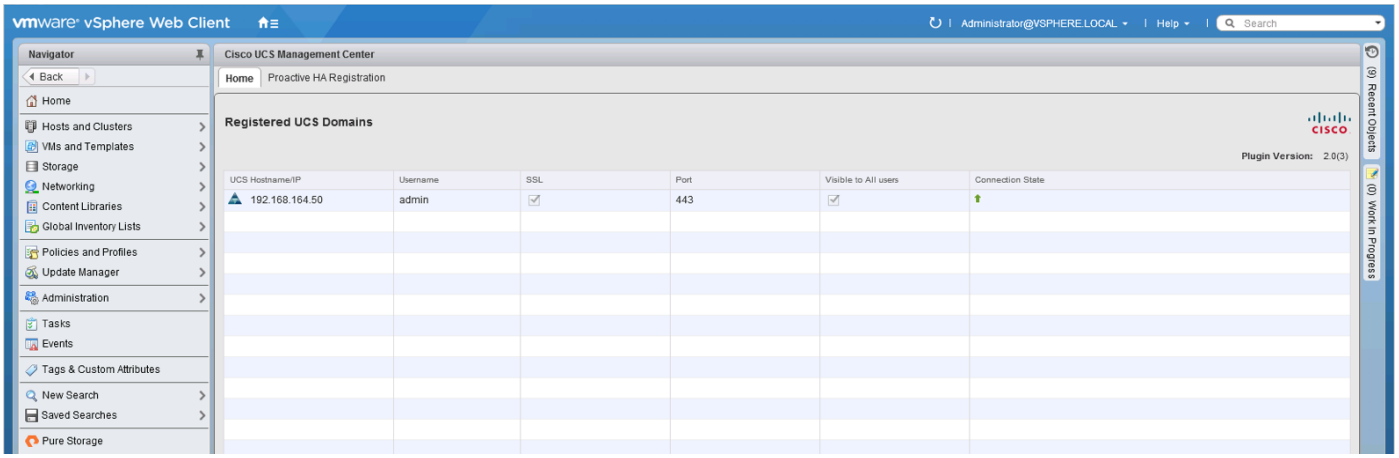
   e. Leave SSL selected and click the Visible to All users option



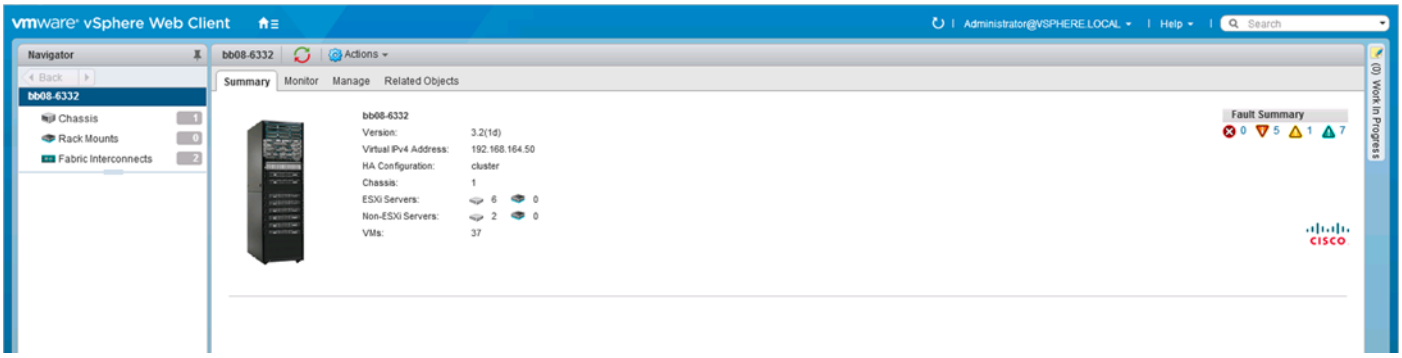
4. Click OK to register the UCS Domain.

Using the Cisco UCS vCenter Plugin

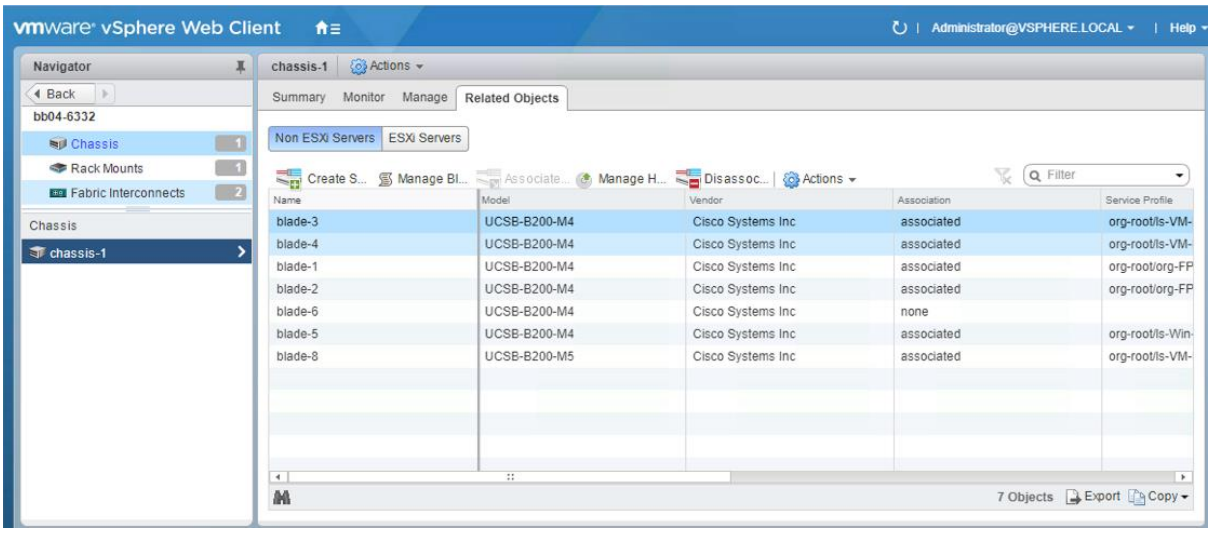
The plugin can now enable the functions described at the start of this section by double-clicking the registered UCS Domain:



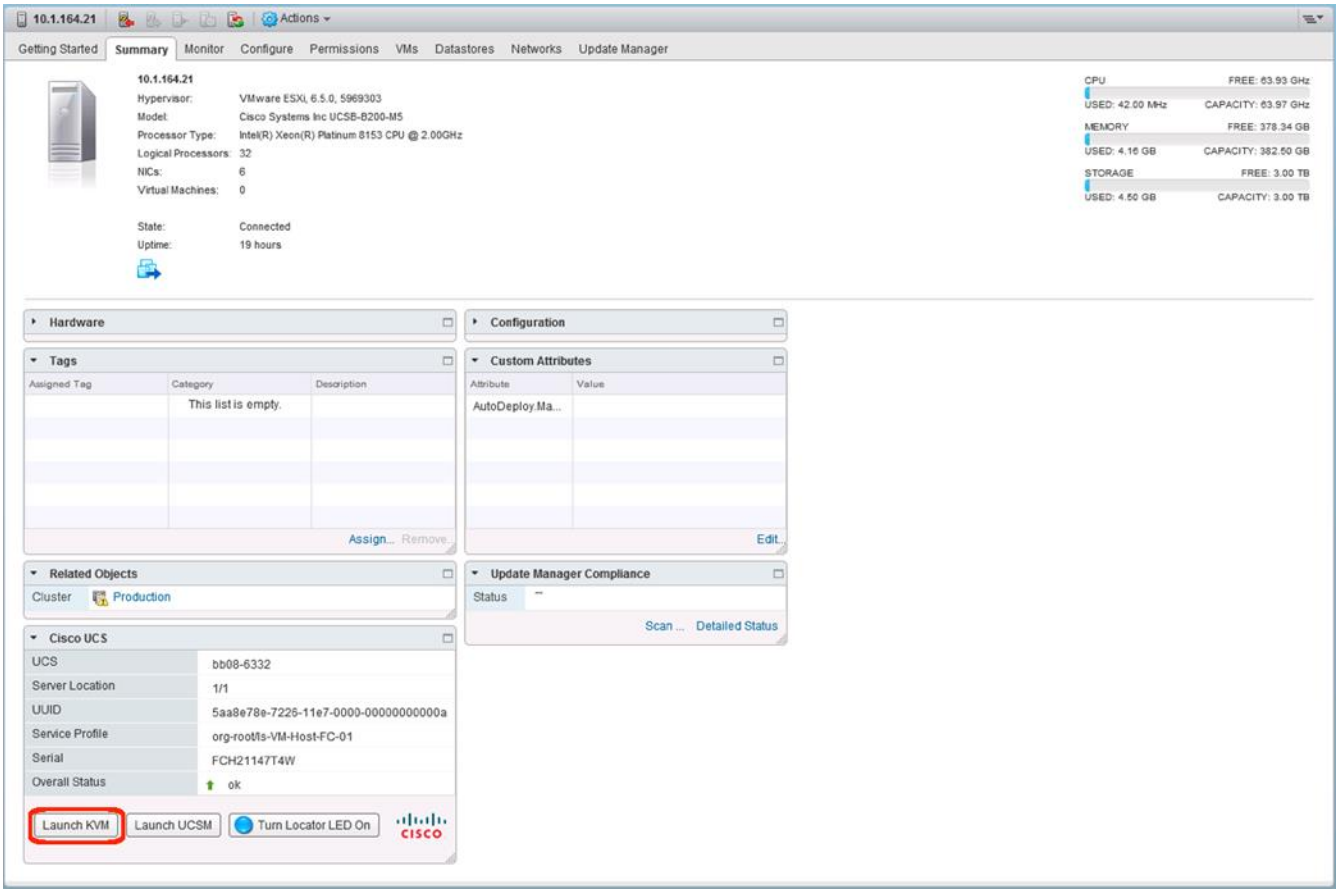
This will pull up a view of the components associated to the domain:



Selecting within the chassis or rack mounts will provide a list of ESXi or non-ESXi servers to perform operations on the following:



In addition to viewing and working within objects shown in the UCS Plug-in's view of the UCS Domain, direct access of UCS functions provided by the plugin can be selected within the drop-down options of hosts registered to vCenter or within the Summary page of the ESXi host:



For full installation instructions and usage information, please refer to the Cisco UCS Manager Plug-in for VMware vSphere Web Client User Guide here: http://www.cisco.com/c/en/us/td/docs/unified_computing/ucs/sw/vmware_tools/vCenter/vCenter_Plugin_User_Guide/2x/b_vCenter_2x.html

Pure Storage Best Practices for vSphere

The Pure Storage FlashArray has very few necessary best practice changes for VMware ESXi. The following are a few requirements and considerations:

- Virtual Disk Types: Pure Storage recommends thin type virtual disks for the majority of virtual machines. Thin virtual disks are the most flexible and provide benefits such as in-guest space reclamation support. For virtual machines that demand the lowest possible latency with the most consistent performance, eagerzeroedthick virtual disks should be used. The use of zeroedthick (aka "lazy" or "sparse") is discouraged at all times.
- Virtual Machine SCSI adapter: Pure Storage recommends using the Paravirtual SCSI adapter in virtual machines to provide access to virtual disks/RDMs. The Paravirtual SCSI adapter provides the highest possible performance levels with the most efficient use of CPU during intense workloads. Virtual machines with small I/O requirements can use the default adapters if preferred.
- Volume sizing and volume count: Pure Storage has no recommendations around volume sizing or volume count. The FlashArray volumes have no artificially limited queue depth, not on the volume level or the port level. A single volume can use the entire performance of the FlashArray if needed. In the case of very large volumes, or volumes serving intense workloads it might be necessary to increase internal queues inside of ESXi (HBA device queue, Disk.SchedNumReqOutstanding, virtual SCSI adapter queue).
- VMFS-6 is the recommended datastore type to enable automatic Run Space Reclamation (UNMAP) to ensure the FlashArray capacity usage accurately reflects the actual usage inside of VMware.
- With iSCSI configured for the FlashArray, disable DelayedAck and increase the Login Timeout to 30 seconds (from a value of 5).

Appendix

Configuration Example Files

Cisco Nexus 93180YC-EX A

```
version 7.0(3)I5(2)
switchname b19-93180-1
vdc b19-93180-1 id 1
  limit-resource vlan minimum 16 maximum 4094
  limit-resource vrf minimum 2 maximum 4096
  limit-resource port-channel minimum 0 maximum 511
  limit-resource u4route-mem minimum 248 maximum 248
  limit-resource u6route-mem minimum 96 maximum 96
  limit-resource m4route-mem minimum 58 maximum 58
  limit-resource m6route-mem minimum 8 maximum 8

cfs eth distribute
feature interface-vlan
feature lacp
feature vpc

username admin password 5 $5$JXKeJeBt$AiT5ys/yITyKSslQRZJ0MX1AiaE160K89W5IwJ4r9q7  ro
le network-admin
ip domain-lookup
system default switchport
copp profile strict
snmp-server user admin network-admin auth md5 0x6a85fb275aedd28f4481cea9cd8724e1 priv
 0x6a85fb275aedd28f4481cea9cd8724e1 localizedkey
rmon event 1 log trap public description FATAL(1) owner PMON@FATAL
rmon event 2 log trap public description CRITICAL(2) owner PMON@CRITICAL
rmon event 3 log trap public description ERROR(3) owner PMON@ERROR
rmon event 4 log trap public description WARNING(4) owner PMON@WARNING
rmon event 5 log trap public description INFORMATION(5) owner PMON@INFO
ntp server 192.168.164.254 use-vrf management
ntp source 10.1.164.13
ntp master 3

vlan 1-2,115,200-203,901-902
vlan 2
  name Native-VLAN
vlan 115
  name IB-MGMT-VLAN
vlan 200
  name vMotion-VLAN
vlan 201
  name VM-App1-VLAN
vlan 202
  name VM-App2-VLAN
vlan 203
  name VM-App3-VLAN
vlan 901
  name iSCSI-A
```

```
vlan 902
  name iSCSI-B

spanning-tree port type edge bpduguard default
spanning-tree port type edge bpdufilter default
spanning-tree port type network default
vrf context management
  ip route 0.0.0.0/0 192.168.164.254
port-channel load-balance src-dst l4port
vpc domain 10
  peer-switch
  role priority 10
  peer-keepalive destination 192.168.164.14 source 192.168.164.13
  delay restore 150
  peer-gateway
  auto-recovery
  ip arp synchronize


interface Vlan1

interface Vlan115
  description In-Band NTP Redistribution Interface VLAN 115
  no shutdown
  no ip redirects
  ip address 10.1.164.13/24
  no ipv6 redirects

interface port-channel11
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901-902
  spanning-tree port type network
  vpc peer-link

interface port-channel151
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901
  spanning-tree port type edge trunk
  mtu 9216
  load-interval counter 3 60
  vpc 151

interface port-channel152
  description UCS 6332-16UP-2 FI
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,902
  spanning-tree port type edge trunk
  mtu 9216
  load-interval counter 3 60
  vpc 152

interface port-channel153
  description Mgmt Switch
  switchport mode trunk
```

```
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  spanning-tree port type network
  mtu 9216
  vpc 153

interface port-channel154
  description Mgmt Switch
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  spanning-tree port type network
  mtu 9216
  vpc 154

interface Ethernet1/1
  description vPC peer-link connection to b19-93180-2 Ethernet1/1
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203
  channel-group 11 mode active
  no shutdown

interface Ethernet1/2
  description vPC peer-link connection to b19-93180-2 Ethernet1/2
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203
  channel-group 11 mode active
  no shutdown

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13

interface Ethernet1/14

interface Ethernet1/15
```

```
interface Ethernet1/16
interface Ethernet1/17
interface Ethernet1/18
interface Ethernet1/19
interface Ethernet1/20
interface Ethernet1/21
interface Ethernet1/22
interface Ethernet1/23
interface Ethernet1/24
interface Ethernet1/25
interface Ethernet1/26
interface Ethernet1/27
interface Ethernet1/28
interface Ethernet1/29
interface Ethernet1/30
interface Ethernet1/31
interface Ethernet1/32
interface Ethernet1/33
interface Ethernet1/34
interface Ethernet1/35
interface Ethernet1/36
interface Ethernet1/37
interface Ethernet1/38
interface Ethernet1/39
interface Ethernet1/40
interface Ethernet1/41
interface Ethernet1/42
interface Ethernet1/43
interface Ethernet1/44
```

```
interface Ethernet1/45

interface Ethernet1/46

interface Ethernet1/47

interface Ethernet1/48

interface Ethernet1/49
  description FlashArray//X ct0.eth8
  switchport access vlan 901
  spanning-tree port type edge
  mtu 9216
  no shutdown

interface Ethernet1/50
  description FlashArray//X ct1.eth8
  switchport access vlan 901
  spanning-tree port type edge
  mtu 9216
  no shutdown

interface Ethernet1/51
  description vPC 151 connection to UCS 6332-16UP-1 FI Ethernet1/33
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901
  mtu 9216
  load-interval counter 3 60
  channel-group 151 mode active
  no shutdown

interface Ethernet1/52
  description vPC 152 connection to UCS 6332-16UP-2 FI Ethernet1/33
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,902
  mtu 9216
  load-interval counter 3 60
  channel-group 152 mode active
  no shutdown

interface Ethernet1/53
  description vPC 153 connection to Upstream Network Switch A
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  mtu 9216
  channel-group 153 mode active
  no shutdown

interface Ethernet1/54
  description vPC 154 connection to Upstream Network Switch B
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
```

```
  mtu 9216
  channel-group 154 mode active
  no shutdown

interface mgmt0
  vrf member management
  ip address 192.168.164.13/24
line console
line vty
boot nxos bootflash:/nxos.7.0.3.I5.2.bin
ip route 0.0.0.0/0 10.1.164.254
```

Cisco Nexus 93180YC-EX B

```
version 7.0(3)I5(2)
switchname b19-93180-2
vdc b19-93180-2 id 1
  limit-resource vlan minimum 16 maximum 4094
  limit-resource vrf minimum 2 maximum 4096
  limit-resource port-channel minimum 0 maximum 511
  limit-resource u4route-mem minimum 248 maximum 248
  limit-resource u6route-mem minimum 96 maximum 96
  limit-resource m4route-mem minimum 58 maximum 58
  limit-resource m6route-mem minimum 8 maximum 8

cfs eth distribute
feature interface-vlan
feature lacp
feature vpc

username admin password 5 $5$D2EmPIzj$QAlwjzc/KcandBmhkr9rkukM88F6DPxCJi02Yj2TXV8  ro
le network-admin
ip domain-lookup
system default switchport
copp profile strict
snmp-server user admin network-admin auth md5 0xff46f80beea9e51b005db0cf74071b95 priv
 0xff46f80beea9e51b005db0cf74071b95 localizedkey
rmon event 1 log trap public description FATAL(1) owner PMON@FATAL
rmon event 2 log trap public description CRITICAL(2) owner PMON@CRITICAL
rmon event 3 log trap public description ERROR(3) owner PMON@ERROR
rmon event 4 log trap public description WARNING(4) owner PMON@WARNING
rmon event 5 log trap public description INFORMATION(5) owner PMON@INFO
ntp server 192.168.164.254 use-vrf management
ntp source 10.1.164.14
ntp master 3

vlan 1-2,115,200-203,901,902
vlan 2
  name Native-VLAN
vlan 115
  name IB-MGMT-VLAN
vlan 200
  name vMotion-VLAN
vlan 201
  name VM-App1-VLAN
vlan 202
  name VM-App2-VLAN
```

```
vlan 203
  name VM-App3-VLAN
vlan 901
  name iSCSI-A
vlan 902
  name iSCSI-B

spanning-tree port type edge bpduguard default
spanning-tree port type edge bpdufilter default
spanning-tree port type network default
vrf context management
  ip route 0.0.0.0/0 192.168.164.254
port-channel load-balance src-dst l4port
vpc domain 10
  peer-switch
  role priority 20
  peer-keepalive destination 192.168.164.13 source 192.168.164.14
  delay restore 150
  peer-gateway
  auto-recovery
  ip arp synchronize


interface Vlan1

interface Vlan115
  description In-Band NTP Redistribution Interface VLAN 115
  no shutdown
  no ip redirects
  ip address 10.1.164.14/24
  no ipv6 redirects

interface port-channel11
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901-902
  spanning-tree port type network
  vpc peer-link

interface port-channel151
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901
  spanning-tree port type edge trunk
  mtu 9216
  load-interval counter 3 60
  vpc 151

interface port-channel152
  description UCS 6332-16UP-2 FI
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,902
  spanning-tree port type edge trunk
  mtu 9216
  load-interval counter 3 60
  vpc 152
```

```
interface port-channel153
  description Mgmt Switch
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  spanning-tree port type network
  mtu 9216
  vpc 153

interface port-channel154
  description Mgmt Switch
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  spanning-tree port type network
  mtu 9216
  vpc 154

interface Ethernet1/1
  description vPC peer-link connection to b19-93180-1 Ethernet1/1
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901-902
  channel-group 11 mode active
  no shutdown

interface Ethernet1/2
  description vPC peer-link connection to b19-93180-1 Ethernet1/2
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901-902
  channel-group 11 mode active
  no shutdown

interface Ethernet1/3

interface Ethernet1/4

interface Ethernet1/5

interface Ethernet1/6

interface Ethernet1/7

interface Ethernet1/8

interface Ethernet1/9

interface Ethernet1/10

interface Ethernet1/11

interface Ethernet1/12

interface Ethernet1/13
```

```
interface Ethernet1/14
interface Ethernet1/15
interface Ethernet1/16
interface Ethernet1/17
interface Ethernet1/18
interface Ethernet1/19
interface Ethernet1/20
interface Ethernet1/21
interface Ethernet1/22
interface Ethernet1/23
interface Ethernet1/24
interface Ethernet1/25
interface Ethernet1/26
interface Ethernet1/27
interface Ethernet1/28
interface Ethernet1/29
interface Ethernet1/30
interface Ethernet1/31
interface Ethernet1/32
interface Ethernet1/33
interface Ethernet1/34
interface Ethernet1/35
interface Ethernet1/36
interface Ethernet1/37
interface Ethernet1/38
interface Ethernet1/39
interface Ethernet1/40
interface Ethernet1/41
interface Ethernet1/42
```

```
interface Ethernet1/43

interface Ethernet1/44

interface Ethernet1/45

interface Ethernet1/46

interface Ethernet1/47

interface Ethernet1/48

interface Ethernet1/49
  description FlashArray//X ct0.eth9
  switchport access vlan 902
  spanning-tree port type edge
  mtu 9216
  no shutdown

interface Ethernet1/50
  description FlashArray//X ct1.eth9
  switchport access vlan 902
  spanning-tree port type edge
  mtu 9216
  no shutdown

interface Ethernet1/51
  description vPC 151 connection to UCS 6332-16UP-1 FI Ethernet1/34
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,901
  mtu 9216
  load-interval counter 3 60
  channel-group 151 mode active
  no shutdown

interface Ethernet1/52
  description vPC 152 connection to UCS 6332-16UP-2 FI Ethernet1/34
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115,200-203,902
  mtu 9216
  load-interval counter 3 60
  channel-group 152 mode active
  no shutdown

interface Ethernet1/53
  description vPC 153 connection to Upstream Network Switch A
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  mtu 9216
  channel-group 153 mode active
  no shutdown

interface Ethernet1/54
```

```
  description vPC 154 connection to Upstream Network Switch B
  switchport mode trunk
  switchport trunk native vlan 2
  switchport trunk allowed vlan 115
  mtu 9216
  channel-group 154 mode active
  no shutdown

interface mgmt0
  vrf member management
  ip address 192.168.164.14/24
line console
line vty
boot nxos bootflash:/nxos.7.0.3.I4.2.bin
ip route 0.0.0.0/0 10.1.164.254
```

About the Authors

Ramesh Isaac, Technical Marketing Engineer, Cisco Systems, Inc.

Ramesh Isaac is a Technical Marketing Engineer in the Cisco UCS Data Center Solutions Group. Ramesh has worked in data center and mixed-use lab settings since 1995. He started in information technology supporting UNIX environments and focused on designing and implementing multi-tenant virtualization solutions in Cisco labs before entering Technical Marketing. Ramesh holds certifications from Cisco, VMware, and Red Hat.

Cody Hosterman, Technical Director for Virtualization Ecosystem Integration at Pure Storage

Cody Hosterman focuses on the core VMware vSphere virtualization platform, VMware cloud and management applications and 3rd party products. He has a deep background in virtualization and storage technologies, including experience as a Solutions Engineer and Principal Virtualization Technologist. In his current position, he is responsible for VMware integration strategy, best practices, and developing new integrations and documentation. Cody has over nine years of experience in virtualization and storage in various technical capacities. He is a VMware vExpert, and holds a bachelor's degree from Pennsylvania State University in Information Sciences and Technology.