

# Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures

Design for 50 and 100 Virtual Machines

Last Updated: October 3, 2013



Building Architectures to Solve Business Problems

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# About the Authors



Sanjeev Naldurgkar



Tim Cerling

### Sanjeev Naldurgkar, Technical Marketing Engineer, Server Access Virtualization Business Unit, Cisco Systems

Sanjeev has over 12 years of experience in information technology, his focus areas include UCS, Microsoft product technologies, server virtualization, and storage technologies. Prior to joining Cisco, Sanjeev was Support Engineer at Microsoft Global Technical Support Center. Sanjeev holds a Bachelor's Degree in Electronics and Communication Engineering and Industry certifications from Microsoft, and VMware.

#### Tim Cerling, Technical Marketing Engineer, Datacenter Group, Cisco Systems

Tim's focus is on delivering customer-driven solutions on Microsoft Hyper-V and System Center products. He has been in the IT business since 1979. He started working with Windows NT 3.5 on the DEC Alpha product line during his 19 year tenure with DEC, and he has continued working with Windows Server technologies since then with Compaq, Microsoft, and now Cisco. During his twelve years as a Windows Server specialist at Microsoft, he co-authored a book on Microsoft virtualization technologies – Mastering Microsoft Virtualization. Tim holds a BA in Computer Science from the University of Iowa.

# **Acknowledgements**

For their support and contribution to the design, validation, and creation of the Cisco Validated Design, we would like to thank:

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- Vadiraja Bhatt-Cisco
- Mehul Bhatt-Cisco
- Vijay Kumar D-Cisco
- Hardik Patel-Cisco
- TJ Singh-Cisco
- Bathu Krishnan-Cisco
- Sindhu Sudhir-Cisco
- Kevin Phillips-EMC
- John Moran-EMC
- Kathy Sharp-EMC

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# Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures

# **Executive Summary**

Cisco solution for the EMC VSPEX is a pre-validated and modular architecture built with proven best of-breed technologies to create and complete an end-to-end virtualization solution. The end-to-end solutions enable you to make an informed decision while choosing the hypervisor, compute, storage and networking layers. VSPEX eliminates the server virtualization planning and configuration burdens. The VSPEX infrastructures accelerate your IT Transformation by enabling faster deployments, greater flexibility of choice, efficiency, and lower risk. This Cisco Validated Design document focuses on the Microsoft Hyper-V architecture for 50 and 100 virtual machines with Cisco solution for the EMC VSPEX.

# Introduction

As part of an effort to improve and enhance the performance and capabilities of its product line, Cisco and EMC from time to time release revisions of its hardware and software. Therefore, some functions described in this guide may not be supported by all revisions of the software or hardware currently in use. For the most up-to-date information on product features, refer to your product release notes.

# **Target Audience**

The reader of this document is expected to have the necessary training and background to install and configure Microsoft Hyper-V, EMC VNXe series storage, Cisco Nexus 5548UP and 3048switches, and Cisco Unified Computing System (UCS) C220 M3 rack servers. External references are provided wherever applicable and it is recommended that the reader be familiar with these documents.

Readers are also expected to be familiar with the infrastructure and database security policies of the customer installation.



### Purpose

This document describes the steps required to deploy and configure a Cisco solution for the EMC VSPEX for Microsoft Hyper-V architectures. The document covers two types of Microsoft Hyper-V architectures:

- Microsoft Hyper-V for 50 virtual machines
- Microsoft Hyper-V for 100 virtual machines

The readers of this document are expected to have sufficient knowledge to install and configure the products used, configuration details that are important to the deployment models mentioned above.

## **Business Needs**

The VSPEX solutions are built with proven best-of-breed technologies to create complete virtualization solutions that enable you to make an informed decision in the hypervisor, server, and networking layers. The VSPEX infrastructures accelerate your IT transformation by enabling faster deployments, greater flexibility of choice, efficiency, and lower risk.

Business applications are moving into the consolidated compute, network, and storage environment. The Cisco solution for the EMC VSPEX using Microsoft Hyper-V helps to reduce every component of a traditional deployment. The complexity of integration management is reduced while maintaining the application design and implementation options. Administration is unified, while process separation can be adequately controlled and monitored. The following are the business needs for the Cisco solution for EMC VSPEX Microsoft Hyper-V architectures:

- Provide an end-to-end virtualization solution to utilize the capability of the unified infrastructure components.
- Provide a Cisco VSPEX for Microsoft Hyper-V Infrastructure as a Service (IaaS) solution for efficiently virtualizing 50 or 100 virtual machines for varied customer use cases.
- Provide a reliable, flexible, and scalable reference design.

### **Solution Overview**

The Cisco solution for EMC VSPEX using Microsoft Hyper-V provides an end-to-end architecture with Cisco, EMC, and Microsoft technologies that demonstrate support for up to 50 and 100 generic virtual machines and provides high availability and server redundancy.

The following are the components used for the design and deployment:

- Cisco C-series Unified Computing System servers
- Cisco Nexus 5000 series or 3000 series switches depending on the scale of the solution
- Cisco virtual Port Channels for network load balancing and high availability
- EMC VNXe3150 or VNXe3300 storage components as per the scale needs
- Microsoft Windows Server 2008 R2 SP1 Hyper-V
- Microsoft SQL Server 2008 R2 SP1 database
- Microsoft System Center 2012 Virtual Machine Manager

The solution is designed to host scalable, mixed application workloads. The scope of this CVD is limited to the Cisco solution for EMC VSPEX Microsoft Hyper-V solutions for 50 and 100 virtual machines only.

# **Technology Overview**

This section describes the various technologies used in this solution and their benefits.

#### **Cisco Unified Computing System**

The Cisco Unified Computing System is a next-generation data center platform that unites computing, network, storage access, and virtualization into a single cohesive system. The platform, optimized for virtual environments, is designed using open industry-standard technologies and aims to reduce total cost of ownership (TCO) and increase business agility. The system integrates a low-latency; lossless 10 Gigabit Ethernet unified network fabric with enterprise-class, x86-architecture servers. It is an integrated, scalable, multi chassis platform in which all resources participate in a unified management domain.

The main components of the Cisco UCS are:

- **Computing**—The system is based on an entirely new class of computing system that incorporates rack mount and blade servers based on Intel Xeon 5500/5600 Series Processors. The Cisco UCS servers offer the patented Cisco Extended Memory Technology to support applications with large datasets and allow more virtual machines per server.
- **Network**—The system is integrated onto a low-latency, lossless, 10-Gbps unified network fabric. This network foundation consolidates LANs, SANs, and high-performance computing networks which are separate networks today. The unified fabric lowers costs by reducing the number of network adapters, switches, and cables, and by decreasing the power and cooling requirements.
- Virtualization—The system unleashes the full potential of virtualization by enhancing the scalability, performance, and operational control of virtual environments. Cisco security, policy enforcement, and diagnostic features are now extended into virtualized environments to better support changing business and IT requirements.
- **Storage access**—The system provides consolidated access to both SAN storage and Network Attached Storage (NAS) over the unified fabric. By unifying the storage access the Cisco Unified Computing System can access storage over Ethernet, Fibre Channel, Fibre Channel over Ethernet (FCoE), and iSCSI. This provides customers with choice for storage access and investment protection. In addition, the server administrators can pre-assign storage-access policies for system connectivity to storage resources, simplifying storage connectivity, and management for increased productivity.

The Cisco Unified Computing System is designed to deliver:

- A reduced Total Cost of Ownership (TCO) and increased business agility.
- Increased IT staff productivity through just-in-time provisioning and mobility support.
- A cohesive, integrated system which unifies the technology in the data center.
- Industry standards supported by a partner ecosystem of industry leaders.

### **Cisco C220 M3 Rack Mount Servers**

Building on the success of the Cisco UCS C220 M3 Rack Servers, the enterprise-class Cisco UCS C220 M3 server further extends the capabilities of the Cisco Unified Computing System portfolio in a 1-rack-unit (1RU) form factor. And with the addition of the Intel® Xeon® processor E5-2600 product family, it delivers significant performance and efficiency gains. Figure 1 shows the Cisco UCS C220 M3 rack server.

#### Figure 1 Cisco UCS C220 M3 Rack Mount Server



The Cisco UCS C220 M3 also offers up to 256 GB of RAM, eight drives or SSDs, and two 1GE LAN interfaces built into the motherboard, delivering outstanding levels of density and performance in a compact package.

#### I/O Adapters

The Cisco UCS rack mount server has various Converged Network Adapters (CNA) options. The UCS P81E Virtual Interface Card (VIC) option is used in this Cisco Validated Design.

This Cisco UCS P81E VIC is unique to the Cisco UCS rack mount server system. This mezzanine card adapter is designed around a custom ASIC that is specifically intended for virtualized systems. As is the case with the other Cisco CNAs, the Cisco UCS P81E VIC encapsulates fibre channel traffic within the 10-GE packets for delivery to the Ethernet network.

UCS P81E VIC provides the capability to create multiple VNICs (up to 128) on the CNA. This allows complete I/O configurations to be provisioned in virtualized or non-virtualized environments using just-in-time provisioning, providing tremendous system flexibility and allowing consolidation of multiple physical adapters.

System security and manageability is improved by providing visibility and portability of network policies and security all the way to the virtual machines. Additional P81E features like VN-Link technology and pass-through switching, minimize implementation overhead and complexity. Figure 2 shows the Cisco UCS P81E VIC.



### **Cisco Adapter Fabric Extender**

Cisco Adapter FEX extends the Cisco FEX technology into traditional rack servers. The Cisco Adapter FEX technology enables the server adapter to be logically partitioned into multiple virtual network interface cards (vNICs). Each vNIC behaves like a physical NIC port and meets the network connectivity needs for each application, so that security and quality of service (QoS) policies can be applied for each vNIC and each application.



#### Figure 3 Network Adapter vNICs as Physical Ports on the Cisco Nexus 5500 Series

Figure 3 shows that a server with the virtualized adapters (called vNICs) can offer an operating system a number of virtual adapters, and with the A-FEX technology, vNICs are presented as directly connected interfaces to the Cisco Nexus 5500 series switches. All the switching between vNICs occurs on the

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upstream Cisco Nexus 5500 series switches, as though they were interfaces of a remote linecard or fabric extenders. In addition to this, all the features right from access control lists (ACLs) to private VLANs, quality of service (QoS), and so on, are available on the remote interfaces.

The redundancy or teaming configuration is not required on the operating system anymore since it is implemented in hardware and controlled by the Cisco Nexus 5500 series switches.

The provisioning model allows the network administrator to define profiles with specific network definitions (mode access or trunk, VLAN, and so on). The server administrator has the choice of defining the number of vNICs and the profile to map them with.

### **Cisco Nexus 5548UP Switch**

The Cisco Nexus 5548UP is a 1RU 1 Gigabit and 10 Gigabit Ethernet switch offering up to 960 gigabits per second throughput and scaling up to 48 ports. It offers 32 1/10 Gigabit Ethernet fixed enhanced Small Form-Factor Pluggable (SFP+) Ethernet/FCoE or 1/2/4/8-Gbps native FC unified ports and three expansion slots. These slots have a combination of Ethernet/FCoE and native FC ports. The Cisco Nexus 5548UP switch is shown in Figure 4.

#### Figure 4 Cisco Nexus 5548UP Switch



#### **Cisco Nexus 3048 Switch**

The Cisco Nexus® 3048 Switch is a line-rate Gigabit Ethernet top-of-rack (ToR) switch and is part of the Cisco Nexus 3000 Series Switches portfolio. The Cisco Nexus 3048, with its compact one-rack-unit (1RU) form factor and integrated Layer 2 and 3 switching, complements the existing Cisco Nexus family of switches. This switch runs the industry-leading Cisco® NX-OS Software operating system, providing customers with robust features and functions that are deployed in thousands of data centers worldwide. The Cisco Nexus 3048 switch is shown in Figure 5.



# Microsoft Windows Server 2008 R2 SP1 Hyper-V

Microsoft Hyper-V is an integral part of Windows Server and provides a foundational virtualization platform that enables you to transition to the cloud. With Windows Server 2008 R2 you get a compelling solution for core virtualization scenarios – production server consolidation, dynamic datacenter, business continuity, VDI, and test & development.

Microsoft Hyper-V provides you better flexibility with features like live migration and cluster shared volumes for storage flexibility.

Microsoft Hyper-V also delivers greater scalability with support for up to 64 logical processors, 2 TB of RAM, NUMA awareness, and improved performance with support for dynamic memory and enhanced networking support.

#### Microsoft System Center 2012 Virtual Machine Manager

Microsoft System Center 2012 Virtual Machine Manager (VMM) is a management solution for the virtualized datacenter. This solution enables you to configure and manage your virtualization host, networking, and storage resources in order to create, deploy, and manage virtual machines and services to private clouds that you have created.

# **EMC Storage Technologies and Benefits**

The EMC VNX<sup>TM</sup> family is optimized for virtual applications delivering industry-leading innovation and enterprise capabilities for file, block, and object storage in a scalable, easy-to-use solution. This next-generation storage platform combines powerful and flexible hardware with advanced efficiency, management, and protection software to meet the demanding needs of today's enterprises.

The EMC VNXe<sup>TM</sup> series is powered by Intel Xeon processor, for intelligent storage that automatically and efficiently scales in performance, while ensuring data integrity and security.

The EMC VNXe series is purpose-built for the IT manager in smaller environments and the VNX series is designed to meet the high-performance, high-scalability requirements of midsize and large enterprises. The EMC VNXe and VNX storage arrays are multi-protocol platform that can support the iSCSI, NFS, and CIFS protocols depending on the customer's specific needs. The solution was validated using NFS for data storage.

The EMC VNXe series storage arrays have the following customer benefits:

- Next-generation unified storage, optimized for virtualized applications
- Capacity optimization features including compression, deduplication, thin provisioning, and application-centric copies
- High availability, designed to deliver five 9s availability
- Multiprotocol support for file and block
- Simplified management with EMC Unisphere<sup>™</sup> for a single management interface for all network-attached storage (NAS), storage area network (SAN), and replication needs

### **Software Suites**

The following are the available EMC software suites:

• Remote Protection Suite—Protects data against localized failures, outages, and disasters.

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- Application Protection Suite—Automates application copies and proves compliance.
- Security and Compliance Suite—Keeps data safe from changes, deletions, and malicious activity.

### **Software Packs**

Total Value Pack—Includes all protection software suites, and the Security and Compliance Suite. This is the available EMC protection software pack.

**EMC** Avamar

EMC's Avamar® data deduplication technology seamlessly integrates into virtual environments, providing rapid backup and restoration capabilities. Avamar's deduplication results in vastly less data traversing the network, and greatly reduces the amount of data being backed up and stored; resulting in storage, bandwidth and operational savings.

The following are the two most common recovery requests used in backup and recovery:

- File-level recovery—Object-level recoveries account for the vast majority of user support requests. Common actions requiring file-level recovery are—individual users deleting files, applications requiring recoveries, and batch process-related erasures.
- **System recovery**—Although complete system recovery requests are less frequent in number than those for file-level recovery, this bare metal restore capability is vital to the enterprise. Some of the common root causes for full system recovery requests are—viral infestation, registry corruption, or unidentifiable unrecoverable issues.

The Avamar System State protection functionality adds backup and recovery capabilities in both of these scenarios.

# **Architectural Overview**

This Cisco Validated Design discusses the deployment model for the following two Microsoft Hyper-V server virtualization solutions:

- Microsoft Hyper-V solution for 50 virtual machines
- Microsoft Hyper-V solution for 100 virtual machines

Table 1 lists the mix of hardware components, their quantities and software components used for different solutions:

Components	Hyper-V 50 VMS	Hyper-V 100 VMs           Four Cisco C220 M3 servers	
Servers	Three Cisco C220 M3 servers		
Adapters	2 Cisco GigE I350 LOM	2 Cisco GigE I350 LOM	
	1 Broadcom NetXtreme II 5709 quad-port per server	1 Cisco UCS P81E VIC per server	
Network Switches	Two Cisco Nexus 3048 switches	Two Cisco Nexus 5548UP switches	

Components	Hyper-V 50 VMS	Hyper-V 100 VMs	
Storage	EMC VNXe3150	EMC VNXe3300	
Network Speed	1 GE	10 GE	
Hypervisor	Microsoft Windows Server 2008 R2 SP1 Hyper-V	Microsoft Windows Server 2008 R2 SP1 Hyper-V	

Table 1 Hardware and Software Compone	ents for Various Solutions
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Table 2 lists the various hardware and software components which occupies different tiers of the Cisco solution for EMC VSPEX using Microsoft Hyper-V architectures under test.

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Vendor	Name	Version	Scope of VSPEX solution	
Cisco	C220 M3 servers	1.4(4a).1 - CIMC	Both Microsoft Hyper-V 50 VMs and	
		C220M3.1.4.4c.0 - BIOS	Microsoft Hyper-V 100 VMs	
Cisco	Cisco Nexus 5548UP Switches	5.1(3)N1(1a)	Only Microsoft Hyper-V 100 VMs	
Cisco	Cisco Nexus 3048 Switches	5.0(3)U2(2b)	Only Microsoft Hyper-V 50 VMs	
EMC	EMC VNXe3150	2.2.0.16150	Only Microsoft Hyper-V 50 VMs	
EMC	EMC VNXe3300	2.2.0.16150	Only Microsoft Hyper-V 100 VMs	
EMC	EMC Avamar	6.0.0-592	Both Microsoft Hyper-V 50 VMs and Microsoft Hyper-V 100 VMs	
EMC Data Domain OS		5.1.0.9-282511 Both Microsoft Hyper-V 50 VMs Microsoft Hyper-V VMs		
Microsoft Windows Server 2008 R2		2008 R2 SP1 Both Microsoft Hyper-V 50 VMs Microsoft Hyper- VMs		
Microsoft	System Center VMM	SCVMM 2012 with update Rollup1	Both Microsoft Hyper-V 50 VMs and Microsoft Hyper-V 100 VMs	

#### Table 2 Hardware and Software Components of Hyper-V Architectures

Vendor	Name	Version	Scope of VSPEX solution
Microsoft	Microsoft Windows Server 2008 R2	2008 R2 SP1	Both Microsoft Hyper-V 50 VMs and Microsoft Hyper-V 100 VMs
Microsoft	Microsoft SQL server	2008 R2 SP1	Both Microsoft Hyper-V 50 VMs and Microsoft Hyper-V 100 VMs

#### Table 2 Hardware and Software Components of Hyper-V Architectures

Table 3 outlines the C220 M3 server configuration details (per server basis) across all the Microsoft Hyper-V architectures.

Table 3	<b>Cisco UCS C220 M3 Server Hardware Configuration</b>
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Component	Capacity
Memory (RAM)	64 GB (8X8 MB DIMM)
Processor	2 x Intel® Xenon ® E5-2650 CPUs, 2 GHz, 8 cores, 16 threads
Network Adapter	2 x Cisco 1GigE 1350 LOM (LAN on Motherboard)
Local Storage	2 x 600 GB SAS 15k RPM hard disk.

# **Storage Guidelines**

The architecture diagrams in this section show the physical disk layout. Disk provisioning on the EMC VNXe series is simplified through the use of wizards, so that administrators do not choose which disks belong to a given storage pool. The wizard may choose any available disk of the proper type, regardless of where the disk physically resides in the array

The reference architecture uses the following configuration:

- Disk allocations for different architectures. The following are the different architectures:
  - 50 VMs—Forty-five 600 GB SAS disks are allocated to a single storage pool as nine 4+1 RAID 5 groups (sold as 5-disk packs).
  - 100 VMs—Seventy-seven 600 GB SAS disks are allocated to a single storage pool as eleven 6+1 RAID 5 groups (sold as 7-disk packs) for 100 virtual machines architecture.
- E MC recommends that in addition to the above numbers at least one hot spare disk is allocated for each 30 disks of a given type.

The EMC VNX/VNXe family is designed for five 9s availability by using redundant components throughout the array. All of the array components are capable of continued operation in case of hardware failure. The RAID disk configuration on the array provides protection against data loss due to individual disk failures, and the available hot spare drives can be dynamically allocated to replace a failing disk.



#### Figure 6 Storag

Storage Architecture for 50 VMs on EMC VNXe3150

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Figure 7

Storage Architecture for 100 VMs on EMC VNXe3300



Table 4 provides the datastores size details for the two types of architectures laid out in Figure 6 and Figure 7.

Parameters	<b>50 Virtual Machines</b>	100 Virtual Machines
Disk capacity & type	600 GB SAS	600 GB SAS
Number of disks	45	77
RAID type	4 + 1 RAID 5 groups	6 + 1 RAID 5 groups
Number of RAID Groups	9	11

 Table 4
 Datastores Details for the Microsoft Hyper-V Architectures

Both reference architectures assume that there is an existing infrastructure / management network available where a virtual machine or physical machine hosting SCVMM server, Database server, and Microsoft Windows Active Directory / DNS server are present. Figure 8 and Figure 9 show high level solution architecture for up to 50 and up to 100 virtual machines, respectively.







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**Reference Architecture for 100 Virtual Machines** 



As it is evident in the above diagrams, following are the high level design points of Microsoft Hyper-V architectures:

- Only Ethernet is used as network layer 2 media to access storage as well as TCP/IP network
- Infrastructure network is on a separate 1GE uplink network
- Network redundancy is built in by providing two switches, two storage controllers and redundant connectivity for data, storage, and infrastructure networking.

This design does not dictate or require any specific layout of infrastructure network which hosts the SCVMM, Database, and Active Directory servers. However, design does require accessibility of certain VLANs from the infrastructure network to reach the servers.

Microsoft Windows Server 2008 R2 SP1 Hyper-V is used as hypervisor operating system on each server and is installed on local hard drives. Typical load is 25 virtual machines per server.

# Architecture for 50 Microsoft Hyper-V Virtual Machines

Figure 10 shows the logical layout of 50 Microsoft Hyper-V virtual machines. Following are the key aspects of this solution:

- Three Cisco C220 M3 servers are used.
- The solution uses two Cisco Nexus 3048 switches, dual-port Cisco 1GigE I350 LOM and quad-port Broadcom 1Gbps NIC. This results in the 1Gbps solution for the storage access.
- Virtual port-channels on storage side networking provide high-availability and load balancing.
- NIC teaming of the adapters on the host provide load balancing and redundancy as shown in Figure 10. Team 1 has two LoM ports for host management and VM access, separated via VLANs. Team 2 has two Broadcom ports for all cluster traffic.
- EMC VNXe3150 is used as a storage array.

#### Figure 10 Cisco Solution for 50 Virtual Machines Using Microsoft Hyper-V



# **Architecture for 100 Microsoft Hyper-V Virtual Machines**

Figure 11 shows the logical layout of 100 Microsoft Hyper-V virtual machines. Following are the key aspects of this solution:

- Four Cisco C220 M3 servers are used.
- The solution uses two Cisco Nexus 5548UP switches and 10 Gbps Cisco VIC adapters. This results in the 10Gbps solution for the storage access and network and makes live migration and storage access much faster compared to the 1 Gbps solution.
- Virtual port-channels on storage side networking provide high-availability and load balancing.
- Cisco VIC P81E supports Adapter-FEX feature of Cisco Nexus 5500 series switches. It provides
  NIC level redundancy at the adapter level. On the switch side the ports are set to vntag mode. Each
  vNIC carved out of NIV enabled Cisco VIC P81E creates a corresponding virtual ethernet interfaces
  on the switch with unique virtual links or channels. 2 vNICs allow storage traffic, 1 vNIC allows
  cluster traffic and one vNIC allows VM traffic.
- NIC Teaming of Cisco 1GigE I350 LOM port provides load balancing and redundancy as shown in the Figure 11. This teamed NIC allows management VLAN traffic. The EMC VNXe3300 is used as a storage array.

#### Figure 11 Cisco Solution for 100 Virtual Machines Using Microsoft Hyper-V



# **Sizing Guidelines**

It is important to define a reference workload in virtual infrastructures. Not all servers perform the same tasks, and it is impractical to build a reference that takes into account every possible combination of workload characteristics.

# **Defining a Reference Workload**

To simplify the discussion, we have defined a representative reference workload. By comparing your actual usage to this reference workload, you can extrapolate which reference architecture to choose.

For the VSPEX solutions, the reference workload was defined as a single virtual machine. Table 5 provides the characteristics of the virtual machine:

Table 5	Virtual Machine	Characteristics
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Characteristics	Value
Virtual machine operating system	Microsoft Windows Server 2008 R1 SP1
Virtual processor per virtual machine (vCPU)	1
RAM per virtual machine	2 GB
Available storage capacity per virtual machine	100 GB
I/O operations per second (IOPS) per VM	25
I/O pattern	Random
I/O read/write ratio	2:1

This specification for a virtual machine is not intended to represent any specific application. Rather, it represents a single common point of reference to measure other virtual machines.

### Applying the Reference Workload

When considering an existing server that will move into a virtual infrastructure, you have the opportunity to gain efficiency by correctly sizing the virtual hardware resources assigned to that system.

The reference architectures create a pool of resources sufficient to host a target number of reference virtual machines. It is entirely possible that your virtual machines may not exactly match the specifications above. In that case, you can say that a single specific virtual machine is the equivalent of some number of reference virtual machines, and assume that the number of virtual machines have been used in the pool. You can continue to provision virtual machines from the pool of resources until it is exhausted. Consider these examples:

#### Example 1 Custom Build Application

A small custom-built application server needs to move into this virtual infrastructure. The physical hardware supporting the application is not being fully utilized at present. A careful analysis of the existing application reveals that the application can use one processor, and needs 3 GB of memory to run normally. The IO workload ranges between 4 IOPS at idle time to 15 IOPS when busy. The entire application is only using about 30 GB on local hard drive storage.

Based on these numbers, following resources are needed from the resource pool:

- CPU resources for 1  $\ensuremath{\text{VM}}$
- Memory resources for 2 VMs
- Storage capacity for 1 VM
- IOPS for 1 VM  $\,$

In this example, a single virtual machine uses the resources of two of the reference VMs. If the original pool had the capability to provide 100 VMs worth of resources, the new capability is 98 VMs.

#### Example 2 Point of Sale System

The database server for a customer's point-of-sale system needs to move into this virtual infrastructure. It is currently running on a physical system with four CPUs and 16 GB of memory. It uses 200 GB storage and generates 200 IOPS during an average busy cycle. The following are the resources needed from the resource pool to virtualize this application:

- CPUs of 4 reference VMs
- Memory of 8 reference VMs
- Storage of 2 reference VMs
- IOPS of 8 reference VMs

In this case the one virtual machine uses the resources of eight reference virtual machines. If this was implemented on a resource pool for 50 virtual machines, there are 42 virtual machines of capability remaining in the pool.

#### Example 3 Web Server

The customer's web server needs to move into this virtual infrastructure. It is currently running on a physical system with two CPUs and 8GB of memory. It uses 25 GB of storage and generates 50 IOPS during an average busy cycle.

The following are the requirements to virtualize this application:

- CPUs of 2 reference VMs
- Memory of 4 reference VMs
- Storage of 1 reference VMs
- IOPS of 2 reference VMs

In this case the virtual machine would use the resources of four reference virtual

machines. If this was implemented on a resource pool for 100 virtual machines, there are 96 virtual machines of capability remaining in the pool.

#### Summary of Examples

The three examples presented show the flexibility of the resource pool model. In all the three cases the workloads simply reduce the number of available resources in the pool. If all the three examples were implemented on the same virtual infrastructure, with an initial capacity of 100 virtual machines they can all be implemented, leaving the capacity of eighty six reference virtual machines in the resource pool.

In more advanced cases, there may be trade-offs between memory and I/O or other relationships where in increasing the amount of one resource decreases the need for another. In these cases, the interactions between resource allocations become highly complex, which is out of the scope of this document. However, once the change in the resource balance has been examined, and the new level of requirements is known; these virtual machines can be added to the infrastructure using the method described in the examples. You can also use the Microsoft Assessment and Planning (MAP) toolkit to assist in the analysis of the current workload. You can download the toolkit from the following Microsoft link:

http://www.microsoft.com/map

# **Networking Configuration Guidelines**

This document provides details for setting up a redundant, highly-available configuration. As such, references are made as to which component is being configured with each step whether that be A or B. For example, SP A and SP B, are used to identify the two EMC VNXe storage controllers that are provisioned with this document while the Nexus A and Nexus B identify the pair of Cisco Nexus switches that are configured. Additionally, this document details steps for provisioning multiple UCS hosts and these are identified sequentially, M100N1 and M100N2, and so on. Finally, when indicating

that the reader should include information pertinent to their environment in a given step, this is indicated with the inclusion of <italicized text> as part of the command structure. See the following example for the VLAN create command on the Cisco Nexus Switch:

switchA(config)# vlan {vlan-id | vlan-range}
switchA(config)# vlan <storage VLAN ID>

This document is intended to allow the reader to fully configure the customer environment. In order to do so, there are various steps which will require you to insert your own naming conventions, IP addresses, and VLAN schemes, as well as record appropriate iSCSI IQN or MAC addresses. Table 8 details the list of VLANs necessary for deployment as outlined in this guide.

# VSPEX Configuration Guidelines

To configure the Cisco solution for EMC VSPEX Microsoft Hyper-V architectures, follow these steps:

- **1.** Pre-Deployment Tasks, page 22
- 2. Cabling Information, page 23
- 3. Prepare and Configure the Cisco Nexus 5548UP Switch, page 26
- 4. Infrastructure Servers, page 37
- 5. Prepare the Cisco UCS C220 M3 Servers, page 38
- 6. Prepare the EMC VNXe3300 Storage, page 73
- 7. Microsoft Windows Failover Cluster Setup, page 90
- 8. Microsoft System Center-2012 VMM Configuration, page 104
- 9. Validating Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures, page 136

The above steps are described in the following sections.

### **Pre-Deployment Tasks**

Pre-deployment tasks include procedures that do not directly relate to environment installation and configuration, but whose results will be needed at the time of installation. Examples of pre-deployment tasks are collection of hostnames, IP addresses, VLAN IDs, license keys, installation media, and so on. These tasks should be performed before the customer visit to decrease the time required onsite.

- Gather documents—Gather the related documents listed in the Preface. These are used throughout the text of this document to provide detail on setup procedures and deployment best practices for the various components of the solution.
- Gather tools—Gather the required and optional tools for the deployment. Use following table to confirm that all equipment, software, and appropriate licenses are available before the deployment process.
- Gather data—Collect the customer-specific configuration data for networking, naming, and required accounts. Enter this information into the Customer Configuration Data worksheet for reference during the deployment process.

#### **Customer Configuration Data**

To reduce the onsite time, information such as IP addresses and hostnames should be assembled as part of the planning process.

The Customer Configuration Data section provides a table to maintain a record of relevant information. This form can be expanded or contracted as required, and information may be added, modified, and recorded as deployment progresses.

Additionally, complete the EMC VNXe Series Configuration Worksheet, available on the EMC online support website, to provide the most comprehensive array-specific information.

# VSPEX M100 Configuration Details

# **Cabling Information**

The following information is provided as a reference for cabling the physical equipment in a VSPEX M100 environment. The tables in this section include both local and remote device and port locations in order to simplify cabling requirements.

This document assumes that out-of-band management ports are plugged into an existing management infrastructure at the deployment site.

Follow the cabling directions in this section. Failure to do so will result in necessary changes to the deployment procedures that follow because specific port locations are mentioned.

Before starting, ensure that the configurations match the cabling details provided in the tables and figures in this section.

Figure 12 shows the VSPEX M100 cabling diagram. The alphabets labeled indicate connections to the end points rather than port numbers on the physical device. For example, connection A is a 10 Gb target port connected from EMC VNXe3300 SP B to Cisco Nexus 5548 A and connection R is a 10 Gb target port connected from Cisco VIC P81E uplink port 1 on Server 2 to Cisco Nexus 5548 B. Connections U and V are 10 Gb vPC peer-links connected from Cisco Nexus 5548 A to Cisco Nexus 5548 B.



#### Figure 12 Cabling Details for VSPEX Microsoft Hyper-V 100 Virtual Machines

Table 6 and Table 7 show that there are five major cabling in these architectures:

- Inter switch links
- Data connectivity for servers (trunk links)
- Management connectivity for servers
- Storage connectivity
- Infrastructure connectivity

Table 6 provides the Cisco Nexus 5548 A Ethernet Cabling Information Local Device Local PortConnection Remote.

Cable ID	Switch Interface	VLAN	Mode	Speed (Gbps)	Port Channel	Remote Device port
Е	Eth1/1	1	Access	1(D)	2	C220 Server1- 1GE LOM 1
F	Eth1/2	1	Access	1(D)	3	C220 Server2- 1GE LOM 1
G	Eth1/3	1	Access	1(D)	4	C220 Server3- 1GE LOM 1
Н	Eth1/4	1	Access	1(D)	5	C220 Server4- 1GE LOM 1

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#### Table 6 Cabling details for 100 VMs on Cisco Nexus 5548UP A

Cable ID	Switch Interface	VLAN	Mode	Speed (Gbps)	Port Channel	Remote Device port
U	Eth1/7	1,40,45,46	Trunk	10(D)	7	VPC peer link
V	Eth1/8	1,40,45,46	Trunk	10(D)	7	VPC peer link
М	Eth1/9	1,40,45,46	vntag	10(D)	-	C220 Server1- P81E VIC Port 0
N	Eth1/10	1,40,45,46	vntag	10(D)	-	C220 Server2- P81E VIC Port 0
0	Eth1/11	1,40,45,46	vntag	10(D)	-	C220 Server3- P81E VIC Port 0
Р	Eth1/12	1,40,45,46	vntag	10(D)	-	C220 Server4- P81E VIC Port 0
(not shown)	Eth1/15	1,40,45,46	Trunk	10(D)	15	Uplink to Infrastructure network
(not shown)	Eth1/17	1,40,45,46	Trunk	10(D)	17	Uplink to Infrastructure network
A	Eth2/1	40	Access	10(D)	21	EMC VNXe3300 (eth10) - SP B
С	Eth2/2	40	Access	10(D)	22	EMC VNXe3300 (eth10) - SP A

#### Table 6 Cabling details for 100 VMs on Cisco Nexus 5548UP A

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#### Table 7 Cabling details for 100 VMs on Cisco Nexus 5548UP B

Cable ID	Switch Interface	VLAN	Mode	Speed (Gbps)	Port Channel	Remote Device port
Ι	Eth1/1	1	Access	1(D)	2	C220 Server1- 1GE LOM 1
J	Eth1/2	1	Access	1(D)	3	C220 Server2- 1GE LOM 1
K	Eth1/3	1	Access	1(D)	4	C220 Server3- 1GE LOM 1
L	Eth1/4	1	Access	1(D)	5	C220 Server4- 1GE LOM 1
U	Eth1/7	1,40,45,46	Trunk	10(D)	7	VPC peer link
V	Eth1/8	1,40,45,46	Trunk	10(D)	7	VPC peer link
Q	Eth1/9	1,40,45,46	vntag	10(D)	-	C220 Server1- P81E VIC Port 0
R	Eth1/10	1,40,45,46	vntag	10(D)	-	C220 Server2- P81E VIC Port 0
S	Eth1/11	1,40,45,46	vntag	10(D)	-	C220 Server3- P81E VIC Port 0

Cable ID	Switch Interface	VLAN	Mode	Speed (Gbps)	Port Channel	Remote Device port
Т	Eth1/12	1,40,45,46	vntag	10(D)	-	C220 Server4- P81E VIC Port 0
(not shown)	Eth1/16	1,40,45,46	Trunk	10(D)	15	Uplink to Infrastructure network
(not shown)	Eth1/18	1,40,45,46	Trunk	10(D)	17	Uplink to Infrastructure network
А	Eth2/1	40	Access	10(D)	21	EMC VNXe3300 (eth10) - SP B
С	Eth2/2	40	Access	10(D)	22	EMC VNXe3300 (eth10) - SP A

Table 7 Cabling details for 100 VMs on Cisco Nexus 5548UP B

# **Prepare and Configure the Cisco Nexus 5548UP Switch**

The following section provides a detailed procedure for configuring the Cisco Nexus 5548 switches for use in EMC VSPEX Microsoft Hyper-V 100 VMs.

Figure 13 shows two switches configured for vPC. In vPC, a pair of switches acting as vPC peer endpoints looks like a single entity to port-channel-attached devices, although the two devices that act as logical port-channel endpoint are still two separate devices. This provides hardware redundancy with port-channel benefits. Both switches form a vPC Domain, in which one vPC switch is Primary while the other is secondary.

Note

The configuration steps detailed in this section provides guidance for configuring the Cisco Nexus 5548 UP running release 5.1(3)N1(1a).



Figure 13 Networking Configuration for Microsoft Hyper-V 100 Virtual Machines

### **Initial Setup of Cisco Nexus Switches**

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These steps provide details for the initial setup on both Cisco Nexus 5548 switches.

#### For Cisco Nexus A and Cisco Nexus B

After booting and connecting to the serial or console port of the switch, the NX-OS setup should automatically start.

- 1. Enter yes to enforce secure password standards.
- 2. Enter the password for the admin user.
- **3.** Enter the password a second time to commit the password.
- 4. Enter yes to enter the basic configuration dialog.
- 5. Create another login account (yes/no) [n]: Enter.
- 6. Configure read-only SNMP community string (yes/no) [n]: Enter.
- 7. Configure read-write SNMP community string (yes/no) [n]: Enter.
- 8. Enter the switch name: <Nexus A Switch name> Enter.
- 9. Continue with out-of-band (mgmt0) management configuration? (yes/no) [y]: Enter.
- **10**. Mgmt0 IPv4 address: <Nexus A mgmt0 IP> Enter.
- **11.** Mgmt0 IPv4 netmask: <Nexus A mgmt0 netmask> Enter.
- 12. Configure the default gateway? (yes/no) [y]: Enter.
- **13.** IPv4 address of the default gateway: <Nexus A mgmt0 gateway> Enter.
- **14**. Enable the telnet service? (yes/no) [n]: Enter.
- **15**. Enable the ssh service? (yes/no) [y]: Enter.

- 16. Type of ssh key you would like to generate (dsa/rsa):rsa.
- **17.** Number of key bits <768–2048> :1024 Enter.
- **18.** Configure the ntp server? (yes/no) [y]: n Enter
- **19.** NTP server IPv4 address: <NTP Server IP> Enter.
- 20. Enter basic FC configurations (yes/no) [n]: Enter.
- **21**. Would you like to edit the configuration? (yes/no) [n]: Enter.
- 22. Be sure to review the configuration summary before enabling it.
- **23.** Use this configuration and save it? (yes/no) [y]: Enter.
- **24.** Configuration may be continued from the console or by using SSH. To use SSH, connect to the mgmt0 address of Nexus A or B.
- **25.** Log in as user admin with the password previously entered.

#### **Enabling Features and Global Configuration**

#### For Cisco Nexus A and Cisco Nexus B

- 1. Type config t to enter the global configuration mode.
- 2. Type feature lacp.
- 3. Type feature interface-vlan
- 4. Type feature vpc.

#### **Set Global Configurations**

These steps provide details for setting global configurations.

#### For Cisco Nexus A and Cisco Nexus B

- 1. From the global configuration mode, type spanning-tree port type network default to make sure that, by default, the ports are considered as network ports in regards to spanning-tree.
- **2.** Type spanning-tree port type edge bpduguard default to enable bpduguard on all edge ports by default.
- 3. Type spanning-tree port type edge bpdufilter default to enable bpdufilter on all edge ports by default.

#### **Configure VLANs**

The steps in this section provide details for creating the VLANs as per the below given reference Table 8.

VLAN Name	VLAN Purpose	ID used in this Document	Host NICs in VLANs
storage	For iSCSI traffic	40	2 Cisco VNICs
VM_traffic	For VM data	45	1 Cisco VNIC

Table 8 VLANs for EMC VSPEX Microsoft Hyper-V M100 Setup

VLAN Name	VLAN Purpose	ID used in this Document	Host NICs in VLANs
cluster	For live migration	46	1 Cisco VNIC
default	For management and cluster	1	2 Cisco 1 GigE 1350 LOM in team

#### Table 8 VLANs for EMC VSPEX Microsoft Hyper-V M100 Setup



For details on network addresses, see the section Customer Configuration Data Sheet, page 138. This section provides tabulated record of relevant information (to be filled at the customer's end). This form can be expanded or contracted as required, and information may be added, modified, and recorded as the deployment progresses.

#### For Nexus A and Nexus B

- 1. Type config-t.
- **2.** Type vlan <storage VLAN ID>.
- 3. Type name storage
- 4. Type exit.
- 5. Type vlan <cluster VLAN ID>.
- 6. Type name cluster
- 7. Type exit.
- 8. Type vlan <vm\_trafficr VLAN ID>.
- 9. Type name VM\_traffic
- 10. Type exit.

### **Configure Port-Channels**

#### **Create Port-Channels**

#### For Cisco Nexus 5548 A and Cisco 5548 B

- 1. From the global configuration mode, type interface Po7.
- **2.** Type description vPC peer-link.
- **3.** Type exit.
- 4. Type interface Eth1/7-8
- **5.** Type channel-group 7 mode active.
- 6. Type no shutdown.
- 7. Type exit.
- 8. Type interface Po2.
- Type description <Cisco 1GigE LOM 1 on UCS Server 1 For Nexus A>/<Cisco 1GigE LOM 2 on UCS Server 1 – For Nexus B>
- 10. Type exit.

- **11**. Type interface Eth1/1.
- **12.** Type channel-group 2 mode active.
- **13.** Type no shutdown.
- 14. Type exit
- **15.** Type interface Po3.
- Type description<Cisco 1GigE LOM 1 on UCS Server 2 For Nexus A>/<Cisco 1GigE LOM 2 on UCS Server 2 – For Nexus B>.
- 17. Type exit.
- **18**. Type interface Eth1/2.
- **19.** Type channel-group 3 mode active.
- 20. Type no shutdown.
- **21**. Type exit.
- **22**. Type interface Po4.
- Type description <Cisco 1GigE LOM 1on UCS Server 3 For Nexus A>/<Cisco 1GigE LOM 2 on UCS Server 3 For Nexus B>.

- 24. Type exit.
- **25**. Type interface Eth1/3.
- **26.** Type channel-group 4 mode active.
- 27. Type no shutdown.
- 28. Type exit
- **29.** Type interface Po5.
- **30.** Type description <Cisco 1GigE LOM 1on UCS Server 4>.
- 31. Type exit.
- **32.** Type interface Eth1/4.
- **33.** Type channel-group 5 mode active.
- 34. Type no shutdown.
- 35. Type exit
- **36.** Type interface Po15.
- 37. Type description <Infrastructure Network>.
- 38. Type exit.
- **39.** Type interface Eth1/15.
- **40.** Type channel-group 15 mode active.
- 41. Type no shutdown.
- 42. Type exit
- **43**. Type interface Po17.
- 44. Type description < Infrastructure Network>.
- 45. Type exit.
- **46.** Type interface Eth1/17.

- **47.** Type channel-group 17 mode active.
- **48.** Type no shutdown.
- 49. Type exit
- 50. Type interface Po21.
- **51**. Type description <VNXe Storage Processor B>
- 52. Type exit.
- **53.** Type interface Eth2/1.
- 54. Type channel-group 21 mode active.
- 55. Type no shutdown.
- 56. Type exit
- **57.** Type interface Po22.
- 58. Type description <VNXe Storage Processor A>
- 59. Type exit.
- 60. Type interface Eth2/2.
- **61.** Type channel-group 22 mode active.
- 62. Type no shutdown.
- 63. Type exit

#### **Add Port Channel Configurations**

These steps provide details for adding Port Channel configurations.

#### For Cisco Nexus A and Cisco Nexus B

- 1. From the global configuration mode, type interface Po7.
- 2. Type switchport mode trunk.
- 3. Type switchport trunk allowed vlan <storage VLAN ID, cluster VLAN ID, vm\_traffic VLAN ID >.
- 4. Type spanning-tree port type network.
- 5. Type no shutdown.
- 6. Type exit.
- 7. Type interface Po15.
- 8. Type switchport mode trunk.
- 9. Type switchport trunk allowed vlan < mgmt. VLAN ID vm\_traffic VLAN ID >.
- **10**. Type spanning-tree port type network.
- 11. Type no shut.
- 12. Type exit.
- **13**. Type interface Po17.
- **14.** Type switchport mode trunk.
- **15.** Type switchport trunk allowed vlan < mgmt. VLAN ID, vm\_traffic VLAN ID >.
- **16.** Type spanning-tree port type network.
- 17. Type no shut.

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- **18**. Type exit.
- **19.** Type interface Po2.
- **20.** Type switchport mode access.
- **21**. Type spanning-tree port type edge.
- 22. Type no shut.
- 23. Type exit.
- 24. Type interface Po3.
- **25.** Type switchport mode access.
- **26.** Type spanning-tree port type edge.
- 27. Type no shut.
- 28. Type exit.
- **29.** Type interface Po4.
- **30.** Type switchport mode access.
- **31.** Type spanning-tree port type edge.
- 32. Type no shut.
- 33. Type exit.
- 34. Type interface Po5.
- **35.** Type switchport mode access.
- **36.** Type spanning-tree port type edge.
- 37. Type no shut.
- **38.** Type exit.
- **39.** Type interface Po21.
- **40.** Type switchport mode access.
- 41. Type switchport access vlan <storage VLAN ID>
- **42.** Type spanning-tree port type edge.
- **43.** Type no shut.
- 44. Type exit.
- 45. Type interface Po22.
- 46. Type switchport mode access.
- 47. Type switchport access vlan <storage VLAN ID>
- **48.** Type spanning-tree port type edge.
- 49. Type no shut.

#### **Configure Virtual Port Channels**

These steps provide details for configuring virtual Port Channels (vPCs).

#### For Cisco Nexus A and Cisco Nexus B

1. From the global configuration mode, type vpc domain <Nexus vPC domain ID>.

- 2. Type peer-keepalive destination <Nexus B mgmt0 IP> source <Nexus A mgmt0 IP>.
- 3. Type exit.
- 4. Type interface Po7.
- **5**. Type vpc peer-link.
- 6. Type exit.
- 7. Type interface Po15.
- 8. Type vpc 15.
- 9. Type exit.
- **10**. Type interface Po17.
- **11**. Type vpc 17.
- 12. Type exit.
- **13**. Type interface Po2.
- **14.** Type vpc 2.
- **15.** Type exit.
- **16**. Type interface Po3.
- **17.** Type vpc 3.
- **18.** Type exit.
- **19**. Type interface Po4.
- **20.** Type vpc 4.
- 21. Type exit.
- **22.** Type interface Po5.
- **23.** Type vpc5.
- 24. Type exit.
- **25.** Type interface Po21.
- **26.** Type vpc 21.
- 27. Type exit.
- **28.** Type interface Po22.
- **29.** Type vpc 22.
- 30. Type exit.

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**31**. Type copy run start

At this point of time, all ports and port-channels are configured with necessary VLANs, switchport mode and vPC configuration. Validate this configuration using the "show port-channel summary" and "show vpc" commands as shown in Figure 14.

Figure 14

VLAN	Name	Status	Ports
1	default	active	P02, P03, P04, P05, P07, P015 P017, Eth1/5, Eth1/6, Eth1/13 Eth1/14, Eth1/15, Eth1/17 Eth1/19, Eth1/20, Eth1/21 Eth1/22, Eth1/23, Eth1/24 Eth1/25, Eth1/26, Eth1/27 Eth1/28, Eth1/29, Eth1/30 Eth1/31, Eth1/32, Eth2/3, Eth2/ Eth2/5, Eth2/6, Eth2/7, Eth2/8
40	storage	active	Po7, Po15, Po17, Po21, Po22 Eth2/7, Veth32773, Veth32775 Veth32778, Veth32781
45	vm_traffic	active	Po7, Po15, Po17, Eth2/7 Veth32769, Veth32770, Veth32771 Veth32772
46	cluster	active	Po7, Po15, Po17, Eth2/7 Veth32776, Veth32779, Veth32782 Veth32784

Show VLAN Brief Output

Ensure that on both switches, all required VLANs are in "active" status and right set of ports and port-channels are part of the necessary VLANs.

Port-channel configuration can be verified using "show port-channel summary" command. Figure 15 shows the expected output of this command.

#### Figure 15 Show Port Channel Summary Output

	EMC-55488# sh port-channel summary Flags: D - Down P - Up in port-channel (members) I - Individual H - Hot-standby (LACP only) s - Suspended r - Module-removed S - Switched R - Routed U - Up (port-channel) M - Not in use. Min-links not met							
Gro	oup Port- Channel	туре	Protocol	Member Ports	;			
- 2 3 4 5 7 15 17 21 22	Po2(SU) Po3(SU) Po5(SU) Po5(SU) Po15(SU) Po17(SU) Po17(SU) Po21(SU) Po22(SU)	Eth Eth Eth Eth Eth Eth Eth Eth Eth	LACP LACP LACP LACP LACP LACP LACP LACP	Eth1/1(P) Eth1/2(P) Eth1/3(P) Eth1/4(P) Eth1/7(P) Eth1/16(P) Eth1/18(P) Eth2/1(P) Eth2/2(P)	Eth1/8(P)			

In this example, port-channel 7 is the vPC peer-link port-channel, port-channels 2, 3, 4 and 5 are connected to the Cisco 1GigE I350 LOM on the host, port-channels 15 and 17 are connected to the infrastructure network, and port-channels 21 and 22 are connected to the storage array. Make sure that state of the member ports of each port-channel is "P" (Up in port-channel). Note that port may not come up if the peer ports are not properly configured. Common reasons for port-channel port being down are:

- Port-channel protocol mis-match across the peers (LACP v/s none)
- Inconsistencies across two vPC peer switches. Use "show vpc consistency-parameters {global | interface {port-channel | port} <id>} command to diagnose such inconsistencies.

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vPC status can be verified using "show vpc" command. Example output is shown in Figure 16.

			Fig	ure 16	Show vPC Brief Output				
	EMC-5548B# sh vpc brief Legend: (*) - local vPC is down, forwarding via vPC peer-link								
Peer VPC Conf Per- Type VPC Numb Peer Dua	<pre>VPC domain id : 111 Peer status : peer adjacency formed ok VPC keep-alive status : peer is alive Configuration consistency status : success Per-vlan consistency status : success Type-2 consistency status : success VPC role : primary Number of VPCs configured : 8 Peer Gateway : Disabled Dual-active excluded VLANS : - Graceful Consistency Check : Enabled</pre>								
VPC	Peer-li	nk stat	us						
id	Port	Status	Active	vlans					
1	P07	up	1,20-2	2,40,42-46					
VPC	status								
id	Port		Status	Consistency	Reason	Active vlans			
2 3 4 5 15	Po2 Po3 Po4 Po5 Po15		up up up up up up	success success success success success success		1 1 1 1 1,20-22,40,			
17	P017		up	success	success	42-46 1,20-22,40, 42-46			
21 22	Po21 Po22		up up	success success	success success	40 40			

Ensure that the vPC peer status is "peer adjacency formed ok" and all the port-channels, including the peer-link port-channel, have their status as "up".

### **Configure Adapter FEX**

The Cisco NX-OS Adapter-FEX feature combines the advantages of the FEX link architecture with server I/O virtualization to create multiple virtual interfaces over a single Ethernet interface. This allows you to deploy a dual port NIC on the server and to configure more than two virtual interfaces that the server sees as a regular Ethernet interface. The advantage of this approach is that it allows you to reduce power and cooling needs and to reduce the number of network ports.

Adapter-FEX can be thought of as a way to divide a single physical link into multiple virtual links or channels. Each channel is identified by a unique channel number and its scope is limited to the physical link.

The physical link connects a port on a server network adapter with an Ethernet port on the switch. This allows the channel to connect a vNIC on the server with a vEthernet interface on the switch.

Packets on each channel are tagged with a VNTag that has a specific source virtual interface identifier (VIF). The VIF allows the receiver to identify the channel that the source used to transmit the packet.

For more information on Adapter-FEX, check the below URLs:

Cisco Nexus 5000 Series NX-OS Adapter-FEX Software Configuration Guide, Release 5.1(3)N1(1)

http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/adapter-fex/513\_n1\_1/b\_Config uring\_Cisco\_Nexus\_5000\_Series\_Adapter-FEX\_rel\_5\_1\_3\_N1.pdf

Cisco Adapter Fabric Extender

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/data\_sheet\_c78-657397.html

This section provides information about how to enable and configure the Cisco Nexus 5500 series for Adapter-FEX. After completing the following steps in this section you will carve out vNICs on Cisco VIC P81E adapter (explained in the later section "Creating and configuring vNICs on Cisco P81E VIC") using the below created port-profiles.

#### **Enabling Switch for Adapter-FEX**

Following steps show enabling the virtualization feature on both the Cisco Nexus switches.

#### For Cisco Nexus A and Cisco Nexus B

- 1. Type Configure terminal
- 2. Type install feature-set virtualization
- 3. Type feature-set virtualization
- 4. Type vethernet auto-create

### **Configuring the Switch for Adapter-FEX**

Following steps show creation of port-profiles on both the switches and put the FEX interfaces into vntag mode for NIC.

#### For Cisco Nexus A and Cisco Nexus B

- **1**. Type Configure terminal
- 2. Type port-profile type vethernet <port-profile name- storage>
- 3. Type switchport access vlan <storage VLAN ID>
- **4**. Type state enabled
- 5. Type exit
- 6. Type port-profile type vethernet <port-profile name- cluster>
- 7. Type switchport access vlan <cluster VLAN ID>
- 8. Type state enabled
- 9. Type exit
- **10.** Type port-profile type vethernet <port-profile name- vm\_traffic>
- **11.** Type switchport access vlan <vm\_traffic VLAN ID>
- 12. Type state enabled
- 13. Type exit
- **14.** Type interface ethernet1/9-12
- 15. Type switchport mode vntag
- 16. Type exit
- **17.** Type copy run start
|                                  | Figure 17         |               | Po            | rt-Profile        | Brief Output   |
|----------------------------------|-------------------|---------------|---------------|-------------------|----------------|
| EMC-5548A# 9                     | sh port-profile b | rief          |               |                   |                |
| Port<br>Profile                  | Profile<br>State  | Conf<br>Items | Eval<br>Items | Assigned<br>Intfs | Child<br>Profs |
| cluster<br>storage<br>vm_traffic | 1<br>1<br>1<br>1  | 1<br>1<br>1   | 1<br>1<br>1   | 4<br>4<br>4       | 0<br>0<br>0    |

### **Enable Jumbo Frames**

Cisco solution for EMC VSPEX Microsoft Hyper-V architectures require MTU set at 9000 (jumbo frames) for efficient storage and live migration traffic. MTU configuration on Cisco Nexus 5000 series switches fall under global QoS configuration. You may need to configure additional QoS parameters as needed by the applications.

The following commands enable jumbo frames on the Cisco Nexus switches.

#### For Cisco Nexus A and Cisco Nexus B

switch(config)#policy-map type network-qos jumbo
switch(config-pmap-nq)#class type network-qos class-default
switch(config-pmap-c-nq)#mtu 9216
switch(config-pmap-c-nq)#exit
switch(config-pmap-nq)#exit
switch(config)#system qos
switch(config-sys-qos)#service-policy type network-qos jumbo

#### Figure 18 Validate Jumbo Frames Support in the Storage Processors

--- 10.10.40.60 ping statistics ---10 packets transmitted, 10 packets received, 0.00% packet loss round-trip min/avg/max = 2.396/2.595/3.859 ms

# **Infrastructure Servers**

Most environments will already have an Active Directory in their infrastructure either running on a virtual machine or on a physical server. This section will not cover the installation of an Active Directory Domain Controller, however it will cover the brief installation of standalone SQL Server 2008 R2 SP1 and System Center VMM 2012 on Microsoft Windows Server 2008 R2 SP1. The following infrastructure servers were used to validate the VSPEX Microsoft Hyper-V architectures.

Server Name	Role	<b>OS</b>
M50AD.M50VSPEX.COM	Domain Controller, DNS and DHCP	Microsoft Windows Server 2008 R2 SP1
M50DB.M50VSPEX.COM	SQL Server for SCVMM	Microsoft Windows Server 2008 R2 SP1
M50SCVMM.M50VSPEX. COM	SCVMM - 2012	Microsoft Windows Server 2008 R2 SP1

#### Table 9 Infrastructure Server Details Used for the VSPEX Solution

For details on network addresses, see the section Customer Configuration Data Sheet, page 138.

# Prepare the Cisco UCS C220 M3 Servers

Preparing the Cisco C220 M3 servers is a common step for all the Hyper-V architectures. Firstly, you need to install the C220 M3 server in a rack. For more information on mounting the Cisco C220 servers, see the installation guide on details about how to physically mount the server: http://www.cisco.com/en/US/docs/unified computing/ucs/c/hw/C220/install/install.html

To prepare the servers, follow these steps:

- 1. Configuring Cisco Integrated Management controller (CIMC), page 38
- 2. Enable Virtualization Technology in BIOS, page 39
- **3.** Configuring RAID, page 40

These steps are discussed in detail in the following sections.

### Configuring Cisco Integrated Management controller (CIMC)

This section describes procedures to prepare the Cisco UCS C220 M3 servers.

#### **Connecting and Powering on the Server (Standalone Mode)**

For connecting and powering on the server (Standalone Mode), follow these steps:

- 1. Attach a supplied power cord to each power supply in your server.
- 2. Attach the power cord to a grounded AC power outlet.
- **3.** Connect a USB keyboard and VGA monitor using the supplied KVM cable connected to the KVM connector on the front panel.
- 4. Press the Power button to boot the server. Watch for the prompt to press F8.
- 5. During bootup, press F8 when prompted to open the BIOS CIMC Configuration Utility.
- 6. Set the "NIC mode" to Dedicated and "NIC redundancy" to None.
- 7. Choose whether to enable DHCP for dynamic network settings or to enter static network settings.
- 8. Press F10 to save your settings and reboot the server.

	i igule i	
CIMC Configurati	on Utility Vers	sion 1.5 Cisco Systems, Inc.
жжжжже страновальные страновальны страновальные страновальн		
NIC Properties		
NIC mode		NIC redundancy
Dedicated:	[ <u>X</u> ]	None: [X]
Shared LOM:	[]	Active-standby:[]
Shared LOM 10G:	[]	Active-active: [ ]
Cisco Card:	[]	
IPV4 (Basic)		Factory Defaults
DHCP enabled:	[]	CIMC Factory Default:[ ]
CIMC IP:	10.29.150.101	Default User (Basic)
Subnetmask:	255.255.255.0	Default password:
Gateway:	10.29.150.1	Reenter password:
VLAN (Advanced)		
VLAN enabled:	[]	
VLAN ID:		
Priority:		
xeletetetetetetetetetetetetete		10101010101010101010101010101010101010
<up arrow="" down=""></up>	Select items	<pre><f10> Save <space bar=""> Enable/Disable</space></f10></pre>
<f5> Refresh</f5>		<esc> Exit</esc>

Figure 19 CIMC Configuration Utility

Once the CIMC IP is configured, the server can be managed using the https based Web GUI or CLI.

Note

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The default username for the server is "admin" and the default password is "password". Cisco strongly recommends changing the default password.

### **Enable Virtualization Technology in BIOS**

Microsoft Hyper-V requires an x64-based processor, hardware-assisted virtualization (Intel VT enabled), and hardware data execution protection (Execute Disable enabled).

To enable Intel ® VT and Execute Disable in BIOS, follow these steps:

- 1. Press the Power button to boot the server. Watch for the prompt to press F2.
- 2. During bootup, press F2 when prompted to open the BIOS Setup Utility.
- 3. Choose Advanced > Processor Configuration.

Figure 20 Cisco UCS C220 M2 KVM Console

1

e View Macros Tools Help VM Virtual Media		
	Copyright (C) 2011 6	American Megatrends, Inc.
Advanced		
Processor Configuration		Socket specific Processor
		Information
· Socket 1 Processor Information · Socket 2 Processor Information		
SOCKET 2 Processor Information		
Intel(R) Hyper-Threading Technolog	[Enabled]	
Number of Enabled Cores	[A11]	
Execute Disable	[Enabled]	
Intel(R) VT	[Enabled]	
Intel(R) VT-d	[Enabled]	
Coherency Support	[Disabled]	
ATS Support	[Enabled]	
		++ Select Screen
Processor Performance Configuration		↑↓ Select Item
		Enter Select Field
Hardware Prefetcher	[Enabled]	+/- Change Value
Adjacent Cache Line Prefetcher	[Enabled]	F1 General Help
DCU Streamer Prefetcher	[Enabled]	F9 BIOS Defaults
DCU IP Prefetcher	[Enabled]	F10 Save & Exit ESC Exit
Direct Cache Access Support	[Enabled]	ESU EXIL
Processor Power Management Configura	ation	

4. Enable Execute Disable and Intel VT as shown in Figure 20.

# **Configuring RAID**

The RAID controller type is Cisco UCSC RAID SAS 2008 and supports 0, 1, 5 RAID levels. We need to configure RAID level 1 for this setup and set the virtual drive as boot drive.

To configure RAID controller, follow these steps:

- 1. Using a web browser, connect to the CIMC using the IP address configured in the CIMC Configuration section.
- 2. Launch the KVM from the CIMC GUI.



Figure 21 Cisco UCS C220 M2 CIMC GUI

**3**. During bootup, press **<Ctrl> <H>** when prompted to configure RAID in the WebBIOS.





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4. Choose the adapter and click **Start**.

Figure 23 Adapter Selection for RAID Configuration
--

10.29.150.151 - KVM Console				
File View Macros Tools Help				
KVM Virtual Media				
Adapter Selection	1			L512
				L J1 2 1 4
Adapter No.	Bus No.	Device No.	Туре	Firmware Version
0. 🥥	130	0	Cisco UCSC RAID SAS 2008M-8i	2.120.234-1471
<u>Start</u>				

5. Choose the "New Configuration" radio button and click Next.

#### Figure 24 MegaRAID BIOS Config Utility Configuration



6. Click Yes and then click Next to clear the configuration.



7. If you choose the "Automatic Configuration" radio button and the "Redundancy when possible" option from the "Redundancy" drop-down list and if only two drives are available, the WebBIOS creates a RAID 1configuration.

Figure 26	Selecting the Configuration Method

Mega	RAID BIOS Config Utility C	onfiguration Wizard	LSID
Sele	ct Configuration Method :		
0	<u>M</u> anual Configuration Manually create drive gr	oups and virtual drives and set their	parameters as desired.
C	Automatic Configuration Automatically create the	e most efficient configuration.	
	<u>R</u> edundancy:	Redundancy when possible	V
		X Cancel	<b>€</b> ack <b>⊪</b> Next

8. Click Accept when you are prompted to save the configuration.

Figure 27 Configuration Pl	Preview
----------------------------	---------

MegaRAID BIOS Config Utility Config Wizard - Pr	review LSI2
Configuration Preview: This is the contribution this configuration free the contribution of the contributi	nfiguration defined. Click ACCEPT to save ration.
Drives	<u>V</u> irtual Drives
Legekplane	Virtual DriveO: RAID1: 67-054 GB:
	🗙 Cancel 🗼 Back 🚦 Accept

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- 9. Click Yes when you are prompted to initialize the new virtual drives.
- 10. Choose the "Set Boot Drive" radio button for the virtual drive created above and click Go.

Figure 28

MegaRAID BIOS Config Utility Virtual Drives	50%
	Virtual Drives:         Image: Contract of the second sec
	<ul> <li>Fast Initialize</li> <li>Slow Initialize</li> <li>Check Consistency</li> <li>Properties</li> <li>Set Boot Drive (current=NONE)</li> <li>Go Reset</li> </ul>
1 Home	er Back

**11.** Click **Exit** and reboot the system.

#### Figure 29 Virtual Drive Configuration in WebBIOS

Setting the Boot Option for Virtual Drives



Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures

# **SQL Server Installation**

This document will not go into details and best practices for SQL server installation and configuration. Consult your DBA team to ensure your SQL deployment is configured for best practices according to your corporate standards. For more information on the system requirements for the VMM database, see the Microsoft TechNet link:

http://technet.microsoft.com/en-us/library/gg610574

- 1. Run setup, choose Installation > New Installation...
  - 1. When prompted for feature selection, install ALL of the following:
  - 2. Database Engine Services
- 3. Management Tools Basic and Complete (for running queries and configuring SQL services)
- **4.** On the Instance configuration, choose a default instance, or a named instance. Default instances are fine for testing and labs. Production clustered instances of SQL will generally be a named instance. For the purposes of the POC, choose default instance to keep things simple.
- 5. On the Server configuration screen, set SQL Server Agent to Automatic. Click "Use the same account for all SQL Server Services, and input the SQL service account and password (see the section Customer Configuration Data Sheet, page 138).
- 6. On the Collation Tab make sure SQL\_Latin1\_General\_CP1\_CI\_AS is selected, as that is the ONLY collation supported.
- 7. On the Account provisioning tab add a domain user account or a group you already have set up for SQL admins.
- 8. On the Data Directories tab set your drive letters correctly for your SQL databases, logs, TempDB, and backup.
- 9. Setup will complete.
- 10. Apply any service pack or update for SQL 2008 R2 SP1.
- **11.** Once the installation is complete, configure a remote instance for of SQL server for VMM as given in the below URL:

http://technet.microsoft.com/en-us/library/cc764295.aspx

12. If you are using a domain administrator account or the local system account, SPN (Service Principal Name) for the server is registered in the Active Directory directory service. See the link on Microsoft KB article to register the SPN:

http://support.microsoft.com/kb/909801

# Microsoft System Center VMM

System Center 2012 - Virtual Machine Manager (VMM) is a management solution for the virtualized datacenter. It enables you to configure and manage your virtualization host, networking, and storage resources in order to create and deploy virtual machines and services to private clouds that you have created. For an overview of System Center 2012 - VMM, see the Microsoft TechNet link:

#### http://technet.microsoft.com/en-us/library/gg671827

This section deals with the installation of the System Center Virtual Machine Manager 2012 on a virtual machine running Microsoft Windows Server 2008 R2 SP1 OS. However, this section does not cover how to create and build a Microsoft Windows Server 2008 R2 with SP1 in a virtual environment.

Before installing a VMM management server, ensure that the computer meets the minimum hardware requirements and that all the prerequisite software is installed. For information about hardware and software requirements for VMM, see the link:

http://technet.microsoft.com/en-us/library/gg610592

# Installing the VMM Server and VMM Administrator Console

To install the VMM Server and VMM administrator console, follow these steps:

- 1. Join the Microsoft Windows Server 2008 R2 virtual machine to the Active Directory domain and login with the domain administrator credentials.
- 2. To start the Microsoft System Center 2012 Virtual Machine Manager Setup Wizard, on your installation media, right-click setup.exe, and click Run as administrator.
- **3.** In the main setup page, click **Install**. If you have not installed Microsoft .NET Framework 3.5 SP1, VMM prompts you to install it now.
- In the "Select features to install" page, choose the VMM management server check box and click Next.

Figure 30 Selecting Feature in Microsoft SCVMM 2012 Setup Wizard

Getting started	Report a problem
Select features to add	Expand all 🗸
VMM management server	
VMM console	× ×
☐ VMM Self-Service Portal	×
	Previous Next > Cancel

- 5. In the "Installation location" page, use the default path or type a different installation path for the VMM program files and click **Next**.
- 6. In the "Database configuration" page, enter the database "Server name" and provide the appropriate credentials (See the section Customer Configuration Data Sheet, page 138). Choose the "New database" radio button and click **Next**.

Database o	configuration
Provide information a	bout the database that you would like to use for your VMM management server.
Server name: M500	Browse
Port:	
☑ Use the following	credentials
User name and doma	in: m50vspex\administrator
Password:	Format: Domain\UserName
Instance name:	MSSQLSERVER
Select an existing dat	tabase or create a new database.
New database:	VirtualManagerDB
C Existing database:	
	Previous Next > Cancel

Figure 31 Database Configuration in Microsoft SCVMM 2012 Setup Wizard

7. In the "Configure service account and distributed key management" page, specify the account that will be used by the Virtual Machine Manager Service.

Figure 32 Configuring Service Account in Microsoft SCVMM 2012 Setup Wizard

Microsoft System Center 2012 Virtual Machine Manager Setup Wizard	
onfiguration	Report a proble
Configure service account and distributed key management	
Virtual Machine Manager Service Account	
Select the account to be used by the VMM service. Highly available VMM installations require the use of a domain accound which type of account should I use?	unt.
C Local System account	
O Domain account	
User name and domain: Password:	
M50VSPEX\vmmadmin ++++++	Select
Distributed Key Management Select whether to store encryption keys in Active Directory instead of on the local machine. Highly available VMM install keys be stored in Active Directory.	lations require the
Store my keys in Active Directory	
Provide the location in Active Directory. For example, CN=DKM,DC=contoso,DC=com.	
How do I configure distributed key management?	
How do I configure distributed key management?	ll.
How do I configure distributed key management?	M.
How do I configure distributed key management?	<u> </u>
How do I configure distributed key management?	

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For more information about which type of account to use, under "Specifying a Service Account for VMM", see the link:

http://technet.microsoft.com/library/gg697600.aspx

- 8. In the "Port configuration" page, provide unique port numbers for each feature and that are appropriate for your environment and click Next.
- **9.** In the "Library configuration" page, choose whether to create a new library share or to use an existing library share on the computer.
- **10.** In the "Installation summary" page, review your selections and click **Install** to install the VMM management server.
- 11. In the "Setup completed successfully" page, click Close to finish the installation.

For more information on installing the System Center 2012 - VMM, see the TechNet article: http://technet.microsoft.com/en-us/library/gg610617.aspx

# Install Microsoft Windows Server on Cisco UCS C220 M3 Servers

This section describes installation of Microsoft Windows Server 2008 R2 SP1 along with driver installation.

### Installation of Microsoft Windows Server 2008 R2 SP1

To install Microsoft Windows Server 2008 R2 Sp1 on all the Cisco UCS C220 M3 bare metal server using the virtual media, follow these steps:

- 1. Find the drivers for your installed devices on the Cisco UCS C-Series Drivers DVD that came with your C-Series server or download them from: http://www.cisco.com/cisco/software/navigator.html and extract them to a local machine such as your laptop.
- 2. Log in to CIMC Manager using your administrator user ID and password.

	ed Management Controller Log https://1 ▼ 😵 C 🔶	gin - Windows Internet Explorer provided 😑 💷	х Р •
<u>File Edit Vie</u>	w F <u>a</u> vorites <u>T</u> ools <u>H</u> elp		
🔶 Favorites	🏉 Cisco Integrated Manager	ment Controller Login	
•1 1-1 1- CISCO ©2008-2012, 0	Cisco Integrated Management Controller ucs-c220-m3 Version: 1.4(4a) Cisco Systems, Inc. All rights	Username: Password: Log In Cancel	

#### Figure 33 CIMC Manager Login Page

- 3. Enable the Virtual Media feature, which enables the server to mount virtual drives:
  - a. In the **CIMC Manager Server** tab, click **Remote Presence**.

- **b.** In the "Remote Presence" pane, choose the **Virtual Media** tab and check the **Enable Virtual Media Encryption** check box.
- c. Click Save Changes.

Figure 34 Enabling Virtual Media in CIMC

cisco Cisco Integ	rated Management Controller CIMC Hostname: ucs-c2 Logged in as: adminic Log Out
Overall Server Status	c   🗈 🛃   🖗 0 Remote Presence
Server Admin	Virtual KVM Virtual Media Serial over LAN
Summary Inventory Sensors System Event Log Remote Presence BIOS Power Policies Fault Summary	Virtual Media Properties Enabled: Active Sessions: 0 Enable Virtual Media Encryption:

4. In the "Remote Presence" pane, choose the Virtual KVM tab and click Launch KVM Console.



cisco Cisco Integ	grated Management Controller CIMC Hostname: ucs-c: Logged in as: admin Log Ou
Overall Server Status	C   🕹 进 🧱   0 0
Good	Remote Presence
Server Admin	Virtual KVM Virtual Media Serial over LAN
Summary	Actions
Inventory Sensors	Launch KVM Console
System Event Log	vKVM Properties
Remote Presence BIOS	Enabled:
Power Policies	Max Sessions: 4
Fault Summary	Active Sessions: 0 Remote Port: 2068
	Enable Video Encryption:
	Enable Local Server Video: 🗹
	Save Changes Reset Values

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- 5. When the "Virtual KVM Console" window launches, choose the Virtual Media tab.
- 6. In the "Virtual Media" window, provide the path to the Windows installation image by clicking Add Image. Use the dialog to navigate to your Microsoft Windows 2008 R2 SP1 ISO file and choose it.

The ISO image is displayed in the "Client View" pane.

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#### Figure 36 Adding an ISO Image in CIMC

7. When the mapping is complete, power cycle the server so that the BIOS recognizes the media that you just added.

- 8. In the "Virtual KVM Console" window, watch during bootup for the F2 prompt and then press F2 to enter the BIOS setup. Wait for the setup utility screen to appear.
- **9.** In the "BIOS Setup utility" screen, choose the **Boot Options** tab and verify that the virtual DVD device that you added in the step 6 is listed as a bootable device.
- 10. Move the device to the top under "Boot Option Priorities" as shown in Figure 37.

Aptio Setup Utility · Main Advanced Security Server P	– Copyright (C) 2011 Americar Management Boot Options Sav	
Boot ●onfiguration		Number of seconds BIOS will
Setup Prompt Timeout Bootup NumLock State	1 [Off]	pause at the end of POST to allow user to press F2 key for
	[011]	entering BIOS Setup Utility.
UCSM boot order rules	[Loose]	65535(0xFFFF) means indefinite waiting.
Boot Option Priorities		warting.
Boot Option #1 Boot Option #2	[Cisco Virtual CD/D]	
Boot Option #2 Boot Option #3	[(Bus 82 Dev 00)PCI] [Cisco Virtual Flop]	
Boot Option #4	[IBA GE Slot 0300 v]	
Boot Option #5	[UEFI: Built-in EFI]	
Hard Drive BBS Priorities		++ Select Screen
Floppy Drive BBS Priorities Network Device BBS Priorities		†↓ Select Item Enter Select Field
CD/DVD ROM Drive BBS Priorities		+/- Change Value
		F1 General Help F9 BIOS Defaults
		F10 Save & Exit
		ESC Exit
Version 2.14.1219. (	Copyright (C) 2011 American ⊧	legatrends, Inc.

#### Figure 37 Cisco UCS C220 M3 BIOS Setup Utility

#### **11.** Exit the BIOS Setup utility.

The Microsoft Windows installation begins when the image is booted.

12. Press Enter when prompted to "boot from CD".

Figure 38 prompt to Boot from CD

Press any key to boot from CD..

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- **13.** Observe the Windows installation process and respond to prompts in the wizard as required for your preferences and company standards.
- **14.** When Windows prompts you with "Where do you want to install Windows?", install the drivers for your mass storage device.

To install the drivers, follow these steps:

Name	Total Siz	re Free Space Type
∱ <u>R</u> efresh		Drive options ( <u>a</u> dvanced)
• <u>R</u> efresh Load Driver		Drive options ( <u>a</u> dvanced)

#### Figure 39 Load Drivers for Installing Microsoft Windows

a. In the "Install Windows" window, click Load Driver.

You are prompted by a "Load Driver" dialog to choose the driver to be installed. In the next steps, you first define a virtual device with your driver ISO image.

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Figure 40 Selecting Drivers for Installing Microsoft Windows

Select	t the driver to be installed.
	Load Driver
	To install the device driver needed to access your hard drive, insert the installation media containing the driver files, and then click OK. Note: The installation media can be a floppy disk, CD, DVD, or USB flash drive.
	Browse OK Cancel

b. If not already open, open a KVM Virtual Media window as you did in Step 5.

- **c.** In the "Virtual Media" window, unmount the virtual DVD that you mapped in Step 6 (uncheck the check box under Mapped).
- d. In the "Virtual Media" window, click Add Image.
- **e.** Use the dialog to navigate to the location where you saved the Cisco driver ISO image for your mass storage device in Step 1 and choose it.

The ISO appears in the "Client View" pane.

**f.** In the "Virtual Media" window, check the check box under "Mapped" to mount the driver ISO that you just chose. Wait for mapping to complete, as indicated in the "Details" pane. After mapping is complete, you can choose the device for Windows installation.

#### Figure 41 Adding an ISO Image in CIMC

10	.29.150.151	- KVM Cons	sole	
File	Help			
KVI	M Virtual	Media		
CI	ient View			
	Mapped	Read Only	/ Drive	Exit
			🛃 A: - Floppy	
		$\checkmark$	F: - Removable Disk	Create Image
		1		Add Image
		1	A D: - CD/DVD	Remove Image
		1	C:\Sanjeev\VSPEX-M100\Win7x64_W2K8_R2.img - Floppy Image File	Details ±
			Sc:/Sanjeev/VSPEX-M100/ucs-cxxx-drivers.1.4.3.iso - ISO Image File	Details *
	V	1	C:\Sanjeev\VSPEX-M100\en_windows_server_2008_r2_standard_enterprise_	
•				
	etails			
	arget Drive		ped To Read Bytes Write Bytes Duration	
Vi	rtual CD/DV	D 🖄 C	:\Sanjeev\\VSPEX-M 173.193M 0 00:19:17	USB Reset
R	emovable Di	sk Not n	napped	
Fl	oppy	Not n	napped	

- g. In the "Load Driver" dialog that you opened in Step a, click Browse.
- h. Use the dialog to choose the virtual DVD device that you just created.
- i. Navigate to the location of the drivers, choose them, and click OK.

Windows loads the drivers and when finished, the driver is listed under the prompt "Select the driver to be installed".

Driver Path - CDROM Drive:\\Windows\Storage\LSI\2008M\W2K8R2\x64

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

) 🄊	Install Windows	to be installed.		
_		Adapter (C:\Win7x64_W2K8_R	2\oemsetup.inf)	-
V	Hide drivers that	are not compatible with hard	ware on this computer.	
	Br <u>o</u> wse	Rescan		Next

Figure 42 Selecting Drivers for Microsoft Windows Installation

**15.** After driver installation finishes, unmap the driver ISO and map the Windows installation image.

To unmap the driver ISO and map the Windows installation image, follow these steps:

- **a.** In the "Virtual Media" window, uncheck the check box under "Mapped" that corresponds to the driver ISO.
- **b.** In the "Virtual Media" window, check the check box under "Mapped" that corresponds to your Windows installation image (the same one that you defined in Step 6).

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Wait for the mapping to complete. Observe the progress in the "Details" pane.

**c.** In the "Install Windows" window, choose the disk or partition where you want to install Windows from the list, and then click **Next**.

Disk 1 Unallocated Space	60.0 GB	60.0 GB	
~			
∱ <u>R</u> efresh		Drive options (ad	vanced)
<u>Merresir</u>		brive options ( <u>a</u> a	vanceay

#### Figure 43 Allocating Disk Space for installing Microsoft Windows

- **16.** Complete the Windows installation according to the requirements and standards of your company. Continue to observe the Windows installation process and answer prompts as required for your preferences. Verify that Windows lists the drivers that you added.
- After the Windows installation is complete, Windows reboots the server again and you are prompted to press Ctrl-Alt-Del and to log in to access the Windows desktop. Use the login that you supplied during the Windows installation process.

# **Device Driver Installation**

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The Cisco UCS C220 M3 in VSPEX M100 solution contains two Cisco 1GigE I350 LOM (LAN-on-motherboard) and a Cisco VIC P81E adapter for which you need to install the drivers. This section explains how to locate and install the chipset and adapter drivers for Microsoft Windows Server 2008 R2 SP1.

Fig	ure 44 Device N	Mar
Computer Management		
Eile Action Yiew Window E	telp	
• ->   🗈 🖪   🛃   🕄 🖬	3	
Computer Management (Local) System Tools Event Viewer Cocal Users and Groups Performance Logs and Alert: Cocal Users and Groups Performance Logs and Alert: Cocal Users and Storage Cocal Users and Anager Storage Cocal Users and Anager Disk Defragmenter Disk Defragment Disk Management Services and Applications	CISCO-7D13C6A6F Computer Compu	rs

To locate and install the chipset and adapter drivers for Microsoft Windows Server 2008 R2 SP1, follow these steps:

- 1. Use a Windows File Manager to navigate to the folder where you extracted the Cisco driver package that you got from the Cisco UCS C-Series Drivers DVD or downloaded from Cisco.com in Step 1 of the Installation of Microsoft Windows Server 2008 R2 SP1 section. Drivers for all of the devices are included in the folders named for each device.
- **2.** Install Intel chipset drivers from the ...\Windows\ChipSet\Intel\C220\W2K8R2\setup.exe and reboot the server.
- **3.** Install the LAN on motherboard (LOM) drivers from ...\Windows\Network\Intel\I350\W2K8R2\x64\PROWinx64.exe and reboot the server if prompted.

#### Figure 45 LOM Drive Installation

#### Installing Drivers

Installing network drivers for: Cisco 1 GigE 1350 LOM

- **4.** Install the drivers for Cisco P81E VIC from ...\D:\Windows\Network\Cisco\P81E\W2K8R2\x64 folder.
- 5. Repeat the driver installation process for each device that still needs drivers, as indicated by yellow flags in the Microsoft Windows Server 2008 R2 SP1 Device Manager.

# **Network Configuration**

This section provides steps to configure the NICs and assign IP addresses on all the Windows host servers.

As shown in Figure 46 (for complete diagram, see Figure 13, the two Cisco 1GigE I350 LOM are connected to different switches and teamed at the host side for redundancy and load balancing.

At the Cisco VIC P81E adapter with two 10 GigE uplink ports, four vNICs are created. Cisco Nexus 5500 series switches with Adapter-FEX feature and Cisco VIC P81E in NIV mode provides redundancy at the adapter level. In Figure 46, the vNIC in purple and the vNIC in green shown as solid lines connecting to uplink ports 0 and 1, respectively, indicate active links. The dotted line connection to uplink ports 2 and 1 for these vNICs indicate standby links. It failovers to standby link in the event of active link failing, thus providing redundancy at the adapter level.

Figure 46 Cisco UCS C220 M3 Network Adapters Configuration



# **NIC Teaming of Cisco 1 GigE LOM**

Teaming of the Cisco 1 GigE LOMs provides redundancy and doubles the available bandwidth. This teamed adapter is used for Microsoft Hyper-V host management.

For NIC teaming of Cisco 1 GigE LOMs, follow these steps:

- 1. Open Server Manager > Diagnostics > Device Manager.
- 2. Right-click the Cisco 1gigE I350 LOM. Choose the **Teaming** tab in the "Cisco 1GigE I350 LOM Properties" window.
- 3. Check the "Team this adapter with other adapters" check box and click New Team.

General	Link Speed	Advanced		anagement
[eaming	VLANs	Boot Options	Driver	Details
intel)	Adapter Tear	ning		
Team t	his adapter with	other adapters		
Team			New Te	am
No te	ams available	<b>v</b>	Properti	es
,				
Allows you participate i	n a team. For an	ther a network coni overview of teamin is not part of a team	ng, <u>click here</u>	
Allows you participate i	to specify whe n a team. For an	n overview of teamin	ng, <u>click here</u>	

Figure 47

Cisco 1GigE I350 LOM Properties

4. Check the "Cisco1GigE I350 LOM # 2" check box in the "New Team Wizard" window.

1

New Team Wizard	×
	Select the adapters to include in this team:  Cisco 1GigE 1350 LOM  Cisco 1GigE 1350 LOM #2
	This list shows the adapters that are available for Advanced Networking Services (ANS) teaming. Adapters that do not support ANS teaming, are already members of another team, or are otherwise unable to join a team, are not listed. Check the adapters you wish to include in the team. Some non-Intel adapters are supported in ANS teams. For
	< Back Next > Cancel

Figure 48 Selecting Adapters for Teaming

 Choose "IEEE 802.3ad Dynamic Link Aggregation" from the "Select a team type:" list and click Next.

	Figure 49	Selecting the Type	of Ada
lew Team Wizard			×
	for increasing throughp switch. This is accompl channeling several port single link using Link Ao This increases the total		
		< Back Next > Canc	el

Figure 49 Selecting the Type of Adapter Teaming

A new team will be created as shown in Figure 50.

Figure 50

Γ

Cisco 1GigE I350 LOM Team Properties

TEAM : InfraTeam - Cisco 1GigE 1350 LOM Properties 🛛 🔹 🔰	TEAM : InfraTeam Properties
General Link Speed Advanced Power Management Tearning Boot Options Driver Details Adapter Tearning	General Settings Advanced VLANs Driver Details
Team this adapter with other adapters Team: InfraTeam Properties	Adapters in team     Status       Cisco 1GigE 1350 LOM #2     Active       Cisco 1GigE 1350 LOM     Active
Team with other adapters Allows you to specify whether a network connection will participate in a team. For an overview of teaming, click here,	Remove Team         Details         Modify Team           Test Switch         Adapter Properties
If not checked this adapter is not part of a team.	Lists the adapters that are members of the selected team and indicates their current state. Status Column
OK Cancel	

6. Choose the teamed adapter, right-click and choose Properties.

Petwork Connections				
🌀 🔵 🖉 🔹 Control Panel 🔹 Network and Internet 🔹 Network Connections 🔹 🔹 🔹 😭				
Organize 🔻				
Name *	Status	Device Name		
🏺 Local Area Connection	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I		
🏺 Local Area Connection 2	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I		
🏺 Local Area Connection 3	M50VSPEX.COM	TEAM : Team-Mgmt		

Figure 51 Network Connections page after NIC teaming

7. Choose Internet Protocol Version 4 (TCP/IPv4) > Properties and assign an IP address from the management VLAN (VLAN 1) subnet.

1



Assigning IP Address to the Teamed Adapter

Local Area Connection 3 Properties	Internet Protocol Version 4 (TCP/IPv4) Properties
Networking Sharing	General
Connect using:	You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.
Configure	Obtain an IP address automatically
This connection uses the following items.	• Use the following IP address:
Advanced Network Switch Protocol     Advanced Network Services Protocol	IP address: 10 . 29 . 150 . 171
🗹 🔺 Cisco NIC Tearning Protocol Driver	Subnet mask: 255 . 255 . 255 . 0
	Default gateway: 10 . 29 . 150 . 1
	C Obtain DNS server address automatically
	☐ Use the following DNS server addresses:
Instali Uninstali Properties	Preferred DNS server: 10 . 29 . 150 . 105
Description	Alternate DNS server: 171 . 70 . 168 . 183
Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.	Validate settings upon exit
OK. Cancel	OK Cancel

**8.** Repeat the above steps to complete the configuration of Cisco 1GigE I350 LOM on all the Cisco UCS C220 M3 servers.

After completion of the above steps successfully, the status of the port-channel summary output on both Cisco Nexus A and B looks like the one shown in Figure 53.

EMC-5 Flags	I – Indi s – Susp S – Swit U – Up (	vidual H ended r ched F port-char	9 - Up in po 1 - Hot-stan 9 - Module-r 8 - Routed		nembers) ly)
- Group	Port- Channel	Туре	Protocol	Member Ports	5
- 2 3 4 5 7 15 17 21 22	Po4(SU) Po5(SU) Po7(SU) Po15(SU) Po17(SU)	Eth Eth Eth Eth Eth Eth Eth Eth	LACP LACP LACP LACP LACP LACP LACP LACP	Eth1/1(P) Eth1/2(P) Eth1/3(P) Eth1/4(P) Eth1/16(P) Eth1/18(P) Eth2/1(P) Eth2/2(P)	Eth1/8(P)

#### Figure 53 Show Port Channel Summary Output

This Cisco LOM teamed adapter will be used for the host management.



Before enabling the Microsoft Hyper-V role, NIC teaming must be completed.

### Creating and Configuring vNICs on Cisco P81E VIC

Cisco P81E VIC supports the Adapter FEX feature and functionality that is enabled on both the Cisco Nexus 5500 series switches. Adapter-FEX can be thought of as a way to divide a single physical link into multiple virtual links or channels. Each channel is identified by a unique channel number and its scope is limited to the physical link. The physical link connects a port on a server network adapter with an Ethernet port on the switch. This allows the channel to connect a vNIC on the server with a Ethernet interface on the switch. Packets on each channel are tagged with a VNTag that has a specific source virtual interface identifier (VIF). The VIF allows the receiver to identify the channel that the source used to transmit the packet.

vNIC	MTU	Uplink	Port-profile Name	Channel Number	Uplink Failover
eth0	9000	Uplink_0	storage	1	Disabled
eth1	9000	Uplink_1	storage	2	Disabled
eth2	1500	Uplink_0	vm_traffic	5	Enabled
eth3	9000	Uplink_1	cluster	6	Enabled

Table 10 Mapping of Port Profiles on Cisco Nexus Switches with vNICs on Server Adapter

Referring to Table 10, the following steps explain how to modify the existing vNICs properties and create two additional vNICs on Cisco P81E VIC for the VSPEX M100 configuration.

To modify the existing vNICs properties and create the additional vNICs, follow these steps:

- 1. Using a web browser, connect to the CIMC using the IP address configured in the CIMC Configuration section.
- 2. Click **Inventory** on the left pane under the **Server** tab and choose the **Network Adapters** tab on the right pane.
- 3. Choose UCS VIC P81E under the "Adapter Cards".

**4.** Click **Modify Adapter Properties** under the **General** tab and enable the Network Interface Virtualization (NIV) mode on the network adapter as shown in Figure 54.

cisco Integ	rated Management	Controller		ed in as: admin@10.6 Log Ou
Overall Server Status Good Server Admin Summary Inventory	C 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Serial Number Product 1	Storage PCI Adapters	CIMC Manager
Sensors System Event Log Remote Presence BIOS	1 UCS VIC P81E	QCI1606A1B1 N2XX-ACPC	101 Cisco Systems Inc	
Power Policies Fault Summary	Adapter Card 1 General VNICS VM FEXS Actions Modify Adapter Properties Export Configuration	Modify Adapter	tode:	
	Import Configuration		Save Chan	ges Close

#### Figure 54 Enabling NIV Mode for Adapter Cards

- 5. Reboot the server.
- 6. Once the server is up, repeat the above steps 1 -3. Now choose the vNICs tab. Choose eth0 and click Properties.
- **7.** Set the MTU size as "9000", uplink port as "0", channel number as "1" in the MTU, Uplink Port, and Channel Number fields respectively. Choose "storage" from the "Port-Profile" drop-down list. Do not "Enable Uplink Failover" for the port-profile name storage.

	e e	•	
cisco Cisco Integ	rated Management Co	ntroller	CIMC Hostname: ucs-c220-m3 Logged in as: admin@10.65
Overall Server Status Server Admin Summary Inventory Sensors System Event Log Remote Presence BIOS Power Policies Fault Summary	C CPUS Memory Power Supplies Adapter Cards CPUS Memory Power Supplies Adapter Cards PCI Slot Product Name Se 1 UCS VIC PBIE QCI Adapter Card 1 General VNICS VM FEXS Host Ethernet Interfaces Add Clone Properties Name MAC Address eth0 F0:F7:55:AA:AA:32 eth1 F0:F7:55:AA:AA:33 eth2 F0:F7:55:AA:AA:36	VNIC Properties Name: MTU: Uplink Port: MAC Address: Class of Service: Trust Host CoS: PCI Order: Default VLAN VLAN Mode: Rate Limit: Enable PXE Boot: Channel Number: Port Profile:	eth0 9000 (1500 - 9000) 0 0 AUTO F0:F7:55:AA:AA:32 N/A ANY (0 - 17) (1 - 4094) N/A N/A (1 - 10000 Mbps) N/A 1 (1 - 1000) storage cluster storage vm_traffic Can

#### Figure 55 vNIC Properties

#### 8. Choose eth1 and click Properties.

**9.** Set the MTU size as "9000", uplink port as "1", and channel number as "2" in the MTU, Uplink Port, and Channel Number fields respectively. Choose "storage" from the "Port-Profile" drop-down list. Do not "Enable Uplink Failover" for the port-profile name storage.

vNIC Properties	0
General	×
Name:	eth1
MTU:	
MIU:	9000 (1500 - 9000)
Uplink Port:	1
MAC Address:	AUTO • F0:F7:55:AA:AA:33
Class of Service:	N/A
Trust Host CoS:	
PCI Order:	ANY (0 - 17)
Default VLAN:	(1 - 4094) N/A
VLAN Mode:	N/A
Rate Limit:	(1 - 10000 Mbps) N/A
Enable PXE Boot:	
Channel Number:	2 (1 - 1000)
	Save Changes Reset Values Cancel

I

#### Figure 56 CIMC- vNIC Properties 1

**10.** Create a third vNIC eth2 for the vm\_traffic port-profile by clicking **Add**. Enter a name for the vNIC in the Name field. Set the MTU to "1500", uplink port to "0" in the MTU and Uplink Port fields respectively. Enter a unique channel number in the Channel Number field.

1

Add vNIC	0
General	
Name:	eth2
MTU:	9000 (1500 - 9000)
Uplink Port:	0 🗘
MAC Address:	I AUTO
Class of Service:	N/A
Trust Host CoS:	
PCI Order:	ANY (0 - 17)
Default VLAN:	(1 - 4094) N/A
VLAN Mode:	N/A
Rate Limit:	(1 - 10000 Mbps) N/A
Enable PXE Boot:	
Channel Number:	5 (1 - 1000)
	Add vNIC Reset Values Cancel

Figure 57 Adding vNIC

11. Scroll down and choose "vm\_traffic" from the "Port-Profile" drop-down list. Check the **Enable Uplink Failover** check box. Enter a value for "Failback Timeout". Click **Add vNIC**. This vNIC will be used to create virtual switch in Microsoft Hyper-V virtual network manager.

F	Figure 58 Ac	lding vNIC 1
Add vNIC		•
Default VLAN:	(1 - 4094) <b>N/A</b>	<b>A</b>
VLAN Mode:	N/A	
Rate Limit:	(1 - 10000 Mbps) N/A	
Enable PXE Boot:		
Channel Number:	5 (1 - 10	00)
Port Profile:	vm_traffic	÷
Enable Uplink Failover:	4	
Failback Timeout:	(0 - 600) 5	
Ethernet Interrupt		
Interrupt Count: 8	(1 - 514)	
Coalescing Time: 125	5 (0 - 65535	i us)
Coalescing Type: MI	N	
Totorrupt Model MC	T A	V
	Add vNIC Re	set Values Cancel

Γ

- **12.** Similarly, create a fourth vNIC eth3 with the parameters as defined in the Table 10. Eth3 vNIC will be used for live migration in failover cluster setup.
- 13. Repeat the steps 1 -12 to complete the task on other Cisco UCS C220 M3 Servers.

The switches respond by creating a VevEthernet interface for each vNIC on the server network adapter and associate the port-profile and channel number to the VevEthernet interface. Figure 59 shows the Cisco Nexus switch's partial running-config output showing the veEthernet interfaces created for each vNICs on the four Cisco UCS C220 M3 servers.

Figure 59	Running-config Showing veEthernet Interfaces on Cisco Nexus Switch
interface Vethernet32769 inherit port-profile vm_traffic bind interface Ethernet1/9 channel 5	
interface Vethernet32770 inherit port-profile vm_traffic bind interface Ethernet1/11 channel 5	
interface Vethernet32771 inherit port-profile vm_traffic bind interface Ethernet1/12 channel 5	
interface Vethernet32772 inherit port-profile vm_traffic bind interface Ethernet1/10 channel 5	
interface Vethernet32773 inherit port-profile storage bind interface Ethernet1/9 channel 2	
interface Vethernet32775 inherit port-profile storage bind interface Ethernet1/10 channel 2	
interface Vethernet32776 inherit port-profile cluster bind interface Ethernet1/10 channel 6	
interface Vethernet32778 inherit port-profile storage bind interface Ethernet1/11 channel 2	
interface Vethernet32779 inherit port-profile cluster bind interface Ethernet1/11 channel 6	
interface Vethernet32781 inherit port-profile storage bind interface Ethernet1/12 channel 2	
interface Vethernet32782 inherit port-profile cluster bind interface Ethernet1/12 channel 6	
interface Vethernet32784 inherit port-profile cluster bind interface Ethernet1/9 channel 6	
<b>14.</b> Assign static	c IP addresses to the NICs as per their VLAN participation. Ping to verify if

**14.** Assign static IP addresses to the NICs as per their VLAN participation. Ping to verify if the assigned IP addresses are working properly. (Optionally, rename the NICs on all the other servers for easy identification and make sure they are consistent to avoid any problems with clustering.

1

Figure 60

Renaming the NICs for Easy Identification

Retwork Connections				
G 🕞 🗸 🔹 Control Panel 🔹 Network and	Internet 👻 Networ	k Connections 👻 🛛 🔻 🛃 Search N	letwork Connections	<u> 2</u>
Organize 🔻				- 🗌 🕡
Name *	Status	Device Name	Connectivity	Network Category
🃮 Local Area Connection	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I350 LOM		
🏺 Local Area Connection 2	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I350 LOM #2		
🏺 Local Area Connection 3 - Mgmt-Cluster	M50VSPEX.COM	TEAM : Team-Mgmt	Internet access	Domain network
🏺 Local Area Connection 3 - eth0 - iSCSI1	Network 4	Cisco VIC Ethernet Interface	No Internet access	Private network
🏺 Local Area Connection 4 - eth1 - iSCSI2	Network 4	Cisco VIC Ethernet Interface #2	No Internet access	Private network
🏺 Local Area Connection 5 - eth3 - Cluster	Network 2	Cisco VIC Ethernet Interface #3	No Internet access	Private network
🏺 Local Area Connection 6 - eth2 - VM_Traffic	Enabled	Cisco VIC Ethernet Interface #4		

**15.** Ping to validate if the assigned IPs are working properly. Figure 61 shows ping status from a host to both storage processors SP A (10.10.40.50) and SP B (10.10.40.60) with jumbo frames.

Figure 61 Jumbo Frame Validation from Source Switch to Destination Storage



# **Host Rename and Domain Join**

This section covers step-by-step instructions to rename and join the hosts to a domain.

To rename and join the hosts to a domain, follow these steps:

- 1. Rename the Windows hostname on all the servers as per your naming convention. The four servers' hostnames are in this document are M100N1, M100N2, M100N3, and M100N43.
- 2. Open the Server Manager and click Change System Properties.

Figure 62 Changing System Properties in Server Manager Window



3. Click Change under the Computer Name tab in the "System Properties" window.

	Figure 63	System Properties Window
System Properties		X
Computer Name Hardwa	re Advanced Remote	
Windows uses on the network	the following information to identif	y your computer
Computer description:		
	For example: "IIS Production Ser "Accounting Server".	ver" or
Full computer name:	M50N2	
Workgroup:	WORKGROUP	
To rename this computer workgroup, click Change		Change
	OK Cancel	Apply

**4.** Under "Member of", choose the "Domain" radio button. Type the name of the domain you want your servers to join and click **OK**.

1

5. Provide the appropriate credentials in the "Windows Security" pop-up screen and click OK.

System Properties		×
Computer Name/Domain Changes		
You can change the name and the membership of this computer. Changes might affect access to network resources. <u>More information</u>	computer	
Computer name: M100N1	ır	
Full computer name: M100N1.M50VSPEX.COM		
More	hange	
Member of © Domain:		
M50VSPEX		
O W Computer Name/Domain Changes 🛛 🗙		
Welcome to the M50V5PEX domain.		
ОК	Apply	

#### Figure 64 Specifying the Domain

- 6. Click OK in the "Welcome" screen and then restart the server to apply these changes.
- 7. Login to the server and apply/update any latest hotfixes on all the Windows Server 2008 R2 SP1.
- 8. Repeat the above steps on all other servers to rename the host and join to the domain.

# **Install Roles and Features**

To install roles and features, follow these steps:

- 1. Click Start > Server Manager.
- 2. In the Features selection page of the "Add Features Wizard", check the "Failover Clustering" and "Multipath I/O" check boxes. Click Next.
- 3. In the "Confirmation selection" page, click Install.

Add Features Wizard	×
Select Features	
Features Confirmation Progress Results	Select one or more features to install on this server.         Description:         Background Intelligent Transfer Service (BTS) (Installed)         BrackCacker Drive Encryption         BrackCacker         Connection Manager Administration Kit         Desktop Experience         DirectAccess Management Console         Failover Clustering         Group Policy Management         Internet Printing Client         Internet Printing Client         Internet Storage Name Server         LPR Port Monitor         Multipath 1/0         Network Lad Balancing         Peer Name Resolution Protocol         Quality Windows Audio Video Experience         Remote Differential Compression         Remote Differential Compression         Mure about features

#### Figure 65 Adding Features to the Server

- 4. Click Start > Administrative Tools > MPIO.
- 5. Choose the **Discover Multi-Paths** tab, check the "Add support for iSCSI devices" check box, and click **Add**. You will be prompted to reboot the server.



10 Properties IPIO Devices Discover Multi-Paths DSM	Reboot Required	×
SPC-3 compliant Device Hardware Id	A reboot is required to complete the operation. Reboot Now?	
	Yes No	
Add support for ISCSI devices	Add	

**6.** After rebooting, if you open the MPIO Control Panel applet, you should see the iSCSI bus listed as a device.

Fig	ure 67	MPIO	Properties	Window
MPIO Properties		×		
MPIO Devices Discover Multi-Paths DSM	1 Install   Configura	ation Snapshot		
To add support for a new device, click Ad Product Ids as a string of 8 characters fol Devices can be specified using semi-colon	lowed by 16 chara as the delimiter.	cters. Multiple		
To remove support for currently MPIO'd d then click Remove.	levices, select the	devices and		
Devices:				
Device Hardware Id		<b>▲</b>		
DGC RAID 3				
DGC RAID 5				
DGC VRAID				
EMC SYMMETRIX				
HP HSV300				
MSFT2005iSCSIBusType_0x9				
NETAPP LUN				
Vendor 8Product 16				
•				
Add		Remove		
More about adding and removing MPIO su	ipport			
	ОК	Cancel		

- 7. Click Start > Server Manager.
- 8. In the "Roles Summary" view of the "Server Manager" window, click Add Roles.

1

#### Figure 68 Adding Roles in the Server Manager Window

🖳 Server Manager				-	
File Action View	Help				
🗢 🔿 🖄 🗖 🛛	2				
Server Manager (MS	Roles				
Roles     Roles     Features     Diagnostics     MC Configuration     Storage		iew the health of the roles in eatures.	stalled on your ser	rver and add or remove roles and	
E E Storage	Roles 5	ummary	?	Roles Summary Help	-
	Roles	2 of 17 installed		Add Roles	
	Fil	e Services	i i i i i i i i i i i i i i i i i i i	Remove Roles	

9. In the "Server Roles" selection page, check the "Hyper-V" check box and click Next.

	Figure 69 Selecting Roles for the	e Server
Add Roles Wizard  Select Server Rol Before You Begin Server Roles Hyper-V Witual Networks Confirmation Progress Results		■ Server ■ Description: Hyper-Y provides the services that you can use to create and manage virtual machines and their resources. Each virtual machine is a virtualized computer system that operates in an isolated execution environment. This allows you to run multiple operating systems simultaneously. ① This is a pre-release version of Hyper-V. Go to the Hyper-V TechCenter for more information.
	More about server roles	xt > Instali Cancel

- 10. In the Hyper-V > Virtual Networks page, click Next without choosing any Ethernet cards.
- 11. In the "Confirmation Selection" page, click Install and reboot the server when prompted.
- 12. Login to the server and click Start > Administrative Tools > Hyper-V Manager.
- 13. In the "Hyper-V Manager", choose the server and click Virtual Network Manager.
- **14.** In "New virtual network", choose **External** from the "What type of virtual network do you want to create" list and click **Add**.

#### Figure 70 Adding New Virtual Networks

EHyper-V Manager		_ 🗆 X
File Action View Window Help		_8×
🗢 🔿 🗾 🖬 🔢 🖬		
Hyper-V Manager	l Machines	Actions
M100N1     Virtua     Virtua		
gig fill coal nectrol K Flanager		New +
* Virtual Networks	👯 Create virtual network	Import Virtual Machine
New virtual network	What type of virtual network do you want to create?	Hyper-V Settings
Cisco VIC Ethernet Interface #4	External	Virtual Network Manager
Global Network Settings     MAC Address Range	Internal Private	Edit Disk
00-15-5D-96-A8-00 to 00-15-5D-9		Inspect Disk
		Stop Service
		Remove Server
	Add	Refresh
	Creates a virtual network that binds to the physical network adapter so that virtual	View 🕨
	machines can access a physical network.	New Window from Here
	More about creating virtual networks	Help

ſ

**15.** Type a name and choose the "External" radio button. From the drop-down list, choose the NIC assigned to vm\_traffic VLAN and click **Next**.

Virtual Networks	New Virtual Network
辚 New virtual network	
VM_Traffic Cisco VIC Ethernet Interface #4	Name: vm_traffic
vm_traffic	
Cisco VIC Ethernet Interface #4	Notes:
Global Network Settings	• • • • • • • • • • • • • • • • • • •
MAC Address Range 00-15-5D-96-AB-00 to 00-15-5D-9	Connection type
	What do you want to connect this network to?
	External:
	External:
	Cisco VIC Ethernet Interface #4
	Allow management operating system to share this network adapter
	O Internal only
	O Private virtual machine network
	Enable virtual LAN identification for management operating system
	-VLAN ID
	The VLAN identifier specifies the virtual LAN that the management operating
	system will use for all network communications through this network adapter. This
	setting does not affect virtual machine networking.
	2

Figure 71 Add Virtual Networks in Virtual Network Manager 1

**16.** Repeat the above steps on all other servers to install the roles and features.

# **Enable iSCSI Initiator**

To enable iSCSI initiator, follow these steps:

- 1. Enable the ISCSI Initiator by clicking **Start** > **Administrative Tools** > **iSCSI initiator**. Click **Yes** to start the Microsoft iSCSI service.
- 2. Repeat the above step on all other servers and note down the initiator name. This is required to create the hosts.
Figure 72

Configuring iSCSI Initiator

SCSI Initiator Properties	×
Targets Discovery Favorite Targets Volumes and Devices RADIUS Configuration	
Configuration settings here are global and will affect any future connections made with the initiator.	
Any existing connections may continue to work, but can fail if the system restarts or the initiator otherwise tries to reconnect to a target.	
When connecting to a target, advanced connection features allow specific control of a particular connection.	
Initiator Name:	
Ign.1991-05.com.microsoft:m100n1.m50vspex.com	
To modify the initiator name, click Change. Change	
To set the initiator CHAP secret for use with mutual CHAP, CHAP	
To set up the IPsec tunnel mode addresses for the initiator, IPsec	
To generate a report of all connected targets and devices on Report the system, click Report.	
More about Configuration	

# Prepare the EMC VNXe3300 Storage

This section explains the following topics:

- Preparing the storage array
- Aggregating data ports for high-availability
- Creating storage pools for Hyper-V datastores
- Creating iSCSI server and assigning host access privileges

### **Initial Setup of EMC VNXe**

To configure the initial setup of the EMC VNXe, follow these steps:

- 1. Connect the eEthernet cables from the management and data ports to the network as shown in Figure 72.
- **2.** Assign an IP address to the management interface or Download and run the Connection Utility to establish an IP address for managing the EMC VNXe storage system. The Connection Utility can be downloaded directly from the product support page:

http://www.emc.com/support-training/support/emc-powerlink.htm

3. Connect to the EMC VNXe system through a web browser using the management IP address.

🔅 🌈 EMC Unisphere	👌 + 🔊 - 🖶 Page - 🎯 1	fools
C Unisphere	ų.	
Dashboard	System System Storage Settings Settings Support	
PEX3300 > Dashbo		
elcome 🧿		3 -
	Common storage tasks	
	Create storage for Microsoft Exchange Create a shared folder	
Free space available Generic Storage Shared Folder <sub>¥lore</sub>	Create storage for VMware Create storage for generic iSCSI	Ξ
vstem Alerts ?	Create storage for Hyper-V	
0 Storage Servers	Common system tasks	I
configured for SPA have stopped and will be	View system capacity details Change management settings	
Show All >>	View system health Manage user roles	

### Figure 73 EMC Unisphere GUI

Note

The SP A and SP B network data ports must be connected to the same subnet. In general, both SPs should have mirrored configurations for all front-end cabling (including VLANs) in order to provide Failover.

## **Create Storage Pools**

Create a pool with the appropriate number of disks as shown in the EMC storage layout in Figure 74.

- 1. In Unisphere, choose **System > Storage Pools**.
- 2. Choose Configure Disks.
- **3.** Manually create a new pool by **Disk Type** for SAS drives in the "Select Configuration Mode" screen of the "Disk Configuration Wizard".

### Disk Configuration Wizard Select Configuration Mode 12 3E >> Step 1 of 7 Select the disk configuration mode: Automatically configure pools Configure disks into the system's pools and hot spares Manually create a new pool Create a new pool by disk type or for a specific application \* Pool created for Hyper-V Storage - Datastore. -O Mar Pool created for Generic Storage - Backup. Ad Pool created for Generic Storage - General Purpose. Pool created for Hyper-V Storage - Database. Pool created for Hyper-V Storage - Datastore. Pool created for Hyper-V Storage - General Purpose. -< Back Next > Finish Cancel Help

I

Figure 74

4. Choose "Pool created for Hyper-V Storage - Datastore".

Selecting the Disk Configuration Mode

5. Specify a name for the pool in the "Name" field.

	Figure 75	Specifying Po	ol Name	in the Disk	Configuratio	n Wizard
Disk Configuration Wiza	rd					
Specify Step 2 of 6	v Pool Name		~ ()			
Specify a name and option	al description.					
Name: * VSPEX	(M100					
Description:						
	< Back Next	> Finish Cancel	Help			

6. Choose "Balanced Perf/Capacity" in the "Select Storage Type" window. The validated configuration uses a single pool with 77 drives.

1

### Figure 76

Selecting Storage Type in the Disk Configuration Wizard

ie disks and f		nt to use for this new pool. e been rated according to th	neir suitability to the
Rating	Disk Type	Max Capacity	Storage Profile
ਸ਼ੇ ਸ਼ੇ ਸ਼ੇ	SAS	0 GB (None Available	Balanced Perf/Capac
में मे	SAS	0 GB (None Available	High Performance
म	EFD	0 GB (None Available	Best Performance
	NL SAS	0 GB (None Available	High Capacity
pool type doe: adequate for	s not offer performance	d level of storage performar as high as High Performan average performance requir 0 5(6+1).	ce pools, but it can be

Figure 77 shows the details of the storage pool you have created.

Figure 77 Window Showing Storage Pools Details

EMC Unisphere		J (3
Dashboar	rd System 🗊 Storage 🖸	🖇 Settings 📳 Hosts 📀 Support
VSPEX3300 > Sys	tem > Storage Pools > Storage Pools Details	
Storage Pools Details		0
Summary		
Status: Name: Remaining Space: Total Space: General Utilizati Name:	9.367 TB 16.921 TB	Subscription: 43% ert Threshold: 70%
Description:		
Type:	SAS	Ξ.
Number of Disks:	77	
Disk Speed:	6 Gbps	
Pool Type:	RAID 5	-
Apply Changes	Cancel Changes Add Disks Recycle Disks	

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Note

MC Ur	C Unisphere						
ij	Dashboard	Syst	em 🇊 Sto	orage  🎆 S	ettings	Hosts 📀	Support
SPEX3: Storage	300 > System	> Storage Poo	ls				2
Storag	e Pools:						
s	Name	Total Space	Current Allo	Percent Used	Remaining S	Subscription	Disks
0	Performance Pool	16.921 TB	7.554 TB	44%	9.367 TB	43%	77 used / 0 unuse
0	Hot Spare Pool	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	3
0	Unconfigured Disk	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	1
Curre	ent Allocation:	Remaining Spa	ce: 📕 🛛 Alert 1	Threshold:			
Select	ed: 0						Items: 3
Conf	figure Disks Deta	alls Recycle Dis	sks Refresh				

Figure 78 Window Showing Storage Pools in EMC Unisphere

# **Configure Advanced Features—Link Aggregation and Jumbo Frames**

To configure advanced features – link aggregation and jumbo frames, follow these steps:

As a performance best practice, all the drives in the pool should be of the same size.

1. In Unisphere choose Settings > More Configuration > Advanced Configuration.

- 2. Choose eth10 and set the MTU size to "9000" in the MTU field.
- 3. Choose eth11 and set the MTU size to "9000" in the MTU field.
- 4. Check the "Aggregrate with eth10" check box.

MC Unisphere											?.
🕎 Dashboa	ard		Syst	tem (	Stor	rage 💈	i i	Settings	Hosts	📀 Support	
SPEX3300 > Se Advanced Configurat		> Mor	e config	guration	. > Adva	anced Con	figurati	on			0
	ion										0
IO Modules				Ethernet I	Port						
▼ IO Module 0 ▼ eth10/eth11	SP A	SP B					Name:	eth11			
eth10	0	0				Aggre	gation:	✓ Aggree	gate with eth10		
eth11	<b>Q</b>	0		Maximum	Transmissio	n Unit (MTL	J) Size:	9000	-		
▼ Base Ports	SP A	SP B				Port	Speed:	10 Gbps			
eth2	•	•				Link	State:	SP A (Link	k Up), SP B (Link Up	0	
eth3	8	•			N	etwork Add		Not config		·	
eth4	0	•	11			CUTOIR AUG	1033031	Hot coming	Jurea		
eth5	•	•									
				Apply Cha	nges C	ancel Chang	jes				

Figure 79 Advanced Configuration Window in EMC Unisphere

### **Create iSCSI Servers**

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To create iSCSI servers, follow these steps:

- 1. In Unisphere, choose Settings > iSCSI Server Settings > Add iSCSI Server.
- 2. Type the server name, IP address, subnet mask and default gateway for the new iSCSI server in the Server Name, IP address, Subnet Mask and Default Gateway fields respectively. Choose "SP A" from the "Storage Processor" drop-down list and choose the aggregated ports from the "Ethernet Port" drop-down list as shown in Figure 80.

SCSI Server						
step 1 of 4	rver					>>
Specify the Network Interface	e for the new	iSCSI Sei	ver:			
Server Name: * iSCS	IServer00					
IP Address: * 10	. 10	. 40	50			
Subnet Mask: * 255	. 255	, 255	0			
Default Gateway: 10	. 10	. 40	1			
Hide advanced						
Storage Processor:	P A 🛛 🔻					
Ethernet Port: et	th10/eth11	(Link Up	) 🔻			
VLAN ID: 0 <	click to edit>	>				
	< Back	Next :	> Fini	sh	Cancel	Help

Figure 80

3. Click Add iSCSI Server again. Type the server name, IP address, subnet mask and default gateway for the new iSCSI server in the Server Name, IP address, Subnet Mask and Default Gateway fields respectively. Choose "SPB" from the "Storage Processor" drop-down list and choose the aggregated ports from the "Ethernet Port" drop-down list as shown in Figure 81.

1

Adding iSCSI Server for Storage Processor - A

iSCSI Server	
Step 1 of 4	< (3)
Specify the Network Interface for the new iSCSI Server:	
Server Name: * iSCSIServer01	
IP Address: * 10 . 10 . 40 . 60	
Subnet Mask: * 255 . 255 . 255 . 0	
Default Gateway: 10 . 10 . 40 . 1	
Hide advanced	
Storage Processor: SP B V	
Ethernet Port: eth10/eth11 (Link Up)	
VLAN ID: 0 <click edit="" to=""></click>	
< Back Next > Finish Ca	ancel Help

### Figure 81

Adding iSCSI Server for Storage Processor - B



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In the EMC VNXe storage systems, for fail safe networking (FSN) and high availability features to work, the peer ports on both the storage processors must belong to the same subnet. For more information about high availability in the EMC VNXe storage systems, see: http://www.emc.com/collateral/hardware/white-papers/h8178-vnxe-storage-systems-wp.pdf

EX3300 S	Settings > i	System Sto	rage 🙀 Set	tings	Hosts 🕑 Sup	oport
SI Server Settin						
😪 iSCSI Sei	vers					
Name	IP Address	Target	Storage Processor	Ethernet Port	Status	
SCSIServer00	10.10.40.50	iqn.1992-05.com.emc:apm00	SPA	eth10/eth11	Ok	
SCSIServer01	10.10.40.60	iqn.1992-05.com.emc:apm00	SPB	eth10/eth11	Ok	
Add iSCSI Ser	ver Details	Remove				
🐓 iSNS Con	figuration		- 🥂 CHAP Secu	urity		
		Remove				

### Figure 82 iSCSI Server Settings Window in EMC Unisphere

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## **Create Microsoft Hyper-V Datastores**

To create Hyper-V datastores, follow these steps:

- 1. In Unisphere, choose **Storage** > **Hyper-V**> **Create**.
- 2. Specify a name for the Hyper-V datastore in the Name field and click Next.

### Figure 83 Specifying Hyper-V Datastore Name

Hyper-V Storage Wizard	
Specify Name Step 1 of 7	?>>
Enter a name for the Hyper-V datastore.	
Name: * ClusterWitness Disk Description:	

**3.** Choose the pool and iSCSI server. Enter "10GB" in the Size field. Do not enable Thin Provisioning and click **Next**.

**Note** The default size of the Hyper-V datastore is 100 GB. The maximum size possible is 1.999 TB and the minimum size required is 10 GB.

lyper-V S	torage Wizard	<u> </u>			
	Configure	Storage			
	Step 2 of 7				<b>S S</b>
Configure t	the storage pool and siz	e for this Hyper-V dat	astore:		
Туре	Pool	Server	Available	Percent Used	Subscription
SAS	Performance Pool	iSCSIServer00	8.973 TB	45%	43%
SAS	Performance Pool	iSCSIServer01	8.973 TB	45%	43%
	ize: * 100	GB ▼	Percent Used:	Percent Available:	Alert Threshold:
			< Back	Next > Finis	h Cancel Help

Γ

Figure 84 Configuring Storage Pool and Size for the Datastore

**4.** Change protection by choosing the "Do not configure protection storage for this storage resource" radio button. If you need additional protection, then additional storage would be required. For more information, see the EMC VNXe Storage Configuration Guide.

Figure 85	Setting Configure Protection
Hyper-V Storage Wizard	
Configure Protection Step 3 of 7	2 >>
Configure protection storage for replication and snapsho	ots:
Do not configure protection storage for this	s storage resource.
Replication and snapshots can be supported by	allocating protection space at a later time.
Configure protection storage, do not configure	gure a snapshot protection schedule.
An automated snapshot protection schedule ma	y be configured at a later time.
Configure protection storage, protect data	using snapshot schedule: Default Protection
This schedule will create snapshots:	
Every day at 01:00, keep for 2 days	
Note: Times are displayed in Local Time	(UTC-0700) in 24-hour format
	< Back Next > Finish Cancel Help

- **5.** Click **Next** in the "Configure Host Access" screen as no host are connected. "Configure Host Access" will be completed in the EMC VNXe3300 Deployment Procedure in the later section.
- 6. Repeat the above steps and create 10 Hyper-V datastores for Cluster Shared Volumes of 750GB size.



We recommend 750 GB size Hyper-V datastore for CSV. You can create bigger size datastores.

NC U	nisphere			2
	Dashboard	System	Storage	Hosts 📀 Support
SPEXS	3300 > Storage > Micro	soft Hyper-V		
Hyper-	V Storage			
Alloca	ted Hyper-V Datastores:			
1	Name	Description	Size	Protection Schedule
0	M100-WitnessDisk		10.000 GB	
0	M100-CSV05		750.000 GB	
0	M100-CSV06		750.000 GB	
0	M100-CSV07		750.000 GB	
0	M100-CSV08		750.000 GB	
0	M100-CSV09		750.000 GB	
0	M100-CSV10		750.000 GB	
0	M100-CSV01		750.000 GB	
0	M100-CSV02		750.000 GB	
0	M100-CSV03		750.000 GB	
0	M100-CSV04		750.000 GB	
Selec	ted: 0			Items: 11
Cre	ate Details Refresh	Delete		

### Hyper-V Datastores for Cluster Shared Volume

# **Create Hosts and Provide Host Access**

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Figure 86

To create hosts and provide host access, follow these steps:

- In EMC Unisphere, click the Hosts tab and click Create Host. The "Host Wizard" page appears.
- In the Name and Description fields, type the name and description of the new host. Click Next. The "Operating System" page appears.

	Figure 87	Specifying Name for Host Configurat	tion
Host Wizard			
Spe Step	ecify Name	<u>?</u> >>	
Enter a name and	optional description for the host co	onfiguration:	
Name: ∗	M100N1		
Description:	Hyper-V Cluster Node 1		
	[	< Back Next > Finish Cancel Help	

**3.** Choose the host OS from the "Operating System" drop-down list. Click **Next**. The "Network Address" page appears.

1

### Host Wizard **Operating System** >> Step 2 of 6 Specify the host operating system. While this information is not required, providing this information will allow for more specific setup and troubleshooting instructions. Operating System: Microsoft Hyper-V . Novell Suse Enterprise Linux ٠ Windows 7 Microsoft Hyper-V Solaris 10 SPARC 1 Other Ŧ < Back Next > Finish Cancel Help

Figure 88

4. Choose the "Network Name" or "IP Address" radio button to enter the details of the host.

Figure 89 Specifying the Host Network Address

Specifying Host Operating System

Host Wizard
Network Address Step 3 of 6
Specify the host network address.
You can specify the network address of the host as either a network name or IP Address.
Network Address:       IP Address:         IP Address:       IP Address:         Advanced Storage Access (ASA):       Allow Access         System-wide ASA: Disabled       This setting is only effective if ASA is set to "Enable access on a per-host basis".         More information
< Back Next > Finish Cancel Help

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5. Enter the IQN of the Hyper-V host in the IQN field. The host IQN can be found in the Configuration tab of the iSCSI initiator. Enter the CHAP secret password if required in your environment in the CHAP Secret field.

1

The "Summary" page appears.

Fig	ure 90	Specify	ing iSCSI	Unique	Number (IC
Host Wizard					
step 4 of 6	S				?>
If this host is connected to iSCSI stor IQNs, each with an optional CHAP se		y a valid iSC	∏address (IQ	N). You can ent	er up to two
The iSCSI Initiator Node Name (I identify a host using the iSCSI pro a CHAP Secret when adding an IQ	tocol. To use CHAP (o		ify		
IQN: iqn.1991-05.com.microsoft	m100n1.m50vspex.c	om			
CHAP Secret:					
Confirm CHAP Secret:					
	Add Ar	other IQN			
	<	Back Ne	ext > Fini:	sh Cance	Help

6. Review the host details and click Finish.

Host Wizard		
Summary		_
Step 5 of 6		< 📀
Confirm the following Host configurati	on:	
Name:	M100N5	
Description:	Hyper-V Cluster Node 5	
Operating System:	Microsoft Hyper-V	
Network Name:	M100N5.M50VSPEX.COM	
Advanced Storage Access (ASA):	Not Allowed	
IQNs:	iqn.1991-05.com.microsoft:m100n5.m50vspex.com CHAP Secret: Not Specified	
	< Back Next > Finish Car	ncel Help

Figure 91 Host Configuration Summary

7. Repeat the above steps to create Host list for all Hyper-V hosts.

🗐 Dashbo	oard 📷	System Stora	ge 🛛 🌋 Setting	s 📳 Hosts	👩 Support
×3300 > +					
s					
sts:					
Name	Description	Network Address	Advanced Stor	IQN	Operating System
M100N1		10.29.150.171	Disabled	iqn.1991-05.com.mi	Microsoft Hyper-V
M100N2		10.29.150.172	Disabled	iqn.1991-05.com.mi	Microsoft Hyper-V
M100N3		10.29.150.173	Disabled	iqn.1991-05.com.mi	Microsoft Hyper-V
M100N4		10.29.150.174	Disabled	iqn.1991-05.com.mi	Microsoft Hyper-V

Figure 92 Hosts Window Listing All the Hyper-V Hosts

- 8. Click Storage > Microsoft Hyper-V.
- 9. Choose an Allocated Hyper-V Datastore and click Details.
- **10.** Click the **Host Access** tab.

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**11.** From the "Access" column drop-down list, choose "Hyper-V Datastore" for all the hosts participating in a Microsoft Windows Hyper-V cluster.

🧃 Dashboar	rd System	Storage	s Settings	Hosts	🗿 Support
<b>X3300</b> > Stor	rage > Microsoft Hyper-V	> Hyper-V Det	ails		
er-V Storage Details	3				
Summary					
Status: 🥪	Ok		Storage Server:	iSCSIServer00 (10.10.4	0.50)
Name: M10	00-WitnessDisk		Storage Pool:	Performance Pool	
Description:			iSCSI Target:	iqn.1992-05.com.emc:	apm001203006930000-
			Hyper-V LUN:	0	
General Datasto	re Capacity Protection Size	Host Access	Snapshots Replicatio		
			Shapanota Replicatio	211	
Name	Network Address		IQN	Acce	ss
Name M100N1	Network Address			Acce	
		🖊 iqn.19	IQN	Acce	e <b>v</b>
M100N1	10.29.150.171	🖊 iqn.19	IQN 91-05.com.microsoft:m1	Acce Hyper-¥ Datastor Hyper-¥ Datastor	B   V B   V
M100N1 M100N2	<pre>10.29.150.171 10.29.150.172</pre>	/ iqn.19 / iqn.19 / iqn.19	IQN 91-05.com.microsoft:m1 91-05.com.microsoft:m1	Acce 0 Hyper-¥ Datastor 0 Hyper-¥ Datastor 0 Hyper-¥ Datastor	
M100N1 M100N2 M100N3	<ul> <li>10.29.150.171</li> <li>10.29.150.172</li> <li>10.29.150.173</li> <li>10.29.150.174</li> </ul>	/ iqn.19 / iqn.19 / iqn.19 / iqn.19	IQN 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1	Acce 0 Hyper-V Datastor 0 Hyper-V Datastor 0 Hyper-V Datastor 0 Hyper-V Datastor	
M100N1 M100N2 M100N3 M100N4 M100N5 Note: Datastore	<ul> <li>10.29.150.171</li> <li>10.29.150.172</li> <li>10.29.150.173</li> <li>10.29.150.174</li> </ul>	/ iqn.19 / iqn.19 / iqn.19 / iqn.19	1QN 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1	Acce 0 Hyper-Y Datastor 0 Hyper-Y Datastor 0 Hyper-Y Datastor 0 Hyper-Y Datastor	
M100N1 M100N2 M100N3 M100N4 M100N5	<ul> <li>10.29.150.171</li> <li>10.29.150.172</li> <li>10.29.150.173</li> <li>10.29.150.174</li> <li>10.29.150.174</li> <li>M100NS M50USD</li> </ul>	<ul> <li>iqn.19</li> <li>iqn.19</li> <li>iqn.19</li> <li>iqn.19</li> <li>iqn.19</li> <li>iqn.19</li> <li>iqn.19</li> <li>sts. That can cause</li> </ul>	1QN 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1 91-05.com.microsoft:m1	Acce 0 Hyper-Y Datastor 0 Hyper-Y Datastor 0 Hyper-Y Datastor 0 Hyper-Y Datastor 0 No. Access	

Figure 93 Hyper-V Datastore Details Window

12. Repeat the above steps to provide Host Access for all the Hyper-V datastores created earlier.

# **Microsoft Windows Failover Cluster Setup**

# **iSCSI** Initiator Configuration

To connect iSCSI targets and configure advanced settings, follow these steps:

- 1. Login to the Microsoft Windows Server 2008 R2 Hyper-V host.
- 2. Click Start > Administrative Tools > iSCSI initiator.
- 3. In the "iSCSI Initiator Properties" dialog box, click Discovery and then click Discover Portal.

Figure 94

Adding Target Portal in iSCSI Initiator Properties Window

Initiator Pro		ets   Volumes and Devices	RADIUS Configuration
Farget portals - The system wil	look for Targets o	n following portals:	Refresh
Address	Port	Adapter	IP address
10.10.40.50	3260	Microsoft iSCSI Initiat	or 10.10.40.4
10.10.40.60	3260	Microsoft iSCSI Initiat	or 10.10.40.5
To add a targe	t portal, click Disco	wer Portal.	Discover Portal
To remove a ta then click Remo		the address above and	Remove

**4.** In the "IP address" or "DNS" name field, enter the EMC VNXe iSCSI Server IP for SP A created earlier in the EMC VNXe3300 Deployment Procedure and click **Advanced**.

Figure 95	Changing the Default Settings of Target P	ortal

Discover Target Portal	×
Enter the IP address or DNS name and want to add.	port number of the portal you
To change the default settings of the di the Advanced button.	iscovery of the target portal, click
IP address or DNS name:	Port: (Default is 3260.)
10.10.40.50	3260 OK Cancel

- **5.** The Advanced Settings dialog box appears. Complete the following in the Advanced Setting window:
  - **a.** Choose "Microsoft iSCSI Initiator" from the Local adapter list box.
  - **b.** Choose the "IP address" of the first NIC connected to the iSCSI server from the Initiator IP list box.
  - c. If you are required to use the CHAP, enter the details else ignore and click Ok.

	Figure 96	Advanced Settings W
nced Settings		? ×
neral IPsec		
Connect using		
Local adapter:	Microsoft iSCSI Initiator	
Initiator IP:	10.10.40.4	
Target portal IP:		<b>_</b>
Data digest Enable CHAP log CHAP Log on inforr EHAP helps ensure o an initiator. To use, specify the s	nation connection security by providing authe same name and CHAP secret that was	configured on the target for this
CHAP helps ensure of an initiator. To use, specify the s	on mation connection security by providing authe	configured on the target for this system unless another name is
Data digest Enable CHAP log CHAP Log on inforr CHAP helps ensure o an initiator. To use, specify the s nitiator. To use, specify the s specified.	on mation connection security by providing authe same name and CHAP secret that was will default to the Initiator Name of the	configured on the target for this system unless another name is
Data digest  CHAP Log on inforr CHAP Log on inforr CHAP Log on inforr CHAP helps ensure o an initiator. To use, specify the s: nitiator. Vame: Parget secret: Perform mutual a	on mation connection security by providing authe same name and CHAP secret that was will default to the Initiator Name of the iqn.1991-05.com.microsoft:m100	configured on the target for this system unless another name is In1.m50vspex.com
Data digest  CHAP Log on inforr CHAP Log on inforr CHAP Log on inforr CHAP Log on inforr To use, specify the s To use, specified.  Vame:  Farget secret:  Perform mutual a For use mutual CHAP RADIUS.	on mation connection security by providing authe same name and CHAP secret that was will default to the Initiator Name of the iqn.1991-05.com.microsoft:m100	configured on the target for this system unless another name is In1.m50vspex.com

**6.** In the "iSCSI Initiator Properties" dialog box, verify the "Target Portals" details that are displayed in the "Discovery" window.

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- 7. Choose the **Targets** tab, and then choose the **VNXe** as the target name.
- 8. Click Connect.

The "Connect To Target dialog box" appears.

- 9. Complete the following in the Targets Window:
  - a. Choose "Add this connection to the list of Favorite Targets".
  - **b.** Clear Enable multi path and click **Ok**. In the Targets tab of the iSCSI Initiator Properties dialog box, verify that the status of the target shows connected.

51 Initiator Properties argets Discovery Favorite Targets Volumes and Device	s RADIUS Configuration
Quick Connect	
To discover and log on to a target using a basic connection, DNS name of the target and then click Quick Connect.	type the IP address or
Target:	Quick Connect
Discovered targets	
	Refresh
Name	Status
ign.1992-05.com.emc:apm001203006930000-2-vnxe	Connected
iqn.1992-05.com.emc:apm001203006930000-3-vnxe	Connected
iqn.1992-05.com.emc:apm0012030069300000-3-vnxe	Connected
iqn.1992-05.com.emc:apm001203006930000-3-vnxe To connect using advanced options, select a target and the click Connect.	
To connect using advanced options, select a target and the click Connect. To completely disconnect a target, select the target and	
To connect using advanced options, select a target and the	n Connect

Figure 97 Window Displaying Discovered Targets

- **10.** Repeat steps from 2-7 to add target portal IP of the VNXe iSCSI Server IP for SP B using the second NIC configured for iSCSI.
- 11. Choose the **Targets** tab, and then choose the first "VNXe" target name.
- 12. Click Properties and in the Properties dialog box click Add Session.

### Figure 98 iSCSI Initiator Properties Displaying Session Identifiers

roperties	×
Sessions Portal Groups	
	Refresh
Identifier	
ffffa80388b51e8-4000013700000001 ffffa80388b51e8-4000013700000002	
To add a session, click Add session.	Add session
To disconnect one or more sessions, select each session and then click Disconnect.	Disconnect
To view devices associated with a session, select a session and then click Devices.	Devices

I

- Choose "Add this connection" to the list of Favorite Targets and click Advanced. The Advanced Settings dialog box appears.
- 14. Complete the following in the Advanced Settings window:
  - **a.** Choose "Microsoft iSCSI Initiator" from the Local adapter list box.
  - **b.** Choose the "IP address" of the second NIC connected to the iSCSI server from the Initiator IP list box.

**c.** Choose the "Target portal IP" of the VNXe iSCSI Server IP for SP A in the Target portal IP list box. Click **Ok**.

Advanced Settings		? ×
General IPsec		
Connect using		
Local adapter:	Microsoft iSCSI Initiator	-
Initiator IP:	10.10.40.5	-
Target portal IP:	Default	<u>-</u>
	Default 10.10.40.50 / 3260	
CRC / Checksum		
🔲 Data digest	Header digest	

Figure 99 Advanced Settings Window

- **15.** Choose "Targets" and then enter the second "VNXe" target name.
- 16. Click Properties and in the Properties dialog box click Add Session.

#### Figure 100 Status of the Discovered Targets

51 Initiator Properties       ×         argets       Discovery       Favorite Targets       Volumes and Devices       RADIUS       Configuration         Quick Connect       To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.       Quick Connect         Target:       Quick Connect			
Quick Connect		<u> </u>	
		type th	ne IP address or
Target:			Quick Connect
Discovered targets			Defrech
			Connect
click Connect. To completely disconnect a target, sele	ect a target and ther		
click Connect. To completely disconnect a target, sele then click Disconnect. For target properties, including configur	ect a target and ther ct the target and		Connect Disconnect
To connect using advanced options, sel click Connect. To completely disconnect a target, selet then click Disconnect. For target properties, including configu select the target and click Properties. For configuration of devices associated	ect a target and ther ct the target and ration of sessions,		Connect

17. Choose "Add this connection" to the list of Favorite Targets and click Advanced.

The Advanced Settings dialog box appears.

- **18.** Complete the following in the Advanced Settings window:
  - a. Choose "Microsoft iSCSI Initiator" from the Local adapter list box.
  - **b.** Choose the IP address of the first NIC connected to the iSCSI server from the Initiator IP list box.
  - **c.** Choose the Target portal IP of the VNXe iSCSI Server IP for SP B in the Target portal IP list box. Click **Ok**.

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Figure 101	Advanced Settings
ligule ioi	Advanced Dettings

Ad	vanced Settings		? >
6	General IPsec		
	Connect using		
	Local adapter:	Microsoft iSCSI Initiator	•
	Initiator IP:	10.10.40.4	•
	Target portal IP:	Default	<u> </u>
	CRC / Checksum	Default 10.10.40.60 / 3260	
	🗖 Data digest	F Header digest	

Figure 102 shows the partial output of command mpclaim.exe -b captured in a file.

	riguic ioz		ingulation output
📕 config_b.txt - Notepad			-
File Edit Format View Help			
MPIO Storage Snapshot	on Monday, 09 J	uly 2012, at 02:44:3	37.565
Registered DSMs: 1			
DSM Name 		Version   PRF	
Microsoft DSM +	006	.0001.07601.17514 00	020 0003 0001 030 False 
Microsoft DSM ====================================	, Round Robin, Al	.UA Not Supported	
Path ID	State	SCSI Address	Weight
0000000077010003 0000000077010002	Active/Optimized Active/Optimized	001 000 003 001 001 000 002 001	0 0
MPIO Disk9: 02 Paths,	Round Robin, AL	JA Not Supported	
Path ID	State	SCSI Address	Weight
0000000077010003 0000000077010002			0 0
MPIO Disk8: 02 Paths,	Round Robin, AL	JA Not Supported	
Path ID	State	SCSI Address	Weight
0000000077010001 0000000077010000	Active/Optimized Active/Optimized	001 000 001 008 001 000 000 008	0 0
MPIO Disk7: 02 Paths,	Round Robin, AL	JA Not Support⊨d	
Path ID	State	SCSI Address	Weight
0000000077010001 0000000077010000			0 0
MPIO Disk6: 02 Paths,	Round Robin, AL	JA Not Supported	
Path ID	State	SCSI Address	Weight
000000077010001	Active/Optimized Active/Optimized	001 000 001 006 001 000 000 006	0 0

ſ

### Figure 102 mpclaim.exe Configuration Output

- 19. Login to the "Windows Hyper-V host" and open "Server Manager".
- 20. In "Server Manager", expand "Storage" and click Disk Management.
- **21.** In the "Disk Management" right window pane, choose and right-click all the SAN disks to online and initialize them.

Once all the disks are initialized, format with the NTFS file system and assign drive letters to them.

**22.** Login to other Hyper-V hosts to which the same above SAN disks are provisioned and bring them online.

# **Cluster Validation**

Cluster Node Name	Node IP Address	Cluster IP Address	Cluster Name
M100N1.M50VSPEX.COM	10.29.150.171		
M100N2.M50VSPEX.COM	10.29.150.172	10.29.150.175	M100Clus
M100N3.M50VSPEX.COM	10.29.150.173		
M100N4.M50VSPEX.COM	10.29.150.174		

### Table 11 Microsoft Windows Failover Cluster Details

For cluster validation, follow these steps:

- 1. Login to M100N1 host using a domain administrative account with local privileges.
- 2. Open Server Manager and browse to Features > Failover Cluster Manager.
- **3**. Validate cluster feasibility:
  - a. Choose "Validate a Configuration", and click Next.
  - b. Add all the nodes one at a time into the Enter server name text field, and click Next
  - c. Choose "Run all tests" and click Next.
  - d. Click Next > Next.
  - e. Review the report and resolve any issues found by the validation wizard before continuing.



**Note** The warning in Figure 103 is expected because the iSCSI NICs are on the same subnet. For failsafe and HA feature of the EMC VNXe storage to work, the peer ports on both storage processors must be on the same subnet and that is the reason for iSCSI NICs to be on same subnet.

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f. Click Finish.

	Figure	103 Failov	er Cluster Validation Rep	ort
🔯 Validate a Configu	ration Wizard		x	
Summary				
Before You Begin Select Servers or a Cluster		sfully. The configuration appears to be e report because it may contain warnin vailability.		
Testing Options Confirmation Validating	Failover Clus	ter Validation	Report	
Summary	Node: m100 Node: m100	n1.m50vspex.com n2.m50vspex.com n3.m50vspex.com n4.m50vspex.com		
	Inventory			
	Name	Result	Description	
	List BIOS Information	1	Success	
	List Environment Variables	6	Success	
	List Fibre Channel Host Bus Ada	pters	Success	
	List iSCSI Host Bus Adapters	on to the second	Success	
	List Memory Information	€	Success	
	List Operating System Informati	on 📩	Success	
	List Plug and Play Devices		Success 💌	
	To view the report created by the wizar To close this wizard, click Finish.		View Report	
	More about cluster validation tests	Create the claster norm		
			Finish	

# **Failover Cluster Setup**

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To setup a failover cluster, follow these steps:

- 1. In the Failover Cluster Manager, choose Create a Cluster.
- 2. In the "Welcome" screen, click Next.
- 3. Add all the nodes one at a time into the Enter server name text field and click Next.

	Figure	e 104	Selecti	ng Servers	for Ada	ling into tl	he Cluster
Create Cluster Wi							K
Before You Begin Select Servers Access Point for Administering the Cluster Confirmation Creating New Cluster Summary	Add the names of all the Enter server name: Selected servers:	he servers that yo 1 m100n1.m50 m100n3.m50 m100n4.m50	Dvspex.com Dvspex.com Dvspex.com	the cluster. You mus	st add at least	Browse Add Remove	
				< Previous	Next >	Cancel	

4. Enter the "Cluster Name", "Cluster IP", and click Next.

1

	Figure 105	Cluster Details
🂱 Create Cluster Wi	zard	
Access F	Point for Administering the C	luster
Before You Begin Select Servers Access Point for Administering the Cluster Confirmation	Type the name you want to use wher Cluster Name: M100Cks One or more IPv4 addresses could not sure the network is selected, and then	t be configured automatically. For each network to be used, make
Creating New Cluster Summary	Networks           Image: 10.29.150.0/2           10.10.46.0/24           10.10.46.0/24           10.10.46.0/24           10.10.46.0/24           More about the administrative Access	Click here to type an address
		< Previous Next > Cancel

5. In the "Confirmation" page, review and click Next.

	Figure	106	Confirn	nation W	indow fo	or Creating	С
Create Cluster Wi	zard						x
Confirma	tion						
lefore You Begin ielect Servers	You are ready to create a The wizard will create yo		following setting	gs:			
Access Point for Administering the	Cluster:	M100C	JS			<b>A</b>	
Cluster	Node:		m50vspex.c				
onfirmation	Node:		.m50vspex.c				
eating New Cluster	Node:		.m50vspex.c				
ummary	Node: IP Address:	m100n4 10.29.1	.m50vspex.c	com			
	IP Address:	10.29.1	50.175			<b>v</b>	
	To continue, click Next.						
				< Previous	Next >	Cancel	

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6. In the "Summary" window click **Finish**.

#### Figure 107 Window Showing Summary of the Created Cluster

Create Cluster Wizard Summary		X
Before You Begin Select Servers You have such	cessfully completed the Create Cluster Wizard.	
ccess Point for dministering the Juster	Create Cluster	<u> </u>
Creating New Cluster		
Churche un	M100Clus	
Summary Node:	m100n1.m50vspex.com	
Node:	m100n2.m50vspex.com	
Node:	m100n3.m50vspex.com	
Node:	m100n4.m50vspex.com	
Quorum:	Node Majority	
IP Address:	10.29.150.175	-
To view the report crea To close this wizard, cli	ted by the wizard, click View Report. ck Finish.	View Report
		Finish

7. In the "Failover Cluster Manager", right-click the cluster name, choose More Actions, Configure Cluster Quorum Settings and click Next.

	Figure 108 F	ailover Cluster Manager	
👹 Failover Cluster Manager			_ @ ×
File Action View Help			
Railover Cluster Manager	Cluster M100Clus.M	50VSPEX.COM	Actions
<ul> <li>■ M100Clus.M50V5PEX.C<sup>®</sup></li> <li></li></ul>	Configure a Service or Application Validate This Cluster View Validation Report	ster M100Clus pations/services and 4 nodes	M100Clus.M50VSP  Configure a Ser
<ul> <li>Example</li> <li>Example</li></ul>	Enable Cluster Shared Volumes	OM Networks: Cluster Network 1, Cluster B Subnets: 3 IPv4 and 0 IPv6	Validate This Clu View Validation Enable Cluster S
	Close Connection	and Disk Majority ( Cluster Disk 11 )	Add Node
	More Actions	Configure Cluster Quorum Settings	Close Connection
	View	Migrate services and applications	More Actions
	Refresh	Shut down Cluster	View 🕨
	Properties	Destroy Cluster 03, Wind	Q Refresh
	Help		Properties
-		configure for high availability	? Help

8. In the "Select Quorum Configuration" page, choose the "Node and Disk Majority" radio button and click Next.

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um Configuration
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🏭 Configure Cluster	Quorum Wizard
Select Q	uorum Configuration
Before You Begin Select Quorum Configuration	Read the descriptions and then select a quorum configuration for your cluster. The recommendations are based on providing the highest availability for your cluster.
Configure Storage Witness	<ul> <li>Node Majority (not recommended for your current number of nodes)</li> <li>Can sustain failures of 1 node(s).</li> </ul>
Confirmation Configure Cluster	Node and Disk Majority (recommended for your current number of nodes) Can sustain failures of 2 node(s) with the disk witness online. Can sustain failures of 1 node(s) if the disk witness goes offline or fails.
Quorum Settings Summary	Node and File Share Majority (for clusters with special configurations)
	Can sustain failures of 2 node(s) if the file share witness remains available. Can sustain failures of 1 node(s) if the file share witness becomes unavailable.
	O No Majority: Disk Only (not recommended)
	Can sustain failures of all nodes except 1. Cannot sustain a failure of the quorum disk. This configuration is not recommended because the disk is a single point of failure.
	More about quorum configurations
	< Previous Next > Cancel

- 9. In the "Configure Storage Witness" page choose the 10GB disk and click Next.
- 10. In the "Confirmation" page review and click Finish.

M100N4 Current Host Server: M100N1 Subnets: 3 IPv4 and 0 IPv6 Quorum Configuration: Node and Disk Majority (Cluster Disk 11) Recent Cluster Events: None in the last 24 hours Custer Network 2 Cluster Network 3 Custer Events Custer Events Custer Core Resources Name Status Cluster Name		
Image: Services and applications   Image: Services and ap	💐 Failover Cluster Manager	
Failower Cluster Manager         Fillower Cluster Manager         M100Clus.M50VSPEX.COM         Services and applications         Modes         M100N1         M100N2         M100N4         Cluster Shared Volumes         Storage         Cluster Networks         Cluster Network 1         Cluster Network 2         Cluster Network 3         Cluster Network 3         Cluster Network 3         Cluster Network 3         Cluster Network 4         Cluster Network 5         Cluster Network 6         Cluster Network 1         Cluster Network 2         Cluster Network 3         Cluster Network 4         Cluster Network 5         Cluster Network 6         Cluster Network 7         Cluster Network 8         Cluster Network 9         Cluster Network 1         Cluster Core Resources         Name         Status         Cluster Name	File Action View Help	
Image: Services and applications   Image: Services and applications   Image: Services and applications   Image: Services and applications   Image: M100Clus.M50VSPEX.COM   Image: M100	🗢 🔿 🞽 🖬 🚺	
<ul> <li>Name: M100Clus</li> <li>P Address: 10.29.150.175</li> <li>Online</li> <li>Disk Drives</li> <li>□ Cluster Disk 11</li> <li>Online</li> <li>Volume: (F)</li> <li>File System: NTFS</li> <li>10 GB (99.1% free )</li> </ul>	Fallover Cluster Manager  M100Clus.M50VSPEX.COM Services and applications Modes M100N1 M100N2 M100N4 Cluster Shared Volumes Storage Networks Cluster Network 1 Cluster Network 1 Cluster Network 3	Summary of Cluster M100Clus         M100Clus has 0 applications/services and 4 nodes         Name: M100Clus.M50VSPEX.COM       Networks: Cluster Network 1, Cluster Network         Current Host Server: M100N1       Subnets: 3 IPv4 and 0 IPv6         Quorum Configuration: Node and Disk Majority (Cluster Disk 11)         Recent Cluster Events: None in the last 24 hours         • Configure         • Cluster Core Resources         Name         Status         Cluster Name         IP Address: 10.23.150.175         IP Online         Volume: (F)

Figure 110 Failover Cluster Manager Online Status

- **11.** To enable the Cluster Shared Volume, open "Failover Cluster Manager" from the node that currently owns the cluster.
- 12. In the "Configure Section" choose Enable Cluster Shared Volumes.
- **13.** Check the check box "I have read the above notice" and click **Ok**.



#### Figure 111 Enabling Cluster Shared Volumes (CSV)

14. Right-click "Cluster Shared Volumes" and choose Add Storage.

💐 Failover Cluster Manage	r			
File Action View Help				
🗢 🔿   🖄 📅   🚺 🗊				
Failover Cluster Manager □ ∰ M100Clus.M50VSPEX.C	OM Cluster	Shared Volum	es	
<ul> <li>Services and application</li> <li>Nodes</li> </ul>		Summary of Clu	ster Shared Volumes	
M100N1 M100N2	Storage	<b>b</b> .	Total Capacity:	
M100N3 M100N4	No disk:		Total: O Bytes Free Space: O Bytes	
Cluster Shared Volu	Mes Add storage	1	Percent Free: 0%	
<ul> <li>Decision</li> <li>Decision</li> <li>Networks</li> <li>Cluster Networ</li> </ul>	View 🕨			
🕎 Cluster Networ	Refresh		Status	Current Owner
🕎 Cluster Networ	Help			
		-		

Figure 112 Adding Storage to CSV

15. Choose all the volumes under "Available disks" and click Ok.

Figure 113

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Select Available Disks For CSV Storage

<b>d Storage</b> Select the disk or disks that j	vou want to add.		Z
Vailable disks:			
Name           Image: Cluster Disk 1           Image: Cluster Disk 2           Image: Cluster Disk 3           Image: Cluster Disk 5           Image: Cluster Disk 6           Image: Cluster Disk 7           Image: Cluster Disk 8           Image: Cluster Disk 9	Status <ul> <li>Online</li> </ul>	Capacity	
		ОК	Cancel

**16.** Once all the disks are added successfully, the status shows Online.

<ul> <li>Failover Cluster Manager</li> <li>Mathematical Mithematical Services and applications</li> <li>Modes</li> </ul>	Cluster Shared Volu	imes Cluster Shared Volumes	5
M100N1 M100N2 M100N3 Cluster Shared Volumes Storage Networks Cluster Network 1	<b>Storage:</b> 10 Total Disks - 10 online	Total Capacity: Total: 7.32 TB Free Space: 7.32 TB Percent Free: 100%	
Cluster Network 2	Disk	Status	Current Owner
型 Cluster Network 3 国 Cluster Events		<ul> <li>Online</li> </ul>	M100N1 M100N2 M100N3 M100N4 M100N1 M100N2 M100N3 M100N4 M100N1 M100N1

Figure 114 Window Showing CSV Disk Status

**17.** Rename the cluster networks (optional).

選 Failover Cluster Manager			
File Action View Help			
<ul> <li>Fallover Cluster Manager</li> <li>M100Clus.M50VSPEX.COM</li> <li>Nodes</li> <li>Nodes</li> <li>Cluster Shared Volumes</li> <li>Storage</li> <li>Networks</li> <li>Mgmt</li> <li>Live_Migration</li> <li>Storage</li> <li>Cluster Events</li> </ul>	Live_Migration Summary of Live_M Live_Migration has 1 subnet(s Status: Up Cluster Use: Internal	:). Subne	ts: (6.0/24 (IP∨4)
	Name Network Connections	Status	Current Owner
	M100N1 - Local Area Connec M100N2 - Local Area Connec Adapter: Cisco VIC Ethemet In IP Address: 10.10.46.5 M100N3 - Local Area Connec Adapter: Cisco VIC Ethemet In IP Address: 10.10.46.6 M100N4 - Local Area Connec Adapter: Cisco VIC Ethemet In IP Address: 10.10.46.7 M100N4 - Local Area Connec Adapter: Cisco VIC Ethemet In IP Address: 10.10.46.7	tio 💿 Up nte tio 💿 Up nte stio 🍞 Up	M100N1 M100N2 M100N3 M100N4

Figure 115 Live Migration Summary in Failover Cluster Manager

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# Microsoft System Center-2012 VMM Configuration

This section provides configuration details of Microsoft System Center Virtual machine Manager (VMM).

## Add Microsoft Hyper-V Hosts and Cluster

To add Microsoft Hyper-V hosts and cluster, follow these steps:

1. Create a "Host Group" and click Add Hyper-V Hosts and Clusters.



### Figure 116 Create a Host Group in SCVMM

**2.** In the "Resource location" page of the "Add Resource Wizard", choose the radio button "Windows server computers in a trusted Active directory domain" and click **Next**.

### Figure 117 Selecting Resource Location



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3. In the "Credentials" page of the "Add Resource Wizard", provide the appropriate credentials and click Next.

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4. In the "Discovery" page of the "Add Resource Wizard", choose the radio button "Specify Windows Server Computer by Name" and enter the cluster name created in the previous sections and click Next.

Add Resource Wizard	X
Resource location Credentials Discovery scope Target resources	Specify the search scope for virtual machine host candidates Search for computers by whole or partial names, FQDNs, and IP addresses. Alternatively, you may generate an Active Directory query to discover the desired computers. © Specify Windows Server computers by names © Specify an Active Directory query to search for Windows Server computers
Host settings Summary	Enter the computer names of the hosts or host candidates that you want VMM to manage. Each computer name must be on a separate line. Computer names: M100CLUS.M50VSPEX.COM
	Skip AD verification Examples: server1 server1.contoso.com 10.0.1.1 2a01:110:1e:3:f8ffcfe44:23
	Previous Next Cancel

Figure 118 Specifying Discovery Scope for VM Hosts

5. In the "Target Resources" page of the "Add Resource Wizard" choose the "cluster name" and click Next.

	Figure 119 Targe	t Resources to Add as Ho	sts
Add Resource Wizard			>
📬 Target re	esources		
Resource location		dit i	111154
Resource location	Select the computers that you	want to add as hosts	
Credentials	Discovered computers:		
Discovery scope	Computer Name	Operating System	Hypervisor
	M100clus.M50VSPEX.COM	Windows Server 2008 R2 Enterprise	Hyper-V
Target resources	M100N1.M50VSPEX.COM	Windows Server 2008 R2 Enterprise	Hyper-V
Host settings	M100N2.M50VSPEX.COM	Windows Server 2008 R2 Enterprise	Hyper-V
-	M100N3.M50VSPEX.COM	Windows Server 2008 R2 Enterprise	Hyper-V
Summary	M100N4.M50VSPEX.COM	Windows Server 2008 R2 Enterprise	Hyper-V
	Select all Refresh Stop		
		Previous	Next Cancel

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6. In the "Host Settings" page of the "Add Resource Wizard" choose the "Host group" created in step 1 and click Next.

	Figure 120	Specifying Host Group and VM Path for Hosts
add Resource Wizard	ıgs	×
Resource location Credentials Discovery scope	Assign the selected comput	up and virtual machine placement path settings for hosts ters to the following host group:
Target resources Host settings Summary	If any of the selected hosts	are currently managed by another Virtual Machine Manager (VMM) environment, select he hosts with this VMM management server.
		Previous Next Cancel

# **Create a Template for Virtual Machine Deployment**

This section covers how to create A Virtual Machine, A Virtual Machine Template, and Highly Available Virtual Machines from the Template.

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To create a virtual machine from a blank .vhd file, follow these steps:

- 1. Open the VMs and Services workspace.
- 2. In the Home tab, in the "Create" group, click the **Create Virtual Machine** drop-down list, and then click **Create Virtual Machine**.

The "Create Virtual Machine" wizard appears.
			-							
		Clu	uster Tools	Administ	rator - M50	SCVMM	.M50V5	PEX.COM -	Virtual M	achine
<b>I</b>	Home F	older Ho	ost Cluster							
*	*	*	*			ith	7	Powe	erShell	
45				-8			-	Jobs		
Create Service	Create Virtual Machine •		ate Host Group	Assign Cloud	Overview	VMs	Services	PRO		
	🕐 Create Vi	rtual Machine	e	Cloud		Show		Wind	low	
VMs and	🏥 Convert F	hysical Mach	nine							
vivio unu		/irtual Machi	ne							
🛆 Cla	ouds									
🔺 🧰 ΔΙΙ	Hosts	Nar	me St	atus 👻	Virtual	Host	C	Job Status	Owner	User
	M100-VSPEX	🐌 2К8	8VM081 R	unning	Running	M100N1			M50VS	Admi
		🛛 🐌 2К8	8VM036 R	unning	Running	M100N1			M50VS	Admi
1	M100Clus	🛛 臇 2К8	8VM009 R	unning	Running	M100N1			M50VS	Admi
	M100N1	🔥 2К8	8VM062 R	unning	Running	M100N1			M50VS	Admi
	M100N2	[ 2К8	8VM023 R	unning	Running	M100N1			M50VS	Admi
	M100N3	🐌 2К8	8VM030 R	unning	Running	M100N1			M50VS	Admi
	M100N4	🔥 2К8	8VM067 R	unning	Running	M100N1			M50VS	Admi

#### Figure 121 Create Virtual Machine

**3.** In the "Select Source" page, choose the radio button "Create the new virtual machine with a blank virtual hard disk" and click **Next**.

-	
🖪 Create Virtual Machine Wiz	ard
🕞 Select Sourc	
	•
Select Source	Select the source for the new virtual machine.
Specify Virtual Machine Identity	O Use an existing virtual machine, VM template, or virtual hard disk.
Configure Hardware	
Select Destination	Browse
Select Host	Create the new virtual machine with a blank virtual hard disk

#### Figure 122 Selecting Source for New VM

- 4. In the "Specify Virtual Machine Identity" page, enter the virtual machine name and optional description, and then click Next.
- 5. In the "Configure Hardware" page, perform any one of the following, and click Next.
  - a. To use an existing hardware profile, in the Hardware profile list, click the desired profile.
  - **b.** Configure hardware settings manually.
- 6. In the "Select Destination" page, choose to place the virtual machine on a virtual machine host.
  - **a.** In the "Select Host" page, review the placement ratings and transfer type, click the **Desired Host**, and then click **Next**.
  - **b.** In the "Configure Settings" page, under "Locations", either accept the default virtual machine path on the host for the virtual machine files, or click **Browse** to specify a different location. If desired, choose the "Add this path" to the list of default virtual machine paths on the host check box.

Under Machine Resources, click **Virtual Hard Disk**. You can accept the default values, or choose a different destination path on the host for the .vhd file. To change the .vhd file name, enter a new name in the File name box.

**c.** In the "Select Networks" page (if it appears), optionally choose the desired logical network, the virtual network, and the VLAN ID (if applicable), and click **Next**.

- **d.** In the "Add Properties" page, configure the action to take when the host starts or stops, and the operating system that you install on the virtual machine. Click **Next**.
- e. In the "Summary" page, confirm the settings and click Create.
- **7.** Install the Operating System on the Virtual Machine created above with latest updates and service pack. Install any Roles and Features, applications and enable any required services to make this a golden image for template creation.

## **Create a Virtual Machine Template**

Figure 123

This section covers on how-to create a virtual machine template from an existing virtual machine that is deployed on a host.

To create a virtual machine template, follow these steps:

Creating VM Template

- 1. Shutdown the VM for template creation and Open the Library workspace.
- 2. In the Virtual Machine tab, choose and right-click the VM that needs to be converted to a template and click **Create** and then **Create VM Template**.

			Cluster To	ools Vi	irtual Machir	e Tools	Administ	rator	- M5	ISCV	MM.M	50VSPEX.CO	DM - Vir	tual	м 🗖	. 8 ×
∎.	Home	Folder	Host Clus	ter	Virtual Mac	hine										^ 🕜
*	0		Power Off		set ve State		. *	ý	Å	Þ	Q 2000	+	7			
Create	Shut Down	Power	Resume		card Saved !	State 🧧	Creat Checkp		Mana Checkp		-	Connect or View •	Dele	te	Propert	ties
Create				V	/irtual Machi	ne						Window	Dele	te	Proper	ties
VMs and S	Services			< VI	Vls (100)											
i Clo	uds															Ą
🔺 🧰 All	Hosts				Name	<b>^</b>			₹ V.	. н	C.	Job Status	0 U	. C.	Serv	0.
	1100-VSPE	x		1	2K8VM		te			•	11	Clone		0.		6 ^
	M100Clus					Shut	Down				1	Create VM Te	· ·	0.		6
	M100N				2K8VM(	-	er On						M A			6 ≣
3	M100N				-	Powe	er Off				·		M A			6
4	-				-	Paus					·		M A			6
1	M100N				-	-					·		M A			6
1	M100N	4			2K8VM	Rese	:C					Completed	М А	0.		6

A warning message is displayed "creating a template destroys the source virtual machine, and any user data on the source virtual machine may be lost".

- 3. To continue, click Yes.
- 4. In the "VM Template Identity" page, provide a name for the virtual machine template, and click Next.
- 5. In the "Configure Hardware" page click Next.
- 6. In the "Configure Operating System" page, configure the guest operating system settings.

If you have an existing guest operating system profile that you want to use, in the Guest OS profile list, click the desired guest operating system profile.

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- 7. After you have configured the guest operating system settings, click Next.
- 8. In the "Select Library Server" page, click the "library server" for the virtual machine, and click Next.

**9.** In the "Select Path" page, click **Browse**, click a "library share" and optional folder path, click **OK**, and click **Next**.



Figure 124 Selecting Location for Saving the VM

- 10. In the "Summary" page, confirm the settings, and click Create.
- **11.** In the "Templates" tab, choose and right-click the template created above and click **Properties**. Make the necessary changes like making the VM highly available as shown in Figure 125.

Figure 125 Modifying Template Properties for VM High Availability



## **Create a Highly Available Virtual Machine from a Template**

You can use the following procedure to create a virtual machine from a virtual machine template in System Center 2012 - Virtual Machine Manager (VMM).

To create a highly available virtual machine from a template, follow these steps:

- 1. Open the VMs and Services workspace.
- 2. In the "Home" tab, in the "Create group" click the **Create Virtual Machine** drop-down button, and then click **Create Virtual Machine**.

The "Create Virtual Machine Wizard" opens.

- **3.** In the "Select Source" page, ensure that you choose "Use an existing virtual machine", "VM template", or "virtual hard disk", and then click **Browse**.
- 4. In the "Select Virtual Machine Source" dialog box, click the appropriate virtual machine template, and then click **Ok**.

	zard									
Select Sourc	e									
ct Source	Select the	e source f	or the new	virtual ma	achine.					
sify Virtual Machine Identity  Use an existing virtual machine, VM template, or virtual hard disk.										
igure Hardware	Use an e	Use an existing virtual machine, VM template, or virtual hard disk.								
		Browse								
	C. Create th	C Create the new virtual machine with a blank virtual hard disk								
lect Virtual Machine Sou			Indennie withe					×		
Select a VM template, virtua	al hard disk, or virtu	ual machine as	s the source for	r the new virtu	ual machine.					
Search		Q	💌 in		•	Туре	•			
Name	Owner	Operating	SAN Cop	Release	Virtualizati	Description	Path			
Type: Virtual Hard D	iel.			5.5		8				
🛯 🖿 i ype: vircuai riard D	ISK									
Blank Disk - Large	15K	None	No		Microsoft	To be us	\\M505C			
	15K	None None	No No		Microsoft Microsoft	To be us To be us	\\M505C			
Blank Disk - Large	<b>15K</b>					To be us				
Blank Disk - Large Blank Disk - Small	15K	None	No		Microsoft	To be us auto-disc	\\M505C			
Blank Disk - Large Blank Disk - Small Temp-Win7	<b>15K</b>	None Unknown	No		Microsoft Microsoft	To be us auto-disc auto-disc	\\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2	M50VSPE	None Unknown Unknown Unknown	No No No		Microsoft Microsoft Microsoft Microsoft	To be us auto-disc auto-disc	\\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2		None Unknown Unknown Unknown	No No No No		Microsoft Microsoft Microsoft Microsoft	To be us auto-disc auto-disc auto-disc	\\M50SC \\M50SC \\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2		None Unknown Unknown Unknown Unknown	No No No No		Microsoft Microsoft Microsoft Microsoft	To be us auto-disc auto-disc auto-disc	\\M50SC \\M50SC \\M50SC \\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2 Win2K8R2.vhd		None Unknown Unknown Unknown Unknown	No No No No No		Microsoft Microsoft Microsoft Microsoft Microsoft Unknown	To be us auto-disc auto-disc auto-disc	\\M50SC \\M50SC \\M50SC \\M50SC \\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2 Win2K8R2.vhd Win2K8R2.vhd		None Unknown Unknown Unknown Unknown Unknown Unknown	No No No No No No		Microsoft Microsoft Microsoft Microsoft Microsoft Unknown Unknown	To be us auto-disc auto-disc auto-disc	\\M50SC \\M50SC \\M50SC \\M50SC \\M50SC \\M50SC \\M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2.whd Win2K8R2.vhd Win2K8R2.vhd Win2K8R2_disk_1	MSOVSPE	None Unknown Unknown Unknown Unknown Unknown Unknown Unknown	No No No No No No No		Microsoft Microsoft Microsoft Microsoft Microsoft Unknown Unknown Microsoft	To be us auto-disc auto-disc auto-disc Win2K8R	\//M50SC \//M50SC \/M50SC \/M50SC \/M50SC \/M50SC \/M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2.whd Win2K8R2.vhd Win2K8R2_disk_1 Win2K8R2_disk_1	MSOVSPE MSOVSPE d	None Unknown Unknown Unknown Unknown Unknown Unknown Unknown	No No No No No No No No		Microsoft Microsoft Microsoft Microsoft Microsoft Unknown Unknown Microsoft Microsoft	To be us auto-disc auto-disc auto-disc Win2K8R	M50SC   M50SC   M50SC   M50SC   M50SC   M50SC   M50SC   M50SC			
Blank Disk - Large Blank Disk - Small Temp-Win7 Temp-Win7-2 Win2K8R2 Win2K8R2.vhd Win2K8R2.vhd Win2K8R2_disk_1 Win2K8R2_disk_1 Win2K8R2_disk_1.vh	MSOVSPE MSOVSPE d	None Unknown Unknown Unknown Unknown Unknown Unknown Unknown Unknown	No No No No No No No No		Microsoft Microsoft Microsoft Microsoft Microsoft Unknown Unknown Microsoft Microsoft Microsoft Unknown	To be us auto-disc auto-disc auto-disc Win2K8R	M50SC   M50SC   M50SC   M50SC   M50SC   M50SC   M50SC   M50SC   M50SC	a stored virtu al hard disk		

#### Figure 126 Selecting Source for Virtual Machine

- 5. In the "Select Source" page, click Next.
- 6. In the "Specify Virtual Machine Identity" page, enter the virtual machine name and optional description, and click Next.
- 7. In the Configure Hardware page, configure the hardware settings.

If you have an existing hardware profile with settings that you want to use, in the Hardware profile list, click the desired hardware profile.

8. After you have configured the hardware settings, click Next.



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In the "Configure Operating System" page, configure the guest operating system settings. If you have an existing guest operating system profile that you want to use, in the Guest OS profile list, click the desired guest operating system profile.

9. After you have configured the guest operating system settings, click Next.

	Figure 128	Configuring OS for the VM
Create Virtual Machine Wize	ard	
🕞 Configure Op	erating System	second the
Select Source	Configure identity, ne	etwork settings, and scripts for the new virtua
Specify Virtual Machine Identity		a guest OS profile or save a new profile bas
Configure Hardware	Guest OS profile: [Default	create new operating system customization settings]
Configure Operating System	Save as	
Select Destination	★ General Settings	
Select Host	ldentity Information	To automatically run a command the first time a use command in the following box, and then click Add.
Configure Settings	2K8VM### Admin Password	Command to add:
Add Properties		
Summary	Roduct Key	Commands to be run at first logon:     Commands to be run at first logon:
	Time Zone Pacific Standard Ti	
	Derating System 64-bit edition of Wi	nd
	* Networking	
	Joined to Domain r	
	Scripts	
	Answer File	
	(GUIRunOnce) Cor c:\vdbench502\vd	

**10.** In the "Select Destination" page, choose whether to place the virtual machine on a virtual machine host.

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- **11.** In the "Select Host" page, review the placement ratings and transfer type, click a desired host that is available for placement, and click **Next**.
- **12.** In the "Configure Settings" page, follow these steps:
  - a. Under Locations, click the Virtual Machine Location.
  - **b.** Either accept the default virtual machine path on the host for the virtual machine files, or click **Browse** to specify a different location.
  - **c.** If desired, choose "Add this path" to the list of default virtual machine paths on the host check box.

#### Figure 129 Window Showing VM Settings



d. Under Operating System Settings, click Identity Information.

You can either accept or change the computer name.





- e. Under "Networking", click a network adapter to view the configured network settings.
- f. Under "Machine Resources", click Virtual Hard Disk, review and optionally modify the settings, and click Next.
- g. In the "Add Properties" page, configure the action to take when the host starts or stops.
- h. In the "Summary" page, confirm the settings and click Create.

	Figure 131	Virtual Machine Settings Confirmation Window
🗄 Create Virtual Machine Wiza	ard	×
📴 Summary		
Select Source	Confirm the settings	
Specify Virtual Machine Identity	Summary:	
Configure Hardware	Property	Value
Configure Operating System	Virtual machine	2K8VM101
Select Destination	Destination host	M100N1.M50VSPEX.COM
	Path	C:\ClusterStorage\Volume2\
Select Host		
Configure Settings		
Add Properties		
Summary		
	Start the virtual machine	e after deploying it

**13.** Figure 132 shows the100 highly available VMs deployed from a VM template.

1

	r Host Cluster					
Home Folder		1				
As and Services <	VMs (100)					
Clouds	1					
S AU 11 - 1	Name	Status	Virtual Machine	Host	Clo Job Status	Owner
All Hosts	2K8VM079	Running	Running	M100N3	Completed	M50VSPEX\Administrat
	2K8VM080	Running	Running	M100N2	Completed	M50VSPEX\Administrat
M100Clus	2K8VM081	Running	Running	M100N1	Completed	M50VSPEX\Administrat
M100N1	2K8VM082	Running	Running	M100N4	Completed	M50VSPEX\Administrat
M100N2	3 2K8VM083	Running	Running	M100N3	Completed	M50VSPEX\Administrat
M100N3	2K8VM084	Running	Running	M100N2	Completed	M50VSPEX\Administrat
# M100N4	2K8VM085	Running	Running	M100N1	Completed	M50VSPEX\Administrat
	2K8VM086	Running	Running	M100N3	Completed	M50VSPEX\Administrat
	3 2K8VM087	Running	Running	M100N4	Completed	M50VSPEX\Administrat
	3K8VM088	Running	Running	M100N3	Completed	M50VSPEX\Administrat
	3 2K8VM089	Running	Running	M100N2	Completed	M50VSPEX\Administrat
	2K8VM090	Running	Running	M100N4	Completed	M50VSPEX\Administrat
	2K8VM091	Running	Running	M100N1	Completed	M50VSPEX\Administrat
	3 2K8VM092	Running	Running	M100N4	Completed	M50VSPEX\Administrat
	6 2K8VM093	Running	Running	M100N3	Completed	M50VSPEX\Administrat
VMs and Services	2K8VM094	Running	Running	M100N2	Completed	M50VSPEX\Administrat
1. Fabric	2K8VM095	Running	Running	M100N1	Completed	M50VSPEX\Administrat
	2K8VM096	Running	Running	M100N2	Completed w/ Info	M50VSPEX\Administrat
🧮 Library	2K8VM097	Running	Running	M100N2	Completed w/ Info	M50VSPEX\Administrat
C	2K8VM098	Running	Running	M100N2	Completed w/ Info	M50VSPEX\Administrat
🗉 Jobs	2K8VM099	Creating	Stopped	M100N1	8188888 81	% M50VSPEX\Administrat
Settings	2K8VM100	Creating	Stopped	M100N1	23	% M50VSPEX\Administrat

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#### Figure 132 100 Highly Available Virtual Machines in the SCVMM Console

14. Figure 133 shows the highly available VMs as seen in the "Failover Cluster Manager".

🔿 📶 🖬 🖬 📷						
Falover Cluster Manager 2 Falover Cluster Ma	Services and appli				Error: 228, Warning	Actions
Services and applications	Name	Status	Type	Dupent C	Auto star: 🔺	Services and applications
SCWM 2K8W001 Resources	SDAMH 2KSVMDD		Vitual Machine	M100N2	Yes	Sonfigure a Service or Application
9CvMM 2X8V/V002 Resources	SDVMM 2K6VM002		Vitual Machine	MICONI	Yes	Vicual Machines
SCVMM 2K0W4000 Resources			Vitual Machine	M100N3	Yes	vircusi Mechines
5CVMM 2K8VM004 Resources	SDAMK 2KEVMEN		Vitual Machine	MICONS MICINA	Yes	More Actions
SCVMM 268VM005 Resources	SCVMR 2KEVM003 SCVMR 2KEVM004 SCVMR 2KEVM005 SCVMR 2KEVM005		Vituel Machine	M100N1	Yes	Viae
SCMM12/08/M006 Resources	SCYMH 2KSYMD06		Vitual Machine	M100N3	Yes	
SCVMM 2K0W4007 Resources SCVMM 2K8W4008 Resources	5 CVMM 2K8VM307		Virtual Machine	M100N4	Yes -	C Refresh
SCAMP 2X CONDUCT Resources			Vitual Machine	M100N2	Yes	🔽 Heb
SCVMM 2680/000 Resources	SDAMK 2KSVMB08	🖲 Dalae	Vitual Machine	MICONT	Yes	-
SCVMM 2XEW/IDL1 Resources	SCVMR 2KOVM00 SCVMR 2KOVM00 SCVMR 2KOVM01 SCVMR 2KOVM01 SCVMR 2KOVM01 SCVMR 2KOVM01 SCVMR 2KOVM01	💮 Dalme	Virtual Machine	M100N3	Yes 🕺	SEVMM 2K8VM001 Resources
5CVMM 2X8W4012 Resources	SCAME 2K6VM011	💽 Daine	Vistual Machine	M100N3	Yes 🛞	Connect to virtual machines
SCVMM 2X8W4013 Resources	SCYME 2K8VM012	🕙 Daine	Vidual Machine	M100N4	Yes 🛞	
SCVMM 2K8VM014 Resources	SCVMR 2K6VM013		Virtual Machine	M100N2	Yes 🛞	Start virtual machines
SCVMM 2X8VM015 Resources	SCVMR 2KSVM014		Vistual Machine	M1C0N4	Yes	Turn off virtual machines
5CVMM 2K8W4016 Resources	SDVMM 2K8VM015	i 🕣 Dnins	Vidual Machine	M100N4	Yes	O Shut down virtual mechines
5CVMM 2K8W4017 Resources	SDVMM 2K0VM010		Vitual Machine	M100N0	Yes 🛞	-
SC/MM 2//S/MOL3 Resources SC/MM 2//S/M/OL9 Resources	SDVMR 2KSVM077		Vitual Machine	M100N1	Yes	🕑 Save virtual nachines
SCWM 2X0/M019 Resources	5CVMM 2K8VM018		Virtual Machine	M100N4	Yes	🛃 Live migrate virtual machine to a
SCVMM 2X8VM025 Resources	SCAME SKOAMDIS		Vitual Machine	M100N3	Yer 🛞	Cancel in-progress live migration
SCNMM 2K8W022 Resources	SDAR SKANDA		Vitual Machine	M100NZ	Yes	Carter in pergress rear injsatur
SCVMM 2X8VM023 Resources	SDVMH 2KEVMD19 SDVMH 2KEVMD21 SDVMH 2KEVMD21 SDVMH 2KEVMD22 SDVMH 2KEVMD22		Vitual Machine	M100N1	Yes	🙀 🙀 Quick migrate virtual machine(s)
SCVMM 2K0VM024 Resources	SDVMR 2K8VM022		Virtual Machine	M100N3	Yes	🚯 Menage vitual mechine
SCVMM 2K8W4025 Resources	SCYMM 2K8VM023		Virtual Machine	M100N4	Yes 🛞	-
SCAMM 2X8VM026 Resources	SCAME SKOADS		Vituel Mechine	M100N2	Yes 🐰	Move virtual machine(s) to anot
SCVMM 26804027 Resources	SDAMK 2KSVM025		Vitual Machine	MICONI	Yes	Show the critical events for this
SCVMM 2K0W4020 Resources	SDVMM 2K6VM026		Vitual Machine Vitual Machine	M100N4 M100N2	Yes 😜	Add storage
SCVMM 2X8W/029 Resources	2			MILITY	- rec	- Add satirage
SCAMM 2X84MLBU Resources	100 Services and app	lication#, 1 i	tem selected.			🔯 Add a resource
SCAMP 2X840031 resources						Disable auto start
SCVMM 2X8W4033 Resources	SCVMM 2KB	VM001 Re:	sources			
SCVMM 2X8VM084 Resources	1					Show Dependency Report
SOMM 2X804035 Resources	8					🔀 Delete
9CvMM 2K8VM035 Resources	Status:	Auto Sta	rt	Preferred	Owners:	Froner ties
SCVMM 2K8W4087 Resources	Gnine	Yes		<none></none>		Froperties
5CVMM 2K8W4C88 Resources	Alerts:	Storage:		Current Dy	wner:	🛛 Halp
SCVMM 2K804089 Resources	<none></none>	<none></none>		M100N2		_
SCVMM 2K8W4040 Resources	Client Access Name:	Capacity		Other Res		
5CVMM 2K0VMD43 Resources 5CVMM 2K8VMD42 Resources	Citeria Andress Marrier	Tolat 0.6	tes	2	ources.	
SCAMM 2X34M042 Resources	5	Fiee Spac	a: 🛛 Bytas			
SCHMM 2X804U43 Resources	IP Addresses: (nonc)	Parcent Fr	66 D%			
SCHIM 2X0100HF Resources	Charles .					
SCVIMI 2K8WI045 Resources						
SOMM 2X804047 Resources						
SCVIMI 2080/4049 Resources	i d				(3) ↓	

Figure 133 100 Highly Available Virtual Machines in the Failover Cluster Manager

# **VSPEX M50 Configuration Details**

## **Cabling Information**

This information is provided as a reference for cabling the physical equipment in a VSPEX M50 environment. The tables in this section include both the local and remote device and the port locations in order to simplify cabling requirements.

This document assumes that out-of-band management ports are plugged into an existing management infrastructure at the deployment site.

Ensure that you follow the cable directions in this section. Failure to do so results in the necessary changes to the deployment procedures that follow because specific port locations are mentioned. Before starting, ensure that the configuration matches what is described in the tables and diagrams in this section.

Figure 134 shows the VSPEX M50 cabling diagram. The labels indicate connections to end points rather than port numbers on the physical device.

For example, connection A is a 1 Gb target port connected from the EMC VNXe3150 SP B to Cisco Nexus 3048 A and connection R is a 1 Gb target port connected from Broadcom NIC 3 on Server 2 to Cisco Nexus 3048 B. Connections W and X are 10 Gb vPC peer-links connected from Cisco Nexus 3048 A to Cisco Nexus 3048 B



#### Figure 134 Cabling Details for VSPEX Microsoft Hyper-V 50 Virtual Machines

Table 12 and Table 13 lists five major cabling sections in these architectures:

- 1. Inter switch links
- 2. Data connectivity for servers (trunk links)
- 3. Management connectivity for servers
- 4. Storage connectivity

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**5**. Infrastructure connectivity

Table 12	Cisco Nexus 3048 A Ethernet Cabling Information Local Device Local Port Connection
	Remote

Cable ID on both ends	Ethernet Interface	VLAN	Mode	Speed	Port Channel	Remote Device Port
Е	Eth1/3	1, 23	trunk	1G	3	C220 Server1- 1GE LOM 1
F	Eth1/4	1,23	trunk	1G	4	C220 Server2- 1GE LOM 1
G	Eth1/5	1,23	trunk	1G	5	C220 Server3- 1GE LOM 1
W	Eth1/51	1,20,22,23	trunk	10G	10	VPC peer link
X	Eth1/52	1,20,22,23	trunk	10G	10	VPC peer link
К	Eth1/13	20	access	1G		C220 Server1- Broadcom NIC 1
L	Eth1/15	20	access	1G		C220 Server2- Broadcom NIC 1

Cable ID on both ends	Ethernet Interface	VLAN	Mode	Speed	Port Channel	Remote Device Port
М	Eth1/17	20	access	1G		C220 Server3- Broadcom NIC 1
Q	Eth1/14	22	access	1G	14	C220 Server1- Broadcom NIC 3
R	Eth1/16	22	access	1G	16	C220 Server2- Broadcom NIC 3
S	Eth1/18	22	access	1G	18	C220 Server3- Broadcom NIC 3
Not shown	Eth1/9	1,20,22,23	trunk	10G	15	Uplink to Infrastructure n/w
Not shown	Eth1/10	1,20,22,23	trunk	10G	17	Uplink to Infrastructure n/w
A	Eth1/25	20	access	1G	25	EMC VNXe3150 (eth2) - SPB
С	Eth1/26	20	access	1G	26	EMC VNXe3150 (eth2) - SPA

 
 Table 12
 Cisco Nexus 3048 A Ethernet Cabling Information Local Device Local Port Connection Remote (continued)

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 Table 13
 Cisco Nexus 3048 B Ethernet Cabling Information Local Device Local Port Connection Remote

Cable ID on both ends	Ethernet Interface	VLAN	Mode	Speed	Port Channel	Remote Device Port
Н	Eth1/3	1, 23	trunk	1G	3	C220 Server1- 1GE LOM 2
Ι	Eth1/4	1,23	trunk	1G	4	C220 Server2- 1GE LOM 2
J	Eth1/5	1,23	trunk	1G	5	C220 Server3- 1GE LOM 2
Y	Eth1/51	1,20,22,23	trunk	10G	10	VPC peer link
Ζ	Eth1/52	1,20,22,23	trunk	10G	10	VPC peer link
Ν	Eth1/13	20	access	1G		C220 Server1- Broadcom NIC 2
0	Eth1/15	20	access	1G		C220 Server2- Broadcom NIC 2
Р	Eth1/17	20	access	1G		C220 Server3- Broadcom NIC 2
Т	Eth1/14	22	access	1G	14	C220 Server1- Broadcom NIC 4
U	Eth1/16	22	access	1G	16	C220 Server2- Broadcom NIC 4
V	Eth1/18	22	access	1G	18	C220 Server3- Broadcom NIC 4
Not shown	Eth1/9	1,20,22,23	trunk	10G	15	Uplink to Infrastructure n/w
Not shown	Eth1/10	1,20,22,23	trunk	10G	17	Uplink to Infrastructure n/w
В	Eth1/25	20	access	1G	25	EMC VNXe3150 (eth10) - SPB
D	Eth1/26	20	access	1G	26	EMC VNXe3150 (eth10) - SPA

Connect all the cables as outlined in Figure 134 and in Table 12 and Table 13.

## **Prepare and Configure the Cisco Nexus 3048 Switch**

The following section provides a detailed procedure for configuring the Cisco Nexus 3048 switches for use in EMC VSPEX M50 solution.

Figure 135 shows two Cisco Nexus switches configured for vPC. In vPC, a pair of switches acting as vPC peer endpoints looks like a single entity to port-channel-attached devices, although the two devices that act as logical port-channel endpoint are still two separate devices. This provides hardware redundancy with port-channel benefits. Both switches form a vPC Domain, in which one vPC switch is Primary while the other is secondary.

Note

The configuration steps detailed in this section provides guidance for configuring the Cisco Nexus 3048 running release 5.0(3)U2(2b).





## **Initial Setup of Cisco Nexus Switches**

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the initial setup on both Cisco Nexus 3048 switches.

## **Enable Features, Jumbo Frames and Global Configuration**

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the global configuration on both Cisco Nexus 3048 switches.

## **Configure VLANs**

In this VSPEX M50 configuration, create 3 VLANs on both the Cisco Nexus switches using the below table as reference. Storage VLAN is for iSCSI traffic between the host iSCSI NICs and the storage array. Cluster VLAN is for the cluster communication traffic (heartbeat, CSV, and live migration) between the failover cluster nodes. VM\_traffic VLAN is for the virtual machines data traffic. Default VLAN is used by the host for management and infrastructure traffic.

VLAN Name	VLAN Purpose	ID used in this document	Network Address	Host NICs participating in VLAN
Storage	For iSCSI traffic	20	10.10.20.0/24	2 Broadcom NICs
Cluster	For Live Migration	22	10.10.22.0/24	2 Broadcom NICs in team
Vm_traffic	For VM data	23	10.10.23.0/24	2 Cisco 1GigE I350 LOM in
Default	For Mgmt,& Cluster	1	10.29.150.0/24	team and on trunk link

Table 14 VLANs for EMC VSPEX Microsoft Hyper-V M50 Setup

#### For Cisco Nexus A and Cisco Nexus B

- 1. Type config-t.
- 2. Type vlan <storage VLAN ID>.
- 3. Type name storage
- 4. Type exit.
- 5. Type vlan <cluster VLAN ID>.
- 6. Type name cluster
- 7. Type exit.
- 8. Type vlan <vm\_traffic VLAN ID>.
- **9.** Type name vm\_traffic
- 10. Type exit.

## **Configure Port Channels**

This section describes configuring port-channels on both the Cisco Nexus switches.

#### **Create Port Channels**

#### For Cisco Nexus A and Cisco Nexus B

From the global configuration mode, type interface Po10.

- 1. Type description vPC peer-link.
- 2. Type exit.
- **3.** Type interface Eth1/51-52.
- 4. Type channel-group 10 mode active.
- 5. Type no shutdown.

- 6. Type exit.
- 7. Type interface Po3.
- 8. Type description <Cisco 1GigE LOM 1 on UCS Server 1 For Nexus A>/< Cisco 1GigE LOM 2 on UCS Server 1 For Nexus B>
- 9. Type exit.
- **10**. Type interface Eth1/3
- **11.** Type channel-group 3 mode active.
- **12.** Type no shutdown.
- 13. Type exit.
- 14. Type interface Po4.
- **15.** Type description < Cisco 1GigE LOM 1 on UCS Server 2 For Nexus A>/< Cisco 1GigE LOM 2 on UCS Server 2 For Nexus B>.
- 16. Type exit.
- **17**. Type interface Eth1/4.
- **18**. Type channel-group 4 mode active.
- **19.** Type no shutdown.
- 20. Type exit.
- **21**. Type interface Po5.
- 22. Type description <Cisco 1GigE LOM 1 on UCS Server 3 For Nexus A>/< Cisco 1GigE LOM 2 on UCS Server 3 For Nexus B >.
- 23. Type exit.
- **24**. Type interface Eth1/5.
- **25.** Type channel-group 5 mode active.
- **26.** Type no shutdown.
- 27. Type exit.
- **28.** Type interface Po14.
- 29. Type description <Broadcom NIC 3 on UCS Server 1- For Nexus A>/< Broadcom NIC 4 on UCS Server 1 For Nexus B>
- **30**. Type exit.
- **31**. Type interface Eth1/14.
- **32.** Type channel-group 14 mode active.
- **33.** Type no shutdown.
- 34. Type exit.
- **35.** Type interface Po16.
- Type description <Broadcom NIC 3 on UCS Server 2- For Nexus A>/< Broadcom NIC 4 on UCS Server 2 For Nexus B >.
- 37. Type exit.
- **38**. Type interface Eth1/16.
- **39.** Type channel-group 16 mode active.

- 40. Type no shutdown.
- 41. Type exit.
- **42**. Type interface Po18.
- **43.** Type description <Broadcom NIC 3 on UCS Server 3- For Nexus A>/< Broadcom NIC 4 on UCS Server 3 For Nexus B >.
- 44. Type exit.
- **45**. Type interface Eth1/18.
- **46.** Type channel-group 18 mode active.
- 47. Type no shutdown.
- 48. Type exit.
- 49. Type interface Po25.
- **50**. Type description <VNXe Storage Processor B>.
- 51. Type exit.
- **52**. Type interface Eth1/25.
- **53.** Type channel-group 25 mode active.
- 54. Type no shutdown.
- 55. Type exit.
- 56. Type interface Po26.
- 57. Type description <VNXe Storage Processor A>
- 58. Type exit.
- **59.** Type interface Eth1/26.
- **60.** Type channel-group 26 mode active.
- 61. Type no shutdown.
- 62. Type exit.

## **Add Port Channel Configurations**

These steps provide details for adding Port Channel configurations.

#### For Cisco Nexus A and Cisco Nexus B

From the global configuration mode, type interface Po10.

- 1. Type switchport mode trunk.
- 2. Type switchport trunk allowed vlan <default VLAN ID, storage VLAN ID, cluster VLAN ID, vm\_traffic VLAN ID>.

- **3**. Type spanning-tree port type network.
- 4. Type no shutdown.
- 5. Type exit.
- **6.** Type interface Po3.
- 7. Type switchport mode trunk.
- 8. Type switcport trunk allowed vlan <default VLAN ID, vm\_traffic VLAN ID>.

- 9. Type spanning-tree port type edge.
- 10. Type no shut.
- 11. Type exit.
- **12.** Type interface Po4.
- **13**. Type switchport mode trunk.
- 14. Type switcport trunk allowed vlan <default VLAN ID, vm\_traffic VLAN ID>.
- **15.** Type spanning-tree port type edge.
- 16. Type no shut.
- 17. Type exit.
- **18**. Type interface Po5.
- **19.** Type switchport mode trunk.
- 20. Type switcport trunk allowed vlan <default VLAN ID, vm\_traffic VLAN ID>.
- **21**. Type spanning-tree port type edge.
- 22. Type no shut.
- 23. Type exit.
- 24. Type interface Po14.
- **25.** Type switchport mode access.
- 26. Type switchport access vlan <cluster VLAN ID>.
- **27.** Type spanning-tree port type edge.
- 28. Type no shut.
- 29. Type exit.
- **30**. Type interface Po16.
- **31**. Type switchport mode access.
- 32. Type switchport access vlan <cluster VLAN ID>.
- **33.** Type spanning-tree port type edge.
- **34**. Type no shut.
- **35.** Type exit.
- **36**. Type interface Po18.
- **37.** Type switchport mode access.
- **38**. Type switchport access vlan <cluster VLAN ID>.
- **39.** Type spanning-tree port type edge.
- 40. Type no shut.
- 41. Type interface Po25.
- **42.** Type switchport mode access.
- **43**. Type switchport access vlan <storage VLAN ID>.
- 44. Type spanning-tree port type edge.
- 45. Type no shut.

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**46**. Type interface Po26

- 47. Type switchport mode access.
- 48. Type switchport access vlan <storage VLAN ID>.
- **49.** Type spanning-tree port type edge.
- 50. Type no shut.

## **Configure Virtual Port Channels**

These steps provide details for configuring virtual Port Channels (vPCs).

#### For Cisco Nexus A and Cisco Nexus B

From the global configuration mode, type vpc domain <Nexus vPC domain ID>.

1. Type peer-keepalive destination <Nexus B mgmt0 IP> source <Nexus A mgmt0 IP>.

- 2. Type exit.
- **3.** Type interface Po10.
- 4. Type vpc peer-link.
- 5. Type exit.
- 6. Type interface Po3.
- **7**. Type vpc 3.
- 8. Type exit.
- 9. Type interface Po4.
- **10.** Type vpc 4.
- 11. Type exit.
- 12. Type interface Po5.
- **13**. Type vpc 5.
- 14. Type exit.
- **15**. Type interface Po14.
- **16.** Type vpc 14.
- 17. Type exit.
- **18**. Type interface Po16.
- 19. Type vpc 16.
- 20. Type exit.
- **21**. Type interface Po18.
- **22.** Type vpc18.
- 23. Type exit.
- 24. Type interface Po25.
- 25. Type vpc .
- 26. Type exit.
- **27.** Type interface Po26
- 28. Type vpc 26.

**29**. Type exit.

N3048A# sh vlan brief

**30**. Type copy run start.

At this point of time, all ports and port-channels are configured with necessary VLANs, switchport mode and vPC configuration. Validate this configuration using the "show port-channel summary" and "show vpc" commands as shown in Figure 137 and Figure 138.

#### Figure 136 Command for Showing VLAN Details

1004						
VLAN	Name	Status	Ports			
1	default	active	Po3, Po4, Po5, Po10, Eth1/1 Eth1/2, Eth1/6, Eth1/7, Eth1/8 Eth1/9, Eth1/10, Eth1/11 Eth1/12, Eth1/19, Eth1/20 Eth1/21, Eth1/22, Eth1/23 Eth1/24, Eth1/27, Eth1/28 Eth1/29, Eth1/30, Eth1/31 Eth1/32, Eth1/36, Eth1/31 Eth1/35, Eth1/36, Eth1/37 Eth1/38, Eth1/39, Eth1/40 Eth1/41, Eth1/42, Eth1/43 Eth1/44, Eth1/45, Eth1/46 Eth1/47, Eth1/48, Eth1/49 Eth1/40			
20	storage	active	Po10, Po25, Po26, Eth1/9 Eth1/10, Eth1/12, Eth1/13 Eth1/15, Eth1/17			
22	cluster	active	Po10, Po14, Po16, Po18, Eth1/9 Eth1/10,			
23	vm_traffic	active	Po3, Po4, Po5, Po10, Eth1/9, Eth1/10			

Ensure that on both switches, all required VLANs are in "active" status and right set of ports and port-channels are part of the necessary VLANs.

Port-channel configuration can be verified using "show port-channel summary" command. Figure 137 shows the expected output of this command.

#### Figure 137 Command for Showing Port Channel Summary

N3048B(config)# sh port-channel summary Flags: D - Down P - Up in port-channel (members) I - Individual H - Hot-standby (LACP only) s - Suspended r - Module-removed S - Switched R - Rouled U - Up (port-channel)						
Group	Port-	Type	Protocol	Member Ports		
Gi Oup	channel	Type	FIOLOCOT	Member Forca	•	
1						
3	Po3(SU)	Eth	LACP	Eth1/3(P)		
4	P04 (SU)	Eth	LACP	Eth1/4(P)		
5	Po5(SU)	Eth	LACP	Eth1/5(P)		
10	Po10(SU)	Eth	LACP	Eth1/51(P)	Eth1/52(P)	
14	Po14 (SU)	Eth	NONE	Eth1/14(P)		
16	Po16(SU)	Eth	NONE	Eth1/16(P)		
18	Po18(SU)	Eth	NONE	Eth1/18(P)		
25	P025(SU)	Eth	LACP	Eth1/25(P)		
26	P026(SU)	Eth	LACP	Eth1/26(P)		
N3048	B(config)#					

In this example, port-channel 10 is the vPC peer-link port channel, port channels 3, 4 and 5 are connected to the Cisco 1GigE I350 LOM on the host, port channels 14, 16 and 18 are connected to the Broadcom NICs on the host, and port channels 25 and 26 are connected to the storage array. Make sure that state of the member ports of each port channel is "P" (Up in port-channel).



The port may not come up if the peer ports are not properly configured.

Common reasons for port channel port being down are:

- Port channel protocol mis-match across the peers (LACP v/s none)
- Inconsistencies across two vPC peer switches. Use show vpc consistency-parameters {global | interface {port-channel | port} <id> command to diagnose such inconsistencies.

vPC status can be verified using "show vpc" command. Figure 138 shows an example output.

Figure 138	Command for Showing vPC Details
------------	---------------------------------

```
N3048A#
            sh vpc brief
Legend:
                      (*) - local vPC is down, forwarding via vPC peer-link
vPC domain id
                                               101
                                               peer adjacency formed ok
peer is alive
success
Peer status
vPC keep-alive status
Configuration consistency status
Per-vlan consistency status
Type-2 consistency status
vPC role
                                               success
                                               success
                                               secondary
Number of VPCs configured
Peer Gateway
Dual-active excluded VLANs
Graceful Consistency Check
                                               8
                                               Enabled
                                             : Enabled
VPC Peer-link status
id
       Port
                Status Active vlans
1
       Po10
                          1,20-23,150
                up
vPC status
id
          Port
                          Status Consistency Reason
                                                                                          Active vlans
3
          Po3
                                    success
                                                     success
                                                                                          1,23
                          up
45
          Po4
                          up
                                    success
                                                     success
                                                                                          1,23
          Po5
                                    success
                                                     success
                          up
                                                                                          22
22
22
22
20
14
          Po14
                          up
                                    success
                                                     success
16
          P016
                          up
                                    success
                                                     success
18
25
          Po18
                          up
                                    success
                                                     success
          Po25
                          up
                                    success
                                                     success
26
          Po26
                           up
                                    success
                                                     success
                                                                                          20
```

Make sure that vPC peer status is "peer adjacency formed ok" and all the port-channels, including the peer-link port-channel, have status "up".

## Infrastructure Servers

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### Active Directory Domain Controller

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### Microsoft SQL Server

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

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### **Microsoft System Center VMM**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

## Prepare the Cisco UCS C220 M3 Servers

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### Configure Cisco Integrated Management controller (CIMC)

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

## **Configure RAID**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### Enable Virtualization Technology in BIOS

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### Installing Microsoft Windows Server OS on UCS C220 M3 Servers

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the task.

## **Device Driver Installation**

VSPEX M50 solution contains Cisco GigE I350 LOM and quad-port Broadcom BCM5709C NetXtreme II GigE adapter.

To install device drivers follow these steps:

- 1. See the corresponding section in the VSPEX M100 Configuration Details, page 23 and execute the steps 1 to 3 to install the chipset drivers and drivers for Cisco GigE I350 LOM.
- 2. To install the Broadcom drivers follow these steps:
  - **a.** Download the Broadcom Management Applications Installer (x64) from the URL given below and install.

http://www.broadcom.com/support/ethernet\_nic/netxtremeii.php

**b.** Remove any existing drivers and install the Broadcom Management Applications Installer (x64) downloaded in the above step. In addition to the Broadcom device drivers, the installer installs the management applications.

## **Network Configuration**

This section provides steps to configure the NIC teaming of Cisco 1 GigE I350 LOM adapters and Broadcom BCM5709C NetXtreme II GigE adapters and assign IP addresses on all the Windows host servers.

## NIC Teaming of Cisco 1 GigE LOM

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the task. Assign an IP address to this teamed adapter from the management VLAN subnet.

## NIC Teaming of Broadcom BCM5709C NetXtreme II GigE adapter

In this section, only the NICs connected to "cluster" VLAN is teamed.

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NICs connected to the "storage" VLAN are not teamed and instead Microsoft MPIO feature is used for redundancy and load balancing.

To team the Broadcom NICs connected to the "cluster" VLAN follow these steps:

- 1. Click Start > All Programs > Broadcom Advanced Control Suite 4.
- 2. Choose and right-click a "NIC" and click Create Team as shown in Figure 139.

#### Figure 139 Teaming Broadcom Adapters

Explorer View	8	Information	Configurations Dia	agnostics
B 000 Hosts		Property		
MSONI     Teams     MSONI     M		- IPv4 A	eent MAC Address ddress d Capabilities mation Version Date Name	
0014] Broadcom BCM5709C NetXtreme II GigE (NDIS VBD Client) #63		useful informat are installed in	section of the Informatic ion about the network ar your system, such as th d general network conne	dapters that e link status (

3. In the "Welcome to the Broadcom Teaming Wizard" page click Next.

I

4. Enter a Name for the Team and click Next.

Note

- 5. In the "Team Type" page, choose FEC/GEC Generic Trunking and click Next.
- **6.** In the next screen, choose the second NIC (Connected to "cluster VLAN") and click **Add**. Set the MTU to 9000.

ii Broadcom Teaming Wizard ? 🗙								
Creating/Modifying a Team: Assigning Team Members Specify which adapters to include in the team. Include adapters that you wish to set for the standby role.						BROADCOM.		
Available Adapters	TOE	LSO	co	RSS	samabl	NDIS	MTU	<u> </u>
[0018] Broadcom BCM5709C NetXtreme II GigE (NDIS VB	No	No	No	No	No	0.0	0	
[0019] Broadcom BCM5709C NetXtreme II GigE (NDIS VB	No	No	No	No	No	0.0	0	
[0027] TEAM : InfraTeam - Cisco 1GigE I350 LOM	No	Yes	Yes	Yes	Yes	6.20	1500	
[0028] TEAM : InfraTeam - Cisco 1GigE I350 LOM #2	No	Yes	Yes	Yes	Yes	6.20	1500	
[0007] Broadcom BCM5709C NetXtreme II GigE (NDIS VB	No	Yes	Yes	Yes	Yes	6.20	1500	
M0101 Broadcom BCM \$709C NetXtreme II GigE (NDIS VB	No	Vec	Vec	Vec	Vec	6.20	1 500	<u> </u>
Add								Remove
Team Members	TOE	LSO	CO	RSS	samabl	NDIS	MTU	
[0016] Broadcom BCM5709C NetXtreme II GigE (NDIS VB	No	Yes	Yes	Yes	Yes	6.20	9000	
[0017] Broadcom BCM5709C NetXtreme II GigE (NDIS VB	No	Yes	Yes	Yes	Yes	6.20	9000	
Team Offload Capabilities: LSO, CO, RSS Team MTU: 9000								
Cancel	< Back		Next			(	cisco.co	Preview 💽

#### Figure 140 Selecting Broadcom Adapters for Teaming

- 7. In the next screen click **Do not configure a standby member** and click **Next**.
- 8. Choose "No for Configure LiveLink" and click Next.
- 9. Choose "Skip Manage VLAN in Manage VLAN" and click Next.
- **10.** Choose "Commit changes to system" and Exit the wizard.
- 11. Click **Preview** to validate and then click **Finish**.

#### Figure 141 Confirmation Window to Commit Changes

Broadcom Teaming Wizard	? ×
Congratulations! The Teaming Wizard has finished collecting information. How would you like to proceed?	M50N1 Teams ■ III ClusterHeadBeatTeam ■ Ø Primary Adapters
Commit changes	
Applying the changes will temporarily interrupt the network connection. The process may take several minutes and the connection will resume afterwards.	
Cancel < Back Finish Preview 🗖	<u>د ا</u>

**12.** Validate the team as shown in Figure 142.

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Broadcom Advanced Control Suite 4	
File View Action Filter Context Tools Teams iSCSI Help	
Filter: TEAM VIEW   Diagnostics  Network Test	
Explorer View 6	Information Diagnostics Statistics
E 000 Hosts	Select tests to run Network Test 💌
🗄 🖳 M50N1	
E Teams	
🖻 👬 ClusterHeatBeatTeam	IP Address to ping 10.10.22.13
🖻 🥟 📂 BASP Virtual Adapters	Status Completed successfully
ClusterHeatBeatTeam ([0021] BASP Virtual Adapter)	Link 2.0 Gbps
🖃 📂 Primary Adapters	Test
👬 [0016] Broadcom BCM5709C NetXtreme II GigE (NDIS VBD Client) #64	
🏭 [0017] Broadcom BCM5709C NetXtreme II GigE (NDIS VBD Client) #65	
🗄 🔯 Unassigned Adapters	
	Network Test
4 F	
Λ	
BROADCOM.	

Figure 142 Window Showing Teamed Broadcom Adapters

**13**. Assign an IP address to the teamed adapter.

## **Host Rename and Domain Join**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task

## **Install Roles and Features**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 and complete the steps from 1 to 13.

In step 14, choose the teamed Cisco 1GigE I350 LOM adapter for the External Connection type for creating a virtual switch. Choose "Allow management operating system to share the network adapter".

Virtual Networks	Virtual Network Properties				
🙀 New virtual network					
🐛 vm_traffic	Name: vm_traffic				
TEAM : Team-Mgmt	Microsoft Virtual Switch -				
Global Network Settings	<ul> <li>Notes: for linking Virtual Machine NICs to the below physical teamed NIC</li> </ul>				
MAC Address Range 00-15-5D-96-AB-00 to 00-15-5D-9					
00 13 3D 70 HD 00 10 00 13 3D 7	-				
	Connection type What do you want to connect this network to?				
	External:				
	TEAM : Team-Mgmt				
	Allow management operating system to share this network adapter				
	O Internal only				
	O Private virtual machine network				
	Enable virtual LAN identification for management operating system     VLAN ID     The VLAN identifier specifies the virtual LAN that the management operating     system will use for all network communications through this network adapter. This     setting does not affect virtual machine networking.     2				
	Remove				
	More about managing virtual networks				

#### Figure 143 Microsoft Hyper-V Virtual Network Manager

The above step also creates a virtual NIC for the host machine and retains the static IP address assigned in the earlier step for host management. Note, this NIC in management VLAN allows host management traffic.

#### Figure 144 Control Panel Network Connections

Network Connections				
🌀 🔵 🗟 🔹 Control Panel 🔹 Network a	nd Internet - Netwo	rk Connections 🔹 🛛 🔹 🚱	earch Network Connection	ns 😢
Organize 🔻				🗉 • 🔲 0
Name	Status	Device Name	Connectivity	Network Category
Local Area Connection	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I350 LOM		
Local Area Connection 2	Enabled	TEAM : Team-Mgmt - Cisco 1GigE I350 L		
Local Area Connection 3 - Mgmt-Cluster	Enabled	TEAM : Team-Mgmt		
Local Area Connection 3	M50VSPEX.COM	vm_traffic	No Internet access	Domain network

## **Enable iSCSI initiator**

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See the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

## Prepare the EMC VNXe3150 Storage

The interface and configuration of the EMC VNXe3150 is very similar to the EMC VNXe3300, so see the section "Prepare the EMC VNXe3300 storage" in VSPEX M100 Configuration Details, page 23 to complete the task.

### Initial Setup of EMC VNXe

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### **Create Storage Pools**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task. Here you create a single storage pool using 45 disks.

### Configure Advanced features—Link Aggregation and Jumbo Frames

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

## **Create iSCSI Servers**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task

## **Create Hosts**

See the steps in the corresponding section of the VSPEX M100 Configuration Details, page 23 to complete the task

## **Create Hyper-V Datastores**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task. For the 50 Virtual Machines configuration create six 750GB Hyper-V datastores for CSV and another small datastore for the cluster witness disk.

## **Microsoft Windows Failover Cluster Setup**

See the steps in the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task.

### **iSCSI** Initiator Configuration

See the steps in the corresponding section of the VSPEX M100 Configuration Details, page 23 to complete the task

## **Cluster Validation**

See the corresponding section of VSPEX M100 Configuration Details, page 23 to complete the task

## **Failover Cluster setup**

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the task.

## **Microsoft System Center-2012 VMM Configuration**

See the corresponding section in the VSPEX M100 Configuration Details, page 23 to complete the task. You need to ensure to connect the VM vNICs to the vm\_traffic VLAN. This can be achieved by following the steps while creating the VM or editing the settings for the VM. This step is to allow traffic from management VLAN and vm\_traffic VLAN to pass through the teamed Cisco 1GigE I350 LOM. On the other end of the Cisco Nexus switch port where the teamed adapters are connected are configured as trunk ports to allow multiple VLAN traffic.

In the settings for VM, choose "Enable Virtual LAN Identification" and enter 23 in the field for VLAN ID.

Settings for 2K8¥M036	10.10.40.4 - 5
2K8VM036	
<ul> <li>★ Hardware</li> <li>▲ Add Hardware</li> <li>▲ BIOS Boot from CD</li> <li>■ Memory 2048 MB</li> <li>■ Processor</li> <li>1 Virtual processor</li> <li>■ IDE Controller 0</li> <li>← Hard Drive Win2K8R2_vhd</li> <li>← Hard Drive Win2K8R2_disk_1.vhd</li> <li>■ IDE Controller 1</li> <li>● DVD Drive None</li> </ul>	<ul> <li>Network Adapter</li> <li>Specify the configuration of the network adapter or remove the network adapter.</li> <li>Network:         <ul> <li>vm_traffic</li> <li>The network adapter is configured to a switch port which no longer exists. In order for this virtual machine to boot you will need to reconfigure this virtual network adapter.</li> <li>MAC Address</li> <li>Dynamic</li> <li>Static</li> <li>00 - 15 - 50 - 96 - AB - 0B</li> <li>Enable spoofing of MAC addressses</li> </ul> </li> </ul>
SCSI Controller  Network Adapter vm_traffic  COM 1 None  COM 2 None Diskette Drive None	<ul> <li>Enable virtual LAN identification</li> <li>VLAN ID</li> <li>The VLAN identifier specifies the virtual LAN that this virtual machine will use for all network communications through this network adapter.</li> <li>23</li> <li>To remove the network adapter from this virtual machine, click Remove.</li> </ul>
None         2K8VM036         Integration Services         All services offered         Snapshot File Location         C:\ClusterStorage\Volume9\2K         Automatic Start Action         None	Remove Use a legacy network adapter instead of this network adapter to perform a network-based installation of the guest operating system or when integration services are not installed in the guest operating system.
	OK Cancel Apply

Figure 145 Window Showing Network Adapter Settings

## Validating Cisco Solution for EMC VSPEX Microsoft Hyper-V Architectures

This section provides a list of items that should be reviewed once the solution has been configured. The goal of this section is to verify the configuration and functionality of specific aspects of the solution, and ensure that the configuration supports core availability requirements.

### **Post Install Checklist**

The following configuration items are critical to functionality of the solution, and should be verified prior to deployment into production.

For post install checklist follow these steps:

- 1. Test Live Migration of VMs from one host to other using SCVMM.
- 2. Restart hosts and check if VMs migrate to available hosts.
- **3.** Ping with "do not fragment switch" to validate if jumbo frames are supported end-to-end on storage and cluster VLANs.
- **4.** Deploy a single virtual machine using the System Center Virtual Machine Manager (SCVMM) interface.



Figure 146 Validating Jumbo Frames Support

## Verify the Redundancy of the Solution Components

The following redundancy checks were performed at the Cisco lab to verify solution robustness:

1. Administratively shutdown one of the two data links connected to the server. Ensure that connectivity is not affected. Upon administratively enabling the shutdown port, the traffic should be rebalanced. This can be validated by clearing interface counters and showing the counters after forwarding some data from virtual machines on the Cisco Nexus switches.

- **2.** Administratively shutdown one of the two data links connected to the storage array. Ensure that storage is still available from all the Microsoft Hyper-V hosts. Upon administratively enabling the shutdown port, the traffic should be rebalanced.
- **3.** Reboot one of the two Cisco Nexus switches while storage and network access from the servers are going on. The switch reboot should not affect the operations of storage and network access from the VMs. Upon rebooting the switch, the network access load should be rebalanced across the two switches.
- 4. Reboot the active storage processor of the EMC VNXe storage array and make sure that all the iSCSI targets are still accessible during and after the reboot of the storage processor.
- 5. Fully load all the virtual machines of the solution. Shutdown one of the Microsoft Hyper-V nodes in the cluster. All the VMs running on that host should be migrated to other active hosts. No VM should lose any network or storage accessibility during or after the migration.



**e** In 50 virtual machines architectures, there is enough head room for memory in other servers to accommodate 25 additional virtual machines. However, for 100 virtual machines solution, memory would be oversubscribed when one of the Hyper-V nodes in the cluster goes down. So, for 100 virtual machines solution, dynamic memory features should be used to oversubscribe physical memory on the remaining hosts.

## **Cisco Validation Test Profile**

"vdbench" testing tool was used with the Microsoft Windows 2008 R2 SP1 server to test scaling of the solution in Cisco labs. The details on the test profile used is displayed in Table 15.

Profile characteristic	Value
Number of virtual machines	50 or 100 depending on architecture
Virtual machine OS	Microsoft Windows Server 2008 R2 SP1
Processors per virtual machine	1
Number of virtual processors per physical CPU core	4
RAM per virtual machine	2 GB
Average storage available for each virtual machine	75 GB
Average IOPS per virtual machine	25 IOPS
Number of datastores to store virtual machine disks	10 CSVs
Disk and RAID type for datastores	RAID 5, 600 GB, 15k rpm, 3.5-inch SAS disks

#### Table 15VDBench Details

# **Bill of Material**

Table 16 gives details of the components used in the CVD for 50/100 virtual machines configuration.

Table 16Component Description

Description	Part #
UCS C220 M3 rack servers	UCSC-C220-M3S
CPU for C220 M3 rack servers	UCS-CPU-E5-2650
Memory for C220 M3 rack servers	UCS-MR-1X082RY-A
RAID local storage for rack servers	UCSC-RAID-11-C220
Cisco VIC adapter for 100 VMs solutions	N2XX-ACPCI01
Broadcom 1Gbps adapter for 50 VMs solution	N2XX-ABPCI03-M3
Cisco Nexus 5548UP switches for 100 VMs solutions	N5K-C5548UP-FA
Cisco Nexus 3048 switches for 50 VMs solution	N3K-C3048TP-1GE
10 Gbps SFP+ multifiber mode	SFP-10G-SR

For more information on the part numbers and options available for customization, see Cisco C220 M3 server specsheet at:

http://www.cisco.com/en/US/prod/collateral/ps10265/ps10493/C220M3\_SFF\_SpecSheet.pdf

# **Customer Configuration Data Sheet**

Before you start the configuration, gather some customer-specific network and host configuration information. Table 17, Table 18, Table 19, Table 20, Table 21, Table 22 provide information on assembling the required network and host address, numbering, and naming information. This worksheet can also be used as a "leave behind" document for future reference.

The EMC VNXe Series Configuration Worksheet should be cross-referenced to confirm customer information.

Server Name	Purpose	Primary IP
	Domain Controller	
	DNS Primary	
	DNS Secondary	
	DHCP	
	NTP	
	SMTP	
	SNMP	
	vCenter Console	
	SQL Server	

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Table 17 Common Server Information

Server Name	PurposeIMicrosoftHyper-V Host 1	Primary IP	Private Net (storage) addresses	
	Microsoft Hyper-V Host 2			
	Microsoft Hyper-V Host 3			
	Microsoft Hyper-V Host 4			

#### Table 18 Microsoft Hyper-V Server Information

#### Table 19Array Information

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Array name	
Admin account	
Management IP	
Storage pool name	
Datastore name	
iSCSI Server IP	

#### Table 20 Network Infrastructure Information

Name	Purpose	IP	Subnet Mask	Default Gateway
	Cisco Nexus 5548UP Switch A			
	Cisco Nexus 5548UP Switch B			

### Table 21VLAN Information

Name	Network Purpose	VLAN ID	Allowed Subnets
vlan-infra	Management and cluster traffic		
Vlan-vm_traffic	For VM data traffic		
vlan-storage	For iSCSI traffic		
vlan-cluster	For CSV and Live Migration		

#### Table 22Service Accounts

Account	Purpose	Password (optional, secure appropriately)
	Microsoft Windows Server administrator	
	Array administrator	
	SCVMM administrator	
	SQL Server administrator	

# References

Cisco Unified Computing System:

http://www.cisco.com/en/US/solutions/ns340/ns517/ns224/ns944/unified\_computing.html

Cisco UCS C-Series Servers Documentation Roadmap

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

Cisco Nexus:

http://www.cisco.com/en/US/products/ps9441/Products\_Sub\_Category\_Home.html

Cisco Nexus 5000 Series NX-OS Software Configuration Guide:

http://www.cisco.com/en/US/docs/switches/datacenter/nexus5000/sw/configuration/guide/cli/CLIConf igurationGuide.html

EMC VNXe3xxx series resources

http://www.emc.com/storage/vnx/vnxe-series.htm#!resources

EMC VNX5xxx series resources

http://www.emc.com/storage/vnx/vnx-series.htm#!resources

Network Adapter Virtualization Design (Adapter-FEX) with Cisco Nexus 5500 Switches

http://www.cisco.com/en/US/prod/collateral/switches/ps9441/ps9670/guide\_c07-690080\_ns1118\_Net working\_Solutions\_White\_Paper.html

**Configuring Port Channels** 

http://www.cisco.com/en/US/docs/switches/datacenter/sw/5\_x/dcnm/interfaces/configuration/guide/if\_portchannel.html

**Configuring Port Profiles** 

http://www.cisco.com/en/US/docs/switches/datacenter/sw/5\_x/dcnm/interfaces/configuration/guide/if\_portprofile.html

Configuring vPCs

http://www.cisco.com/en/US/docs/switches/datacenter/sw/5\_x/dcnm/interfaces/configuration/guide/if\_vPC.html

System Center 2012 - Virtual Machine Manager

http://technet.microsoft.com/en-us/library/gg610610

Microsoft SQL Server installation guide

http://msdn.microsoft.com/en-us/library/ms143219.aspx

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