THE LENOVO THINKSERVER – EMC VSPEX PRIVATE CLOUD VALIDATED REFERENCE ARCHITECTURE DEPLOYMENT GUIDE

Scalable VMware[®] vSphere[™] 5.1 for Up To 100 Virtual Machines

EMC VSPEX powered by Lenovo ThinkServer

Abstract

The Lenovo ThinkServer - EMC VSPEX Private Cloud solution for VMware vSphere 5.1 supports up to 100 virtual machines with redundant server/network topology and highly available storage. This validated and modular reference architecture built with proven best-of-breed technologies is a complete virtualization solution for Private Cloud deployments.



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Chapter 1 Introduction

This chapter presents the following topics:	
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Purpose of this guide

The Lenovo ThinkServer - EMC VSPEX Private Cloud solution for VMware vSphere 5.1 provides a system architecture capable of supporting up to 100 virtual machines with a redundant server/network topology and highly available storage. This validated and modular reference architecture built with proven best-of-breed technologies is a complete virtualization solution enabling informed hypervisor, compute, and networking layer decisions for Private Cloud deployments. When embarking on server virtualization, the Lenovo ThinkServer - EMC VSPEX Private Cloud Solution accelerates your IT transformation by enabling faster deployments, greater efficiency, and lower risk.

This document describes the key components, logical design and deployment instructions for this highly available virtualized converged solution for business applications.

Business value

Business applications are moving into virtualized and consolidated compute, network, and storage environments. The choices available to build such an environment are vast and often lacking proven guidelines at every stage of the design:

- Vendor and component selection
- Component interoperability
- Solution Scalability
- Solution Performance
- Solution Robustness and Availability
- Physical and Logical System Design and Configuration

The Lenovo ThinkServer - EMC VSPEX Private Cloud solution using VMware eliminates the complexity of designing and building virtualized converged infrastructure solutions by providing a proven and documented reference architecture:

- Trusted component vendors
- Interoperability testing already done
- Assured performance and high availability
- Reliable, flexible, and scalable reference design
- Virtualization planning and configuration burdens reduced
- Physical cable connectivity guidelines

Scope

This document contains the key design principles and deployment instructions required to build a highly available virtualized converged Lenovo ThinkServer - EMC VSPEX solution for business applications. The document provides:

- a base understanding of the design principles applied to the Lenovo ThinkServer - EMC VSPEX solution
- deployment instructions to build the Lenovo ThinkServer EMC VSPEX solution

This document does not provide the guiding principles to size and match an internal or external customer's business need to a Lenovo ThinkServer -EMC VSPEX platform. It assumes that this has been completed prior to deployment as per the Lenovo ThinkServer – EMC VSPEX Solution Architecture Guide.

Audience

This document is intended for channel partner professional services teams who will be deploying the Lenovo ThinkServer – EMC VSPEX platform.

Expected Level of Technical Knowledge: High for devices and technologies described in this document.

Terminology

The abbreviations used in this document are summarized in the table below.

Abbreviation	Description	
ACL	Access Control List	
CNA	Converged Network Adapter	
DRS	Distributed Resource Scheduling within VMware	
НА	High Availability	
івмс	Integrated Baseboard Management Controller	
iK∨M	Integrated Keyboard, Video and Mouse Remote Control	
IOPs	Performance metric for number of inputs or outputs per second	
iscsi	Internet Small Computer Systems Interface	
LACP	Link Aggregation Control Protocol	

Table 1.Abbreviations

Chapter 1: Introduction

Abbreviation	Description
LUN	Logical Unit Number
PCIe	Peripheral Component Interconnect Express
PDU	Power Distribution Unit
QoS	Quality of Service
SAN	Storage Area Network
SAS	Serial Attached SCSI
SP	Service Processor
vCPU	Virtual CPU
VLAN	Virtual LAN
VM	Virtual Machine

Solution Tested

The Lenovo ThinkServer - EMC VSPEX Private Cloud solution core elements organized by virtualization, compute, networking and storage layers are: Virtualization

- VMware vSphere 5.1 ESXi Hypervisor and
- VMware vCenter Server
- VMware vSphere High Availability

Compute

- Lenovo ThinkServer RD630
- Lenovo ThinkServer RD330 (Management)
- QLogic 8300 Series Converged Network Adapters

Networking

• Extreme Networks Summit Series x670 with ExtremeXOS TM

Storage

• EMC VNXe Series Storage

The table below provides a summary of the hardware and its configuration.

Hardware	Configuration	Notes
Compute: Lenovo ThinkServer	3 ThinkServer RD630 CPU: 2 x socket 8 cores each One vCPU per virtual machine Four vCPUs per physical core Memory: 2 GB RAM per virtual machine 256 GB RAM across all servers 2GB Ram reservation per vSphere host Network: Two QLogic 8362 CNA	Configured as a single vSphere cluster
Network infrastructure: Extreme Summit Series	2 Extreme Summit x670 48-port Four 10GbE ports used per vSphere Server Four 10Gbe ports used for VNXe	Redundant LAN configuration
Storage: VNXe Series	VNXe 3300 Chassis 3U Two storage processors (active/active) Five 12 Slot 3.5" 2U Disk-Array Enclosures Eighty-Five (total) 300GB 15KRPM 3.5" SAS Drives	iSCSI Storage
Management Platform: Lenovo ThinkServer	ThinkServer RD330 CPU: 2 x socket > 4 cores each Two vCPU per virtual machine Memory: 64 GB RAM 8GB Ram reservation per vSphere host Network: Motherboard GbE interface	Configured as a single ESX host to run the following Infrastructure VM's Vcenter, SQL server, Active Directory, Lenovo Management software
Virtualization Vmware	 VMware vSphere 5.1 ESXi Hypervisor and VMware vCenter Server VMware vSphere High Availability 	VMware vSphere 5 Enterprise recommended

Table 2. Hardware Summary

The guiding principles for the solution design are:

• Function

General purpose business applications that run in a virtual environment.

• Usability

Simplified debug, maintenance, upgrade and monitoring with predetermined network, storage and compute configurations, all validated and documented with procedures.

• Performance

Targets a general-purpose workload of up to 100 virtual machines with a typical workload. Example workloads would be medium-tolight database, web application or mail server processing.

• Resilience / Reliability

This design is intended to provide N+1 redundancy throughout the system to recover from typical single points of failure at each layer of the system. Compute, network and storage all provide fail over and fail back of services without impacting business applications.

• Ease of Deployment

Channel partners trained on the platform can deploy a system ready for business application service enablement in days versus weeks or months for a similar solutions that are not pre-engineered

• Scalability

Designed from the ground up to enable pay as you grow scaling. Compute and storage layers have assigned ratios that allow customers to incrementally grow each tier to match new business demands. For example, a pre-engineered server to disk ratio is designed into the architecture.

• Manageability / Maintainability

The best practices to configure each component in the system are documented to maximize the value of the tools used to manage a converged Infrastructure platform. Some examples are: BIOS settings, MTU size, onboard IPMI capabilities, power consumption and rack design.

• Economic and technical constraints, and tradeoffs

N+1 design requires powered and connected compute, storage and network infrastructure to be lightly loaded during normal business production hours. This architecture includes an optional server to enable high availability at the compute layer, so if a server fails, the system has enough resources to maintain business operations. The design is an active/passive design aimed at availability and reduced complexity.

Chapter 2 Solution Architecture

This chapter presents the following topics:

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Logical Design	View1	7

Architecture Overview

The Lenovo ThinkServer – EMC VSPEX Validated Private Cloud Solution offers a scalable solution for up to 100 VMware based virtual machines with full hardware and software redundancy.

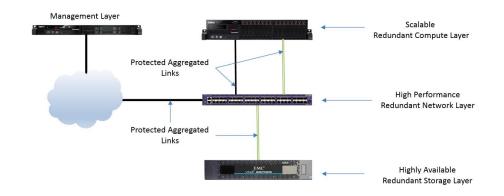


Figure 1. Solution Architecture Logical View

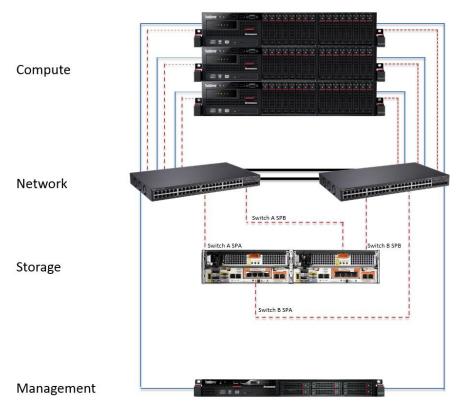


Figure 2. Solution Architecture Physical View

The solution architecture was designed and tested based on the goals below to enable a robust compute platform for typical business applications without sacrificing performance or availability:

- Matched Compute Cores and Memory to disk spindles for typical business work loads
- Converged network adaptors equipped with hardware offload for storage processing, allowing more CPU cycles for business applications
- Simple HA design (Active/Passive) N+1
- Simple growth rules to increase capacity
- In band VMware ESX management path over redundant interfaces; other components are managed out of band (network, storage, compute hardware)
- Reduced cabling requirements
- Converged layer 2 Ethernet fabric all storage, network and high availability traffic.

Both of the storage and network communications fabrics have at least two physical ten-gigabit Ethernet paths with one active and one passive path. Network traffic is segregated on these physical links into at least five virtual LANs (VLANs):

• Compute

iSCSI and TCP processing off loaded to QLogic 8300 Converged Network Adapters with hardware ASIC's to reduce CPU utilization and maximize compute layer CPU for business applications

• Management

Management path QOS to ensure reachability of all devices under all network conditions.

• Storage

Dedicated high bandwidth/low latency physical links exclusively for Ethernet based iSCSI storage traffic. Storage network traffic is designed to provide access to storage at less than 3ms latency.

• vMotion

High-bandwidth links for migrating and live migrating virtual machines from one physical server to another

• User Access

Bandwidth dedicated to application communication networks for user to machine and machine to machine designated traffics. Many User Access VLANs are typically provisioned. • Fault Tolerance

Low latency/low bandwidth/high quality network utilized for hypervisor to hypervisor health checks and resource scheduling. This is used with the optional VMware Fault Tolerance host to host replication of storage and state to a 2nd physical host.

Quality of Service (QoS) is applied to each shared VLAN to predictably manage the behavior of these networks and to ensure shared links prioritize application and storage traffic as needed.

With this VMware based solution, common infrastructure components are virtualized and hosted on a separate dedicated management server: VMware vSphere management server, Microsoft Windows 2012 Active Directory, DHCP server, DNS server and Microsoft Windows SQL Server 2008R2 Standard.

Lenovo RD630 enterprise class servers are deployed in an N+1 configuration to provide full failover capabilities for all hosted virtual application servers. A minimum of one physical core is allocated for every four virtual CPUs (vCPU), with one vCPU to each virtualized application server. This gives a final ratio of no more than four virtualized application servers for each physical CPU core. At least two gigabytes of Physical RAM is reserved for each virtual application.

Overall the solution is designed to be resilient to multiple simultaneous failures at the network, computing, storage and power layer.

Best practices are documented throughout this document. However, advanced design elements are highlighted but not described in detail, as the goal for the solution is reduced complexity for install, support and management of the system.

Logical Design View

Once a system is physically connected, it is often difficult to predict how or where data will go without a logical component layer view to highlight the relevant design elements. The Lenovo ThinkServer – EMC VSPEX Validated Private Cloud Solution is designed to use an active/passive failure plane to simplify the configuration, debugging, deployment and dependencies.

This logical view of the design is an important tool to simplify solution debugging and for reliably predicting impacts of typical maintenance activities. For example, the effect of rebooting an Ethernet switch must be understood in advance to avoid any disruption to business applications that are running in a live environment. The logical view for Customer access, Management access, Storage access and Cluster/HA design are provided below for reference.

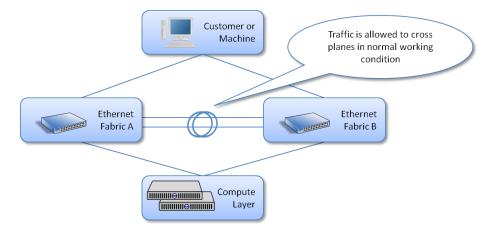


Figure 3. Customer Logical View

Customer Basic Design:

• Active Path and Passive Path

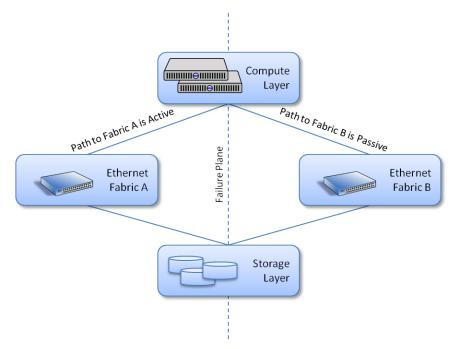


Figure 4. Storage Logical View

Storage Basic Design:

• Active Path and Passive Path based on Hypervisor Multi-Pathing

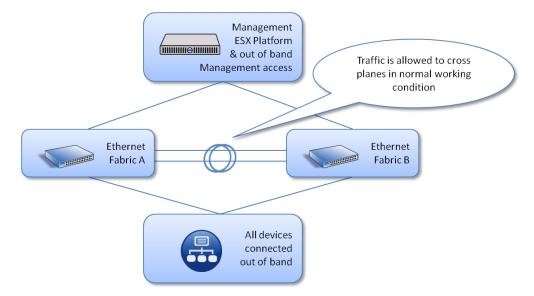


Figure 5. Management Logical View

Management Basic Design:

• All devices have connection to management network with dedicated management port out of band

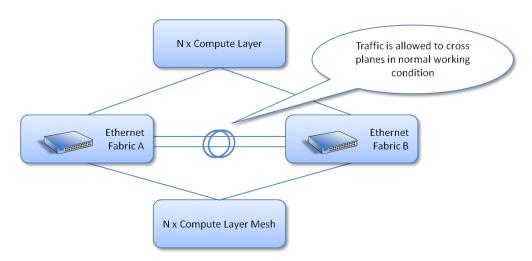


Figure 6. Cluster/HA Logical View

Cluster/HA Basic Design:

• Active trunk LACP L2 or L2 Load Share

Chapter 3 Solution Deployment

This chapter presents the following topics:Deployment Overview.21Deployment and Interoperability Prerequisites.21Pre-Deployment Tasks.22Solution Deployment.22

Deployment Overview

The deployment process has been designed to simplify system turn up at a customer site. The high level steps are based on how the system was built and tested and provide checkpoints throughout the process to ensure that the system is deployed and ready for business applications once complete. This document also serves as documentation repository for key system variables that are required to operate the system and to provide to customers.

Steps to Deployment:

- 1. Review all planning checklists in the Appendices
- 2. Complete Physical Rack installation based on Appendix G
- 3. Complete Network Layer installation and configuration
- 4. Complete Server installation and configuration
- 5. Complete Virtualization Layer installation and configuration
- 6. Complete Storage Layer installation and configuration
- 7. Add Storage to Virtualization Layer
- 8. Validate Solution Deployment
 - a. Guest VM to disk traffic test
 - b. Guest VM to network traffic test
 - c. Guest VM to Guest VM traffic test
 - d. Compute to Compute traffic test

Following these steps will reduce the time to install and debug all paths between components and will ensure that the building blocks are built in the correct order such that traffic tests can be successfully completed and and the solution can be handed off to the customer.

Deployment and Interoperability Prerequisites

All components were tested with a basic configuration that ensures the highest level of interoperability. For example, VLAN tagging was used to separate traffic and vswitches. It is not expected that software specific dependencies exist in the design and it is therefore recommended to update all components to the latest versions available before going into production. Each section outlines when software or firmware should be updated before moving to the next building block.

Pre-Deployment Tasks

It is important to ensure all sections for planning are complete before deployment begins. Key checklists that should be reviewed before starting a deployment are listed below. All checklists are found in the Appendices.

- 1. Power and Rack position planning
- 2. IP Address and VLAN planning
- 3. Server CNA and slot planning
- 4. Software version check on all components with required software versions downloaded and available

It is highly recommended to keep a record of actual deployment data that can be provided to the customer as part of the deployment handoff process. The planning tables should be used as a reference for the data that needs to be documented.

Solution Deployment

This section describes the deployment steps for the Lenovo ThinkServer – EMC VSPEX Solution. The deployment must follow the order as described in this section.

Network Layer This section describes the installation and configuration steps for the Installation and Configuration Steps for the Lenovo ThinkServer – EMC VSPEX Solution.

Pre-Installation Requirements

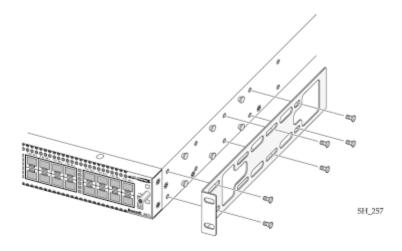
The following additional tools and equipment should be on-hand prior to starting the Network Layer Installation and Configuration:

- #1 Phillips screwdriver
- Rack mounting screws
- 4x AC Power Cables
- Extreme management console cable
- Twin-Axial or SFP+/Fiber Cables for system connectivity
- Complete and review actual IP Address and VLAN table for deployment

Network Layer Installation and Configuration Steps

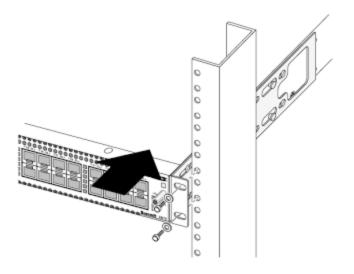
Physical Switch Installation

- 1. Identify the switch space designation within the target rack (refer to Appendix G for rack layout plan).
- 2. Attach each mounting bracket to the switch housing with the screws.





- 3. Slide the switch into the rack and secure the mounting brackets into the rack.
- 4. Repeat steps 1 3 for the second switch.





Power Cables

- 1. Power is supplied to all equipment in this design by redundant PDUs with each PDU supplied from a discrete and independent source.
- 2. Attach power cords from the separate PDUs to both power supplies located at the back of the switch.
- 3. Make sure the cables are neatly stowed to the side away from fan intakes and exhaust.
- 4. Repeat steps 1 3 for the second switch.

SFPs and Cabling

Passive electrical twin-axial cables at 1M and 3M are recommended for all interconnects although a mix of Extreme SFP and fibre optic cable can be used as an alternative.

- 1. Review suggested cabling configuration included in Appendix D and proceed with connecting equipment
- 2. Installing passive electrical twin-axial cable:
 - **a.** Holding the connector by its sides, insert the connector into the port on the switch.
 - **b.** Push the connector into the port until you hear it click into place.
- **3.** Installing SFP and fibre optic cable combination:
 - **a.** Seat SFP modules into designated ports on the switch.
 - **b.** Connect SFPs via a fibre optic cable of appropriate length to ensure tidy deployment.
- 4. Complete cabling for both switches.

Switch Initial configuration

- 1. Use the Summit® Family Switches Hardware Installation Guide to complete the initial management access section for the Summit x670.
- 2. Use the ExtremeXOS® Concepts Guide Software Version 15.1 to configure:
 - Switch Name
 - SNMP Information
 - NTP
- **3.** Save the configuration.
- 4. Repeat steps 1 3 for the second switch.

Upgrade Firmware

1. Download image to secondary partition.

```
Example:
# download image 172.16.41.1 summitX-12.6.1.3.xos vr "VR-
Default" secondary
```

2. Set secondary partition as the boot image.

```
# use image secondary
```

3. Reboot extreme switch to restart with new installed firmware.

reboot

- 4. Verify the firmware version.
 - # show version
- 5. Repeat steps 1 4 for the second switch.

Configure Jumbo Frames

Jumbo frames are used between endstations that support larger frame sizes for more efficient transfers of bulk data. Both endstations involved in the transfer must be capable of supporting jumbo frames. Jumbo frames are disabled by default. The default size setting is 9216 which is the maximum size that can be set and is the required setting for this solution. Jumbo frames must be enabled on ports that are used in this deployment.

- 1. Login into the switch CLI interface.
- 2. Configure preferred jumbo frame size of 9216.

configure jumbo-frame-size 9216

3. Enable jumbo frames on ports that are used in this solution:

Example: Enable jumbo frames on a particular port enable jumbo-frame ports 5

Example: Enable jumbo frames on multiple ports: enable jumbo-frame ports 5,6,10

4. Repeat steps 1 - 3 for the second switch.

Configure Sharing

- 1. Login into switch Cll.
- 2. To configure sharing add ports using the following syntax:

configure sharing <master_port> add ports <port_list>

Example: configure sharing 3:9 add ports 3:13

3. Repeat steps 1 - 2 for the second switch.

Configure QoS Queues

Quality of Service (QoS) allows traffic groups higher priority access to network resources in the event of network contention. Bandwidth can be reserved for special groups of traffic. It is recommended that the *Fault Tolerance* VLAN be configured with the highest traffic priority, and sufficient bandwidth for the level (LockStep mirror, warm recover, etc) of Fault Tolerance required by the deployed application.

Create and configure VLANs

- 1. Login into switch Cll.
- 2. Create desired VLAN and VLAN tag.

Example:

create VLAN "VSPX-CUS0" configure VLAN VSPX-CUS0 tag 2100

- 3. Repeat for all VLANs in the VLAN list.
- 4. Repeat steps 1 3 for the second switch.

Refer to Appendix A for sample VLAN and IP Address layout.

Configuring ports (names)

Descriptive port names, or "*display-strings*", assist with debugging and switch management. A list of suggested port display-strings are included in Appendix E.

- 1. Log into the switch CLI
- 2. Configure the port display string.

```
Example:
configure ports 7 display-string "VNX5300-SPb6-0"
```

3. Validate port names are configured as expected.

```
Example: show ports 7
```

🔤 Te	Inet 10.27.0.28				- • •
Port	-Local.6 # show p Summary Monitor Display String		Fri Aug 2 13:2 Port Link Spee State State Actu	23:37 2013 d Duplex al Actual	·
7	UNX5300-SP56-0	USPX-STOR	E A 100	G FULL	Ε
=====	=======================================				
	D-ELS			-Loopback,	
U	->page up D->pag				~

Figure 9. Example CLI for Port Display String Validation

Add Ports to VLANS

- 1. Login into the switch Cll.
- 2. Create the desired VLAN and VLAN tag.

```
Example:
configure VLAN VSPX-CUSO add ports 9, 11, 13, 16, 24, 39
tagged
configure VLAN VSPX-CUS1 add ports 9, 11, 13, 24, 39
tagged
```

- 3. Repeat for all VLANs in the deployment VLAN list.
- 4. Repeat steps 1 3 for the second switch.

Server This section describes the installation and configuration steps for the Servers required for this deployment.

You will need to have the following document handy for reference:

http://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd630ug _en.pdf

Refer to the listed pages to complete the following tasks. These tasks are completed for all servers in this solution.

- 1. Review the Guidelines and Precautions sections Page 69
- 2. Remove the server cover Page 71
- **3.** Remove cooling shroud Page 76
- 4. Install RAM Page 80
- 5. Install NICs into slots specified in Appendix F Page 87

- 6. Install CPUs Page 114
- 7. Re-install cooling shroud and server cover
- 8. Install redundant PSU Page 108
- 9. Connect Ethernet cables following port recommendations in Appendix D
- 10. Connect power cables
- 11. Update firmware for BIOS, BMC, iKVM and Raid Controller by using ThinkServer EasyUpdate firmware updater. The latest version of Easy Update can be found at http://www.lenovo.com/drivers and navigating to the RD630 server.
- 12. Create a RAID1 local LUN for operating system boot Page 64
- Enable Hyper-Threading and Intel Virtualization, and configure Boot order (Boot from Local RAID1 LUN) by using the pre-boot BIOS Setup Utility – Page 53
- 14. Assign IP Addresses and user accounts to ThinkServer Management Module (TMM) and iKVM using the guide found at <u>http://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/r</u> d530rd630tmmug_en.pdf

Virtual Layer This section describes the installation and configuration steps for the Virtual Layer. Configuration

Pre-installation Requirements

Installation and Configuration

- VMware media
- VMware Documentation <u>http://pubs.vmware.com/vsphere-51/index.jsp?topic=%2Fcom.vmware.vsphere.install.doc%2FGUID-7C9A1E23-7FCD-4295-9CB1-C932F2423C63.html</u>
- VMware license keys
- Physical server installation completed
- CNA drivers from Qlogic website
- All appendix checklists completed

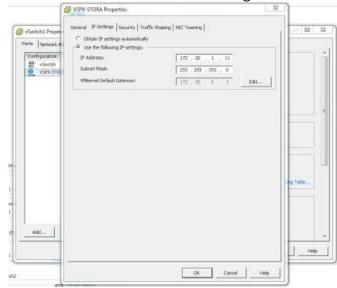
OS Installation

- 1. VMware DVD can be inserted in DVD drive (Keyboard mouse monitor connected to server)
- 2. Reboot server and manually interrupt boot progress to boot from DVD.
- **3.** Set management IP address for out of band management port during installation
- 4. Connect management port as per appendix cabling table

- 5. Verify ping to management port on OS before continuing
- 6. Download the vSphere client from this host by pointing a browser at the management IP address provisioned above
- 7. Install vSphere client and login to ESX host to continue
- 8. OS Post Configuration (networking/management)
- **9.** Check the ESX host networking configuration to ensure all cards were detected by the installation
- 10. Enable SSH access on the ESX host (for driver installation)
- 11. Install CNA drivers as per Qlogic instructions supplied with the driver download

🕑 vspx-esxi02 - PuTTY	
eCertified 2013-04-15 ~ # esxcli software vib list Name	Version
ima-qla4xxx net-qlcnic qlogic-adapter-provider scsi-qla4xxx	500.2.01.31-1vmw.0.0.060523 5.1.157-10EM.500.0.0.472560 1.6.22-469512 634.5.18.0-10EM.500.0.0.472560

12. Following the CNA slot guide in Appendix B assign IP address and VLAN information to the matching CNA driver on the host



13. Repeat steps for IP and VLAN for Vmotion network interfaces, Customer access interfaces using the slot table and IP

address and vlan tables in the appendix for data to complete the steps on each network card

	STORA Properties		2]
VSwitch1 Proper Path Network A Configstation 1 국민·VSWtch1 VSWtch1 모 VSWtch1 모 VSWtch1 모 VSWtch1	General [IP Settings] Security Part Properties Network Label VLAH ID (Optional) Water: Pault Tolerance Logging: Management Traffic:	Traffic Shuping NIC Tearing /SP3-STORA 2001 Chudied Dudied Enabled Chudied	×	
	ISCS Pertificang: -NIC Settings MTU:	IF tradiet		e no Table
4dd		CK	Cancel Help	

- 14. If enabling vMotion you must check the box for vMotion
- **15.** If Management Traffic to the ESX host the check box must be enabled
- 16. If enabling Fault Tolerance features the check box must be enabled
- 17. If enabling for iSCSI the check box must be enabled

18. Repeat for other networks/VLANs as needed

6	vSwit	ch1 Properties					x
Γ	Ports	Network Adapters					
		figuration vSwitch VSPX-CUS0 define therefore VSP-VMOT VSP-VMOT VSP-MGMT	Summary 120 Ports Virtual Machine Port Group Virtual Machine Port Group Virtual Machine Port Group Vintual Machine Port Group VMotion and IP StoragePort vMotion and IP StoragePort	Port Properties Network Label: VLAN ID: vMotion: Fault Tolerance Logging: Management Traffic: iSCSI Port Binding:	VSP-MGMT 2000 Disabled Enabled Disabled		^
	<u>Q</u>	ian maell	vMotion and IP StoragePort	NIC Settings MAC Address: MTU: IP Settings IP Address: Subnet Mask:	00:0e:1e:0a:2b:50 9000 172.20.0.10 255.255.255.0	View Routing Table	12
	A	3d	m)	Effective Policies Security Promiscuous Mode: MAC Address Changes: Forged Transmits:	Reject Accept Accept	Close Help	Ţ.

vCenter/Licensing

1. Add licenses to Vcenter installation (installed separately on management server)

Product		Available	
 Evaluation Mode 			
O (No License	Key)		
VMware vSphere!	5 Enterprise Plus (unlimited	6 CPUs	
0		6 CPUs	
C Assign a new license ke	y to this host		
C Assign a new license ke	y to this host		
Enter Key	y to this host 	Plus (unlimited co	res per CPU
Enter Key	VMware vSphere 5 Enterprise 12 CPUs	Plus (unlimited co	res per CPU
Enter Key Product: Capacity: Available:	VMware vSphere 5 Enterprise 12 CPUs 6 CPUs	Plus (unlimited co	res per CPU
Product: Capacity: Available: vRAM per CPU entitlement:	VMware vSphere 5 Enterprise 12 CPUs 6 CPUs 96 GB	Plus (unlimited co	res per CPU
-	VMware vSphere 5 Enterprise 12 CPUs 6 CPUs	Plus (unlimited co	res per CPU

2. Add ESX host(s) to Vcenter

Connection Settings fast Summery Writual Machine Location Ready to Complete	Connection Enter the name or IP address of the host to add to vCenter. Host:
	Authorization Enter the administrative account information for the host, v6phere Client w use this information to connect to the host and establish a permanent account for its operations. Username: Possword:

vCenter Configuration Creation

Configure Data Center and HA DRS if licenses have been purchased to automate failover policy of VM's between hosts

- 1. Optional set NTP IP address, SMTP Configuration for Vcenter
- 2. Optional Startup Options for VM's and boot order

Network and VLAN configuration

1. vSwitches and vlan should be configured on all interfaces from the appendix interface table

Connection Type	
	can be partitioned to accommodate each service that requires connectivity.
Connection Type	
Network Access	Connection Types
Connection Settings	C Virtual Machine
Summary	Add a labeled network to handle virtual machine network traffic.
	• VMkernel
	The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.
	(Budy Marsha) Count
Help	< Back Next > Cancel
Add Network Wizard	
VMkernel - Network Ac	cess
VMkernel - Network Ac	
VMkernel - Network Ac	cess
VMkernel - Network Ao The VMkernel reaches	cess networks through uplink adapters attached to VSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new
VMkernel - Network Ac The VMkernel reaches Connection Type Network Access	cess networks through uplink adapters attached to vSphere standard switches.
VMkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings	CESS The through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vighter standard switch using the unclaimed network adapters listed below. The virtual standard set of the virtual standa
VMkernel - Network Ac The VMkernel reaches Connection Type Network Access	cess networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new 'vSphere standard switch using the unclaimed retwork adapters lated below.
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CESS The through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vighter standard switch using the unclaimed network adapters listed below. The virtual standard set of the virtual stan
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Cess The through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below. Complex Standard Standard Standard Standard Down None Complex Standard Standard Down None Complex Standard Standa
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	cess networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new VSphere standard switch using the unclaimed retwork adapters lated below. Select which vSphere standard switch will handle the network staffic for this connection. You may also create a new VSphere standard switch using the unclaimed retwork adapters lated below. Select which vSphere standard switch will handle the network staffic for this connection. You may also create a new VSphere standard switch using the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated below. Select which vSphere standard switch will be the unclaimed retwork adapters lated be the unclaimed retwork adapters lated be the unclaimed retwork adapters adapters lated be the unclaimed retwork adapters lated be the unclaimed
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Cess The through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below. Complex Standard Standard Standard Standard Down None Complex Standard Standard Down None Complex Standard Standa
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Select which vSphere standard switches. Select which vSphere standard switches above standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch using the unclaimed network adapters listed below. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new visit prevention to the vortex of the prevention of the vortex of the v
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Select which vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard mitch using the unclaimed retwork adapters lated below. Image: Select which vSphere standard switches.
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Select which vSphere standard switches. Select which vSphere standard switch will handle the network staffic for this connection. You may also create a new vSphere standard switch will be solved. Select which vSphere standard switch will handle the network staffic for this connection. You may also create a new vSphere standard switch will be solved. Select which vSphere standard switch will be solved. Wink vSphere standard switch will be solved. Wink vSphere standard switch will be solved. Vise vSwitchi Speed
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	Cess The through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vsphere standard switch using the unclaimed network adapters listed below. Comparison of the transmission of the tr
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VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	cess networks through uplink adapters attached to vighere standard switches. Select which vighere standard switch will handle the network straffic for this connection. You may also create a new vighere standard switch using the unclaimed network adapters lated below. Image: Select which vighere standard switches. Image: Select which vighere standard switches. Image: Select which vighere standard switches lated below. Image: Select which vighere standard switches. Image: Select which vighere. Image: Select which vi
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplik adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 10006 Full None Image: Select Corp QLogic QLES242 Pci Express to 106bf, Dual Channel CIA Image: Select Corp QLogic QLES242 Pci Express to 106bf, Dual Channel CIA Image: Select Corp QLogic QLES242 Pci Express to 10606 Full Channel CIA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Select Corp QLogic QLES242 Pci Express to 10600 Full Select Sele
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	cess networks through uplink adapters attached to vighere standard switches. Select which vighere standard switch will handle the network straffic for this connection. You may also create a new vighere standard switch using the unclaimed network adapters lated below. Image: Select which vighere standard switches. Image: Select which vighere standard switches. Image: Select which vighere standard switches lated below. Image: Select which vighere standard switches. Image: Select which vighere. Image: Select which vi
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 1006F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 1060F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 106000 Full
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 1006F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 1060F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 106000 Full
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 1006F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 1060F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 106000 Full
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 1006F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 1060F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 106000 Full
VHkernel - Network Ac The VMkernel reaches Connection Type Network Access Connection Settings IP Settings	CES networks through uplink adapters attached to vSphere standard switches. Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters listed below. Image: Select which vSphere standard switch will handle the network traffic for this connection. You may also create a new vSphere standard switch will be on the network adapters to 1006F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 106bF, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 1060F, Dual Channel CKA Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 10600 Full Image: Select Corp QLogic QLES242 Pci Express to 106000 Full

Chapter 3: Solution Deployment

VMkernel - Connection Use network labels to i					x
	Settings dentify VMkernel connections while m	nanaging your hosts and datacenters.			
Connection Type Network Access Connection Settings IP Settings Summary	Port Group Properties Network Label: VLAN ID (Optional):	None (0) Use this port group for vMoti Use this port group for Fault	Tolerance logging		
	Network Type:	IP (Default)			
	Preview: 	Physical Adapters Physical Ada			
Help			< Back Next >	Canc	_
Add Network Wizard VMkernel - IP Connection Specify VMkernel IP se					
Connection Type Network Access Connection Settings IP Settings Summary	C Obtain IP settings automa G Use the following IP settin IP Address: Subnet Mask:		•		
our in a p	VMkernel Default Gateway:	172 . 20 . 0			
		Physical Adapters	. <u>1</u> Edt		

Storage Configuration

1. iSCSI configuration requires binding iSCSI kernel to CNA and set IP address information

ISCSI Properties	4.com.glogicsisp8			- F	
ISCSI Name: km.2000-0 ISCSI Alias:	-com.gogic:spe	\$324.000	NE TE 1 101%	58.5	
Hardware Initiator Properties IP Settings					
IP Address:					
Subnet Mask:	255 , 2	55 , 25	s , o		
Default Gateway:	L.L.a.		35		
DNS Servers				-	
Preferred DNS Server: Alternate DNS Server:		- 64	- (e) 	-	
Allo hale ono servo :					

2. With dual paths to storage, two kernel drivers will be visible once all bindings are complete. These steps are repeated on all cards with the appendix VLAN and IP address information as a guide to which ports on each host should be connected to each switch, VLAN, and target SPA or SPB ports on the VNX array

Part Group	VMkemel Adapter Part Grou	op Policy Path Status	Textsparecell2-37048629	
VSPN-STORA (VSwitc)	ht) vek2 🕑 Can	iplat 🔶 Actie	THE REPORT OF A CONTRACTOR OF A CONTRACT OF	
9 VOR-STORE (VSWIN	52) vink3 🙄 Car	nplat 🔶 Active		
	(Bind with Wikenel Net	work Adopter	1000
0		Only Weenel adapter physical adapters are	s compatible with the ISCSI port binding licked.	requirements and available
Mixernel Port Binding Detail		D'a targeted VMarnel Its effective homing p	adapter is not leted, go to Host > Conf elicy.	lgurebon > Networking to updat
Virtual Network Adapt	et	Select Wkernel adapter to b		
VMkernel:	vek2	Fast Grang	VMkamel Adapter	Physical Adapter
Switch	sSwitch1	28	1.00	versic3 (19080, Full)
Port Group:	VSPX-STORA	-		vmmid5 (30000, Pull)
Port Group Policy	Conclast		-	Extent I
Paddwee	172.28.1.11			venici)
Subnat Hapk:	255,255,255,8			Steel 1
Physical Network Adap	der	Network Adveters Details:		
Nation	VENCE			
Device	01.0011 Corp 01.68362 01.00112-00	Virtsal Network Adapt		
Link Status: Carifigured Speed:	Consected 1000 Mbps (full Duples)	traning and fallor	ical network adapter is net associated w isr policy. VMixemel network adapter mu day uplinks to be eligible for binding to 8	at have subcits are active
		Physical Network Adap	eer .	
		Name:	Come	
		Device:	OLOGIE Corp OLENSE2 OLOGIE 2 po	+ 10/5/784
		Link Status:	Consected	
	OCC ISCILLUR THE ADDRESS OF	Configured Speed	10080 Mags (Full Duples)	
		considered (them	The other states of the second	

3. It's recommended to enable jumbo frames for storage traffic. This also requires storage port configuration on the VNX and network switch to match the selected MTU recommend value 9000 bytes. This is done under advanced settings

Advanced Settings			
ARP Redirect ISCSI adapter option : ARP Red	drext	F	
re C Jumbo Prame ISCSI adapter option : Jumbo I Ad	Frame	ধ	
MTU ISCSI adapter option : MTU Min: 0 M	tex: 2147483647	ſ	9000
ErrorRecoveryLevel ISCSI option : ISCSI Error Reco	very Level (BRL) value that the B	S(initiator would negotiate o	0 during 1
Mirt, D 34	lasr 0		
LoginRetryMax	er of times ESX initiator would re		0

4. Confirm ping traffic initiated from the network switch can reach all ports in the storage, customer, vmotion and management networks.

5. Configure iSCSI initiator parameters on the iSCSI kernel driver.

-iSCSI Properties	-						
ISCSI Name: ISCSI Alias:	jign. 2000-04.	com.qlogic:i	ip8324	.000e	1e1109	8a.5	
DUDI ANES:							
Hardware Initiat	or Properties -						
IP Address:				·	•	1	
Subnet Mas	a.	255	255	255	, 0		
Default Gate	eway:		-	_	*	1	
DNS Servers							
Preferred DI	NS Server:	1.1.2	1	2	14. L	1	
Alternate Df	(S Server:	1.5		6	36	1	
				_			
					-		 _

6. Ensuring that there is a working path to the storage arrays, the targets can be added either statically or dynamically.

Chapter 3: Solution Deployment

Mkernel Port Bindings:					
Port Group	🔷 🖉 VMkernel Adapter	Port (Group Policy	Path St	tatus
VSPX-STOR (vSwitch)			Compliant	•	ctive
VSPX-STORB (vSwitc	h0) vmk0	0	Compliant	♠ A	ctive
(Þ
Mkernel Port Binding Details	5:		Add		Remove
	~				
Virtual Network Adapt	er				
VIFTUAI Network Adapt VMkernel:	vmk3				
VMkernel:	vmk3				
VMkernel: Switch:	vmk3 vSwitch2				
VMkernel: Switch: Port Group:	vmk3 vSwitch2 VSPX-STOR				
VMkernel: Switch: Port Group: Port Group Policy:	vmk3 vSwitch2 VSPX-STOR © Compliant				
VMkernel: Switch: Port Group: Port Group Policy: IP Address:	vmk3 vSwitch2 VSPX-STOR © Compliant 172.20.1.10	64/64			
VMkernel: Switch: Port Group: Port Group Policy: IP Address: Subnet Mask:	vmk3 vSwitch2 VSPX-STOR Compliant 172.20.1.10 255.255.255.0 fe80::250:56ff:fe67:86	64/64			
VMkernel: Switch: Port Group: Port Group Policy: IP Address: Subnet Mask: IPv6 Address:	vmk3 vSwitch2 VSPX-STOR Compliant 172.20.1.10 255.255.255.0 fe80::250:56ff:fe67:86	64/64			
VMkernel: Switch: Port Group: Port Group Policy: IP Address: Subnet Mask: IPv6 Address: Physical Network Adap	vmk3 vSwitch2 VSPX-STOR Compliant 172.20.1.10 255.255.255.0 fe80::250:56ff:fe67:86		'ci Express to 1	0GbE, Du	al Chan
VMkernel: Switch: Port Group: Port Group Policy: IP Address: Subnet Mask: IPv6 Address: Physical Network Adap Name:	vmk3 vSwitch2 VSPX-STOR Compliant 172.20.1.10 255.255.255.0 fe80::250:56ff:fe67:86 oter vmnic7		'ci Express to 1	0GbE, Du	al Chan

🕢 iSCSI Initiator (vmhba37)	Properties	
General Network Configura	tion Dynamic Discovery Static Discovery	
Send Targets		
Discover iSCSI targets dyna	mically from the following locations (IPv4, IPv6, host name):	
iSCSI Server Location		
172.20.1.251:3260		
172.20.1.252:3260		
172.20.11.251:3260		
172.20.11.252:3260	Add Send Target Server	<u> </u>
	SCSI Server: 3260 Parent: Authentication may need to be configured before a s be established with any discovered targets. CHAP OK Cancel	ession can Advanced Help
		1.5.00
	Add Remove	Settings
	Close	e Help

7. Rescan all adapters and devices should populate. From there the devices can be configured as datastores

	chines Resource Allocation Performance Con	figuration Tasks & Events	Alarms Permission	s Maps Stor	age Views Hardwa	re Status	
Hardware	View: Datastores Devices						
Processors	Devices					Refresh	Rescan All
Memory	Name	A 0	Operational State	LUN Type			Cap
 Storage 	DGC iSCSIDisk (naa.60060160261133005e4			0 disk	Non-SSD	iSCSI	1.
Networking	DGCiSCSIDisk (naa.6006016026113300da6			1 disk	Non-SSD		2.
Storage Adapters	Local LSI Disk (naa.600605b0050dced018d	· · · · · · · · · · · · · · · · · · ·		0 disk	Non-SSD		
Network Adapters	Local PLDSCD-ROM (mpx.vmhba0:C0:T0:L0) N	lounted	0 cdro	m Unknowr	Block Adap	ter
Advanced Settings							
Power Management							
oftware	•						
Licensed Features	Device Details					N	Aanage Paths
Time Configuration	DGC iSCSI Disk (naa.6006016026113						-
DNS and Routing	Location: /vmfs/devices/disks/naa.600	5016026 ID:	naa.6006016026	1133005e4dcb21	00a6e211		
Authentication Services	Type: disk	Capacity:	1.57 TB				
Power Management	Owner: NMP	Partition Forma	at: GPT				
Virtual Machine Startup/Shutdown	Primary Partitions Capacity	Transport					
Virtual Machine Swapfile Location	1. VMFS 1.57 TB	ISCSI					
Security Profile							
Getting Started Summary Virtual Ma	hines Resource Allocation Performance Con	figuration Tasks & Events	Alarms Permission	Maps Stor	age Views Hardwa	re Status	
Hardware	View: Datastores Devices		·`	<u> </u>	<u> </u>		
	Datastores				Refresh Dele	te Add Storage	Rescan All
Processors							
Memory	Identification 🛆 Status	Device Drive Ty	pe Capaci	ty Free	Type Last U	pdate A	larm Actions
 Storage 	🔋 Fast VNX 15K R0x3 🛕 Warning	DGC iSCSI Disk (Non-SSD	1.57	TB 305.80 GB	VMFS5 07/08/	2013 12:11:53 Er	nabled
Networking	🔋 VSPEXValidations 🤗 Normal	DGC iSCSI Disk (Non-SSD	2.03	TB 938.04 GB	VMFS5 07/08/	2013 12:11:53 Ei	nabled
Storage Adapters	👔 vspx-esxi01-Local 🥑 Normal	Local LSI Disk (n Non-SSD	553.50 (GB 208.82 GB	VMFS5 07/08/	2013 11:41:53 Ei	nabled
Network Adapters							
Advanced Settings							
Power Management							
Fond Hanagement							
5oftware							
and the second	Datastore Details						Properties.
Licensed Features	upper us to be the						rioperacor
Time Configuration	VSPEX Validations Location: /vmfs/volumes/51e98a62-ca43	seech and oncerderable	2.03 TB Capac	ity 🧷			1
DNS and Routing	Hardware Acceleration: Supported	0090-8800-0020200C/DT8	1.11 TB 📕 Us	ed 🖉			
Authentication Services			938.04 GB 🔲 Fre				
Power Management	Refresh Storage Capabilities				-		
Virtual Machine Startup/Shutdown	System Storage Capability: N/A						
Virtual Machine Swapfile Location	User-defined Storage Capability: N/A						

Storage Layer Installation and Configuration

This section describes the installation and configuration steps for the Storage Layer.

Storage Layer Installation and Configuration Steps

The following additional tools and equipment should be on-hand prior to starting the Network Layer Installation and Configuration:

- Phillips screwdriver to install the system in a rack.
- Laptop or PC with Internet access to register for EMC Online Support, and with local network access to confgire the VNXe system
- Two 110/220 volt AC circuits.
- VNXe Connection Utility (Download from EMC)
- DNS, NTP for network name resolution and network time synchronization
- Four ethernet cables bulk Cat5 or higher for internet ip connectivity to network

- Review the Sizing Guidelines section in the 100 VM Reference Architecture document.
- Reference documentation:
- Quickstart Guide: https://community.emc.com/servlet/JiveServlet/downloadBody/1 6485-102-4-65899/docu31492_VNXe-Series-Quick-Start.pdf
- 100 VM Reference Architecture Document:

http://www.emc.com/collateral/technicaldocumentation/h11328-vspex-pi-pc-vmw-vnxe.pdf

Unpack VNXe, DAEs, Drives and Accessories

- 1. Unpack (1)VNXe DPE and (5)DAEs
- 2. Insert drives into DPE and DAE slots if they have not already been installed.
- 3. Start with DPE and insert drives all free slots.
- 4. Repeat for DAE 1 and DAE 2.
- 5. Insert drives into slots 0-13 in DAE's 3 and 4
- **6.** Insert drives into slots 0-6 in DAE 5.
- 7. Install rack rails for DAEs and DPE into frame as per rack layout diagram

VNXe Installation and Initial Configuration

Refer to the VNXe System Installation Guide (bundled in with the VNXe system) for details.

- 1. Connect cables between DPE and DAEs and connect DPE to Extreme Networks switch
- 2. Connect power to VNXe components and wait until the LEDs indicate that the system is ready.
- 3. Connect the SPA and SPB Ports (0 and 1) to the Extreme switches as defined in Appendix D.
- 4. Download and install the VNXe Connection Utility to assign a static IP address to the VNXe system
- 5. Point a web browser to the ip address assigned to the VNXe in the previous step
- 6. Login to Unisphere with the following credentials:

Username: admin

Password: Password123#

7. The Unisphere Configuration Wizard will guide you through configuring the following system settings:

Passwords for system administrators and service accounts

ESRS and ConnectEMC features for advanced proactive EMC support

DNS and NTP time synchronization

- 8. Skip Storage Pool Configuration
- 9. Obtain license files and complete system registration
- **10.** Update system software, firmware and language packs following the available online guides.
- 11. Assign IP's to VNXe iSCSI interfaces.
- **12.** From Unisphere, click on the System, Settings, Network, Setting for Block.
- **13.** Scroll down to Slot A1 Port 0 (SP Port A-6), RT Click and select properties.

Ports					ି 🕹
Y 🗸 Filter for	Show	Ports Both SPs	~		
Physical Location 🔺	SP-Port	Туре	Speed	IP Addresses	IQ
🕜 Onboard Port 0	B-Bus 0	SAS	6Gbps	N/A	N/A
💣 Onboard Port 0	A-Bus 0	SAS	6Gbps	N/A	N/A
🕜 Onboard Port 1	B-Bus 1	SAS	6Gbps	N/A	N/A
🕜 Onboard Port 1	A-Bus 1	SAS	6Gbps	N/A	N/A
Dnboard Port 2	B-0 (MirrorView)	Fibre	4Gbps	N/A	50:
Dnboard Port 2	A-0 (MirrorView)	Fibre	4Gbps	N/A	50:
Ponboard Port 3 💭	B-1	Fibre	8Gbps	N/A	50:
Ponboard Port 3 💭	A-1	Fibre	8Gbps	N/A	50:
Ponboard Port 4 📮	B-2	Fibre	8Gbps	N/A	50:
Ponboard Port 4	A-2	Fibre	8Gbps	N/A	50:
Ponboard Port 5 🤪	B-3	Fibre	8Gbps	N/A	50:
Ponboard Port 5	A-3	Fibre	8Gbps	N/A	50:
Port 0, Port 9	A-4	FCoE	N/A	N/A	50:
Slot A0, Port 1	A-5	FCoE	N/A	N/A	50:
Slot A1, Port 0	A-6 (MirrorView) Flash LEDs On	iscst	10Gbps	172.20.1.251, 10.	iqn
Port 1, Port 1	A-7 Flash LEDs Off		10Gbps	172.20.11.251, 1.	. iqn
Port 0 Slot B0, Port 9	B-4 Tools	>	N/A	N/A	50:
Port 1 Slot B0, Port 1	B-5 Properties		N/A	N/A	50:

Figure 10. Configure SP Interface Properties

- 14. Configure MTU on the port by selecting 9000 from the MTY drop down.
- Add a virtual port by clicking on Add, then entering the IP information (address, gateway, netmask and tag) for port SP-A port 0.

🔄 VNX5300-0 - SI	P A: Port 0 [A-6] - iSCSI Virtual Port Properties
IQN: iqn. 1992-	04.com.emc:cx.apm00125127014.a6
Virtual Port -	
-IPv4 Configu	Iration
IP Address:	10 . 10 . 10 . 10
Gateway:	10 . 10 . 10 . 1
Subnet Mask:	255 . 255 . 255 . 0
VLAN Config Enable VLA VLAN ID: 10	N Tagging
Authenticati	on
	<u>O</u> K <u>C</u> ancel <u>H</u> elp

Figure 11. Configure iSCSI Virtual Port Properties

16. Repeat for SP A Port 1, SP B port 0 and SP B Port 1.

Test connectivity of each port by right clicking on the port, selecting tools, and then Ping. Select the relevant source IP from the dropdown box, then enter the destination address for the destination field. Ping the relevant initiator configured in the virtualization section above.

Debugging Tip: If ping is not working as expected, perform the following steps to troubleshoot.

Is link up? Check the VNX, Switch and Initiator ports to confirm physical connectivity. Each connected port should have an enabled link light. and should be flashing with some activity. Resolve any physical connectivity issues by cleaning/testing fibers and SFP's using an optical meter, and fiber cleaning pads.

Are MAC's being learned? After physical connectivity has been confirmed, log on to the switch and check that mac addresses are being learned on the correct ports and VLANs. Record MAC addresses of endpoints (initiators and targets) then confirm that the MAC addresses are being learned by the switch

Checking FDB on Ports:

Run the show fdp ports {port-range} command.

show fdb ports 7,8

Telnet 10.27.0.28	·		
X670-Local.8 # show Mac		Age Flags	Port / Virtual Port List
00:60:16:46:bf:62 00:60:16:4f:62:00			7 8
x - IPX, 1 ss Blackhole, b - Ingress anslation, D - drop pa	– lockdown MAC, 3 Blackhole, v –	L - lockdown-ti MAC-Based VLAN, are Aging, o - 1	- NetLogin, m - MAC, i - IP, imeout MAC, M- Mirror, B - Egre , P - Private ULAN, T - ULAN tr (EEE 802.1ah Backbone MAC,
Total: 50 Static: 6 t: 0 FDB Aging time: 306 X670-Local.9 # _		50 Dropped: 0	Locked: 0 Locked with Timeou

Figure 12. Check for VNXe MAC Addresses

MAC addresses for each VNXe should be learned on the ports that were configured above.

And:

show fdb ports 9,10

	ow fdb ports 9,1	9	
			Port / Virtual Port List
0:0e:1e:11:09:80	USPX-MGMT (2000)	0031 d m	9
0:50:56:51:09:80			9
0:50:56:51:09:80			9
0:50:56:51:09:80			9
0:50:56:65:7e:07			10
0:50:56:86:5f:88	VSPX-CUS0(2100)	0049 d m	9
s Blackhole, b - Ingres nslation, D - drop p	s Blackhole, v -	MAC-Based U are Aging, d	m-timeout MAC, M- Mirror, B - Egre JLAN, P - Private ULAN, I - ULAN tr) - IEEE 802.1ah Backbone MAC,
	Ø Perm: Ø Dun:	51 Dropped	l: 0 Locked: 0 Locked with Timeou

Figure 13. Check for Host Initiator MAC Addresses

MAC addresses for iSCSI initiators should be learned on the ports configured above.

VLANS should contain MAC addresses for both targets and initiators.

show fdb vlan VSPX-STOR

Telnet 10.27.0.28			
670-Local.18	ow fdb vlan VSP Vlan		Port ∕ Virtual Port List
10:50:56:65:7e:07 10:50:56:67:86:64 10:60:16:46:bf:62 10:60:16:4f:62:00	USPX-STOR(2001) USPX-STOR(2001)) 0010 d m) 0059 d m	10 12 7 8
x - IPX, 1 s Blackhole, b - Ingres nslation, D - drop p	– lockdown MAC s Blackhole, v –	, L - lockdown-t - MAC-Based ULAN ware Aging, o - 1	- NetLogin, m - MAC, i - IP, imeout MAC, M- Mirror, B - Egre , P - Private ULAN, T - ULAN tr IEEE 802.1ah Backbone MAC,
otal: 49 Static: : 0 DB Aging time: 30 670-Local.19 # _	2	: 49 Dropped: Ø	Locked: Ø Locked with Timeou

Figure 14. Confirm Host and VNXe MACs

This confirms the devices have the transport to communicate with each other.

Still Can't Ping? If Ping fails at this point, there is an issue with IP addresses or netmasks. Confirm the IP addresses and netmasks.

Create Storage Pools

1. Create the storage pool by clicking on the Storage, Storage Configuration, Storage Pools and then Create.

VNX5300-0 - Create Stor	age Pool			
General Advanced				
Storage Pool Para	meters			
Storage Pool Type:		Group		
biologe roor ryper	Scheduled Au			
Storage Pool ID:	2			*
Storage Pool Name:	Pool 2			
Extreme Perform: RAID Configuration [RAID5 (4+1) Performance RAID Configuration [RAID5 (4+1) Distribution Not enough disks (1) Disks	Number of F 0 Number of S 0	~		
Automatic Use	Power Saving Eligi	ible Disks		
O Manual		<u>S</u> elect		
Disk	Capacit	y Drive Type	Model	State
Disk				

Figure 15. Create Storage Pool

- 2. Select Pool for Storage Pool Type, Tick Scheduled Auto-Tiering, and then enter a Storage Pool Name.
- **3.** Select Raid5 (6+1)
- 4. Tick Manual, then click Select. Drives as follows:

Raid5 Group Number	Enclosure	Drives	
1	0	0-6	
2	0	7-13	
3	1	0-6	
4	1	7-13	
5	2	0-6	
6	2	7-13	
7	3	0-6	
8	3	7-13	
9	4	0-6	
10	4	7-13	
11	5	0-6	

Table 3.VNXe Raid Group Layout

5. Follow the above table to complete the storage pool creation. This storage pool is used to present LUNS to the ESX hosts in this solution.

Y Filter for	RAID T	ype All	~		
Name		State	RAI	ID T	Drive T.
🛱 VSPEX Validation Storage Poo	al	Read		IDE	SAS
		INCau	y Incer	.05	343
	51	Keau		.05	JAJ
	51	::	y 1041	.03	383

Figure 16. Create Storage Pool

Creating LUNS

To create a LUN:

1. Log into Unisphere

2. <u>Click Storage, then LUNS then Create.</u>

🕢 VNX5300-0 - Create LUN	
General Advanced	
Storage Pool Properties	
Storage Pool Type:	Pool <u>R</u> AID Group
RAID Type:	RAID5: Distributed Parity (High Throughput)
Storage Pool for new LUN:	VSPEX Validation Storage Pool 💽 <u>N</u> ew
Available Capacity: 0. Oversubscribed By:	Consumed Capacity:
LUN Properties	
User Capacity: 1	GB V
LUN ID: 2	Number of LUNs to create: 1
LUN Name	
Automatically assign LU	N IDs as LUN Names
	<u>Apply</u> <u>Cancel</u> <u>Help</u>

Figure 17. Create LUNs

Create at least 10 LUNs for the VSPEX solution. LUNS can be sized according to application requirements. Each of these LUNs will be presented to vSphere as Datastores or RDMs.

TIPS:

- 10 LUNs be created at once. Take the available capacity, and divide that by 10. Enter the result into the "User Capacity" box, then select 10 in the "Number of LUNs to create" box.
- Assign descriptive names to LUNs
- Record LUN ID's

Register Hosts and "Log" Initiators into the VNXe

Hosts must connect to the VNX, and then be registered in order to be added to storage groups.

IMPORTANT: Confirm connectivity between ESXi Hosts iSCSI initiators and the VNXe iSCSI Target interfaces prior to this section by completing the "Test Connectivity" steps previously detailed.

- 1. Log into vCenter
- 2. Select ESXi host 1
- 3. Click on Configuration, then Storage Adapters

4. Right click on the iSCSI Software Adapter and select properties.

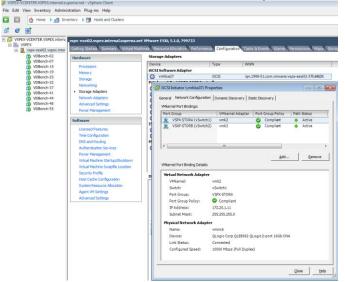


Figure 18. Configure VMware iSCSI Software Adapter

5. Static Discovery Tab. At this point the tab should not be populated.

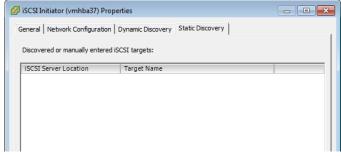


Figure 19. iSCSI SW Initiator Dynamic Discovery

- 6. Now click on the Dynamic Discovery tab. This should also be blank.
- 7. Click on the Add button

🕜 Add S	🕗 Add Send Target Server				×	
						_
iSCSI S	Server:	172.20.1.251				
Port:		3260]			
Parent	:					
i,		n may need to be d with any discov			session can	
				<u>C</u> HAP	<u>A</u> dvanced,	
		OK		Cancel	<u>H</u> elp	

Figure 20. Configure iSCSI SW Initiator Target IP

8. Enter the iSCSI IP address on Storage VLAN 1 for SP-A as configured on the VNXe in previous steps, then click on OK.

- **9.** This initiates a login request from the host initiator to the VNXe. The task will complete after a brief moment.
- Click on the Static Discovery Tab. The tab will be populated with the Storage VLAN 1 SP-A and SP-B targets, which confirms connectivity

SCSI Initiator (vmhba37) P	roperties
eneral Network Configuration	on Dynamic Discovery Static Discovery
Discovered or manually enter	red iSCSI targets:
	_
iSCSI Server Location	Target Name
	_

Figure 21. iSCSI SW Initiator Static Discovery

- 11. Click on the Dynamic Tab once again and repeat steps to add Storage VLAN 2 SP-A.
- **12.** A list of four iSCSI Server Locations on the Static Discovery tab confirms configuration and connectivity from host initiator to the VNXe iSCSI storage array.

🗿 iSCSI Initiator (vmhba37) P	roperties	
General Network Configuration	Dynamic Discovery Static Discovery	
Discovered or manually enter	ed iSCSI targets:	
iSCSI Server Location	Target Name	
172.20.1.251:3260	iqn.1992-04.com.emc:cx.apm00125127014.a6	
172.20.11.251:3260	iqn.1992-04.com.emc:cx.apm00125127014.a7	
172.20.1.252:3260	iqn.1992-04.com.emc:cx.apm00125127014.b6	
172.20.11.252:3260	iqn.1992-04.com.emc:cx.apm00125127014.b7	

Figure 22. iSCSI SW Initiator Static Discovery Populated

NOTE: SPA Port 6 and SPB Port 6 are connected to Storage VLAN 1 and SP-A Port 7 and SP-B Port 7 are connected to Storage VLAN 2. This can be confirmed by matching the statically discovered target IQN to the IP's listed in the Static Discovery tab. The IQN's are suffixed by a6, b6, a7, and b7 which correspond to SP-A Port 6, SP-B Port 6, SP-A Port 7 and SP-B Port 7 respectively. The IPs should match what was configured in previous steps. In the screen captures above, Storage VLAN 1 is 172.20.1.0/24 and Storage VLAN 2 is 172.20.11.0/24. SP-A is '251' and SP-B is '252'.

- 13. Click on OK to close this wizard. When asked to Rescan HBA, click OK. This is process that *logs* the initiators *into* the VNXe array and will allow the initiators to be registered in the next section.
- 14. Repeat this section for the remaining ESXi hosts in this solution.

Once completed you will notice 2 Connected Targets, 1 Device and 4 *Paths* in the details section. This indicates that the hosts are connected to the VNXe, but have not be 'allowed' to see any LUNS. This is expected.



Figure 23. VNXe Discovered

vmhba37			
Model:	iSCSI Software Adapter		
iSCSI Name:	iqn. 1998-01.com.vmware:vspx-esxi02-37b68629		
iSCSI Alias:			
Connected Targets	: 2 Devices: 1 Paths: 4		
View: Devices P	aths		
Runtime Name	Target	LUN	S1
Runtime Name vmhba37:C0:T3:L0		LUN 0	△ 5
View: Devices P Runtime Name vmhba37:C0:T3:L0 vmhba37:C0:T2:L0 vmhba37:C0:T1:L0	Target iqn.1992-04.com.emc:cx.apm00125127014.b7:172.20.11.252:3260	0	△ SI

Figure 24. Paths to VNXe

After all ESXi hosts have been logged into the VNXe, return to the Unisphere GUI to *Register* the hosts.

Registering Hosts

1. Login to the Unisphere GUI, click on the Hosts tab then select Initiators

k https:/	/10.27.0.122/start.html						
EMC U	nisphere						
< >	👔 🗐 VNX3300-0 🔽 🔠 Da	ishboard	Syster	n 👔 Storaç	je 🚺 Hos	ts 🐻 D	ata Prot
<u>VNX33</u>	00-0 > <u>Hosts</u> > Initiators						
Initiato	ſS	_					_
۳.	Filter for Connection S	tatus All		~			
🝸 🗸	Filter for Connection S Initiator Name	tatus All	Host Name 🔺	Host IP Address	Storage Group	Registered	Logged
	Connection 3	SP Port	Host Name 🔺		Storage Group ~management	-	Logged] Yes
Status	Initiator Name	SP Port B-7v0		Host IP Address		No	
Status	Initiator Name	SP Port B-7v0 A-7v0	UNKNOWN	Host IP Address	~management	No No	Yes

Figure 25. VNXe Discovered Initiators

At this point, initiators should be Logged In but not Registered and should be in the *~management* Storage Group. This indicates that the hosts initiators have connected to the storage, but have not yet been accepted, and not been permitted to connect to any LUNs.

2. Select the initiator connected to SP Port A-6v1 and select Register to start the registration wizard.

Initiator Information WWW/IQN: (m.198-01.com.vmware:vspx-esx02-37b68629 SP - port: A-6v1 (ISCS1) Initiator Type: CLARiiON/VNX Host Agent Information	🖉 Register Init	ator Record		— X
SP - port: A-6v1 (ISCSI) Initiator Type: CLARiiON/VNX Flost Agent Information Mew Host Host Name: vspx-esx02.vspex.internal.supernat.net IP Address: I72.20.0.11 	Initiator In	formation		
Initiator Type: CLARION/VNX Selected Host Pailover Mode: re-Active mode(ALUA)-failovermode 4 Revealed Host Agent Information Existing Host Selected Host Host Name: vspx-esx02.vspex.internal.supernat.net IP Address: 172.20.0.11	WWN/IQN:	iqn.1998-01.com.vmware:vspx-esxi02-37b6	58629	
Host Agent Information Mew Host Mew Host Mew Host Mex Strain Stra	SP - port:	A-6v1 (iSCSI) 💌		
New Host Nost Vspx-esx02.vspex.internal.supernat.net IP Address: I72.20.0.11 Internal Sector 2 Internal Sec	Initiator Typ	e: CLARiiON/VNX 🔽 Fail	over Mode: /e-Active mode(ALU	A)-failovermode 4 💌
Host Name: vspx.esxi02.vspex.internal.supernat.net Browse Host IP Address: 172.20.0.11	-Host Agent	T 6		
IP Address: 172.20.0.11	nost Agent	Information		
		Information	Existing Host	Selected Host
Advanced Options	• New Host			Selected Host
Advanced Options	New Host Host Name:	vspx-esxi02.vspex.internal.supernat.net		Selected Host
	 <u>N</u>ew Host Host Name: IP Address: 	vspx-esxi02.vspex.internal.supernat.net 172.20.0.11		Selected Host

Figure 26. VNXe Host Initiator Registration

- **3.** Select CILARiiON/VNX for Initiator Type and ALUA-failovermode 4 for Failover Mode.
- 4. Select New Host and enter the Host Name and IP Address of the host being registered, then click on OK.

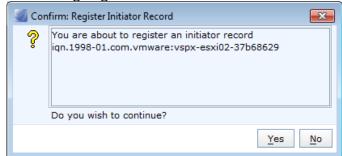


Figure 27. Confirm Initiator Registration

5. Click Yes to confirm.

This registers all Initiators for the host. The initiators will now appear as logged in, and registered, but will still be in the *~management* storage group.

6. Repeat this section for all hosts in the solution.

Creating Storage Groups

Once all initiators have been registered, and LUNs created, click on the Hosts tab in the Unisphere GUI and select Storage Groups to create a Storage Group.

1. Click on Create to launch the Storage Group Wizard.

4.

2.	Enter ?	a name in the Storage Group Name box, This operation will create a new storage group named "VSPEX Storage".	click on OK then Yes
		Do you wish to continue?	
		Yes No]

Figure 28. VNXe Storage Group Configuration

3. The new Storage Group is created.

Click	Yes to add LUNS or connect hosts now.
ୖୄ	Results from call to create storage group:Success
	Do you wish to add LUNs or connect hosts?
	Do you wish to continue?
	<u>Y</u> es <u>N</u> o

Figure 29. Confirm VNXe Storage Group Hosts and LUNs

- 5. Click on the LUNs tab and expand SP-A and SP-B then select all LUNs created in the previous steps, and click Add.
- 6. The LUNs will appear in the Selected LUNs box.
- 7. Click the Hosts tab.
- Select all Hosts registered in the previous steps and Click on the Right Arrow
- 9. The Hosts will appear in the "Hosts to be Connected" Box.
- **10.** Review Hosts and LUNs to be added to group, then Click on OK once finished.

Adding Storage to Virtual Machines

Rescan HBA to view a list of the newly added LUNS in vCenter. Create Datastores or RDM's and present to virtual machines as required.

Chapter 4 Acknowledgements

This chapter presents the following topic:

Acknowledgements	.54	4
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Acknowledgements

The Lenovo ThinkServer - EMC VSPEX Private Cloud solution for VMware vSphere 5.1 was independently validated at Superna (<u>http://www.superna.net</u>).

Chapter 5 References

References	56
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References

VSPEX Solution References:

EMC VSPEX Private Cloud Proven Infrastructure Guide

http://www.emc.com/collateral/technical-documentation/h11553-vspex-pi-pcvmware-vnx.pdf

Lenovo Thinkserver – EMC VSPEX Private Cloud Validated Reference Architecture

<insert link to published Lenovo VSPEX Solution Reference Architecture document>

Extreme Summit References:

Legacy CLI Quick Reference Guide

http://www.extremenetworks.com/libraries/services/Legacy_CLI_Quick_Reference_ Guide.pdf

ExtremeXOS ScreenPlay User Guide

http://www.extremenetworks.com/libraries/services/ExtremeXOS_ScreenPlay.pdf

ExtremeXOS® Concepts Guide Software Version 15.1

http://www.extremenetworks.com/libraries/services/EXOSConcepts_15.1_Version4. pdf

Summit® Family Switches Hardware Installation Guide

http://www.extremenetworks.com/libraries/services/100286-00_Rev18_InstallGuide.pdf

Lenovo ThinkServer References:

ThinkServer User Guide

http://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd630ug_en.pdf

ThinkServer Management Module (TMM) and iKVM Guide

http://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd530rd630tmmug _en.pdf

VMWare References:

vSphere Installation and Setup

http://pubs.vmware.com/vsphere-51/topic/com.vmware.ICbase/PDF/vsphere-esxivcenter-server-51-installation-setup-guide.pdf

EMC VNX References:

EMC® VNX™ VNXe3300™ Installation Guide

https://support.emc.com/docu31489_VNXe3300-Installation-Guide.pdf?language=en_US

EMC® VNXe[™]3300 System Hardware Installation Guide for Telco Racks

https://support.emc.com/docu34546_VNXe3300-Enclosures-Hardware-Installation-Guide-for-Telco-Racks.pdf?language=en_US

EMC® VNXe[™] Series: Using a VNXe System with VMware NFS or VMware VMFS

https://support.emc.com/docu31486_VNXe-Series-Using-a-VNXe-System-with-VMware.pdf?language=en_US

Appendix A VLAN and IP Address Schema

VLAN and IP Address Schema

VLAN and IP Address Schema

Each device should have its VLAN and IP address match the table below. The subnet schema embeds the VLAN number into the IP address to simplify the mapping when debugging. This design allows simplified debugging without needing to refer to documents when looking at IP addresses or VLAN's as the rule allows administrators to map them as per the numbers. For example VLAN 2500 would translate to 172.25.0.x and VLAN 3500 translates to an IP address of 172.35.0.x.

Device	VID	IP
ESXi-1 Mgmt	1001	172.10.1.10
esx-1 Storage ESXi-1 Storage Fabric A	2001	172.20.1.10
ESXi-1 Storage Fabric B	2011	172.20.11.10
ESXi-1 vMotion A	2002	172.20.2.10
ESXi-1 vMotion B	2012	172.20.12.10
ESXi-1 Fault Tolerance/HA A	2003	172.20.3.10
ESXi-1 Fault Tolerance/HA B	2013	172.20.13.10
VNX Mgmt SPa	1001	172.10.1.201
VNX Mgmt SPb	1001	172.10.1.211
VNX mgmt (virtual)	1001	172.10.1.200
VNXe iSCSI Fabric A	2001	172.20.1.200
VNXe iSCSI Fabric B	2011	172.20.11.200

Table 4. Sample IP Address Schema

Appendix B Compute Card Schema

This appendix presents the following topic:
CNA Network Assignments

CNA Network Assignments

To ensure post deployment supportability, the table below will greatly assist network and server administrators debug physical issues with cabling and data flow through the VSPEX system. All servers should be listed below. The slot naming convention should be based on visual arbitrary slot numbers and not PCI bus numbers as they will not match the physical view from outside the server.

The information will also assist in the installation of new hosts when slotting cards to different network devices. The term fabric is used to break the design down into logical areas. Fabric A and Fabric B is a logical division of all devices in the system and ensures a correct cabling of a device, slot, and port to the correct fabric. This step is critical as all logical flow troubleshooting post deployment is based on the assumption data will flow over certain paths and fabric as primary or secondary paths.

When loading sharing is enabled or multi-pathing data can take different paths through the fabrics, which complicates debugging of the physical to logical design.

Host	Card Type	Slot	Protocol	Port	Fabric (A or B)	QTag	Networks
ESXi	CNA	1	IP	1	A	yes	vMotion, Customer, Management, FT
ESXi	CNA	1	iSCSI, IP	2	А	yes	Storage
ESXi	CNA	2	IP	1	В	yes	vMotion, Customer, Management, FT
ESXi	CNA	2	iscsi, Ip	2	В	yes	Storage

Table 5. CNA Network Assignments

Appendix C Sample Network Configuration

This appendix presents the following topic:	
Sample Network Configuration	63

Sample Network Configuration

Fabric A	#Disable unused ports disable port 1-48 #Clear unused ports out of Default VLAN configure VLAN default delete ports all #Delete unused ports from vr configure vr VR-Default delete ports 1-48		
	#Ensure relevant ports are attached to vr configure vr VR-Default add ports 7 - 14, 16, 24, 39,40 #Create Trunk		
	enable sharing 39 grouping 39-40 algorithm address-based L2 lacp		
	# Create and tag VLANs create VLAN "VSPX-CUSO"		
	configure VLAN VSPX-CUS0 tag 2100 create VLAN "VSPX-CUS1"		
	configure VLAN VSPX-CUS1 tag 2101 create VLAN "VSPX-CUS2"		
	configure VLAN VSPX-CUS2 tag 2102 create VLAN "VSPX-CUS3" configure VLAN VSPX-CUS3 tag 2103		
	create VLAN "VSPX-FLTT" configure VLAN VSPX-FLTT tag 2003		
	create VLAN "VSPX-MGMT" configure VLAN VSPX-MGMT tag 2000		
	create VLAN "VSPX-STOR" configure VLAN VSPX-STOR tag 2001		
	create VLAN "VSPX-VMOT" configure VLAN VSPX-VMOT tag 2002 #Add ports to VLANs		
	configure VLAN VSPX-CUSO add ports 9, 11, 13, 16, 24, 39 tagged		
	configure VLAN VSPX-CUS1 add ports 9, 11, 13, 24, 39 tagged		
	configure VLAN VSPX-CUS2 add ports 9, 11, 13, 24, 39 tagged		
	configure VLAN VSPX-CUS3 add ports 9, 11, 13, 24, 39 tagged		
	configure VLAN VSPX-FLTT add ports 9, 11, 13, 39 tagged configure VLAN VSPX-MGMT add ports 9, 11, 13, 16, 24, 39 tagged		
	configure VLAN VSPX-STOR add ports 7-8, 10, 12, 14 tagged		
	configure VLAN VSPX-VMOT add ports 9, 11, 13, 39 tagged # Enable Jumbo Frames		
	enable jumbo-frame ports 7-14,16,24,39		
	<pre># Enable Ports enable ports 7-14,16,24,39</pre>		
Fabric B	<pre>#Disable unused ports disable port 1-48 #Clear unused ports out of Default VLAN configure VLAN default delete ports all #Delete unused ports from vr configure vr VR-Default delete ports 1-48</pre>		
	#Ensure relevant ports are attached to vr configure vr VR-Default add ports 7 - 14, 16, 24, 39,40 #Create Trunk		

enable sharing 39 grouping 39-40 algorithm address-based L2 lacp # Create and tag VLANs create VLAN "VSPX-CUS0" configure VLAN VSPX-CUS0 tag 2100 create VLAN "VSPX-CUS1" configure VLAN VSPX-CUS1 tag 2101 create VLAN "VSPX-CUS2" configure VLAN VSPX-CUS2 tag 2102 create VLAN "VSPX-CUS3" configure VLAN VSPX-CUS3 tag 2103 create VLAN "VSPX-FLTT" configure VLAN VSPX-FLTT tag 2003 create VLAN "VSPX-MGMT" configure VLAN VSPX-MGMT tag 2000 create VLAN "VSPX-STORB" configure VLAN VSPX-STORB tag 2011 create VLAN "VSPX-VMOT" configure VLAN VSPX-VMOT tag 2002 #Add ports to VLANs configure VLAN VSPX-CUS0 add ports 9, 11, 13, 16, 24, 39 tagged configure VLAN VSPX-CUS1 add ports 9, 11, 13, 24, 39 tagged configure VLAN VSPX-CUS2 add ports 9, 11, 13, 24, 39 tagged configure VLAN VSPX-CUS3 add ports 9, 11, 13, 24, 39 tagged configure VLAN VSPX-FLTT add ports 9, 11, 13, 39 tagged configure VLAN VSPX-MGMT add ports 9, 11, 13, 16, 24, 39 tagged configure VLAN VSPX-STORB add ports 7-8, 10, 12, 14 tagged configure VLAN VSPX-VMOT add ports 9, 11, 39 tagged # Enable Jumbo Frames enable jumbo-frame ports 7-14,16,24,39 # Enable Ports enable ports 7-14,16,24,39

Appendix D Sample Cabling Guide

Sample Cabling	Guide
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Sample Cabling Guide

Table 6. Cabling Guide

Switch	Switch Port	Device	Device Port
Switch A	1	Uplink 1	N/A
Switch A	7	VNXe	SP A Port 0
Switch A	8	VNXe	SP B Port 0
Switch A	9	Server 1	CNA 1 Port 1
Switch A	10	Server 1	CNA 1 Port 2
Switch A	11	Server 2	CNA 1 Port 1
Switch A	12	Server 2	CNA 1 Port 2
Switch A	13	Server 3	CNA 1 Port 1
Switch A	14	Server 3	CNA 1 Port 2
Switch A	39	Switch B	39
Switch A	40	Switch B	40
Switch B	1	Uplink 2	N/A
Switch B	7	VNXe	SP A Port 1
Switch B	8	VNXe	SP B Port 1
Switch B	9	Server 1	CNA 2 Port 1
Switch B	10	Server 1	CNA 2 Port 2
Switch B	11	Server 2	CNA 2 Port 1
Switch B	12	Server 2	CNA 2 Port 2
Switch B	13	Server 3	CNA 2 Port 1
Switch B	14	Server 3	CNA 2 Port 2
Switch B	39	Switch A	39
Switch B	40	Switch A	40

Appendix E Sample Switch Port Labeling Guide

This appendix presents the following topic:	
Sample Switch Port Labeling Guide	.68

Sample Switch Port Labeling Guide

SwitchPort	Display-String (Switch A)	Display String (Switch B)
7	VNX5300-SPb6-0	VNX5300-SPb7-0
8	VNX5300-SPa6-0	VNX5300-Spa7-0
9	vs-esx01-83aP1v3	vs-esx01-83bP1v3
10	vs-esx01-83aP2v4	vs-esx01-83bP2v4
11	vs-esx02-83aP1v4	vs-esx02-83bP1v4
12	vs-esx02-83aP2v4	vs-esx02-83bP2v4
13	vs-esx03-83aP1v4	vs-esx03-83bP1v4
14	vs-esx03-83aP2v4	vs-esx03-83bP2v4
24	Uplink A	Uplink B
39	VS-TRUNK-M	VS-TRUNK-M
40	VS-TRUN-S	VS-TRUN-S

Table 7. Sample Switch Port Labeling Guide

Appendix F Compute Firmware and Hardware Installation

This appendix presents the following topics:

PCIe Slot Assignment	70
Recommended Firmware Release (TBC)	70

PCIe Slot Assignment

Table 8. PCIe Slot Assignment

PCIe Slot	Card
1	Qlogic 8362 - A
2	Qlogic 8362 - B
3	Raid 700 Controller

Recommended Firmware Release (TBC)

Table 9. Recommended Firmware Release

BIOS	Release
MGMT Server	2.12
Compute Fabric	2.12
Compute Fabric RAID	2.120.183-1415
Compute Fabric BMC	1.12

Appendix GPower and Rack Position Planning

This appendix presents the following topic:	
Power and Rack Position Planning7	'2

Power and Rack Position Planning

Figure 30. Power and Rack Position Planning

