

# EMC<sup>®</sup> VNXe<sup>®</sup> Series

## Configuring Hosts to Access VMware NFS or VMware VMFS Datastores

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# PREFACE

*As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.*

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**Note:** This document was accurate at publication time. New versions of this document might be released on the EMC online support website. Check the EMC online support website to ensure that you are using the latest version of this document.

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## Purpose

This document is part of the EMC VNXe documentation set. It describes how to set up VMware ESX hosts to access VMware storage on a VNXe system with VNXe Operating Environment version 3.0 or later.

The information included in this document will enable you to achieve a minimum recommended configuration. Use this document along with the relevant host documentation to plan and configure a robust host access solution that your environment requires.

### **IMPORTANT**

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The VNXe VMware storage is presented directly to the ESX host and not to the host's virtual machines.

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## Audience

This document is intended for the person or persons who are responsible for setting up the hosts to access the VNXe storage.

Readers of this document should be familiar with VNXe VMware storage and with the ESX Server operating system running on ESX hosts that will access VNXe VMware storage.

## Related documentation

Other VNXe documents include:

- ◆ *Installation Guide*
- ◆ *Hardware Information Guide*
- ◆ *Parts Location Guide*
- ◆ *Configuring Host Access to CIFS File Systems*
- ◆ *Configuring Host Access to NFS File Systems*
- ◆ *Configuring Host Access to Fibre Channel (FC) or iSCSI LUNs*
- ◆ *Unisphere Online Help*
- ◆ *Unisphere CLI User Guide*

EMC Unisphere help provides specific information about the VNXe storage, features, and functionality. The Unisphere help and a complete set of VNXe customer documentation are located on the EMC Online Support website (<http://www.emc.com/vnxesupport>).

## Conventions used in this document

EMC uses the following conventions for special notices:



**DANGER** indicates a hazardous situation which, if not avoided, will result in death or serious injury.

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**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury.

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**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

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**NOTICE** is used to address practices not related to personal injury.

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**Note:** A note presents information that is important, but not hazard-related.

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### **IMPORTANT**

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An important notice contains information essential to software or hardware operation.

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## Typographical conventions

EMC uses the following type style conventions in this document:

<b>Normal</b>	Used in running (nonprocedural) text for: <ul style="list-style-type: none"> <li>Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus</li> <li>Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, and utilities</li> <li>URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, and notifications</li> </ul>
<b>Bold</b>	Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages  Used in procedures for: <ul style="list-style-type: none"> <li>Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus</li> <li>What the user specifically selects, clicks, presses, or types</li> </ul>

<i>Italic</i>	Used in all text (including procedures) for: <ul style="list-style-type: none"> <li>• Full titles of publications referenced in text</li> <li>• Emphasis, for example, a new term</li> <li>• Variables</li> </ul>
Courier	Used for: <ul style="list-style-type: none"> <li>• System output, such as an error message or script</li> <li>• URLs, complete paths, filenames, prompts, and syntax when shown outside of running text</li> </ul>
<b>Courier bold</b>	Used for specific user input, such as commands
<i>Courier italic</i>	Used in procedures for: <ul style="list-style-type: none"> <li>• Variables on the command line</li> <li>• User input variables</li> </ul>
< >	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

## Where to get help

You can find support, product, and licensing information for the storage system as follows:

**Product information** — For documentation, release notes, software updates, or information about EMC products, licensing, and service, go to the EMC online support website (registration required) at:

<http://www.emc.com/vnxesupport>

**Technical support** — For technical support, go to EMC online support. Under Service Center, you will see several options, including one to create a service request. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

## Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

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# CHAPTER 1

## Setting Up a Host to Use VNXe VMware NFS Datastores

This chapter describes how to set up a VMware ESX host or virtual machine to use EMC VNXe VMware NFS datastores.

Topics include:

- ◆ Requirements for setting up a host to use VNXe VMware NFS datastores ..... 10
- ◆ Configuring VNXe NFS datastores for the host..... 12
- ◆ Configuring user and group access to the NFS datastore..... 13
- ◆ Manually setting up the connection to a VNXe NFS datastore ..... 14

# Requirements for setting up a host to use VNXe VMware NFS datastores

Before you can set up a host to use VNXe NFS datastores, the following VNXe system and network requirements described in this section must be met.

## VNXe system requirements

- ◆ You have installed and configured the VNXe system using the VNXe Configuration Wizard, as described in the *Installation Guide* for your storage system.
- ◆ You have used Unisphere or the VNXe CLI to perform basic configuration of one or more VNXe NAS servers on the VNXe system.

## Network requirements

The host must be in a LAN environment with the VNXe NAS server.

Users can store files on a VNXe NAS server in a Network Information Service (NIS) environment, but you cannot configure a VNXe NAS server as an NIS client.

## Using network high availability

The VNXe system supports link aggregations that allows up to four Ethernet ports connected to the same physical or logical switch to be combined into a single logical link. This behavior is called link aggregation. To configure link aggregation on a VNXe system, each storage processor (SP) must have the same type and number of Ethernet ports because configuring link aggregation actually creates two link aggregations — one on each SP. This provides high availability as follows. If one of the ports in the link aggregation fails, the system directs the network traffic to one of the other ports in the aggregation. If you add an Ethernet I/O module to each SP in a VNXe system, you can create one additional link aggregation group on the set of ports in the I/O module.

The rest of this section describes:

- ◆ [“Link aggregations” on page 10](#)
- ◆ [“Configuring a link aggregation” on page 11](#)

For additional information on data availability in your VNXe system and your connectivity infrastructure, refer to *EMC VNXe High Availability, A Detailed Review* white paper.

## Link aggregations

Link aggregations use the Link Aggregation Control Protocol (LACP) IEEE 802.3ad standard. A link aggregation appears as a single Ethernet link and has the following advantages:

- ◆ High availability of network paths to and from the VNXe system — If one physical port in a link aggregation fails, the system does not lose connectivity.
- ◆ Possible increased overall throughput — Because multiple physical ports are bonded into one logical port with network traffic distributed between the multiple physical ports.

Although link aggregations can provide more overall bandwidth than a single port, the

connection to any single client runs through one physical port and is therefore limited by the port's bandwidth. If the connection to one port fails, the switch automatically switches traffic to the remaining ports in the group. When the connection is restored, the switch automatically resumes using the port as part of the group.

On the VNXe system, you can configure up to four ports in a link aggregation. When you configure a link aggregation, you are actually configuring two link aggregations — one on each SP. If one of the ports in a aggregation fails, the system directs network traffic to one of the other ports in the group. If all the ports in the group fail, the system fails over to the corresponding link aggregation on the peer SP.

## Switch requirements

If the VNXe ports are connected to different network switches, you should configure all switch ports connected to the VNXe ports to immediately switch from blocking mode to forwarding mode and not pass through spanning tree states of listening and learning when an interface comes up. On Cisco switches, this means that you must enable the portfast capability for each switch port connected to a VNXe port to guarantee that the switch forwards the Ethernet frame that the VNXe system generates when a physical link is enabled. You enable the portfast capability on a port-to-port basis. When enabled, the portfast variable causes the port to immediately switch from blocking to forwarding mode. Do *not* use portfast on switch-to-switch connections.

For link aggregation, network switches must have IEEE 802.3ad protocol support and guarantee that packets from a single TCP connection always go through the same link in a single direction.

## Configuring a link aggregation

For link aggregation, you have at least one 802.3ad-compliant switch, each with an available port for each switch port you want to connect to a VNXe port in the aggregation.

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**Note:** The term *NIC teaming* refers to all NIC redundancy schemes, including link aggregation with 802.3ad.

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For link aggregation, you need to perform two sets of configuration tasks:

- ◆ [“Configuring link aggregation from the switch to the VNXe system” on page 11](#)
- ◆ [“Configuring link aggregation from the ESX host to the switch” on page 12](#)

### Configuring link aggregation from the switch to the VNXe system

1. Configure the switch ports, which are connected to the VNXe, for LACP in active mode, as described in the documentation provided with your switches.
2. Join the VNXe ports into a link aggregation using the Unisphere Advanced Configuration option (**Settings > More configuration > Port Settings**). For information on using the Advanced Configuration option, refer to the Unisphere online help. Two link aggregations are created with the same ports — one aggregation on each SP.

## Configuring link aggregation from the ESX host to the switch

To configure link aggregation from the ESX host to the switch, perform these tasks:

- ◆ [“Task 1: Configure switch ports for link aggregation” on page 12.](#)
- ◆ [“Task 2: Set up NIC teaming on the ESX host” on page 12](#)

### Task 1: Configure switch ports for link aggregation

Configure the switch ports, which are connected to the ESX host for link aggregation.

**NOTICE**

Depending on the type of NIC teaming used, you may not need to configure these switch ports for link aggregation. For more information, refer to your VMware documentation.

### Task 2: Set up NIC teaming on the ESX host

On an ESX host, you create a NIC team by creating a virtual switch with two or more physical NICs. For information on creating a virtual switch, refer to the VMware documentation for the version of ESX running on the host.

## Configuring VNXe NFS datastores for the host

Use Unisphere or the VNXe CLI to:

1. Discover VMware ESXi hosts.
2. Create VNXe NFS datastores.

**IMPORTANT**

When you create VNXe NFS datastores for discovered VMware ESXi hosts, the VNXe system automatically configures the hosts to use the datastores. If you select multiple discovered hosts for the datastores, all the selected hosts are configured automatically. If an ESXi host cannot see the NFS datastore after you create the datastore, go to [“Manually setting up the connection to a VNXe NFS datastore” on page 14.](#)

For information on performing these tasks refer to the Unisphere online help.

## Configuring user and group access to the NFS datastore

Use the steps below to adjust permissions for best security in an environment where the connections from a VNXe system to the ESX hosts are not on a separate physical or virtual network. If you are using an isolated storage network for these connections, the step below may not be required.

1. Log in as root to an ESX host with **Read/Write, allow Root** access to the VNXe NFS datastore.

If the VNXe datastore is not visible to the host, make sure that you are logged in to the correct domain.

2. Set up the datastore's directory and file structure.

3. Set up user and group permissions to the datastore's directories and files.

For the best security, use the most restrictive access that is acceptable, such as not allowing root access to the share and mounting the datastore with read-only access wherever feasible.

4. For added security, change the access for the host with Read/Write, allow Root access to Use Default Access, Read-Only, or Read/Write:

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**Note:** You must be a member of the VNXe local Administrators group to change host access to a share.

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- a. Open Unisphere and select **Storage > VMware**.
- b. Select the datastore and click **Details**.
- c. Click the **Host Access** tab and in the **Access** column for the host, select **Use Default Access, Read Only, or Read/Write**.

### What next?

You are now ready to either migrate (relocate) a virtual disk to the VNXe NFS datastore or have the ESX host start using the NFS datastore. To migrate a virtual disk to the NFS datastore, go to [Chapter 4, "Migrating VMware Virtual Machines to the VNXe System."](#)

## Manually setting up the connection to a VNXe NFS datastore

If the ESX host cannot see a VNXe NFS datastore, the VNXe system's configuration of the ESX host may not have succeeded. In this situation, you must do the following:

1. Use EMC Unisphere™ software to find the IP address of the VNXe NAS server for the NFS datastore:
  - a. Select **Storage > VMware** and select the datastore.
  - b. Select **Details > View Access Details**.

The first part of the Export Path before the colon (:) is the IP address of the NAS server. For example, in the Export Path 10.222.3.44:/nfsdatastore2, 10.222.3.44 is the IP address of the NAS server for the datastore nfsdatastore2.

2. Log into VMware vSphere Client VI client as administrator.
3. For each NFS datastore:
  - a. In the Inventory panel, select the host and click the **Configuration** tab.
  - b. In the Hardware panel, click **Storage**, and then click **Add Storage**.
  - c. Select **Network File System** as the file storage type, and then click **Next**.
  - d. Enter the following information and click **Next**:
    - For the server — the IP address of the VNXe NFS NAS server.  
You can find this address using the Unisphere path **Settings > NAS Server Settings**.
    - For the folder — the path to the VNXe share.
    - The name of the new VMware datastore.
  - e. In the Network File System Summary page, review the configuration options for the new datastore, and click **Finish**.

Perform a rescan to make the VMware NFS datastore visible to ESX Server and verify that the datastore you created is in the datastores list that appears.

# CHAPTER 2

## Setting Up a Host to Use VNXe VMware VMFS (iSCSI) Datastores

This chapter describes the requirements for setting up an ESX host to use EMC VNXe VMFS datastores, how to set up the ESX host for path management software, and how to troubleshoot the connection between the ESX host and a VNXe VMFS datastore.

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**Note:** The procedures in this document use “ESX” to refer to “VMware ESX.”

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Topics include:

- ◆ Requirements for setting up a host to use VNXe VMware VMFS datastores..... 16
- ◆ Using multi-path management software ..... 18
- ◆ Creating a VMkernel port for the software iSCSI adapter ..... 19
- ◆ Setting up multipathing for iSCSI ..... 20
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# Requirements for setting up a host to use VNXe VMware VMFS datastores

Before you set up a host to use VNXe VMware VMFS datastores, the VNXe system and network requirements in described this section must be met.

## VNXe system requirements

- ◆ You have installed and configured the VNXe system using the VNXe Configuration Wizard, as described in the *Installation Guide* for your storage system.
- ◆ You have used Unisphere or the VNXe CLI to perform basic configuration of one or more iSCSI interfaces on the VNXe system.

## Network requirements

For a host to connect to VMware VMFS datastores on a VNXe iSCSI interface, the host must be in a network environment with the VNXe iSCSI interface; to achieve best performance, the host should be on a local subnet with each VNXe iSCSI interface that provides storage for it. If possible, you should segment network traffic from the VNXe system through a private LAN using either a virtual LAN or a dedicated network switch.

To achieve maximum throughput, connect the VNXe iSCSI interface and the hosts for which it provides storage to their own private network, that is, a network just for them. When choosing the network, consider network performance.

## Path management network requirements

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**Note:** Path management software is not currently supported for a Windows 7 or Mac OS host connected to a VNXe system.

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When implementing a highly-available network between a host and the VNXe system, keep in mind that:

- ◆ A VNXe VMware VMFS datastore is visible to both SPs
- ◆ You can configure up to 8 IPs/VLANs per physical interface. You can create up to 64 iSCSI IPs per system.
- ◆ Network switches may be on separate subnets.

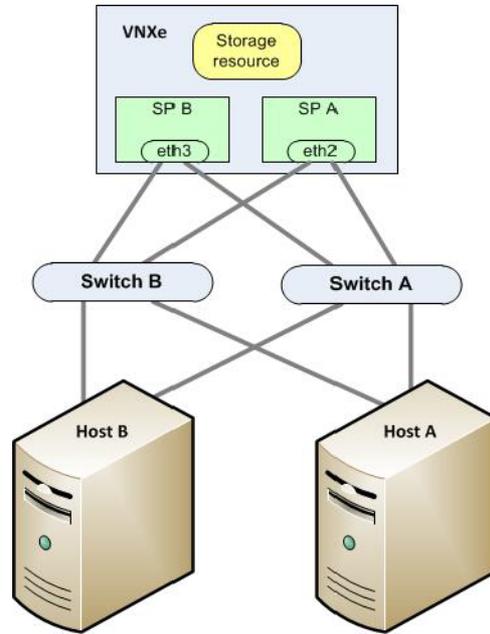
### **IMPORTANT**

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Directly attaching an ESX host to a VNXe system is supported.

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[Figure 1 on page 17](#) shows a highly-available iSCSI network configuration for hosts accessing a VNXe storage resource (VMware VMFS datastore). Switch A and Switch B are on separate subnets. Host A and Host B can each access the storage resource through separate NICs. If the storage resource is owned by SP A, the hosts can access the storage resource through the paths to the eth2 interface on SP A. Should SP A fail, the VNXe system transfers ownership of the resource to SP B and the hosts can access the storage resource through the paths to the eth2 interface on SP B.



**Figure 1** Sample highly-available iSCSI network

## Using multi-path management software

Multi-path management software manages the connections (paths) between the host and the VNXe system to provide access to the VNXe storage should one of the paths fail. The following types of multi-path management software are available for an ESX host connected to a VNXe system:

- ◆ ESX native failover on any ESX host
- ◆ EMC PowerPath/VE software on an ESXi 5.x host.

For the supported versions of the PowerPath/VE software, refer to the VNXe EMC Simple Support Matrix for the VNXe Series on the EMC Online Support website (<http://www.emc.com/vnxesupport>). To find this matrix on the website, search for “Simple Support Matrix” on the VNXe Support Page.

For information on data availability in the VNXe system and in your connectivity infrastructure, refer to *EMC VNXe High Availability, A Detailed Review*, in the White Papers section of the VNXe support website (<http://emc.com/vnxesupport>).

## Setting up a VNXe system for multi-path management software

For a VNXe system to operate with hosts running multi-path management software, two iSCSI IPs are required, and they can be on different interfaces.

Use the EMC Unisphere™ **Settings > iSCSI Settings** page to check for this configuration. For details on how to configure iSCSI interfaces, refer to the topic on changing iSCSI interface settings in the Unisphere online help.

### **IMPORTANT**

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For highest availability, use two network interfaces on the iSCSI interface. The network interfaces can be on separate subnets. You can view the network interfaces for an iSCSI interface with Unisphere under Network Interface advanced settings (**Settings > iSCSI Settings**).

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## Installing PowerPath/VE

### **IMPORTANT**

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vSphere ESX or VNXe link aggregation is not supported with PowerPath/VE.

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1. On the host or virtual machine, download the latest PowerPath/VE version from the PowerPath/VE software downloads section on the EMC Online Support website (<http://support.emc.com>).
2. Install PowerPath/VE, as described in the appropriate PowerPath/VE installation and administration guide for the host’s operating system.

This guide is available on the EMC Online Support website. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the readme file that accompanies the patch.

## Creating a VMkernel port for the software iSCSI adapter

Connect the VMkernel, which runs services for iSCSI storage, to the physical network adapter:

1. Log in to the vSphere Client as an administrator.
2. From the Inventory panel, select the host.
3. Click the **Configuration** tab, and click **Networking**.
4. In the Virtual Switch view, click **Add Networking**.
5. Select **VMkernel** and click **Next**.
6. Select **Create a virtual switch** to create a new vSwitch.
7. Select an adapter that you want to use for iSCSI traffic and click **Next**.

### **IMPORTANT**

Do not use iSCSI on 100 Mbps or slower adapters.

If no adapters appear under **Create a virtual switch**, the existing vSwitches are using all the network adapter in the host. In this situation, you can use an existing vSwitch for iSCSI traffic.

8. Under Port Group Properties, enter the network label, and click **Next**.  
The network label is the name that you want to identify the VMkernel port that you are creating.
9. Specify the IP settings and click **Next**.
10. After you review the summary information, click **Finish**.

### **What next?**

If your host uses only one physical network adapter for iSCSI, your network configuration is complete.

If your host uses more than one physical network adapter for iSCSI, you must connect additional adapters to the vSwitch and associate each port with a VMkernel port using the port binding technique. You can do this in one of following ways:

- ◆ Use a single vSwitch for iSCSI multipathing by connecting the additional network adapters and VMkernel ports to the vSwitch that you just created and override the default setup so that each port maps to only one active adapter. To do this, continue to the next section, "[Setting up multipathing for iSCSI](#)" on page 20.
- ◆ Create separate vSwitches for each additional network adapter by repeating the previous steps 1 through 10 for each additional adapter.

## Setting up multipathing for iSCSI

Use this procedure only if:

- ◆ You have two or more NICs that you can designate for iSCSI and
- ◆ You want to connect all of these iSCSI NICs to a single vSwitch.

The procedure associates VMkernel ports with the iSCSI NICs using a 1-to-1 mapping.

### To set up multipathing for Software iSCSI

Before following the procedure below to set up multipathing for software iSCSI, you must have created one VMkernel port for your network adapter.

#### CAUTION

**If the network adapter that you add to the software iSCSI initiator is not in the same subnet as your iSCSI target (VNXe iSCSI interface), the host cannot establish sessions from this network adapter to the target.**

1. Log in to the vSphere Client as an administrator.
2. From the Inventory panel, select the host.
3. Click the **Configuration** tab, and click **Networking**.
4. Select the vSwitch that you use for iSCSI and click **Properties**.
5. Bind additional network adapters to the vSwitch:
  - a. In the vSwitch Properties dialog box, click the **Network Adapters** tab and click **Add**.
  - b. From the list of adapters, select the ones that you want to add to the vSwitch and click **Next**.
  - c. After you review the information on the summary page, click **Finish**.

The list of network adapters reappears, showing the network adapters that the vSwitch claims.
6. Create VMkernel ports for that network adapters that you connected to the vSwitch:

#### **IMPORTANT**

Each VMkernel port in a vSwitch with multiple network adapters must have only one network adapter designated as active for each VMkernel port. The other adapters must be designated as unused.

- a. In the vSwitch Properties dialog box, click the **Ports** tab and click **Add**.
- b. Select **VMkernel** and click **Next**.
- c. Under Port Group Properties, enter a network label and click **Next**.

The network label is the name that you want to identify the VMkernel port group that you are creating.

- d. Specify the IP settings and click **Next**.

When you enter the subnet mask, be sure that the network adapter are set to the subnet of the VNXe iSCSI interface to which it connects.

- e. After you review the information on the summary page, click **Finish**.

7. Map each VMkernel port to just one active adapter.

By default all network adapters appear as active for each VMkernel on the vSwitch. You must override this setup so that each port maps to only one active adapter. For example, VMkernel port vmk1 maps to active adapter vmnic1, port vmk2 maps to vmnic2, and so on.

For *each* VMkernel port on the vSwitch:

- a. On the **Ports** tab, select a VMkernel port and click **Edit**.
- b. Click the **NIC Teaming** tab and select **Override vSwitch failover order**.
- c. Specify only one adapter as active and move all the remaining adapters to the **Unused Adapters** list.

8. Connect the VMkernel ports to the software iSCSI initiator:

- a. Log in to the vSphere Client as an administrator.
- b. From the Inventory panel, select the host.
- c. Click the **Configuration** tab, and click **Storage Adapters**.
- d. Select the iSCSI adapter and click **Properties**.
- e. Select the **Network Configuration** tab and click select.
- f. Select the VMkernel ports on the vSwitch and then click **OK**.
- g. Review the summary and click **Finish**.

## Configure the ESX iSCSI adapters

Follow these steps to configure software iSCSI adapters. If CHAP authentication is required, follow VMware vSphere steps to configure CHAP parameters for iSCSI adapters.

1. Log into VMware vSphere Client as administrator.
2. From the inventory panel, select the server with the initiator that you want to configure.
3. Click the **Configuration** tab, and click **Storage Adapters**.
4. Click **Add** in the **Add Storage Adapter** dialog box, and then select **Add Software iSCSI Adapter**.
5. Select the iSCSI initiator that you want to configure, and click **Properties**.
6. In the **iSCSI Initiator Properties** page, click the **General** tab and then click **Configure**.
7. Select **Enabled**.
8. Under **iSCSI Properties**, enter a user-friendly iSCSI name and an iSCSI alias for the software iSCSI initiator, and then click **OK**.
9. Add target addresses for the software iSCSI initiator:
  - a. Click the **Static Discovery** tab and click **Add**.
  - b. Add the target's information and click **OK**.
  - c. Rescan the adapter.
10. If you want to configure CHAP credentials for the target, access the **iSCSI Initiator Properties** page, click the **Static Discovery** tab, and click **Settings** > **CHAP**. Then rescan the adapter.

---

**Note:** See VMware vSphere 5.x documentation for more details about CHAP configuration.

---

## Configuring VNXe VMware VMFS datastores for the host

1. Add the software iSCSI adapter, if not already added, as described in VMware vSphere documentation.
2. Use Unisphere or the VNXe CLI to:
  - a. Discover VMware ESXi hosts
  - b. Create VNXe VMFS datastores

For information on performing the above Unisphere tasks, refer to the Unisphere online help.

### **IMPORTANT**

When you create VNXe VMFS datastores for discovered VMware ESXi hosts, the VNXe system automatically configures the hosts to use the Datastores. If you select multiple discovered hosts for the datastores, all the selected hosts are configured automatically. The VMware VMFS datastores are presented directly to the ESXi hosts and not to the hosts' virtual machines. If an ESXi host cannot see the VMFS datastore after you create the datastore, go to [“Manually configuring the connection to a VNXe VMFS datastore” on page 25.](#)

3. Rescan for the VMFS datastores:
  - a. From the Inventory panel, select the server, and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage Adapters**.
  - c. Under **iSCSI Software Adapters** in the list of adapters, right click on the iSCSI Software adapter and then click **Rescan**.
  - d. In the **Rescan** dialog box, select the adapter (NIC), and then click **Rescan**.
  - e. In the **Rescan** dialog box, select both **Scan for New Storage Devices** and **Scan for New VMFS Volumes**, and click **OK**.

If the host can see the VMFS datastore, you must set up the host to use the datastore, as described in the next section.

If the host cannot see the VMFS datastore, you may have problems with one of the following:

- Connection between the host and iSCSI target (VNXe iSCSI interface), in which case you need to manually configure this connection as described in [“Manually configuring the connection to a VNXe VMFS datastore” on page 25.](#)

or

- Session between the host and an iSCSI target. To troubleshoot this problem, see [“iSCSI session troubleshooting” on page 27.](#)

## Configuring ESXi Server native failover

ESXi Server includes native failover for managing the I/O paths between the server and storage system. Native failover provides multiple paths from the server to the storage system. To use the ESXi Server native failover with your storage system, you must implement one of the failover policies listed below. For more information about these policies, refer to the ESX configuration guide.

- ◆ Round Robin (default)
- ◆ Fixed with failover mode
- ◆ Most Recently Used (MRU)

### Configuring the native failover policy

1. Log into VMware vSphere Client VI client as administrator.
2. From the inventory panel, select the server, and click the **Configuration** tab.
3. Under **Hardware**, click **Storage** and select the datastore (LUN).
4. Click **Properties**.
5. In the properties page, click **Manage Paths**.
6. In the **Manage Paths** page, under **Policy**, verify that the policy is one you want:

Fixed (VMware) for fixed native failover policy

Round Robin (VMware) for Round Robin native failover policy

Most Recently Used (VMware) for MRU native failover policy

If the policy is not set to the desired policy, in the policy selection dialog, select the correct policy.

7. If you selected the **Fixed (VMware)** policy, under **Paths**, select the preferred path.  
You can statically balance the load using the fixed policy by selecting different paths for each datastore. To designate a different path as preferred, right click on the path and click **preferred**.
8. Click Close.

### What next?

You are now ready to either migrate a virtual machine to the VMFS datastore or create a virtual machine on the VMFS datastore. To migrate a virtual disk to the VMFS datastore, go to [Chapter 4, “Migrating VMware Virtual Machines to the VNXe System.”](#) For information about creating a virtual machine on the VMFS datastore, refer to the VMware documentation.

## Manually configuring the connection to a VNXe VMFS datastore

If you receive a connection error when the host is trying to log in to an iSCSI target (VNXe iSCSI interface) or you cannot see the datastores on the target, you may be having problems with the iSCSI session between the initiator and the target. This problem may be because:

- ◆ The VNXe system's configuration of the ESX host for the VMFS datastore either failed to configure Software iSCSI on the host to access the datastore (see [“Configuring software iSCSI when host configuration fails” on page 25](#)) or failed to set up the host to use the VMFS datastore (see [“Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails” on page 26](#)).

or

- ◆ Other issues with the iSCSI session occurred (see [“iSCSI session troubleshooting” on page 27](#)).

### Configuring software iSCSI when host configuration fails

If the VNXe system successfully configures the ESX host when you add a host to a VMware datastore, the appropriate ESX iSCSI adapters on the host are configured to access the datastore. If this host configuration does not complete successfully or returns an error message, you must add the software iSCSI adapter:

1. Log in to the vSphere Client as an administrator.
2. From the Inventory panel, select the host with the initiator you want to configure.
3. Click the **Configuration** tab, and click **Storage Adapters**.
4. If the Software iSCSI adapter is not listed, click **Add** in the **Add Storage Adapter** dialog box, and then select **Add Software iSCSI Adapter**.
5. Select the iSCSI initiator that you want to configure, and click **Properties**.
6. In the **iSCSI Initiator Properties** page, click the **General** tab and then click **Configure**.
7. If the adapter is not already enabled, select **Enabled**.
8. If you want a name and alias for the software iSCSI adapter, enter them under **iSCSI Initiator Properties** and click **OK**.

## Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails

1. Log in to the VMware VI Client as an administrator.
2. Rescan for new storage devices:
  - a. From the Inventory panel, select the server, and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage Adapters**.
  - c. Under **iSCSI Software Adapters** in the list of adapters, select the adapter (NIC), and then click **Rescan**.
  - d. In the **Rescan** dialog box, select the adapter (NIC), and then click **Rescan**.
  - e. In the **Rescan** dialog box, select both **Scan for New Storage Devices** and **Scan for New VMFS Volumes**, and click **OK**.
3. Add *each* VNXe VMFS datastore to the ESX host:
  - a. From the Inventory panel, select the host and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage**, and click **Add Storage**.
  - c. On the **Select Disk/LUN** page, select the VNXe VMFS datastore that you want to use for the datastore, and click **Next**.
  - d. On the **Current Disk Layout** page, review the current virtual disk layout, and click **Next**.
  - e. On the **Disk/LUN-Properties** page, enter the *exact same name* that was used to create the datastore on the VNXe system.

You can find this name using Unisphere.
  - f. On the **Disk/LUN-Formatting** page, if needed, adjust the file system values and the capacity for the datastore, and click **Next**.
  - g. On the **Ready to Complete** page, review the datastore information, and click **Finish**.

The datastore (VMFS volume) is created on the VNXe VMFS datastore for the ESX host.

## iSCSI session troubleshooting

1. Verify the connectivity between the host and the target either from the VNXe iSCSI interface IP interface or from the ESX host:

### From the VNXe iSCSI interface IP interface

Use Unisphere under **Settings > More configuration > Routing Configuration**:

- Select the SP and the interface on the SP and click **Ping Destination**.
- Enter the network name of the host iSCSI adapter, and click **Ping**.

### From the ESX host

Use **vmkping** to verify connectivity to the VNXe iSCSI interface IP interfaces.

If jumbo frames are configured, you should use vmkping with the **-s** option at a size larger than 1500 to verify that all network elements are properly configured for jumbo frames. For example:

```
vmkping -s 9000 <IP_address_of_iSCSI_Server>
```

Using the IP address avoids name resolution issues.

---

**Note:** You can find the IP address for the target by selecting **Settings > iSCSI Settings** in Unisphere.

---

Some switches intentionally drop ping packets or lower their priority during times of high workload. If the ping testing fails when network traffic is heavy, verify the switch settings to ensure the ping testing is valid.

2. On the host, verify that the iSCSI initiator service is started.

---

**Note:** The iSCSI service on the iSCSI interface starts when the VNXe system is powered up.

---

3. If you are using CHAP authentication, ensure that the CHAP security settings are correct for your system. See VMware vSphere steps for configuring CHAP parameters for iSCSI adapters.



# CHAPTER 3

## Setting Up a Host to Use VNXe VMware VMFS (FC) Datastores

This chapter describes the requirements for setting up an ESX host to use EMC VNXe VMFS datastores, how to set up the ESX host for path management software, and how to troubleshoot the connection between the ESX host and a VNXe VMFS datastore.

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**Note:** The procedures in this document use “ESX” to refer to “VMware ESX.”

---

Topics include:

- ◆ Requirements for setting up a host to use VNXe VMware VMFS datastores..... 30
- ◆ Using multi-path management software ..... 31
- ◆ Configuring VNXe VMware VMFS datastores for the host ..... 32
- ◆ Configuring ESXi Server native failover ..... 33

## Requirements for setting up a host to use VNXe VMware VMFS datastores

Before you set up a host to use VNXe VMware VMFS datastores, the VNXe system and network requirements in described this section must be met.

VNXe automatically detects VMware ESX hosts on the SAN. It is possible to add ESX hosts manually, but letting the VNXe detect ESX hosts automatically provides the highest level of functionality.

### VNXe system requirements

- ◆ You have installed and configured the VNXe system using the VNXe Configuration Wizard, as described in the *Installation Guide* for your storage system.
- ◆ You have used Unisphere or the VNXe CLI to perform basic configuration of one or more FC LUNs on the VNXe system.

### SAN requirements

For a host to connect to VMware VMFS datastores on VNXe, the host must be in a SAN environment with the VNXe, and zoned so that the host and the VNXe are visible to each other over the SAN.

### Path management SAN requirements

---

**Note:** Path management software is not currently supported for a Windows 7 or Mac OS host connected to a VNXe system.

---

When implementing a highly-available SAN between a host and the VNXe system, keep in mind that:

- ◆ A VNXe VMware VMFS datastore is visible to both SPs
- ◆ You can configure multiple paths for a LUN. These paths should be associated with separate physical ports on the same SP.
- ◆ Each LUN must present the same LUN ID to all hosts.

Directly attaching an ESX host to a VNXe system is supported.

## Using multi-path management software

Multi-path management software manages the connections (paths) between the host and the VNXe system to provide access to the VNXe storage should one of the paths fail. The following types of multi-path management software are available for an ESX, or Windows Server 2012 host connected to a VNXe system:

- ◆ ESX native failover on any ESX host
- ◆ EMC PowerPath/VE software on an ESX 5.x host.

For the supported versions of the PowerPath/VE software, refer to the VNXe EMC Simple Support Matrix for the VNXe Series on the EMC Online Support website (<http://www.emc.com/vnxesupport>). To find this matrix on the website, search for “Simple Support Matrix” on the VNXe Support Page.

For information on data availability in the VNXe system and in your connectivity infrastructure, refer to *EMC VNXe3200 High Availability, A Detailed Review* white paper.

## Setting up a VNXe system for multi-path management software

For a VNXe system to operate with hosts running multi-path management software, each FC LUN on the VNXe system should be associated with multiple paths.

### **IMPORTANT**

For highest availability, use multiple paths. The network interfaces can be on separate subnets.

## Installing PowerPath/VE

1. On the host or virtual machine, download the latest PowerPath/VE version from the PowerPath/VE software downloads section on the EMC Online Support website (<http://support.emc.com>).
2. Install PowerPath/VE, as described in the appropriate PowerPath/VE installation and administration guide for the host’s operating system.

This guide is available on the EMC Online Support website. If the host or virtual machine is running the most recent version and a patch exists for this version, install it, as described in the readme file that accompanies the patch.

## Configuring VNXe VMware VMFS datastores for the host

1. Use Unisphere or the VNXe CLI to:
  - a. Discover VMware ESXi hosts
  - b. Create VNXe VMFS datastores

For information on performing the above Unisphere tasks, refer to the Unisphere online help.

### **IMPORTANT**

When you create VNXe VMFS datastores for discovered VMware ESXi hosts, the VNXe system automatically configures the hosts to use the Datastores. If you select multiple discovered hosts for the datastores, all the selected hosts are configured automatically. The VMware VMFS datastores are presented directly to the ESXi hosts and not to the hosts' virtual machines. If an ESXi host cannot see the VMFS datastore after you create the datastore, go to [“Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails” on page 34.](#)

2. The system rescans the VMFS datastores. If there is a problem, you can manually rescan for the VMFS datastores:
  - a. From the Inventory panel, select the server, and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage Adapters**.
  - c. Right click on the FC HBA and then click **Rescan**.
  - d. In the **Rescan** dialog box, select the HBA, and then click **Rescan**.
  - e. In the **Rescan** dialog box, select both **Scan for New Storage Devices** and **Scan for New VMFS Volumes**, and click **OK**.

If the host can see the VMFS datastore, you must set up the host to use the datastore, as described in the next section.

If the host cannot see the VMFS datastore, you may have problems with the SAN connection between the host and the FC LUN, in which case you need to manually configure this connection as described in [“Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails” on page 34.](#)

## Configuring ESXi Server native failover

ESXi Server include native failover for managing the I/O paths between the server and storage system. Native failover provides multiple paths from the server to the storage system. To use the ESXi Server native failover with your storage system, you must implement one of the failover policies listed below. For more information about these policies, refer to the ESX configuration guide.

- ◆ Round Robin (default)
- ◆ Fixed with failover mode (default for a VNXe system)
- ◆ Most Recently Used (MRU)

### Configuring the native failover policy

1. Log into VMware vSphere Client VI client as administrator.
2. From the inventory panel, select the server, and click the **Configuration** tab.
3. Under **Hardware**, click **Storage** and select the datastore (LUN).
4. Click **Properties**.
5. In the properties page, click **Manage Paths**.
6. In the **Manage Paths** page, under **Policy**, verify that the policy is one you want:

Fixed (VMware) for fixed native failover policy

Round Robin (VMware) for Round Robin native failover policy

Most Recently Used (VMware) for MRU native failover policy

If the policy is not set to the desired policy, in the policy selection dialog, select the correct policy.

7. If you selected the **Fixed (VMware)** policy, under **Paths**, select the preferred path.

You can statically balance the load using the fixed policy by selecting different paths for each datastore. To designate a different path as preferred, right click on the path and click **preferred**.

8. Click **Close**.

### What next?

You are now ready to either migrate a virtual machine to the VMFS datastore or create a virtual machine on the VMFS datastore. To migrate a virtual disk to the VMFS datastore, go to [Chapter 4, “Migrating VMware Virtual Machines to the VNXe System.”](#) For information about creating a virtual machine on the VMFS datastore, refer to the VMware documentation.

If you receive a connection error when the host is trying to log into an FC LUN, or you cannot see the datastores on the target, you may be having problems with the SAN connection between the host and the VNXe. This problem may occur because:

- ◆ The Fibre Channel SAN is zoned incorrectly.
- ◆ A physical hardware issue is disrupting the SAN connectivity.

A rescan of the storage is required after any change is made to the SAN. See to [“Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails”](#) on page 34 to manually add VNXe VMFS datastore to the ESX host

## Setting up an ESX host to use a VNXe VMFS datastore when host configuration fails

1. Log in to the VMware VI Client as an administrator.
2. Rescan for new storage devices:
  - a. From the Inventory panel, select the server, and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage Adapters**.
  - c. In the list of adapters, select the FC HBA, and then click **Rescan**.
  - d. In the **Rescan** dialog box, select the FC HBA, and then click **Rescan**.
  - e. In the **Rescan** dialog box, select both **Scan for New Storage Devices** and **Scan for New VMFS Volumes**, and click **OK**.
3. Add *each* VNXe VMFS datastore to the ESX host:
  - a. From the Inventory panel, select the host and click the **Configuration** tab.
  - b. Under **Hardware**, click **Storage**, and click **Add Storage**.
  - c. On the **Select Disk/LUN** page, select the VNXe VMFS datastore that you want to use for the datastore, and click **Next**.
  - d. On the **Current Disk Layout** page, review the current virtual disk layout, and click **Next**.
  - e. On the **Disk/LUN-Properties** page, enter the *exact same name* that was used to create the datastore on the VNXe system.  
You can find this name using Unisphere.
  - f. On the **Disk/LUN-Formatting** page, if needed, adjust the file system values and the capacity for the datastore, and click **Next**.
  - g. On the **Ready to Complete** page, review the datastore information, and click **Finish**.

The datastore (VMFS volume) is created on the VNXe VMFS datastore for the ESX host.

# CHAPTER 4

## Migrating VMware Virtual Machines to the VNXe System

To migrate a VMware virtual machine to the VNXe system, relocate the VMware datastore with the configuration and disk files for the virtual machine from its current storage location to a VNXe VMware datastore. You can migrate the virtual machine with either suspended migration, which relocates a suspended virtual machine, or with vMotion migration, which relocates a powered-on virtual machine using the vMotion software.

This chapter contains the following topics:

- ◆ [VMware virtual machine migration environment and limitations](#) ..... 36
- ◆ [Migrating a virtual machine to a VNXe datastore](#)..... 37

## VMware virtual machine migration environment and limitations

Table 1 outlines the environments for suspended migration and a vMotion migration. The VMware administrator’s guide for your version of ESX Server provides more information about the migration limitations. Table 2 compares the availability of a graphical user interface and access to the virtual machine for a suspended and vMotion migration.

**Table 1** Virtual machine migration environment and limitations

Component	Requirement	
	Suspended migration	vMotion migration
VNXe	Datastore sized to accommodate the existing data that you are migrating and to allow for data growth.	Datastore sized to accommodate the existing data that you are migrating and to allow for data growth.
Hosts	One or two ESXi hosts	One or two ESXi hosts, each with: <ul style="list-style-type: none"> <li>• A vMotion license and configured for vMotion.</li> <li>• Access to both the source and target datastores.</li> <li>• Sufficient resources to support two instances of the virtual machine running concurrently for a brief time.</li> </ul>
Virtual machine	None	Virtual machine with snapshots cannot be migrated.
Datastore	<ul style="list-style-type: none"> <li>• Datastore is on either a local or attached storage device and does not need to be shared storage.</li> <li>• Entire datastore is migrated to the VNXe datastore.</li> </ul>	<ul style="list-style-type: none"> <li>• Datastore is on either a local or attached storage device and must be shared storage.</li> <li>• Entire datastore is migrated to the VNXe datastore.</li> <li>• Datastore is in persistent mode.</li> </ul>

**Table 2** Comparison of a suspended migration and a vMotion migration of a virtual machine

Parameter	Suspended migration	vMotion migration
Graphic user interface (GUI)	Provided by ESX Server Migrate Virtual Machine wizard.	Provided with vSphere Client for ESXi 5.x with vMotion.
Access to virtual machine	Disrupted relative to time required for the copying of the virtual machine to the VNXe datastore.	No disruption.

# Migrating a virtual machine to a VNXe datastore

To migrate a virtual machine to a VNXe datastore, perform these tasks:

- ◆ “[Task 1: Set up the host for the virtual machine migration](#)” on page 37.
- ◆ *Either* “[Task 2: Migrating a virtual machine with suspended migration](#)” on page 37. *or* “[Task 3: Migrating a virtual machine with vMotion](#)” on page 37.

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**Note:** In Unisphere, the polling period for a VMware ESXi host or vCenter is once every 24 hours.

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## Task 1: Set up the host for the virtual machine migration

Set up the ESX Server host to access the new datastore, as described in [Chapter 1, “Setting Up a Host to Use VNXe VMware NFS Datastores,”](#) for an NFS datastore, or in [Chapter 2, “Setting Up a Host to Use VNXe VMware VMFS \(iSCSI\) Datastores,”](#) for a VMFS datastore, or in [Chapter 3, “Setting Up a Host to Use VNXe VMware VMFS \(FC\) Datastores.”](#)

## Task 2: Migrating a virtual machine with suspended migration

Use the Migrate Virtual Machine wizard to migrate the datastore, as described in the VMware administrator’s guide for your version of ESX Server. After you click **Finish** in the wizard, the migration operation begins. During the migration operation, you have no access to the virtual machine’s functions.

## Task 3: Migrating a virtual machine with vMotion

---

**Note:** You must move the virtual machines .vmx file during a migration with vMotion. If you want to move a virtual machine’s disks while keeping the .vmx file in the same place, you must move the .vmx file and the disks to a new location, and then move the .vmx file back to its original location.

---

Use the vSphere Client:

1. Set up VMkernel for vMotion:
  - a. From the Inventory panel, select the server, and click the **Configuration** tab.
  - b. Click **Networking**.
  - c. In the **Virtual Switch** view, click **Add Networking**.
  - d. Select **VMkernel**, and then click **Next**.
  - e. Either select the virtual switch or create one.
  - f. Select the network adapters for the virtual switch to use and click **Next**.
  - g. Specify the name and VLAN ID for the port group you are creating.
  - h. Select **Use this port group for vMotion**, and then click **Next**.

- i. Select one of the following:
    - **Obtain IP settings automatically**
    - **Use the following IP settings**, enter the IP settings, click **Edit** to set the VMKernel default gateway for VMkernel services, such as vMotion, and then click **OK** and **Next**.
  - j. Proceed through the remaining pages until you reach the summary page.
  - k. On the summary page, verify the settings and then click **Finish**.
2. From the Inventory panel, select the server with the virtual machine that you want to migrate and click the **Virtual Machine** tab.
  3. Right-click the virtual machine that you want to migrate, select **Migrate** and click **Next**.
  4. Select the VNXe VMware datastore.
  5. For Disk format select **Same format as source** and click **Finish**.