Storage / SAN Compatibility Guide
For ESX Server 3.5 and ESX Server 3i

Last Updated: March 12, 2008

What's New

Changes since the last edition of this guide include:

- Added Direct connect support column to Fibre Channel SANs tables. See "Fibre Channel SANs" on page 4.
- Added support for NetApp FAS200 Series. See "Network Appliance," on page 14.
- Added support for Overland Storage ULTAMUS RAID 1200. See "Overland Storage," on page 15 and "SAN Array Model Reference," on page 36.
- Added support for EMC Invista-Brocade. See "EMC," on page 17 and "SAN Array Model Reference," on page 36.
- Added support for HP XP20000 and XP24000. See "Hewlett Packard," on page 18.
- Added support for Hitachi USP V and USP VM. See "Hitachi," on page 18.
- Added support for HDS USP V and USP VM. See "Hitachi Data Systems (HDS)," on page 19.
- Added support for SUN StorageTek 9985V and StorageTek 9990V. See "Sun," on page 20.
- Modified support information for IBM DS3300. See "IBM," on page 30.
- Added support for NEC iStorage E1-10. See "NEC," on page 33.

Introduction

VMware ESX Server software has been tested and deployed in a variety of storage area network (SAN) environments. This guide describes the storage devices currently tested by VMware and its storage partners.

NOTE The use of an external enclosure, or JBOD connected to a supported SAS/SCSI controller in a supported server is supported, as long as there is no disk sharing among multiple servers or SAS/SCSI cards.

NOTE ESX Server 3.5, ESX Server 3i Embedded and ESX Server 3i Installable are equivalent products from a storage compatibility perspective.

NOTE You will note that this guide is sparsely populated at present. The reason for this is that storage arrays require re-certification for ESX Server 3.5 and ESX Server 3i, and while many re-certifications are in process or planned, relatively few have been fully completed to date. In contrast, servers and I/O devices do not require re-certification. The Systems Compatibility and I/O Compatibility Guides for ESX Server 3.5 and ESX Server 3i are already well populated because in almost all cases certification from the latest ESX Server 3.x version of the guides was simply carried over to the ESX Server 3.5 and ESX Server 3i version. For details on when the re-certification of a specific storage array for ESX Server 3.5 and ESX Server 3i will be complete, please contact the storage vendor.

If you are having a technical issue with 3rd party HW/SW and it is not found on this list, please refer to our 3rd Party HW/SW support policy at **http://www.vmware.com/support/policies/ThirdParty.html**.

This document discusses the following topics:

Maximum Storage Specifications Supported

The following system and virtual machine maximums are supported for ESX Server hosts:

Table 1. Supported system and virtual machine maximums

	ESX Server 3.x
Maximum LUNs per system	256 (128 during install)
Maximum HBAs per system	16 ports (4 quad-port cards, 8 dual-port cards, etc.)
Maximum virtual HBAs per virtual machine	4
Maximum targets per virtual HBA	15
Maximum virtual disks per Windows virtual machine	60

Table 1. Supported system and virtual machine maximums (Continued)

	ESX Server 3.x
Maximum virtual disks per Linux virtual machine	60
Maximum number of VMFS file systems per server	256
Maximum disk space per VMFS	2TB * # of extents
Maximum file size per VMFS-3 file	Default max file size for VMFS-3 is 256GB (block size of 1MB). This can be configured to a block size of 8MB which will allow a 2TB file.
Maximum number of files per VMFS-3	Supports enough files to hold the maximum number of VMs per VMFS volume supported by ESX 3.0 (typically greater than 30,000 files)
Maximum number of paths per LUN	32
Maximum number of total paths	1024
Maximum number of targets per HBA	15
Minimum VMFS-3 volume size	1.1 GB

Third-Party Software

Third party backup, replication, and snapshot software is certified and supported by the providers of the software. The ESX Server 2.5 guide at **http://www.vmware.com/pdf/esx25_san_cfg.pdf** shows the list of software that was supported with ESX Server 2.5. Please contact your SAN vendors regarding their plans to support ESX Server 3.x. As vendors certify software, we will create a list of certified software for ESX Server 3.x.

Microsoft Cluster Service (MSCS) with ESX

Clustering refers to the use of Microsoft Cluster Services (Windows 2003 and 2000) in a shared disk configuration between two virtual machines or a virtual machine and a physical system.

Application-level clustering using MSCS on virtual machines is certified only with certain arrays listed in this guide, and only with ESX Server 3.0.x. MSCS is not yet certified with ESX 3.5. Before installing VMware ESX Server 3.0.x software with your storage array, please examine the lists on the following pages to find out whether your array and configuration are supported.

Please refer to the *Setup for Microsoft Cluster Service with ESX Server 3 and Virtual Center 2* documentation for more information.

Fibre Channel SANs

For Fibre Channel SANs, VMware tests the following configurations:

- **Basic Connectivity** — The ability of ESX Server 3.x hosts to recognize and interoperate with the storage array. This configuration does not allow for multipathing or any type of failover.
- **Multipathing** — The ability of ESX Server 3.x hosts to handle multiple paths to the same storage device.
- **HBA Failover** — In this configuration, the ESX Server 3.x host is equipped with multiple HBAs connecting to one or more SAN switches. The server is robust to HBA and switch failure only.
- **Storage Port Failover** — In this configuration, the ESX Server 3.x host is attached to multiple storage ports and is robust to storage port failures.
- **Clustering Support** — Clustering support applies to Windows 2000 SP4, Windows 2003 RTM, SP 1, R2 and SP 2. For ESX Server version requirements for these operating systems in cluster environment, please refer to **http://kb.vmware.com/kb/2021**. Clustering is supported only with a limited set of HBAs; please refer to the I/O Compatibility Guide (**http://www.vmware.com/pdf/vi3_io_guide.pdf**) for the list of HBAs not supported with MSCS.
- **Boot from SAN** — In this configuration, the ESX Server 3.x host boots from a LUN stored on the SAN rather than a local disk.
- **Direct Connect** — In this configuration, the ESX Server 3.x host is directly connected to the array (that is, no switch between HBA and the array). HBA and Storage Processor Failover is supported provided that there is no sharing of LUNs between multiple hosts. Clustering is not supported in this configuration.

In the following tables, an X in a table cell indicates the storage array or an equivalent configuration has been tested. All storage products listed in this compatibility guide are supported. For further details about array firmware, storage product configurations and best practices, please contact the storage vendor.

There are several items on the ESX Server 2.5.x SAN Compatibility Guide (**http://www. vmware.com/pdf/esx_SAN_guide.pdf**) that are not on this 3.x list. Please contact your storage vendors for plans regarding these items.

NOTE Unless otherwise footnoted, all fibre channel arrays are supported with both 2Gbit and 4Gbit connectivity.

VMware works closely with each of its OEMs to drive towards mutual support of ESX Server at the time of announcement. Due to different product release cycles, levels of testing, and OEM agreements, not all OEM devices will be supported at the general availability date of a new version of ESX Server. We recommend contacting the OEM vendor for the best information on when their device is planned to be certified with Virtual Infrastructure 3.

VMware supports Storage Virtualization Devices (SVD) with ESX Server 3.0.2 or later. See "Storage Virtualization Device (SVD)" on page 16 for more information.

This section contains information on storage arrays from the following vendors:

Table 2. 3PAR

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
E200	X		X	X	X	X		X	X		X		X	X	
S400	X		X	X	X	X		X	X		X		X	X	
S800	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.															

Table 3. Compellent

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
Storage Center	X[1]		X[1]	X[1]	X[1]	X[1]		X[1]	X[1]		X[1]		X[1]	X[1]	

See **NOTE** on page 1 for JBOD support information.

[1] Supported with Qlogic HBAs only.

Table 4. Dell

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
AX	AX4-5[1]	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Support for QLogic HBAs only.

Table 4. Dell (Continued)

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
Dell CLARiiON	CX3-10c	X		X	X	X	X		X	X		X		X	X	
	CX3-20	X		X	X	X	X		X	X		X		X	X	
	CX3-20c	X		X	X	X	X		X	X		X		X	X	
	CX3-20f	X		X	X	X	X		X	X		X		X	X	
	CX3-40	X		X	X	X	X		X	X		X		X	X	
	CX3-40c	X		X	X	X	X		X	X		X		X	X	
	CX3-40f	X		X	X	X	X		X	X		X		X	X	
	CX3-80	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Support for QLogic HBAs only.

Table 5. EMC

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
AX	AX150[3]	X		X	X	X	X		X	X		X		X	X	
	AX4-5	X		X	X	X	X		X	X		X		X	X	
Celerra	NS20FC[1, 2]	X		X	X	X	X		X	X		X		X	X	
	NS40FC[1, 2]	X		X	X	X	X		X	X		X		X	X	
EMC CLARiiON	CX3-10c	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-20	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-20c	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-20f	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-40	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-40c	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-40f	X	X	X	X	X	X	X	X	X		X	X	X	X	
	CX3-80	X	X	X	X	X	X	X	X	X		X	X	X	X	
EMC Symmetrix	DMX-3	X		X	X	X	X		X	X		X		X	X	
	DMX-4	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Supported only for the open Fibre Channel ports on the arrays that are captive to NS20FC and NS40FC.

[2] LUNs are not shared between Fibre Channel and iSCSI hosts.

[3] Support for Emulex HBAs only..

Table 6. Fujitsu

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
ETERNUS 2000	Model 50	X		X	X	X	X		X	X		X		X	X	
	Model 100	X		X	X	X	X		X	X		X		X	X	
	Model 200	X		X	X	X	X		X	X		X		X	X	
ETERNUS 4000	Model 300	X		X	X	X	X		X	X		X		X	X	
	Model 500	X		X	X	X	X		X	X		X		X	X	
ETERNUS 8000	Model 700	X		X	X	X	X		X	X		X		X	X	
	Model 900	X		X	X	X	X		X	X		X		X	X	
	Model 1100	X		X	X	X	X		X	X		X		X	X	
	Model 2100	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.																

Table 7. Fujitsu Siemens

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
FibreCAT	CX3-10c	X		X	X	X	X		X	X		X		X	X	
	CX3-20	X		X	X	X	X		X	X		X		X	X	
	CX3-20c	X		X	X	X	X		X	X		X		X	X	
	CX3-20f	X		X	X	X	X		X	X		X		X	X	
	CX3-40	X		X	X	X	X		X	X		X		X	X	
	CX3-40c	X		X	X	X	X		X	X		X		X	X	
	CX3-40f	X		X	X	X	X		X	X		X		X	X	
	CX3-80	X		X	X	X	X		X	X		X		X	X	
	SX88[1, 2]	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] No FW-Update possible under host I/O.

[2] Contact Fujitsu Siemens for SAN Boot guidelines.

Table 8. Hewlett Packard

		ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
		Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
HP Enterprise Virtual Array (EVA)	4000	X		X	X	X	X		X	X		X		X	X	
	6000	X		X	X	X	X		X	X		X		X	X	
	8000	X		X	X	X	X		X	X		X		X	X	
XP20000		X		X	X	X	X		X	X		X		X	X	
XP24000		X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

Please contact your local HP account or service representative for definitive information about supported HP storage product configurations including Guest OS types, array firmware and best practices when used with VMware products.

Table 9. Hitachi

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
USP V	X		X	X	X	X		X	X		X		X	X	
USP VM	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

Table 10. Hitachi Data Systems (HDS)

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
USP V	X		X	X	X	X		X	X		X		X	X	
USP VM	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

Table 11. IBM

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
DS3400	X		X	X	X	X		X	X		X		X	X	
DS4200	X		X	X	X	X		X	X		X		X	X	
DS4700	X		X	X	X	X		X	X		X		X	X	
DS4800	X		X	X	X	X		X	X		X		X	X	
DS8000	X		X	X	X	X		X	X		X		X	X	
ESS 750/800[1]	X		X	X		X		X	X		X		X	X	
F10/F20[1]	X		X	X		X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Support for Emulex HBAs only.

Table 11. IBM (Continued)

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
N3300	X		X	X	X	X		X	X		X		X	X	
N3600	X		X	X	X	X		X	X		X		X	X	
N5200	X		X	X	X	X		X	X		X		X	X	
N5300	X		X	X	X	X		X	X		X		X	X	
N5500	X		X	X	X	X		X	X		X		X	X	
N5600	X		X	X	X	X		X	X		X		X	X	
N7600	X		X	X	X	X		X	X		X		X	X	
N7700	X		X	X	X	X		X	X		X		X	X	
N7800	X		X	X	X	X		X	X		X		X	X	
N7900	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Support for Emulex HBAs only.

Table 12. NEC

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
iStorage E1-10	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.															

Table 13. Network Appliance

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
FAS200 Series	X		X	X	X	X		X	X		X		X	X	
FAS2000 Series	X		X	X	X	X		X	X		X		X	X	
FAS3000 Series	X		X	X	X	X		X	X		X		X	X	
FAS6000 Series	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.															

Table 14. Overland Storage

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
ULTAMUS RAID 1200	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.															

Table 15. Sun

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
StorageTek 9985v	X		X	X	X	X		X	X		X		X	X	
StorageTek 9990v	X		X	X	X	X		X	X		X		X	X	
See **NOTE** on page 1 for JBOD support information.															

Table 16. Xiotech

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
Magnitude 3D 3000[1]	X		X	X	X	X		X	X		X		X	X	
Magnitude 3D 4000[1]	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

[1] Supported with Qlogic HBAs only.

Table 17. Xyratex Ltd

	ESX Server 3.5					ESX Server 3i Embedded					ESX Server 3i Installable				
	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Direct connect support	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
F5412E	X		X	X	X	X		X	X		X		X	X	

See **NOTE** on page 1 for JBOD support information.

Storage Virtualization Device (SVD)

VMware supports Storage Virtualization Devices (SVD) with ESX Server 3.0.2 or later.

- Backend storage arrays must be listed on both the *ESX Server 3.x Storage/SAN Compatibility Guide* (**http://www.vmware.com/pdf/vi3_san_guide.pdf**) and the SVD Vendor supported list.

- Do not share the same LUN of the backend storage array between SVD and any other host.

This section contains information on storage arrays from the following vendors:

- "EMC," on page 17
- "Hewlett Packard," on page 18
- "Hitachi," on page 18
- "Hitachi Data Systems (HDS)," on page 19
- "IBM," on page 19
- "Sun," on page 20

Table 18. EMC

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
Invista-Brocade[1, 2, 3, 4]	X	X	X	X	X	X	X		X	X	X	

[1] This Storage Virtualization Device is supported with Qlogic HBAs only.

[2] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

[3] Contact EMC for Non Disruptive Upgrade (NDU) procedure for Invista firmware upgrade.

[4] Contact EMC for supported Brocade switches, Invista patch level, and Data Path Controllers.

Table 19. Hewlett Packard

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
XP20000[1]	X	X	X	X	X	X	X		X	X	X	
XP24000[1]	X	X	X	X	X	X	X		X	X	X	

[1] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

Table 20. Hitachi

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
USP V[1]	X	X	X	X	X	X	X		X	X	X	
USP VM[1]	X	X	X	X	X	X	X		X	X	X	

[1] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

Table 21. Hitachi Data Systems (HDS)

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
USP V[1]	X	X	X	X	X	X	X		X	X	X	
USP VM[1]	X	X	X	X	X	X	X		X	X	X	

[1] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

Table 22. IBM

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
SVC[1]	X	X	X	X	X	X	X		X	X	X	

[1] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

Table 23. Sun

	ESX Server 3.5				ESX Server 3i Embedded				ESX Server 3i Installable			
	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN	Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Boot from SAN
StorageTek 9985V[1]	X	X	X	X	X	X	X		X	X	X	
StorageTek 9990V[1]	X	X	X	X	X	X	X		X	X	X	

[1] In an environment where RDM is used in back-end storage, special caution must be taken after RDM migration. Please see KB 1002564 for further details: **http://kb.vmware.com/kb/1002564**.

Network Attached Storage

This section contains information on the support for network attached storage with ESX Server software.

NOTE MSCS clustering is not supported with NAS.

The following sections are included:

- "Supported Linux Distributions" on page 20
- "Supported Storage Devices" on page 20

Supported Linux Distributions

The following Linux distributions support network attached storage when used with ESX Server 3.x software:

- Red Hat Enterprise Linux 3 NFS Server (Update 5).
- Fedora Core 4 NFS Server (2.6.12-1.1456_FC4.9550smp).
- Fedora Core 6 NFS Server (2.6.18-1.2798.fc6 #1 SMP) for ESX Server 3.5 only.

Supported Storage Devices

This section lists all of the supported devices for network attached storage with ESX Server 3.x software from the following vendors:

Table 24. BlueArc Corp

	ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
Titan 2200	X	X	X

Table 25. EMC

	ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
Celerra NS 20/40/80 series, NS 350, NS 500/700 series, CNS, and NSX DART version 5.5	X	X	X

Table 26. IBM

		ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
N3300	Data ONTAP 7.2.2	X	X	X
N3600	Data ONTAP 7.2.2	X	X	X
N5200	Data ONTAP 7.2	X	X	X
	Data ONTAP 7.2.4	X	X	X
N5300	Data ONTAP 7.2	X	X	X
	Data ONTAP 7.2.4	X	X	X

Table 26. IBM (Continued)

		ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
N5500	Data ONTAP 7.2	X	X	X
	Data ONTAP 7.2.4	X	X	X
N5600	Data ONTAP 7.2	X	X	X
	Data ONTAP 7.2.4	X	X	X
N7600	Data ONTAP 7.2.4	X	X	X
N7700	Data ONTAP 7.2.4	X	X	X
N7800	Data ONTAP 7.2.4	X	X	X
N7900	Data ONTAP 7.2.4	X	X	X

Table 27. Network Appliance

		ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
FAS2000 Series	Data ONTAP 7.2.2	X	X	X
FAS3000 Series	Data ONTAP 7.2	X	X	X
	Data ONTAP 7.2.4	X	X	X
FAS6000 Series	Data ONTAP 7.2.4	X	X	X

Table 28. Sun

	ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
StorageTek 5320 NAS Appliance	X	X	X
Sun Fire X4500[1]	X	X	X

[1] Sun Fire X4500 running Solaris 10 8/07 and the ZFS filesystem.

NOTE Celerra models noted are family names and cover all model numbers and model types (integrated and gateway) within the family.

iSCSI

VMware supports the iSCSI Storage listed in this section.

The following maximums are in place when using iSCSI arrays with ESX Server hosts:

Table 29. Storage parameter maximums with iSCSI Arrays

Parameter	Initiator type used	Limit
Number of HBAs	software	1
	hardware	1 dual port or 2 single port
Maximum number of targets	both software and hardware initiator	64
Number of LUNs	both software and hardware initiator	254
Number of paths to storage	software	4
	hardware	8

NOTE These maximums may not apply in the case of Virtual SAN Appliance (VSA). Please refer to the specific LeftHand Networks supported arrays for the maximums and minimum supported configurations with VSA. See "LeftHand Networks," on page 32.

VMware supports connections to iSCSI arrays using either the software initiator in the kernel or a hardware initiator (iSCSI HBA). Please refer to the *I/O Compatibility Guide* at http://www.vmware.com/pdf/vi3_io_guide.pdf for a list of hardware initiators that can be used with ESX.

The following configurations are supported for iSCSI storage with the software initiator over a supported NIC:

- **iSCSI Base Connectivity** – The ability of an ESX Server host to recognize the target and interoperate with it.
- **SP failover** – In this configuration the ESX Server host is attached to multiple ports and is robust to storage port failover
- **NIC failover for software initiator** – If the Ethernet adapters are teamed and one fails, the other one takes over. Both adapters must be connected to the same physical switch and be on the same subnet (both NICs and iSCSI storage ports).

The following configurations are supported for iSCSI storage with hardware initiators:

- **iSCSI Base Connectivity** – The ability of an ESX Server host to recognize the target over an iSCSI HBA and interoperate with it.
- **SP failover** – In this configuration, ESX Server host is attached to multiple ports over an iSCSI HBA and is robust to storage port failover.
- **Boot from iSCSI** – In this configuration, ESX Server hosts boot from the target iSCSI array rather than from a local disk.

- **iSCSI hardware initiator failover** – The ESX server host is equipped with multiple hardware initiators and is robust to hardware initiator failover.

NOTE Clustering is not supported with iSCSI.

NOTE Software initiated iSCSI is supported fully in ESX 3.0 and later releases. Hardware initiated iSCSI is supported in experimental mode only in ESX 3.0. It is supported fully in ESX 3.0.1 with iSCSI arrays that have been qualified/certified for use with the hardware initiators.

iSCSI Storage devices from the following manufactures have been tested for the stated release of ESX Server 3.x:

Table 30. 3PAR

	ESX Server 3.5								ESX Server 3i Embedded								ESX Server 3i Installable							
	iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
InServ E200	X	X	X						X	X	X						X	X	X					
InServ S400	X	X	X						X	X	X						X	X	X					
InServ S800	X	X	X						X	X	X						X	X	X					

Table 31. BlueArc Corp

	ESX Server 3.5								ESX Server 3i Embedded								ESX Server 3i Installable							
	iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
Titan 2200	X								X								X							

Table 32. Compellent

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
Storage Center	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X

Table 33. Dell

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
MD3000i[2]	X	X	X					X	X	X					X	X	X				
NX1950[2]	X	X	X					X	X	X					X	X	X				
PS5000E[1]	X	X	X	X	X[4]	X	X	X	X	X	X	X[4]		X	X	X	X	X	X[4]		X
PS5000X[3]	X	X	X	X	X[4]	X	X	X	X	X	X	X[4]		X	X	X	X	X	X[4]		X
PS5000XV[3]	X	X	X	X	X[4]	X	X	X	X	X	X	X[4]		X	X	X	X	X	X[4]		X

[1] Supported with firmware versions V3.2 to V3.3. Contact Dell for supported firmware versions.

[2] Contact Dell for additional information including supported array firmware versions.

[3] Supported with firmware V3.3. Contact Dell for supported firmware versions.

[4] Contact Dell for timeout value settings for proper SP failover operation.

Table 34. EMC

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator			
	iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
AX150i[1]	X	X	X					X	X	X					X	X	X				
AX4-5i[1]	X	X	X					X	X	X					X	X	X				
CX3-10c[1]	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
CX3-20c[1]	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
CX3-40c[1]	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
DMX-3[1]	X	X	X					X	X	X					X	X	X				
DMX-4[1]	X	X	X					X	X	X					X	X	X				

[1] Contact EMC for additional information including supported array firmware versions.

Table 35. EqualLogic

		ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
		iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator			
		iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware	iSCSI Base	SP failover	NIC failover for	iSCSI Base	SP failover	Boot from iSCSI	iSCSI hardware
PS Series	PS50E[1]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS70E[1]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS100E[1]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS300E[1]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS400E[1]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS3600X[3]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS3700X[3]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS3800XV[3]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X
	PS3900XV[3]	X	X	X	X	X[2]	X	X	X	X	X	X	X[2]		X	X	X	X	X	X[2]		X

[1] Supported with firmware versions V3.1 to V3.3. Contact EqualLogic for supported firmware versions.

[2] Contact EqualLogic for timeout value settings for proper SP failover operation.

[3] Supported with firmware V3.3. Contact EqualLogic for supported firmware versions.

Table 36. Fujitsu Siemens

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
FibreCAT CX3-10c[3]	X	X	X		X	X	X		X	X	X	X		X	X			X	X	X	X		X	X			X
FibreCAT CX3-20c[3]	X	X	X		X	X	X		X	X	X	X		X	X			X	X	X	X		X	X			X
FibreCAT CX3-40c[3]	X	X	X		X	X	X		X	X	X	X		X	X			X	X	X	X		X	X			X

[1] SP/datamover or cluster failover is not supported during boot from iSCSI.

[2] iSCSI hardware initiator support is experimental only.

[3] Contact Fujitsu Siemens for additonal information including supported array firmware versions.

Table 37. Hitachi, Ltd.

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
SMS100[1]	X	X	X		X	X	X		X	X	X	X		X	X			X	X	X	X		X	X			X

[1] Dual Controller models only.

Table 38. Hitachi Data Systems (HDS)

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
SMS100[1]	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X

[1] Dual Controller models only.

Table 39. IBM

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator				iSCSI software initiator			iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator	iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
DS3300	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X		X
N3300 ONTAP 7.2.4	X	X	X					X	X	X					X	X	X				
N3600 ONTAP 7.2.4	X	X	X					X	X	X					X	X	X				
N5200 ONTAP 7.2RC4	X	X	X	X	X	X[1]	X	X	X	X	X	X		X	X	X	X	X	X		X
N5300 ONTAP 7.2RC4	X	X	X	X	X	X[1]	X	X	X	X	X	X		X	X	X	X	X	X		X

[1] SP/datamover or cluster failover is not supported during boot from iSCSI.

Table 39. IBM (Continued)

	ESX Server 3.5								ESX Server 3i Embedded								ESX Server 3i Installable							
	iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator				iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
N5500 ONTAP 7.2RC4	X	X	X		X	X	X[1]	X	X	X	X		X	X		X	X	X	X		X	X		X
N5600 ONTAP 7.2RC4	X	X	X		X	X	X[1]	X	X	X	X		X	X		X	X	X	X		X	X		X
N7600 ONTAP 7.2.4	X	X	X						X	X	X						X	X	X					
N7700 ONTAP 7.2.4	X	X	X						X	X	X						X	X	X					
N7800 ONTAP 7.2.4	X	X	X						X	X	X						X	X	X					
N7900 ONTAP 7.2.4	X	X	X						X	X	X						X	X	X					

[1] SP/datamover or cluster failover is not supported during boot from iSCSI.

Table 40. LeftHand Networks

	ESX Server 3.5							ESX Server 3i Embedded							ESX Server 3i Installable						
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator			
	iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover		iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover		iSCSI Base Connectivity	SP failover	NIC failover for software initiator		iSCSI Base Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
Dell 2950 and SAN/iQ® 7	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
HP® ProLiant DL320s and SAN/iQ® 7	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
NSM 160 and SAN/iQ® 7	X	X	X					X	X	X					X	X	X				
NSM 2060 and SAN/iQ® 7	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
NSM 2120 and SAN/iQ® 7	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X
NSM 4150 and SAN/iQ® 7	X	X	X					X	X	X					X	X	X				
VSA SAN/iQ® 7[1]	X	X	X					X	X	X					X	X	X				

[1] VMware support for the LeftHand Networks iSCSI Virtual SAN Appliance (VSA) is contingent on the following requirements:

- VMware supports connections to the VSA using only the software initiator in the kernel.
- The following configurations are supported when running the VSA with supported NICs and server configuration that do not exceed the matching defined maximums and minimum requirements supported with the VSA as specified in this document:
  Shared Server Configuration – A configuration where the VSA and other virtual machines share the same VMware ESX Server host.
  Dedicated Server Configuration – A configuration where the VSA is the only virtual machine running on the ESX Server hosts in the VSA cluster.
- Only VSA running SAN/iQ 7.0 has been tested and it is supported with ESX Server 3.5, ESX Server 3i Embedded and ESX Server 3i Installable.
- Minimum server requirements for deploying the VSA in a shared server configuration are a Quad Core or two Dual Core CPU with 2Ghz/Core, four 1Gb NICs, and 2GB of RAM.
- Minimum server requirements for deploying the VSA in a dedicated server configuration are a Dual Core CPU with 2Ghz/Core, two 1Gb NICs, and 2GB of RAM.
- The maximum number of supported targets exported by the VSA, in an ESX Server environment, is 32.
- To properly function the VSA requires 2 Ghz of reserved CPU resources and 1024M reserved memory.
- The VSA only supports a virtual disk with 5 GB to 2 TB of space located on internal SCSI or SAS disk storage, or direct attached SCSI or SAS storage that is not accessible from more than one physical server.
- All virtual disks for the VSA must be configured as independent persistent.
- The VMFS datastore for the VSA must not be shared with any other virtual machines.
- For high availability, a minimum of two VSA nodes in a cluster and a failover manager or virtual manager are required.
- Please refer to the LeftHand Networks User Manual and Quick Start Guide for VSA for configuration guidelines and deployment best practices.

Table 41. NEC

	ESX Server 3.5									ESX Server 3i Embedded									ESX Server 3i Installable								
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator				
	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
iStorage E1-10	X		X	X						X		X	X						X		X	X					

Table 42. Network Appliance

	ESX Server 3.5									ESX Server 3i Embedded									ESX Server 3i Installable								
	iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator					iSCSI software initiator				iSCSI hardware initiator				
	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover	iSCSI Base	Connectivity	SP failover	NIC failover for software initiator	iSCSI Base	Connectivity	SP failover	Boot from iSCSI	iSCSI hardware initiator failover
FAS2000 Series Data ONTAP 7.2.4	X		X	X						X		X	X						X		X	X					
FAS3000 Series Data ONTAP 7.2RC4	X		X	X	X		X	[1]	X	X		X	X	X		X		X	X		X	X	X		X		X
FAS6000 Series Data ONTAP 7.2.4	X		X	X						X		X	X						X		X	X					
iStorage E1-10	X		X	X						X		X	X						X		X	X					

[1] SP/datamover or cluster failover is not supported during boot from iSCSI.

[2] iSCSI hardware initiator support is experimental only

SAS Arrays

For SAS Arrays, VMware tests the following configurations:

- **Basic Connectivity** — The ability of ESX Server 3.5 hosts to recognize and interoperate with the storage array. This configuration does not allow for multipathing, any type of failover, or sharing of LUNs between multiple hosts.

In the following tables, an X in a table cell indicates the storage array or an equivalent configuration has been tested. All storage products listed in this compatibility guide are supported. For further details about array firmware, storage product configurations and best practices, please contact the storage vendor.

This section contains information on storage arrays from the following vendors:

- "Dell" on page 35
- "IBM" on page 36

Table 43. Dell

	ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
	Basic connectivity	Basic connectivity	Basic connectivity
MD3000	X	X	X

Table 44. IBM

	ESX Server 3.5	ESX Server 3i Embedded	ESX Server 3i Installable
	Basic connectivity	Basic connectivity	Basic connectivity
DS3200	X	X	X

OEM SAN Array Model Reference

Table 45. SAN Array Model Reference

OEM	Array Type	Mode	Recommended Path Policy	Model String
3PAR	InServ E200	Active-active	Fixed	3PARdata VV
3PAR	InServ S400	Active-active	Fixed	3PARdata VV
3PAR	InServ S800	Active-active	Fixed	3PARdata VV
BlueArc Corp	Titan 2200	Active-active	Fixed	Titan 5.0
Compellent	Storage Center	Active-active	Fixed	Compellent Vol
EMC	AX series	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	CX3 series	Active-passive	MRU – Most Recently Used	DGC
EMC	Symmetrix series	Active-active	Fixed	Symmetrix
EMC	Celerra NS20FC	Active-passive	MRU – Most Recently Used	DGC
EMC	Celerra NS40FC	Active-passive	MRU – Most Recently Used	DGC
EMC	Invista-Brocade	Active-active	MRU – Most Recently Used	Invista
EqualLogic	PS Series	Active-active	Fixed	EQLOGIC
Hewlett Packard	EVA-4000	Active-active	Fixed	HSV200
Hewlett Packard	EVA-6000	Active-active	Fixed	HSV200
Hewlett Packard	EVA-8000	Active-active	Fixed	HSV210
Hewlett Packard	XP20000	Active-active	Fixed	
Hewlett Packard	XP24000	Active-active	Fixed	

Table 45. SAN Array Model Reference (Continued)

OEM	Array Type	Mode	Recommended Path Policy	Model String
Hitachi, Ltd.	SMS100	Active-active	MRU – Most Recently Used	
Hitachi, Ltd.	USP V	Active-active	Fixed	
Hitachi, Ltd.	USP VM	Active-active	Fixed	
Hitachi Data Systems	SMS100	Active-active	MRU – Most Recently Used	
Hitachi Data Systems	USP V	Active-active	Fixed	
Hitachi Data Systems	USP VM	Active-active	Fixed	
IBM	DS-3300	Active-passive	MRU – Most Recently Used	
IBM	DS-4800	Active-passive	MRU – Most Recently Used	1815
IBM	DS-8000	Active-active	Fixed	2107900
IBM	SVC	Active-active	MRU – Most Recently Used	2145
LeftHand Networks	Dell 2950 and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
LeftHand Networks	HP® ProLiant DL320s and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
LeftHand Networks	NSM 160 and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
LeftHand Networks	NSM 2060 and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
LeftHand Networks	NSM 2120 and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
LeftHand Networks	NSM 4150 and SAN/iQ® 7	Active-active	Fixed	iSCSIDisk
Overland Storage	ULTAMUS RAID 1200	Active-active	Fixed	F5412E
Sun	StorageTek 9985v	Active-active	Fixed	
Sun	StorageTek 9990v	Active-active	Fixed	
Xiotech	Magnitude 3D 3000	Active-active	Fixed	
Xiotech	Magnitude 3D 4000	Active-active	Fixed	Magnitude 3D
Xyratex Ltd	F5412E	Active-active	Fixed	F5412E

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