



Storage / SAN Compatibility Guide for ESX Server 3.0.1 RC

Last Updated: August 18, 2006

Note: This is a list of items planned to be in the storage/SAN compatibility guide at the time of ESX 3.0.1 general availability. This is not a guarantee that these systems will be supported at the time of VMware ESX Server 3.0.1 general availability. This document should be used for planning purposes only and does not reflect any commitment of support from VMware.

VMware ESX Server 3.0.1 RC supports all of the devices currently supported by ESX Server 3.0. This guide includes accurate information as of 08/09/2006. For more up to date information on any changes made to support for devices in ESX Server 3.0, please refer to the current documentation at http://www.vmware.com/support/pubs/vi_pubs.html.

What's New

Changes since the last edition of this guide include:

- This is the first edition of the Storage / SAN Compatibility Guide for ESX Server 3.0.1 RC.

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.

This document discusses the following topics:

- [Third-Party Software on page 1](#)
- [Fibre Channel SANs on page 1](#)
- [Network Attached Storage on page 6](#)
- [iSCSI on page 6](#)
- [OEM SAN Array Model Reference on page 9](#)

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 3.0.1. As vendors certify software, we will create a list of certified software for ESX Server 3.0.1.

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.

When clustering physical machines with virtual machines, third-party multipathing software cannot be used in the physical machine or the virtual machine (native ESX multipathing is automatically used on the ESX host). One effect of this is that for active/passive arrays, both hosts can only be connected to a single storage processor.

Application-level clustering using MSCS on virtual machines is certified only with certain arrays listed in this guide. Before installing VMware ESX Server 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 3.0.1 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 3.0.1 hosts to handle multiple paths to the same storage device.
- **HBA Failover** — In this configuration, the ESX Server 3.0.1 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 3.0.1 host is attached to multiple storage ports and is robust to storage port failures.
- **Clustering Support** — Clustering support applies to Windows 2000 SP4, and Windows 2003 RTM. 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.

Note: MSCS is not supported with the default drivers used by VMware ESX Server 3.0.1. In order to deploy MSCS with ESX Server 3.0.1, secondary drivers must be loaded. Please refer to http://www.vmware.com/products/beta/esx-vc/vi301/releasenotes_vi3.html for more information.

- **Boot from SAN** — In this configuration, the ESX Server 3.0.1 host boots from a LUN stored on the SAN rather than a local disk.
- **Direct Connect** — In this configuration, the ESX Server 3.0.1 host directly connects to the array (no switches).

In the following tables, an X in a table cell indicates the storage array or an equivalent configuration has been tested. Please contact the respective storage array vendor for interoperability information such as which HBAs are supported with which devices.

There are several items on the ESX 2.5.x Compatibility Guide (www.vmware.com/pdf/esx_SAN_guide.pdf) that are not on this 3.0.1 list. Please contact your storage vendors for plans regarding these items.

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.

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

- [Dell](#)
- [EMC](#)
- [Fujitsu Siemens](#)
- [Hewlett Packard](#)
- [Hitachi Data Systems \(HDS\)](#)
- [IBM](#)
- [NEC](#)

Dell

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
AX	AX100	X	X	X			X
	AX150	X	X	X			X
Dell CLARiiON							
	CX200	X	X	X	X	X	
	CX300	X	X	X	X	X	
	CX400	X	X	X	X	X	
	CX500	X	X	X	X	X	
	CX600	X	X	X	X	X	
	CX700	X	X	X	X	X	
	CX3-20	X	X	X		X	
	CX3-40	X	X	X		X	
	CX3-80	X	X	X		X	

EMC

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
AX	AX100	X	X	X			X
	AX150	X	X	X			X
EMC CLARiiON							
	CX200	X	X	X	X	X	
	CX300	X	X	X	X	X	
	CX400	X	X	X	X	X	
	CX500	X	X	X	X	X	
	CX600	X	X	X	X	X	
	CX700	X	X	X	X	X	
	CX3-20	X	X	X		X	
	CX3-40	X	X	X		X	
	CX3-80	X	X	X		X	
EMC Symmetrix							
	8000 Series	X	X	X	X	X	
	DMX/DMX2	X	X	X	X	X	

Fujitsu Siemens

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
FibreCAT	AX100	X	X	X			X
	CX200	X	X	X	X	X	
	CX300	X	X	X	X	X	
	CX400	X	X	X	X	X	
	CX500	X	X	X	X	X	
	CX600	X	X	X	X	X	
	CX700	X	X	X	X	X	
	CX3-20	X	X	X		X	
	CX3-40	X	X	X		X	
CX3-80	X	X	X		X		

Hewlett Packard

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
HP Modular Systems Array (MSA) ¹	1000 ¹	X	X	X		X	
	1500 ¹	X	X	X	X ⁴	X	
HP Enterprise Virtual Array (EVA)	3000 ²	X	X	X		X	
	4000 ³	X	X	X	X	X	
	5000 ²	X	X	X		X	
	6000 ³	X	X	X	X	X	
HP XP	8000 ³	X	X	X	X	X	
	128 ³	X	X	X	X ⁴	X	
	1024 ³	X	X	X	X ⁴	X	

¹ These are active/passive versions, FW 4.xx (MSA1000) and FW 5.xx ((MSA1500).

² These are active/passive versions, FW 3.0xx.

³ These are active/active versions.

⁴ Support for Windows 2000 SP4 only.

Contact HP for additional information.

Hitachi Data Systems (HDS)

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
Thunder	9500V Series	X	X	X		X	

Contact HDS for additional information, including HDS storage array microcode levels and the specific guest operating system, HBA, and switched fabric configurations that HDS supports.

IBM

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
IBM	DS4100/FAStT100	X	X	X		X	
	FAStT200	X	X	X		X	
	DS4300/FAStT600	X	X	X		X	
	DS4400/FAStT700	X	X	X		X	
	DS4500/FAStT900	X	X	X		X	
	DS6000	X	X	X		X	
	DS8000	X	X	X		X	
	ESS750/800	X	X	X		X	
	F10/F20	X	X	X		X	

NEC

		Basic connectivity	Multipathing with HBA failover	Multipathing with storage port failover	Clustering support	Boot from SAN	DirectConnect and multipathing with HBA failover
iStorage	S500	X	X	X		X	
	S1500	X	X	X		X	
	S2500	X	X	X		X	
	S2800	X	X	X		X	

Network Attached Storage

Storage devices listed in this section are supported in ESX Server 3.0.1.

Network Appliance

The following Network Appliance Network Attached Filers storage devices are supported:

- FAS900 Series (920, 940, 960, 980): Data ONTAP 6.5.3P4
- FAS200 Series (250, 270): Data ONTAP 7.0
- FAS3000: Data ONTAP 7.2
- FAS6000: Data ONTAP 7.2

Linux Distributions

- Red Hat Enterprise Linux 3 NFS Server (Update 5.)
- Fedora Core 4 NFS Server (2.6.12-1.1456_FC4.9550smp.)

EMC

- Celerra NS 350, NS 700/500 series, Celerra NSX, and Celerra CNS: DART version 5.5

Note: MSCS clustering is not supported with NAS.

iSCSI

VMware supports the iSCSI Storage listed in this section.

Note: The maximum number of HBAs supported for iSCSI is 2.

The maximum number of targets is 8.

The maximum number of LUNs is 254.

For iSCSI Storage, VMware tests the following configurations:

- iSCSI base connectivity hardware and software—The ability of ESX server 3.0.1 hosts to recognize and interoperate
- iSCSI hardware and software (SP failover)—In this configuration, the ESX 3.0.1 host is attached to multiple storage ports and is robust to storage port failures.
- Boot from iSCSI (hardware only)—In this configuration, ESX 3.0.1 host boots from the target iSCSI array rather than from a local disk.
- 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). This uses the ESX Server NIC teaming functionality.
- iSCSI hardware initiator failover—The ESX Server 3.0.1 host is equipped with multiple hardware initiators; the server is robust to the hardware initiator failover.

Note: Clustering is not supported with iSCSI.

Note: Hardware-initiated iSCSI is only supported experimentally with ESX Server 3.0.1. That is, it is not recommended for use in production environments. Software-initiated iSCSI is supported fully and is the recommended configuration for production iSCSI deployments with ESX Server.

The following devices have been tested for this release:

Dell

	iSCSI Base Connectivity	iSCSI Hardware & Software (SP failover)	Boot from iSCSI (hardware only)	NIC failover for software initiator	iSCSI hardware initiator failover
AX100i FLARE 02.19.500.5.019	X		X ¹	X	X
CX300i FLARE 02.19.500.5.019		X	X	X	X
CX500i FLARE 02.19.500.5.019	X	X	X	X	X
¹ SP/datamover or cluster failover is not supported during boot from iSCSI.					

EMC

	iSCSI Base Connectivity	iSCSI Hardware & Software (SP failover)	Boot from iSCSI (hardware only)	NIC failover for software initiator	iSCSI hardware initiator failover
AX100i FLARE 02.19.500.5.019	X		X ¹	X	X
CX300i FLARE 02.19.500.5.019		X	X	X	X
CX500i FLARE 02.19.500.5.019	X	X	X	X	X
Celerra NS 350/500/700 series, NSX, and CNS DART 5.5	X		X ¹	X	X
¹ SP/datamover or cluster failover is not supported during boot from iSCSI.					

EqualLogic

	iSCSI Base Connectivity	iSCSI Hardware & Software (SP failover)	Boot from iSCSI (hardware only)	NIC failover for software initiator	iSCSI hardware initiator failover
PS300	X		X	X	X

Fujitsu Siemens

	iSCSI Base Connectivity	iSCSI Hardware & Software (SP failover)	Boot from iSCSI (hardware only)	NIC failover for software initiator	iSCSI hardware initiator failover
AX100i	X		X ¹	X	X
CX300i	X	X	X	X	
CX500i	X	X	X	X	X

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

Network Appliance

	iSCSI Base Connectivity	iSCSI Hardware & Software (SP failover)	Boot from iSCSI (hardware only)	NIC failover for software initiator	iSCSI hardware initiator failover
FAS200 series (250/270) Data ONTAP 7.2	X		X ¹	X	X
FAS900 series (920, 940, 960, 980) Data ONTAP 6.5.3 P4	X		X ¹	X	X
FAS3000 series Data ONTAP 7.2	X		X	X	X

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

Maximum Storage Specifications Supported

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

ESX Server 3.0.1 Support	
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
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 3.0.1 (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

OEM SAN Array Model Reference

OEM	Array Type	Mode	Recommended Path Policy	Model String
EMC (Dell)	DMX	Active-active	Fixed	Symmetrix
EMC (Dell)	Symmetrix 8000	Active-active	Fixed	Symmetrix
EMC (Dell)	CX-200 → CX-700	Active-passive	MRU – Most Recently Used	DGC
EMC (Dell)	AX-100	Active-passive	MRU – Most Recently Used	DGC
Fujitsu	ETERNUS 3000	Pseudo-active-active	Fixed	
Fujitsu	ETERNUS 6000	Active-active	Fixed	
Fujitsu-Siemens	S-80	Active-active	Fixed	FC2502
Fujitsu-Siemens	S-60	Active-active	Fixed	
HDS	HDS-9500V	Active-passive	MRU – Most Recently Used	DF600F
Hewlett Packard	XP-12000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-10000	Active-active	Fixed	OPEN-
Hewlett Packard	XP-1024	Active-active	Fixed	OPEN-
Hewlett Packard	XP-512	Active-active	Fixed	OPEN-
Hewlett Packard	XP-128	Active-active	Fixed	OPEN-
Hewlett Packard	XP-48	Active-active	Fixed	OPEN-
Hewlett Packard	EVA-8000 v. 5.0	Active-active	Fixed	HSV210
Hewlett Packard	EVA-6000 v. 5.0	Active-active	Fixed	HSV200
Hewlett Packard	EVA-4000 v. 5.0	Active-active	Fixed	HSV200
Hewlett Packard	EVA-5000 v. 4.0	Active-active	Fixed	HSV111

OEM	Array Type	Mode	Recommended Path Policy	Model String
Hewlett Packard	EVA-3000 v. 4.0	Active-active	Fixed	HSV101
Hewlett Packard	EVA-5000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV110
Hewlett Packard	EVA3000 v. 3.0	Active-passive	MRU – Most Recently Used	HSV100
Hewlett Packard	MSA-1500 V5	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	MSA-1000 V4	Active-passive	MRU – Most Recently Used	MSA1000_VOLUME
Hewlett Packard	HSG80	Active-passive	MRU – Most Recently Used	HSG80
IBM	DS-8000		Fixed	2107900
IBM	DS-6000		Fixed	
IBM	DS-4000		MRU – Most Recently Used	1814
IBM	DS-4800		MRU – Most Recently Used	1815
IBM	DS-4500 or FastT-900		MRU – Most Recently Used	1742
IBM	DS-4400 or FastT-700		MRU – Most Recently Used	1742
IBM	DS-4300 or FastT-600		MRU – Most Recently Used	1722
IBM	FastT-500	Active-passive	MRU – Most Recently Used	3552
IBM	FastT-200	Active-passive	MRU – Most Recently Used	3542
IBM	DS-4100 or FastT-100	Active-passive	MRU – Most Recently Used	1724-100
IBM	SVC	Active-active	MRU-Most Recently Used	2145
NEC	S400	Active-active	Fixed	iStorage 1000
NEC	S1400	Active-active	Fixed	iStorage 1000
NEC	S2400	Active-active	Fixed	iStorage 1000
NEC	S2800	Active-active	Fixed	iStorage 1000
NetApp	FAS200	Active-active	Fixed	LUN
NetApp	FAS800	Active-active	Fixed	LUN
NetApp	FAS900	Active-active	Fixed	LUN
NetApp	FAS3000	Active-active	Fixed	LUN
StorageTek	FLX -210	Active-passive	MRU – Most Recently Used	BladeCtrl B210
StorageTek	FLX-220	Active-passive	MRU – Most Recently Used	BladeCtrl B220
StorageTek	FLX-240	Active-passive	MRU – Most Recently Used	BladeCtrl B240
StorageTek	FLX-280	Active-passive	MRU – Most Recently Used	BladeCtrl B280
StorageTek	FLX-380	Active-passive	MRU – Most Recently Used	BladeCtrl B220
StorageTek	BC82	Active-passive	MRU – Most Recently Used	BladeCtrl BC82

OEM	Array Type	Mode	Recommended Path Policy	Model String
StorageTek	BC84	Active-passive	MRU – Most Recently Used	BladeCtrlr BC84
StorageTek	BC88	Active-passive	MRU – Most Recently Used	BladeCtrlr BC88
StorageTek	9176	Active-passive	MRU – Most Recently Used	OPENstorage 9176
StorageTek	D173	Active-passive	MRU – Most Recently Used	OPENstorage D173
StorageTek	D178	Active-passive	MRU – Most Recently Used	OPENstorage D178
StorageTek	D210	Active-passive	MRU – Most Recently Used	OPENstorage D210
StorageTek	D220	Active-passive	MRU – Most Recently Used	OPENstorage D220
StorageTek	D240	Active-passive	MRU – Most Recently Used	OPENstorage D240
StorageTek	D280	Active-passive	MRU – Most Recently Used	OPENstorage D280
Sun	StorEdge 6920	Active-active	Fixed	
3Par	S200	Active-active	Fixed	
3Par	S400	Active-active	Fixed	
3Par	S800	Active-active	Fixed	

RC

VMware, Inc. 3145 Porter Drive Palo Alto, CA 94304 www.vmware.com

Copyright © 1998-2006 VMware, Inc. All rights reserved. Protected by one or more of U.S. Patent Nos. 6,397,242, 6,496,847, 6,704,925, 6,711,672, 6,725,289, 6,735,601, 6,785,886, 6,789,156, 6,795,966, 6,880,022, 6,961,941, 6,961,806, and 6,944,699; patents pending. VMware, the VMware "boxes" logo and design, Virtual SMP and VMotion are registered trademarks or trademarks of VMware, Inc. in the United States and/or other jurisdictions. All other marks and names mentioned herein may be trademarks of their respective companies. Revision: 20060809 Item: VI-ENG-Q306-224