Symantec Storage Foundation

Products by Symantec

Host and Storage Configuration Guide for Dynamic Multi-Pathing

AIX, HP-UX, Linux, and Solaris

5.0, 5.1, 6.0, 6.1, and 6.2

Symantec Storage Foundation Products by Symantec Host and Storage Configuration Guide

v.5.0, 5.1, 6.0, 6.1 & 6.2

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Printed in the United States of America.

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Chapter 1

Host-Side Settings

This chapter provides host-side setting information for solutions using Symantec Storage Foundation and High Availability Solutions 5.0, 5.1, 6.0 & 6.1 products.

The following platforms are covered in this chapter:

- "IBM AIX"
- "HP HP-UX"
- "RHEL/Oracle/SLES Linux"
- "Oracle Solaris"

IBM AIX

Required Settings for DMP on AIX Platforms

The settings listed in the table below are required for DMP to work properly on AIX platforms.

Platform	Required Settings	Suggested Steps
AIX	Enable fail_fast on all FC initiators	chdev -l fscsix -a fc_err_recov=fast_fail -P where x is the specific HBA (fscsi0, fscsi1, and so forth).
AIX	Enable Dynamic Tracking of FC devices for all FC initiators	chdev -l fscsix -a dyntrk=yes -P where x is the specific HBA (fscsi0, fscsi1, and so forth).
AIX	Disable MPIO if it is enabled for certain devices	Install the vendor specified ODM, referring to the steps provided by the vendor. (Reboots may be required)
AIX	If any path to the target disk has SCSI reserve ODM attribute set (reserve_policy or reserve_lock), then change the attributes to release the SCSI reservation from the paths, in the event to run DMP in VIOS, the DMP device will be used in cluster set-up having fencing enabled, or the shared DMP device will be used as	chdev –l hdiskx –a reserve_policy=no_reserve –P Or chdev –l hdiskx –a reserve_lock=no –P Reboot the system for the changes to take effect.

	SANboot disk	

HP HP-UX

Required Settings for DMP on HP-UX Platforms

The settings listed in the table below are required for DMP to work properly on HP-UX platforms.

Platform	Required Settings	Suggested Steps
HP-UX 11iv3	Disable HP nMP ALUA support to work with SF 5.0, and 5.0.1 release	scsimgr set_attr -N "/escsi/esdisk" -a alua_enabled=0 scsimgr save_attr -N "/escsi/esdisk" -a alua_enabled=0 Please refer to the following link for more information: https://www.veritas.com/support/en_US/article.TECH87877

Red Hat Enterprise/Oracle/Suse Linux

Best Practices for DMP on Linux Platforms

The settings listed in the table below are suggested best practices for DMP to work on Linux platforms.

Platform	Best Practices	Suggested Steps
Linux	Set fast_io_fail_tmo to 20 to better work with DMP	Create file /etc/udev/rules.d/40-rport.rules with the following content line: KERNEL=="rport-*", SUBSYSTEM=="fc_remote_ports", ACTION=="add",RUN+="/bin/sh -c 'echo 20 > /sys/class/fc_remote_ports/%k/fast_io_fail_tmo'"

Oracle Solaris

Required Settings for DMP on Solaris Platforms

The settings listed in the table below are required for DMP to work properly on Solaris platforms.

Platform	Required Settings	Suggested Steps
SPARC	Disable MPxIO for DMP to work properly	stmsboot -d (A reboot is required)

Chapter 2

Storage Devices

This document provides storage devices support information for solutions using Symantec Storage Foundation and High Availability 5.0, 5.1, 6.0 & 6.1 products.

Supported products

For the Symantec products supported with the devices in this document, see the *Symantec Storage Foundation and High Availability Solutions 5.0 Hardware Compatibility List*, *Symantec Storage Foundation and High Availability Solutions 5.1 Hardware Compatibility List*, *Symantec Storage Foundation and High Availability Solutions 6.0 Hardware Compatibility List* or *Symantec Storage Foundation High Availability Solutions 6.1 Hardware Compatibility List*

Note: Storage devices listed in this document and/or included in Array Support Library do not imply the devices are supported. Each Symantec product can have different supported devices matrix; for supported product and storage devices combinations, please refer to the Hardware Compatibility Lists above for detail.

Supported technologies

FC

'**NOTE:** Issues may trigger application with Sun Storage Tek SAN 4.4.6, 4.4.7, and 4.4.8 software. See SAN 4.4.6, 4.4.7 and 4.4.8 Software (and associated drivers) Issues May Cause Applications to Exit Unexpectedly

iSCSI .

NOTE: With Solaris 10 Update 5, a disabled iSCSI path will not re-enable automatically once the path is restored. Sun CR 6719804. This has been fixed in Solaris 10 Update 8

SAS

FCoE

Storage device settings

Note: Before implementing any device shown in this document, verify that it is also shown as supported on the desired platform in the *Symantec Storage Foundation and High Availability Solutions 5.0 Hardware Compatibility List, Symantec Storage Foundation and High Availability Solutions 5.1 Hardware Compatibility List, Symantec Storage Foundation and High Availability Solutions 6.0 Hardware Compatibility List, Symantec Storage Foundation and High Availability Solutions 6.1 Hardware Compatibility List.* Storage devices in this chapter may have the same characteristics, including bit settings, across all UNIX platforms, or platform-specific settings. Specialized or platform-specific information appears immediately following the generalized information for any given device or device series. The tables of information for each device or family of devices provide the appropriate platform-based settings.
The settings shown for devices reflect those used in Symantec testing, and are not necessarily the only supported settings.

Failover modes

The Dynamic Multi-Pathing (DMP) failover function of the Symantec products supports the following storage types:

- Active/Active (A/A) - Supports simultaneous I/O on all paths
- Active/Active-Asymmetric (A/A-A) - Supports simultaneous I/O on all paths, but seeks the most optimized path for the I/O transmission rate
- Asymmetric Logical Unit Access (ALUA) - It characterizes the devices that support simultaneous I/O on all paths, but seek the most optimized path for the I/O transmission rate as defined by SPC3.
- Active/Passive (A/P) - Supports I/O on a single primary (active) path, while the secondary (passive) path is engaged in the event of primary path failure
- Active/Passive-Concurrent (A/P-C) - Supports I/O on multiple primary (active) paths, while the secondary (passive) paths are engaged in the event of failure of all primary paths
- Active/Passive-Group (A/P-G) - Supports LUN group failover in which a group of LUNs is connected through a controller as a single failover entity, and failover occurs at the controller level rather than the LUN level
- Active/Passive-Failover (A/P-F) - Supports I/O on a single primary (active) path, while the secondary (passive) path is engaged through the use of an explicit command in the event of primary path failure
- Third Party Driver (TPD) - devices which are under control of a third party multi-pathing

driver which have pass through support for DMP .e.g. PowerPath, MPxIO, RDAC

DELL Storage Devices

The DELL devices qualified for this release include the:

- DELL EqualLogic

DELL EqualLogic

Platform	Minimum Firmware	DMP Failover Mode
RHEL5 **	FW v4.3.5-H1	A/A

** To support RHEL 5/OL, a minimum kernel level of 2.6.18-164.el5 is required

EMC Storage Devices

The EMC devices qualified for this release include the:

- CLARiiON™ AX, and CX4 series
- Symmetrix™ DMX-3 ,DMX-4, and VMAX
- VNX family (5100, 5300, 5500, 5700 and 7500)
- VNX2 family (5400, 5600, 5800, 7600 and 8000)
- VPLEX

EMC CLARiiON

DMP functionality for the EMC CLARiiON devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Initiator type	Failover mode	DMP Failover Mode
AIX*	FLARE 28 (CX4)	CLARiiON OPEN	Failover Mode=3	TPD: PowerPath (A/P-F mode)
AIX/Linux/Solaris	FLARE 28 (CX4)	CLARiiON OPEN	Failover Mode=1	DMP: A/P-F
HP-UX	FLARE 28 (CX4)	HP NO Auto TRESSPASS	Failover Mode=2	A/P-C
AIX/HP-UX/Linux/Solaris	FLARE 28 (CX4)	CLARiiON OPEN	Failover Mode=4	TPD: Powerpath (ALUA mode)

				DMP: ALUA

* On AIX, Failover Mode 3 only applies to TPD: PowerPath; Failover Mode 4 applies to both TPD: PowerPath or DMP

EMC Symmetrix Storage Arrays support

Symantec Volume Manager (VM), and Dynamic Multi-pathing (DMP) work with the EMC Symmetrix Storage Arrays only if the storage arrays meet certain conditions. Before including the storage arrays in your system, confirm that all LUNs are set for SCSI-3 PGR so that I/O Fencing can operate. Follow the settings as per table below for respective platforms:

Contact your EMC Technical Support Representative for instructions or information.

Contact your Symantec sales representative for further updates on hardware support.

EMC Symmetrix DMX series

DMP functionality for the EMC Symmetrix DMX series devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Fibre Flags	SCSI Flags	DMP Failover Mode
AIX	5772.97 (DMX 3) 5773.134 (DMX 4) 5774 (V-MAX)	[e]PP.UWN	[a]C, [b]SC3, SPC2, VCM (optional), EAN (optional), [c]PER (volume based flag), Link Speed, OS2007	A/A
Linux/Solaris	5772.97 (DMX 3) 5773.134 (DMX 4) 5774 (V-MAX)	[e]PP.UWN	C, SC3, SPC2, EAN, VCM (optional), PER (volume based flag), Link Speed	A/A
HP-UX	5772.97 (DMX 3) 5773.134 (DMX 4) 5774 (V-MAX)	[e]PP.UWN	C, [d]V , SPC2, PER, Link Speed	A/A

[a]C= Common_Serial_Number – A required setting for VM-DMP and PowerPath functionality

[b]SC3 = SCSI3 PGR Director flag

[c]PER = SCSI3 Persistent Reserve LUN flag

[d]V =Volume Set Addressing (HP-UX-only requirement)

[e]PP = only required for switched environments

EMC VNX family (5100, 5300, 5500, 5700, and 7500)

DMP functionality for the EMC VNX devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Initiator type	Failover mode	DMP Failover Mode
AIX*	VNX Block OE 05.31	CLARiiON OPEN	Failover Mode=3	TPD: PowerPath
AIX/Linux/Solaris	VNX Block OE 05.31	CLARiiON OPEN	Failover Mode=1	A/P-F
HP-UX (11iv2)	VNX Block OE 05.31	HP NoAutotresspass	Failover Mode=1	A/P-F
HP-UX (11iv3)	VNX Block OE 05.31	CLARiiON OPEN / HP NoAutotresspass	Failover Mode=4	TPD: PowerPath DMP: ALUA (CLR-ALUA)
AIX*/Linux/Solaris	VNX Block OE 05.31	CLARiiON OPEN	Failover Mode=4	TPD: PowerPath DMP: ALUA (CLR-ALUA)

* On AIX, Failover Mode 3 only applies to TPD: PowerPath; Failover Mode 4 applies to both TPD: PowerPath or DMP

EMC VNX2 family (5400, 5600, 5800, 7600, and 8000)

DMP functionality for the EMC VNX2 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Initiator type	Failover mode	DMP Failover Mode
AIX*	VNX Block OE 05.33	CLARiiON OPEN	Failover Mode=3	TPD: PowerPath
HP-UX (11iv3)	VNX Block OE 05.33	CLARiiON OPEN / HP NoAutotresspass	Failover Mode=4	TPD: PowerPath DMP: ALUA (CLR-ALUA)
AIX*/Linux/Solaris	VNX Block OE 05.33	CLARiiON OPEN	Failover Mode=4	TPD: PowerPath DMP: ALUA (CLR-ALUA)

* On AIX, Failover Mode 3 only applies to TPD: PowerPath; Failover Mode 4 applies to both TPD: PowerPath or DMP

EMC VPLEX

DMP functionality for the EMC VPLEX devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Initiator type	Failover mode	DMP Failover Mode
AIX	5.0	Aix	N/A	A/A
HP-UX (11iv2)	5.0	Hp-ux	N/A	A/A
HP-UX (11iv3)	5.0	Hp-ux	N/A	A/A
Linux	5.0	default	N/A	A/A
Solaris	5.0	Sun-vcs	N/A	A/A

Contact your EMC Technical Support Representative for further instructions on configuring EMC hardware.

Fujitsu Storage Devices

The Fujitsu devices qualified for this release include the:

- FUJITSU Storage ETERNUS DX100 S3
- FUJITSU Storage ETERNUS DX200 S3
- FUJITSU Storage ETERNUS DX500 S3
- FUJITSU Storage ETERNUS DX600 S3
- ETERNUS DX60 S2
- ETERNUS DX80 S2
- ETERNUS DX90 S2
- ETERNUS DX400 S2 series
- ETERNUS DX8000 S2 series
- ETERNUS DX60
- ETERNUS DX80
- ETERNUS DX90
- ETERNUS DX400 series
- ETERNUS DX8000 series
- ETERNUS2000
- ETERNUS4000
- ETERNUS8000

The Fujitsu devices have the limitation of the number of Persistent Reservation Keys:

Devices	Number of Persistent Reservation keys can be registered in a storage
ETERNUS DX100 S3/DX200 S3	64000
ETERNUS DX500 S3/DX600 S3	64000
ETERNUS DX60 S2	32767
ETERNUS DX80 S2/DX90 S2	64000
ETERNUS DX400 S2 series	64000
ETERNUS DX8000 S2 series	64000
ETERNUS DX60/DX80/DX90	1024 (Firmware less than V10V64), 32767 (Firmware V10V64 or higher)
ETERNUS DX400 series	4096
ETERNUS DX8000series	4096
ETERNUS2000	1024
ETERNUS4000	4096
ETERNUS8000	4096

DMP Failover Mode "ALUA" support is now embedded with the current released ASL. You may observe the DMP Failover Mode been updated to "ALUA" after you install the ASL or you upgrade the Storage Foundation products. **Confirm that the appropriate Host Response "ACTIVE-ACTIVE / PREFERRED_PATH" value is set for your storage arrays.**

ETERNUS DX100 S3/DX200 S3, DX500 S3/DX600 S3

The DMP functionality of the ETERNUS DX100 S3/DX200 S3, DX500 S3/DX600 S3 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V10L10	Host Response : AIX VxVM		ALUA
		LUN Addressing : Flat space addressing Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE NACA : Enabled		A/A

HP-UX	V10L10	Host Response : HP-UX	[x]Disable load balance	ALUA
		LUN Addressing : Flat space addressing Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE NACA : Enabled		A/A
Linux(RHEL and SLES)	V10L10	Host Response : Default		ALUA
		Host Response : Default Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Solaris	V10L10	Host Response : Default		ALUA
		Host Response : Default Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
		Host Response : Default Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX60, ETERNUS DX80

The DMP functionality of the ETERNUS DX60/ETERNUS DX80 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Sub System Parameters	DMP Failover Mode
AIX	V10L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
HP-UX	V10L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V10L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Solaris	V10L11	Reservation Conflict Response for Test Unit Ready:		ALUA

		Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
	V10L50	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX90

The DMP functionality of the ETERNUS DX90 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Sub System Parameters	DMP Failover Mode
AIX	V10L31	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
HP-UX	V10L31	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V10L31	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Solaris	V10L31	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode		ALUA

		Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
	V10L50	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX60 S2

The DMP functionality of the ETERNUS DX60 S2 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V20L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
HP-UX	V20L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V20L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Solaris	V20L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access:		ALUA

		ACTIVE-ACTIVE / PREFERRED_PATH(Default)		
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX80 S2, ETERNUS DX90 S2

The DMP functionality of the ETERNUS DX80 S2, ETERNUS DX90 S2 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
HP-UX	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)	[x]Disable load balance	ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Linux(RHEL and SLES)	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A

Solaris	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX410/DX440, ETERNUS DX8100/DX8400/DX8700

The DMP functionality of the ETERNUS DX410/DX440, and ETERNUS DX8100/DX8400/DX8700 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V20L41	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
HP-UX	V20L41	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V20L41	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
Solaris	V20L41	Reservation Conflict Response for Test Unit Ready: Normal		ALUA

		Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
	V20L21	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX410 S2/DX440 S2

The DMP functionality of the ETERNUS DX410 S2/DX440 S2 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
HP-UX	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)	[x]Disable load balance	ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
Linux(RHEL and SLES)	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access:		A/A

		ACTIVE / ACTIVE		
Solaris	V10L10	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH(Default)		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE		A/A
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS DX8100 S2/DX8700 S2

The DMP functionality of the ETERNUS DX8100 S2/DX8700 S2 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V10L20	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
HP-UX	V10L20	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH	[x]Disable load balance	ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
Linux(RHEL and SLES)	V10L20	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal		A/A

		Host Specific Mode: Normal mode Sense Data Conversion: No Conversion (Default) Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		
Solaris	V10L20	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS2000

The DMP functionality of the ETERNUS2000 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	**Sub System Parameters**	DMP Failover Mode
AIX	V10L11	Reservation Conflict Response for Test Unit Ready: Normal response Host Specific Mode: AIX mode Sense Code Conversion: No conversion		ALUA (SF5.1SP1RP4, SF6.1.x or later)
				A/A (SF5.1SP1RP3, SF6.0.x or earlier)
HP-UX	V10L11	Reservation Conflict Response for Test Unit Ready: Normal response Host Specific Mode: HP-UX mode Sense Code Conversion: No conversion	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V10L22	Reservation Conflict Response for Test Unit Ready: Normal response Host Specific Mode: Normal mode Sense Code Conversion: Linux Recommended		ALUA (SF5.1SP1RP4, SF6.1.x or later)
				A/A (SF5.1SP1RP3, SF6.0.x or earlier)
Solaris	V10L10	Reservation Conflict Response for Test Unit Ready: Normal response Host Specific Mode: Normal mode Sense Code Conversion: No conversion		ALUA (SF5.1SP1RP4, SF6.1.x or later)
				A/A (SF5.1SP1RP3, SF6.0.x or earlier)
	V10L72		[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS (SF5.1SP1RP3, SF6.0.x or earlier)

ETERNUS4000 Model400/600, ETERNUS8000 Model800/1200/2200

The DMP functionality of the ETERNUS4000Model400/600, ETERNUS8000Model800/1200/2200 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V20L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
HP-UX	V20L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V20L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
Solaris	V20L11	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
	V20L21	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

ETERNUS4000 Model300/500, ETERNUS8000 Model700/900/1100/2100

The DMP functionality of the ETERNUS4000Model300/500, ETERNUS8000Model700/900/1100/2100 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Response	Subsystem Parameters	DMP Failover Mode
AIX	V11L12	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: AIX mode (Extended Address) Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
HP-UX	V11L12	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: HP-UX mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Disable load balance	A/A
Linux(RHEL and SLES)	V11L12	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: Linux Recommended Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
Solaris	V10L62	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE-ACTIVE / PREFERRED_PATH		ALUA
		Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)		A/A
	V11L71	Reservation Conflict Response for Test Unit Ready: Normal Host Specific Mode: Normal mode Sense Data Conversion: No conversion Asymmetric / Symmetric Logical Unit Access: ACTIVE / ACTIVE(Default)	[x]Reject INQUIRY from Unauthorized Host	A/A-ETERNUS

Hitachi Data Systems (HDS) Storage Devices

The HDS devices qualified for this release include the:

- AMS/WMS series
- HUS 100 series
- HUS VM storage
- SMS/AMS2000 series
- TagmaStore USP/NSC series
- TagmaStore USPV/USPVM
- VSP storage
- VSP G1000

HDS AMS/WMS

The DMP functionality of the AMS/WMS devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Setting 1	Setting 2	Setting 3	DMP Failover Mode
AIX	0726/F-M	Unique Reserve Mode 1 = ENABLED	UA (06/2A00) SUPPRESS MODE	NACA Mode	A/A-A
[e]HP-UX	0726/F-M	Unique Reserve Mode 1 = ENABLED	HP-UX MODE		A/A-A
Linux (RHEL and SUSE)	0726/F-M	Unique Reserve Mode 1 = ENABLED			A/A-A
Solaris	0726/F-M	Unique Reserve Mode 1 = ENABLED			A/A-A

[e]When used with Storage Foundation for Oracle RAC, set dmp_retry_timeout=5 seconds.

HUS 100 series

The DMP functionality of the HUS 100 series devices requires the following conditions for use with the supported

Symantec products:

Platform	Minimum Firmware	Middleware (Additional Setting)	Common Settings	DMP Failover Mode
All Platforms	0915/B	VCS (if VCS are used) Unique Reserve Mode 1 = enabled	Standard Mode	A/A

HDS HUS VM

The DMP functionality of the HUS VM devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Setting 1	DMP Failover Mode
AIX	73-01-02/00	0F[AIX]	02 (VERITAS Database Edition/Advanced) 22 (Veritas Cluster Server)	A/A
HP-UX	73-01-02/00	03[HP]	02 (VERITAS Database Edition/Advanced) 22 (Veritas Cluster Server)	A/A
Linux (RHEL and SLES)	73-01-02/00	00[Standard]	02 (VERITAS Database Edition/Advanced) 22 (Veritas Cluster Server)	A/A
Solaris	73-01-02/00	09[Solaris]	02 (VERITAS Database Edition/Advanced) 22 (Veritas Cluster Server)	A/A

HDS SMS/AMS2000 series

The DMP functionality of SMS/AMS2000 series storage requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Middleware (Additional Setting)	Common Settings	DMP Failover Mode
All Platform	0832/A-M	VCS (if VCS are used) Unique Reserve Mode 1 enabled	Standard Mode	A/A

HDS TagmaStore USP/NSC

The DMP functionality of the TagmaStore USP/NSC devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Host Mode Options	DMP Failover Mode
AIX	50-07-66-00 (USP/NSC)	0F (AIX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
HP-UX	50-07-66-00 (USP/NSC)	03 (HP-UX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Linux (RHEL and SUSE)	50-07-66-00 (USP/NSC)	00 (Linux)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Solaris	50-07-66-00 (USP/NSC)	09 (Solaris)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A

HDS TagmaStore USP-V/USP-VM

The DMP functionality of the TagmaStore USP-V/USP-VM devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Host Mode Options	DMP Failover Mode
AIX	60-01-70-00 (USPV/VM)	0F (AIX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
HP-UX	60-01-70-00 (USPV/VM)	03 (HP-UX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A

Linux (RHEL and SUSE)	60-01-70-00 (USPV/VM)	00 (Linux)	02 (Storage Foundation for Oracle Rac), 22 (Cluster Server)	A/A
Solaris	60-01-70-00 (USPV/VM)	09 (Solaris)	02 (Storage Foundation for Oracle Rac), 22 (Cluster Server)	A/A

HDS VSP

The DMP functionality of the VSP storage requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Host Mode Options	DMP Failover Mode
AIX	70-01-04-00 (VSP)	0F (AIX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
HP-UX	70-01-04-00 (VSP)	03 (HP-UX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Linux (RHEL and SUSE)	70-01-04-00 (VSP)	00 (Linux)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Solaris	70-01-04-00 (VSP)	09 (Solaris)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A

HDS VSP G1000

The DMP functionality of the VSP G1000 storage requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Host Mode Options	DMP Failover Mode

AIX	80-01-22-00 (VSP G1000)	0F (AIX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
HP-UX	80-01-22-00 (VSP G1000)	03 (HP-UX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Linux (RHEL and SUSE)	80-01-22-00 (VSP G1000)	00 (Linux)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Solaris	80-01-22-00 (VSP G1000)	09 (Solaris)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A

HDS VSP Gx00/Fx00 series

The DMP functionality of the VSP Gx00/Fx00 series storage requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	Host Mode Options	DMP Failover Mode
AIX	83-01-03-00 (VSP Gx00/Fx00)	0F (AIX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
HP-UX	83-01-03-00 (VSP Gx00/Fx00)	03 (HP-UX)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Linux (RHEL and SUSE)	83-01-03-00 (VSP Gx00/Fx00)	00 (Linux)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A
Solaris	83-01-03-00 (VSP Gx00/Fx00)	09 (Solaris)	02 (Storage Foundation for Oracle Rac), 22 (Veritas Cluster Server)	A/A

* On Linux 5.1SP1, need to set dmp_fast_recovery=off to avoid "too many sg segment" errors, also see technote https://www.veritas.com/support/en_US/article.TECH211042 for more information or update your build to 5.1SP1PR3RP4

HP Storage Devices

The HP devices qualified for this release include the:

- StorageWorks 3PAR F-Class, T-Class, and 7000/10000
- StorageWorks EVA4100/6100/8100
- StorageWorks EVA4400/6400/8400 and P6300/P6500
- StorageWorks MSA 2000/2300/2040/P2000
- StorageWorks XP10000/12000/20000/24000/P9500

HP StorageWorks 3PAR F-Class, T-Class, and 7000/10000

The DMP functionality of the 3PAR F-Class, T-Class, and 7000/10000 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	DMP Failover Mode
AIX	3.1	8 (AIX-legacy)	A/A
HP-UX	3.1	7 (HPUX-legacy)	A/A
HP-UX	3.1.3	13 (HPUX)	A/A
Linux (RHEL and SUSE)	3.1	1 (Generic)	A/A
Linux (RHEL and SUSE)	3.1	2 (Generic-ALUA)	A/A
Solaris 9 and 10	3.1	1 (Generic)	A/A
Solaris 9 and 10	3.1.3	2 (Generic-ALUA)	A/A
Solaris 11	3.1	2 (Generic-ALUA)	A/A

Note: 10000 requires minimum Firmware level of 3.1; 7000 requires minimum Firmware level of 3.1.2.

HP StorageWorks EVA 4100/6100/8100

The DMP functionality of the EVA 4000/6000/8000 and EVA 4100/6100/8100 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	DMP Failover Mode

AIX	6000	Custom: 00000000001109A8	ALUA
HP-UX	6000	HPUX	ALUA
Linux (RHEL and SUSE)	6000	Linux	ALUA
Solaris	6000	Solaris	ALUA

[j]Preferred path/mode' required on each LUN. They are to be set either 'Controller A/B - Failover/Fail-back' instead of the default 'No Preference' via Command View, and setting should be kept static.

HP StorageWorks EVA 4400/6400/8400 and P6300/6500

The DMP functionality of the EVA 4400/6400/8400 and P6300/6500 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	DMP Failover Mode
AIX	09534000	Custom: 00000000001109A8	ALUA
HP-UX	09534000	HPUX	ALUA
Linux (RHEL and SUSE)	09534000	Linux	ALUA
Solaris	09534000	Solaris	ALUA

[j]Preferred path/mode' required on each LUN. They are to be set either 'Controller A/B - Failover/Fail-back' instead of the default 'No Preference' via Command View, and setting should be kept static

HP StorageWorks MSA 2000/2300/2040/P2000

The DMP functionality of the MSA 2000/2300/2040/P2000 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	DMP Failover Mode
HP-UX	HP Website	HP-UX	ALUA
Linux (RHEL and SUSE), Solaris	HP Website	Standard	ALUA

[i]During controller reboot operation, the storage flips the preferred bit of the secondary paths belonging to the surviving controller temporarily. After the reboot is complete and the controller comes back online, the original preferred bit setting is again restored. Because of this temporary change in preferred bit, vxdctl enable, vxdisk scandisks should not be run during controller reboot operation because that might result in inconsistent path states (SECONDARY changing to PRIMARY).

HP StorageWorks XP10000/12000/20000/24000/P9500

The DMP functionality of the XP10000/12000/20000/24000/P9500 devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Mode	System Options	DMP Failover Mode
AIX	50-05-06-00 (XP10000/12000) 60-01-31-00 (XP20000/24000) 70-01-04-00 (P9500)	0F (AIX)	02 (Storage Foundation for Oracle RAC), 22 (Cluster Server)	A/A
HP-UX	50-05-06-00 (XP10000/12000) 60-01-31-00 (XP20000/24000) 70-01-04-00 (P9500)	08 (HP-UX)	02 (Storage Foundation for Oracle RAC), 22 (Cluster Server)	A/A
Linux (RHEL and SUSE)	50-05-06-00 (XP10000/12000) 60-01-31-00 (XP20000/24000) 70-01-04-00 (P9500)	00 (Linux)	02 (Storage Foundation for Oracle RAC), 22 (Cluster Server)	A/A
Solaris	50-05-06-00 (XP10000/12000) 60-01-31-00 (XP20000/24000) 70-01-04-00 (P9500)	09 (Solaris)	02 (Storage Foundation for Oracle RAC), 22 (Cluster Server)	A/A

Huawei Storage Devices

The Huawei devices qualified for this release include the:

- 18000 series
- S2300/S2300E
- S2600C/S2600F
- S5000T series
- S5300/S5500/S5600/S6800E
- VIS series

18000 series

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	V100R001	AIX (4)	A/A
HP-UX	V100R001	HPUX (3)	A/A
Linux (RHEL and SUSE)	V100R001	Linux (0)	A/A
Solaris	V100R001	Solaris (2)	A/A

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.
18500 and 18800 controllers also support ALUA mode. For these controllers, ALUA mode can be selected through GUI or CLI.

S2300/S2300E

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	1.02.01.206.T03	AIX (4)	A/P-F
	V100R001		A/A-A
HP-UX	1.02.01.206.T03	HPUX (3)	A/P-F
	V100R001		A/A-A
Linux (RHEL and SUSE)	1.02.01.206.T03	Linux (0)	A/P-F
	V100R001		A/A-A
Solaris	1.02.01.206.T03	Solaris (2)	A/P-F

	V100R001		A/A-A

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.

S2600C/S2600F

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	1.04.01.203.T01	AIX (4)	A/P-F
	V100R001		A/A-A
HP-UX	1.04.01.203.T01	HPUX (3)	A/P-F
	V100R001		A/A-A
Linux (RHEL and SUSE)	1.04.01.203.T01	Linux (0)	A/P-F
	V100R001		A/A-A
Solaris	1.04.01.203.T01	Solaris (2)	A/P-F
	V100R001		A/A-A

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.

S5000T series

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	V100R001	AIX (4)	A/A-A
	V100R002		ALUA (A/A-A)
HP-IX	V100R001	HPUX (3)	A/A-A
	V100R002		ALUA (A/A-A)
Linux (RHEL and SUSE)	V100R001	Linux (0)	A/A-A
	V100R002		ALUA (A/A-A)

Solaris	V100R001	Solaris (2)	A/A-A
	V100R002		ALUA (A/A-A)

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.

S5300/S5500/S5600/S6800E

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	1.03.01.109.T05	AIX (4)	A/P-F
	V100R001		A/A-A
HP-UX	1.03.01.109.T05	HPUX (3)	A/P-F
	V100R001		A/A-A
Linux (RHEL and SUSE)	1.03.01.109.T05	Linux (0)	A/P-F
	V100R001		A/A-A
Solaris	1.03.01.109.T05	Solaris (2)	A/P-F
	V100R001		A/A-A

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.

VIS series

The DMP functionality of the devices requires the following conditions for use with the supported Symantec products:

Platform	Minimum Firmware	Host Group Type	DMP Failover Mode
AIX	1.05.01.108.T01	AIX (4)	A/P-F
	1.05.02.105.T01		A/A
HP-UX	1.05.01.108.T01	HPUX (3)	A/P-F
	1.05.02.105.T01		A/A
Linux (RHEL and SUSE)	1.05.01.108.T01	Linux (0)	A/P-F

	1.05.02.105.T01		A/A
Solaris	1.05.01.108.T01	Solaris (2)	A/P-F
	1.05.02.105.T01		A/A

Note: The Host Group Type, if using the storage GUI, select the OS type (AIX, HPUX, Linux, or Solaris).
If you are using the storage CLI, then use the CLI command to select the OS, where the OS type would be "0" for Linux, "2" for Solaris, "3" for HPUX, and "4" for AIX.

IBM Storage Devices

The IBM devices qualified for this release include the:

- Storwize, SAN Volume Controller (SVC) family
- System Storage DS3512/DS3524, DSC3700
- TotalStorage™ DS3xxx/DS4xxx/DS5xxx
- TotalStorage DS6000
- TotalStorage DS8000
- XIV Storage System family
- FlashSystem family

With AIX 7.1 and later releases, use vxmpio utility to disable MPIO in order for DMP to manage devices failover. See http://www.veritas.com/docs/TECH174333 for more detail.

IBM Storwize V7000, Storwize V7000 Unified, FlashSystem V9000, SVC

The IBM virtualization family including Storwize V7000, and Storwize V7000 Unified, FlashSystem V9000, SVC devices require the following conditions for use with the DMP functionality of the supported Symantec products.

Platform	Minimum Firmware	DMP Failover Mode
All platforms	4.2.1.x	ALUA

IBM System Storage DS3512/DS3524, System Storage DSC3700

For configuration details and required procedures, see "IBM Storage Manager Installation and Host Support Guide" at http://www-947.ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5075652

IBM System Storage DS3512/DS3524, System Storage DSC3700 devices have the following additional requirements for use with the DMP functionality of the supported Symantec products.

Platform	Minimum	Host Mode	DMP Failover Mode

	Firmware		
Linux	07.84.44.xx	LNXALUA (please execute scripts to turn on NVSRAM settings for DMP)[1]	ALUA

Linux ALUA

[1] Run below scripts to set TPGS bit in the LNXALUA Het Host region:

set controller[a] hostNVSRAMByte [22, 0x28] = 0x02,0x02;

set controller[b] hostNVSRAMByte [22, 0x28] = 0x02,0x02;

reset controller[a];

reset controller[b];

IBM TotalStorage DS3xxx/DS4xxx/DS5xxx

For AIX, the IBM DS3xxx/DS4xxx/DS5xxx devices require the use of the RDAC driver as a multi-pathing driver in conjunction with the Symantec products. Furthermore, the use of multiple primary paths is not supported on these DS3xxx/DS4xxx/DS5xxx devices with AIX platform.

For configuration details and required procedures, see "IBM Storage Manager Installation and Host Support Guide" at http://www-947.ibm.com/support/entry/portal/docdisplay?Indocid=MIGR-5075652

IBM DS3xxx/DS4xxx/DS5xxx devices have the following additional requirements for use with the DMP functionality of the supported Symantec products.

Platform	Minimum Firmware	Host Mode	DMP Failover Mode
AIX	06.16.xx.xx	AIX	TPD : RDAC[m]
Linux	06.16.xx.xx	Linux LNXCLVMWARE[k] LNXCluster[l]	A/P-C (5.0 release only), A/P-F for DS5xxx only A/P-F A/P-F
HP-UX	07.50.13.xx	HPXTPGS	ALUA
Solaris	06.16.xx.xx	Solaris (with DMP) Solaris (with or without MPXIO)	A/P-C A/P-F

[k] (region 13) for firmware 07.50.xx.xx and prior to 7.60.40.00

[l] (region 13) for firmware 07.60.40.00 and later

[m] RDAC supports AIX 6.1 or lower; AIX 7.1 does not support RDAC.

Note: IBM script needs to be executed on DS4xxx to enable/disable A/P-F failover mode

IBM TotalStorage DS6000

The IBM DS6000 devices require the following conditions for use with the DMP functionality of the supported Symantec products:

Platform	Host Type	DMP Failover Mode
AIX	pSeries	A/P-C
Linux (RHEL and SUSE)	LinuxRHEL / LinuxSUSE	A/P-C
Solaris	Sun	A/P-C

IBM TotalStorage DS8000 family

The IBM DS8000 devices require the following conditions for use with the DMP functionality of the supported Symantec products:

Platform	Host Type	DMP Failover Mode
AIX	pSeries	A/A
HP-UX	Hp	A/A
Linux (RHEL and SUSE)	LinuxRHEL / LinuxSUSE	A/A
Solaris	Sun	A/A

IBM XIV Storage System family

The IBM XIV requires the following conditions for use with the DMP functionality of the supported Symantec products:

Platform	Type	DMP Failover Mode
AIX*	default	A/A, ALUA**
HP-UX*	hpux	A/A, ALUA**
Linux*	default	A/A, ALUA**
Solaris*	default	A/A, ALUA**

* require firmware 10.0 or above for I/O Fencing

** require firmware 10.2.1 or above for array to be claimed as ALUA mode by DMP

IBM FlashSystem 840/900 family

The IBM FS 840/900 devices require the following conditions for use with the DMP functionality of the supported Symantec products:

Platform	Type	Host Type	DMP Failover Mode
AIX	1.2.x	pSeries	A/A
HP-UX	1.1.x*	Hp	A/A
Linux (RHEL and SUSE)	1.2.x	LinuxRHEL / LinuxSUSE	A/A
Solaris	1.2.x	Sun	A/A

*HP-UX support only for SF 6.2.x and only support in 1.1.x

Kove Storage Devices

The Kove XPD L2i requires Storage Foundation 6.0.5 or later. The following conditions for use with DMP functionality of the supported products are required:

Platform	Minimum Firmware	OS Settings	DMP Failover Mode
RHEL	3.2.66.s.3	Send errors up to DMP quicker by setting KDSA tunable -> edit /etc/modprobe.d/kdsa.conf: options kdsa kdsa_always_failfast=1 Disable KDSA multipathing -> edit /etc/kdsa_system.conf: KDSA_MPIO_MAX_CONN=1 Set DMP tunable to allow Infiniband to migrate to an alternate path -> execute "vxdmpadm settune dmp_lun_retry_timeout=25"	A/A

NetApp Data ONTAP

In Data ONTAP 8.2 by default all newly provisioned LUNs are created with LBPME off. This means that all newly created LUNs in ONTAP 8.2 and 8.3 are Thick LUNs. To enable Thin Provisioning on LUNs in ONTAP 8.2 and 8.3, the NetApp specific "space-allocation" setting on the LUN must be turned on. Enabling "space-allocation" will enable the SCSI Logical Block Provisioning protocol features on the LUN.

Oracle Storage Devices

The Oracle's Sun storage devices qualified for this release include the:

- Oracle Storage 7000 series
- Oracle StorageTek 2510/2530/2540
- Oracle StorageTek 6130/6140/6540/6580/6780/6180
- Oracle Sun StorEdge™ 3510/3511
- Oracle Sun StorEdge 6320 (T4)
- Oracle Sun StorageTek 9970/9980
- Oracle Sun StorageTek 9985/9990

Note: This release of the Symantec Storage Foundation and High Availability Solutions products no longer include support for Sun T3 and T3+ storage devices.

Oracle Storage 7000 series

OS Platforms	Minimum Firmware	Storage Type	DMP Tunables		VCS Agent Tunables
RHEL 5, OL **	ak-2010.02.09.0.0	ALUA	dmp_health_time = 0 dmp_lun_retry_timeout = 200 dmp_path_age = 0		
SLES 10 ***	ak-2011.04.24.3.0	ALUA			
Solaris10_Sparc**** Solaris10_X64****	ak-2010.02.09.0.0	ALUA	iSCSI	dmp_health_time = 0 dmp_lun_retry_timeout = 300 dmp_path_age = 0 recoveryoption = timebound iotimeout = 600	CVMVolDg MonitorInterval = 360
			FC	dmp_health_time = 0 dmp_lun_retry_timeout = 200 dmp_path_age = 0	

** To support RHEL 5/OL, SF patch level 5.1RP2 patch level available on VOS portal is a minimum requirement.
*** To support SLES 10, SF patch level 5.1SP1RP2 patch level available on VOS portal is a minimum requirement.
**** To support the 7000 series clustered storage arrays models when performing controller takeover/failback++ requires hot fix VxVM5.1RP1HF3 or above available on VOS portal and DMP or VCS Agent tunables to be set
++ Controller takeover/Failback operations are not supported when I/O Fencing is enabled

Oracle Sun StorageTek 2510/2530/2540

The DMP functionality of the Oracle Sun StorageTek 2500 series devices requires the following conditions for use with the supported Symantec products:

Storage	Storage Configuration setting for DMP	DMP Failover Mode
StorageTek 2510 (iSCSI)	Solaris (with Traffic Manager)	TPD: MPxIO DMP: A/P-F
StorageTek 2530 (SAS)	Solaris (with Traffic Manager)	TPD: MPxIO DMP: A/P-F
StorageTek 2540 (FC)	Solaris (with Traffic Manager)	TPD: MPxIO DMP: A/P-F

NDU supportability limitations: "NDU is not supported between major f/w code upgrade as 6.x to 7.x"

Oracle Sun StorageTek 6130/6140/6540

The DMP functionality of the Oracle's Sun StorageTek 6130/6140/6540 devices requires the following conditions for use with the supported Symantec products.

Platform	Minimum Firmware	Host Mode (Storage Setting)	DMP Failover Mode
AIX	06.16.xx.xx	AIX(with DMP)	A/P-C
Linux	06.16.xx.xx	Linux (please execute scripts to turn on NVSRAM settings for DMP)[1]	A/P-C
Linux	06.16.xx.xx	Linux (please execute scripts to turn on NVSRAM settings for DMP)[2]	A/P-F
Solaris	06.16.xx.xx	Solaris (with Traffic Manager) Solaris (with Traffic Manager) Solaris (with DMP)	TPD: MPxIO DMP: A/P-F DMP: A/P-C

Linux A/P-C

[1]NVSRAM settings for DMP are: NVSRAM offset 0x1a = 0x01, NVSRAM offset 0x23 = 0x01, NVSRAM offset 0x24 = 0x01, and NVSRAM offset 0x25 = 0x80 (Linux specific).

Linux A/P-F

[2]NVSRAM settings for DMP are: NVSRAM offset 0x1a = 0x01, NVSRAM offset 0x23 = 0x01, NVSRAM offset 0x24 = 0x00, NVSRAM offset 0x25 = 0x00, and NVSRAM offset 0x27 = 0x00 (Linux specific).

Oracle Sun Storage 6580/6780/6180

The DMP functionality of the Oracle's Sun Storage 6580/6780/6180 devices requires the following

conditions for use with the supported Symantec products.

Platform	Minimum Firmware	Host Mode (Storage configuration setting)	DMP Failover Mode
AIX	07.5x.xx.xx	AIX (please execute scripts to turn on NVSRAM settings for DMP)[1]	A/P-F
HP-UX	07.5x.xx.xx	HPUX (with Target Port Group Support)[2]	ALUA
Linux	07.5x.xx.xx	Linux (please execute scripts to turn on NVSRAM settings for DMP)[3]	A/P-F
Solaris	07.5x.xx.xx	Solaris (with Traffic Manager)	TPD: MPxIO DMP: A/P-F

AIX A/P-F: AIX

[1]NVSRAM settings for DMP are: NVSRAM offset 0x1a = 0x01, NVSRAM offset 0x23 = 0x01, NVSRAM offset 0x24 = 0x00, NVSRAM offset 0x25 = 0x01, and NVSRAM offset 0x27 = 0x01 (AIX specific)

HPUX ALUA: HPUX

[2]NVSRAM offset 0x23 = 0x01, and NVSRAM offset 0x24 = 0x00 (HPUX specific)

Linux A/P-C

[3]NVSRAM settings for DMP are: NVSRAM offset 0x1a = 0x01, NVSRAM offset 0x23 = 0x01, NVSRAM offset 0x24 = 0x00, NVSRAM offset 0x25 = 0x00, and NVSRAM offset 0x27 = 0x00 (Linux specific).

Oracle Sun StorEdge 6320 (T4)

The DMP functionality of the Oracle's Sun 6320 devices requires the following conditions for use with the supported Symantec products:

Storage	Host Type Mode	DMP Failover Mode
SE6320 (T4)	mp_support = rw	A/P
SE6320 (T4)	mp_support = mpxio	A/P-F

Note that this release of the Symantec Storage Foundation and High Availability Solutions products no longer include the libvxpurple.so ASL to support Sun T3 and T3+ devices. Those devices are now processed as JBODs with a failover mode of A/P. The conditions required for using the DMP functionality of the Oracle's Sun devices with the supported Symantec products are listed in the section below.

Using the Oracle Sun StorEdge T4 device with Storage Foundation

You can configure the Oracle's Sun StorEdge T4 device in the following modes:

- RW (implicit failover or auto-trespass) mode. LUN failover will be triggered on any read or write command with the exception of a read of LBA 0. To enable the implicit LUN failover, use the sys `mp_support=rw` command on the Sun StorEdge T4 device.

- MPxIO (explicit failover or nonauto-trespass) mode. (MPxIO is Solaris OS multi-pathing)LUN failover will be triggered with a storage specific command. To enable the explicit LUN failover, use the sys mp_support=mpxio on the Sun StorEdge T4 storage. In this mode, you can use the Sun StorEdge Traffic Manager (SSTM) driver or DMP to handle multi-pathing. To enable SSTM see the Solaris documentation.

Note: All hosts in the clustered environment must use the same configuration set-up for the T4 storage.

Oracle Sun StorageTek 9970/9980

The conditions required for using the DMP functionality of the Oracle's Sun StorageTek 9970/9980 devices with the supported Symantec products are the same as that required by the HDS Lightning 9970V/9980V devices. For more information, see "HDS Lightning 9970V/9980V devices" on page 13.

Additional steps to set queue depth properly is required when multiple OS type share the same port on the storage. See StorEdge[TM] 99X0: Heterogeneous Host, Queue Depth, and Other I/O Related Parameters

Oracle Sun StorageTek 9985/9990

The conditions required for using the DMP functionality of the Oracle's Sun StorageTek 9985/9990 devices with the supported Symantec products are the same as that required by the HDS TagmaStore USP/NSC and USP V/VM devices. For more information, see "HDS TagmaStore USP/NSC and USP V/VM devices" on page 12.