Dell™ PowerVault™ MD Series

SUPPORT MATRIX

MD32/36 Series
RAID Controller Firmware Version 07.84.53.60

Revised:
January 17, 2014



Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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January 2014 **A05**

Dell™ PowerVault™ MD3-Series Storage Array Support Matrix

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NOTE: This Support Matrix contains the latest compatibility and interoperability information. Should you encounter inconsistencies between this information and other MD-series documentation, this document should be considered superseding.

Changes in Version A05

- New OS support
  - Note: Update to Windows 2008 R2 SP1 is required
- New hard drive support
- ALUA Support Details added
- Deprecated OS support
  - Windows
    - Windows Server 2003 R2
  - Red Hat Enterprise Linux
    - RHEL 6.3
    - RHEL 5.8
    - RHEL 5.7
  - SUSE Linux Enterprise Server
    - SLES 11.1
    - SLES 11.0
    - SLES 10.4
    - SLES 10.3
  - VMware ESX(i)
    - All ESX(i) 4.1

Introduction

This document provides information on supported software and hardware for Dell PowerVault MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3600f, MD3620i, MD3620f, MD3260, MD3260i, MD3660i and MD3660f storage arrays, as well as usage considerations, recommendations and rules.

NOTE: Unless specified, all information in this document is applicable to the most current RAID controller firmware version available from **dell.com/support**.

Table 1. MD-Series Models and Data Protocols Supported

MD Array Model [3]	Data Protocol
MD3200[1]	6 Gbps Direct Attached SAS storage array with 12 drives (3.5 inch)
MD3220[1]	6 Gbps Direct Attached SAS storage array with 24 drives (2.5 inch)
MD3200i[1]	1 Gbps iSCSI network storage array with 12 drives (3.5 inch)
MD3220i[1]	1 Gbps iSCSI network storage array with 24 drives (2.5 inch)
MD3600i[1]	10 Gbps iSCSI network storage array with 12 drives (3.5 inch)
MD3620i[1]	10 Gbps iSCSI network storage array with 24 drives (2.5 inch)
MD3600f[1]	8 Gbps Fiber Channel network storage array with 12 drives (3.5 inch)
MD3620f[1]	8 Gbps Fiber Channel network storage array with 24 drives (2.5 inch)
MD3260[2]	6 Gbps Direct Attached SAS storage dense array
MD3260i[2]	1 Gbps iSCSI network storage dense array
MD3660i[2]	10 Gbps iSCSI network storage dense array
MD3660f[2]	8 Gbps Fiber Channel network storage dense array

NOTES:

[1] MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3620i, MD3600f and MD3620f models support 120 physical disks/slots in base configuration; with premium feature activation, 192 physical disks/slots are supported

[2] MD3x60i/f dense array has default 120 drives/slots support (with 20 drives minimum), and 180 drives/slots support with PFK

[3] Premium Key Feature (PFK) is optional on all models

Dell PowerVault MD-Series Storage Array Rules

This section contains both general and model-specific connectivity and consideration rules for MD storage arrays. Only the rules shown in **Table 2** apply to ALL storage array models. For rules applying to specific MD models, see **Tables 3 and 4**.

Table 2. MD-Series Storage Array Rules for All Models

NOTE: MD3260, MD3260i, MD3660i and MD3660f platforms are supported in dual-RAID controller (duplex) configurations only.

	MD3200 series	MD3200i series	MD3600i series	MD3600f series
RULE	**6Gbps SAS**	**1Gbps iSCSI**	**10Gbps iSCSI**	**8Gbps Fibre Channel**
Maximum number of host servers a single storage array can connect to with one RAID controller module installed	4	32	64	64
Maximum number of host servers a single storage array can connect to with two RAID controller modules installed	8 (4 if using high availability)	32	64	64
Maximum number of Dell 6GbSAS HBA cards supported in a single host server attached to single array. (It is recommended to use two Dell 6Gb SAS HBA cards for all redundant cabling configurations.)	2 (each card has two ports)	N/A	N/A	N/A
Unused ports on a Dell 6Gb SAS HBA card already connected to an MD3260 cannot be connected to another device (such as a tape drive or other model storage array).	✓	N/A	N/A	N/A
Maximum number of MD Series Storage Arrays a host server may connect to:	2 (HA)	4	4	4
SAS and iSCSI storage arrays can be connected to the same host server.	✓	✓	✓	The I/O co-existence between the Fibre Channel and any other protocol on same host is not supported.
A hot spare for a disk group must be a physical disk of equal or greater size than any of the member disks.	✓	✓	✓	✓
When using out-of-band management with SMcli by specifying the RAID Controller management port IP addresses on the MD Storage Array, SMcli commands that change the attributes of a virtual disk, virtual disk copy, or snapshot virtual disk, must have management access to the owning RAID Controller Module. Where applicable, it is best practice to specify both management port IP addresses on the SMcli invocation: SMcli 192.168.128.101 192.168.128.102 -c.	✓	✓	✓	✓

On Linux systems Device Mapper multipathing drivers are required for multipath support	✓	✓	✓	✓
Co-existence of several Linux multi-path drivers is not supported. When using a MD3200 or MD3600 series array with Linux host servers only the Linux Device Mapper failover driver is supported.	✓	✓	✓	✓
Virtual disks on MD Series Storage Arrays cannot be used for booting.	✓	✓	✓	
Disk Groups can be migrated between a Dell PowerVault MD3260/3260i/3660i/3660f by following the appropriate Disk Group migration procedure	✓	✓	✓	✓
Disk pools cannot be migrated.	✓	✓	✓	✓
Greater than 180 drives for Disk Pooling is not currently supported.	✓	✓	✓	✓
Maximum capacity per array for dynamic disk pooling.	1024 TB	256 TB	256 TB	1024 TB
All iSCSI Host ports on a controller have to be at the same port speed	N/A	Only 1Gbps Supported	✓	N/A
iSCSI Host ports will only auto-negotiate to the port speed set in MDSM	N/A	Only 1Gbps Supported	✓	N/A
If the iSCSI initiators are connected to MD3200i and/or MD3600i series through the network switches, make sure that your switches support IEEE 802.3x flow control, and the flow control is enabled for both sending and receiving on all switch ports and server NIC ports. If you do not enable the flow control, your iSCSI storage array may experience the degradation of the I/O performance. In addition to enabling the Ethernet IEEE 802.3x flow control it is also recommended to disable unicast broadcast storm control on the switch ports connected to the iSCSI initiators and target arrays and turn on the "PortFast" mode of the spanning tree protocol (STP) on the switch ports connected to the iSCSI initiators and target arrays. Note that turning on the "PortFast" mode is different from turning off the whole operation of STP on the switch. With "PortFast" on, the STP is still enabled on the switch ports. Turning STP off may affect the entire network and can leave the network vulnerable to physical topology loops.	N/A	✓	✓	N/A
For optimal I/O performance, avoid having more than one iSCSI session originating from one host iSCSI port to the same controller. Ideally, the iSCSI host NIC should be connected to only one iSCSI target port on the storage subsystem.	N/A	✓	✓	N/A

For Dell-Oracle Tested and Validated solutions on the MD arrays, please refer to the following site http://en.community.dell.com/techcenter/enterprise-solutions/w/oracle_solutions/current-release.aspx	✓	✓	✓	✓
The number of VD copies limited to a maximum of 511 with a maximum of 8 concurrent copies (applicable to RAID controller firmware version 07.84.xx.xx)	✓	✓	✓	✓
Remote Replication is not supported in Simplex Mode.	N/A	✓	✓	✓

Table 3. MD-Series Storage Array Rules for Non-Dense, 2U Models Only (MD3200, MD3220, MD3200i, MD3220i, MD3600i, MD3620i, MD3600f and MD3620f

	MD3200 series	MD3200i series	MD3600i series	MD3600f series
RULE	**6Gbps SAS**	**1Gbps iSCSI**	**10Gbps iSCSI**	**8Gbps Fibre Channel**
Support for up to 120 physical slots (system default configuration). Up to nine MD1200 and/or MD1220 series expansion enclosures can be attached to an MD storage array. Any mixture of MD1200 and MD1220 enclosures for a total of 120 physical slots is supported.	✓	✓	✓	✓
Support for up to 192 physical slots through a premium feature option. Up to fifteen MD1200 and/or MD1220 series expansion enclosures can be attached to an MD storage array. Any mixture of MD1200 and MD1220 enclosures for a total of 192 physical slots is supported.	✓	✓	✓	✓
Maximum number of physical disks in a RAID0, RAID1/10 is 120.	✓	✓	✓	✓
Maximum number of physical disks in a RAID5 or RAID6 disk group is 30.	✓	✓	✓	✓
Attached MD1200 series expansion enclosures must be run in unified mode.	✓	✓	✓	✓
The number of Snapshots (Legacy) is limited to: • maximum of 256 per array • maximum of 16 per VD	✓	✓	✓	✓
The number of Remote Replicas (Legacy) is limited to • maximum of 16 pairs	N/A	N/A	N/A	✓
The number of Snapshots is limited to: • maximum of 512 per array • maximum of 128 per VD (32 per snapshot group with a max of 4 snapshot groups per VD)	✓	✓	✓	✓
The number of Remote Replicas is limited to: • maximum of 32 per array	N/A	✓	✓	✓

Table 4. MD-Series Storage Array Rules for Dense, 4U Models Only (MD3260, MD3260i, MD3660i and MD3660f)

	MD3260 series	MD3260i series	MD3660i series	MD3660f series
RULE	**6Gbps SAS**	**1Gbps iSCSI**	**10Gbps iSCSI**	**8Gbps Fibre Channel**
Support for up to 180 physical slots with a premium feature activation.	✓	✓	✓	✓
Maximum number of physical disks in a RAID0, RAID1/10 is 120.	✓	✓	✓	✓
Up to two MD3060e series expansion enclosures can be attached to MD3260/MD3260I/MD3660i/MD3660f dense storage arrays for a total of 3 MD3x60 enclosures.	✓	✓	✓	✓
Support for up to 120 physical slots (system default configuration).	✓	✓	✓	✓
A minimum of 20 SAS or SSD drives are required in each MD3x60 enclosure (4 in front of each drawer)	✓	✓	✓	✓

Default IPv4 settings for the Management Ports on the MD Series Storage Arrays

NOTE: No default gateway is set.

By default, the management ports on the storage array are set to DHCP. If DHCP fails, the following IPv4 settings will be used:

Table 5. Default IPv4 Management Port Adresses

Controller	IPv4 address	Subnet Mask
Controller 0	192.168.128.101	255.255.255.0
Controller 1	192.168.128.102	255.255.255.0

Default IPv4 settings for the iSCSI Ports on MD36x0i array

NOTE: No default gateway is set.

By default, the iSCSI ports on the storage array are set to the following static IPv4 settings:

Table 6. Default iSCSI Port IPv4 Addresses on MD36x0i Storage Arrays

Controller/Port (MD36x0i)	IPv4 address	Subnet Mask	Port #
Controller 0, Port 0	192.168.130.101	255.255.255.0	3260
Controller 0, Port 1	192.168.131.101	255.255.255.0	3260
Controller 1, Port 0	192.168.130.102	255.255.255.0	3260
Controller 1, Port 1	192.168.131.102	255.255.255.0	3260

Default IPv4 settings for the iSCSI Ports on MD32x0i array

Table 7. Default iSCSI Port IPv4 Addresses on MD32x0i Storage Arrays

Controller/Port	IPv4 address	Subnet Mask	Port #
Controller 0, Port 0	192.168.130.101	255.255.255.0	3260
Controller 0, Port 1	192.168.131.101	255.255.255.0	3260
Controller 0, Port 2	192.168.132.101	255.255.255.0	3260
Controller 0, Port 3	192.168.133.101	255.255.255.0	3260
Controller 1, Port 0	192.168.130.102	255.255.255.0	3260
Controller 1, Port 1	192.168.131.102	255.255.255.0	3260
Controller 1, Port 2	192.168.132.102	255.255.255.0	3260
Controller 1, Port 3	192.168.133.102	255.255.255.0	3260

Supported RAID Controller Firmware and NVSRAM

NOTE: It is advisable to gather support information before performing any firmware upgrade.

NOTE: Only drivers and firmware released by Dell are supported. For the latest driver and firmware releases, see the Downloads section at **dell.com/support**.

Table 8. Latest RAID Controller Firmware and NVSRAM Versions

Software	Version
RAID Controller	07.84.53.60
RAID Controller NVSRAM	N26X0-784890-004 for MD32xx and MD32xxi(SAS and 1Gb/s iSCSI storage arrays) N26X0-784890-904 for MD36xxi and MD36xxf (10Gb/s iSCSI and Fibre Channel storage arrays)

Supported SAS Host Bus Adapters

Please go to **dell.com/support** to download the latest supported version of the 6Gbps SAS HBA firmware and drivers for your specific server hardware platform.

Table 9. Supported 6Gbps SAS HBA

Host Bus Adapter Name
Dell 6Gbps SAS HBA

Supported iSCSI Software Initiators

Table 10. Supported iSCSI Initiators

Operating System	SW Initiator Vendor	SW Initiator Version	Notes
Windows Server OS	Microsoft	RTM or later	Included w/OS
Red Hat Enterprise Linux	Red Hat	RTM or later	Included w/OS
SUSE Linux Enterprise Server	SUSE	RTM or later	Included w/OS
VMware ESX	VMware	RTM or later	Included w/OS
Citrix XenServer	Citrix	RTM or later	Included w/OS

NOTE: For detailed information on OS support, refer to Supported Operating Systems section of this document.

Supported Protocol Offload (TOE / iSCSI) Adapters

Standard Gigabit and 10 Gigabit Ethernet adapters are supported when used with supported software iSCSI initiators. Hosts must have a standards compliant iSCSI initiator to access MD Series storage. Initiator support is provided by the initiator/operating system vendor. Dell PowerVault does not support Converged Network Adapters (CNA) in Converged mode. Although PowerVault does not endorse or support initiators directly, this support matrix provides some useful configuration information for common initiators.

Dell's PowerVault MD Series Arrays will work with any ***RFC 3720*** iSCSI compliant initiators. The initiator MUST support all mandatory iSCSI features (IPSec is not required). This information is subject to change without notice. Dell is not responsible for any errors in this information. Hardware initiators are not supported by Dell.

Also be sure to read the initiator documentation and release notes from the particular vendors, as well as the MD Series release notes for up to date configuration recommendations.

Fibre Channel SFP+ Transceiver Support

Table 11. Supported Fibre Channel SFP+ Transceivers

Description	Manufacturer	Mfr. Part Number
8G FC SFP+	JDSU	PLRXPL-VC-SH4-23-N
8G FC SFP+	Finisar	FTLF8528P2BCV-LS
8G FC SFP+	Avago	AFBR-57D7APZ

Supported Physical Disks

Only physical disks with a Dell P/N from the table below are supported. All other physical disk drives purchased from the Dell Software and Peripheral store with a part number other than specified below are not supported.

Refer to the MD3200/MD3600/MD3660i/MD3660f Drivers and Downloads section on **dell.com/support** for the latest available physical disk firmware.

Table 12. Supported Physical Disk Models

Form Factor	Dell P/N	Model	Capacity	Speed	Vendor
2.5”	X143K	MBD2147RC	146GB	10K	Fujitsu
2.5”	U706K	MBD2300RC	300GB	10K	Fujitsu
2.5”	R727K	MBE2073RC	73GB	15K	Fujitsu
2.5”	W328K	MBE2147RC	146GB	15K	Fujitsu
2.5”	T6TWN	HUC101212CSS600	1.2 TB	10K	HGST
3.5"	WTJVY	HUS724020ALS640	2TB	7.2K	HGST
3.5"	MY58D	HUS724030ALS640	3TB	7.2K	HGST
3.5"	7J9RN	HUS724040ALS640	4TB	7.2K	HGST
2.5”	T855K	HUC103014CSS600	146GB	10K	Hitachi
2.5”	U709K	HUC103030CSS600	300GB	10K	Hitachi
2.5”	YJ0GR	HUC106030CSS600	300GB	10K	Hitachi
2.5”	CXF82	HUC109030CSS600	300GB	10K	Hitachi
2.5”	8WP8W	HUC106060CSS600	600GB	10K	Hitachi
2.5”	G76RF	HUC109060CSS600	600GB	10K	Hitachi
2.5”	H5WGN	HUC109090CSS600	900GB	10K	Hitachi
2.5”	R730K	HUC151473CSS600	73GB	15K	Hitachi
2.5”	W330K	HUC151414CSS600	146GB	15K	Hitachi
3.5”	X150K	HUS156030VLS600	300GB	15K*	Hitachi
3.5”	W348K	HUS156060VLS600	600GB	15K*	Hitachi
3.5”	T875K	HUS156045VLS600	450GB	15K*	Hitachi
3.5”	VYRKH	HUS723020ALS640	2TB	7.2K	Hitachi

3.5”	CWJ92	HUS723030ALS640	3TB	7.2K	Hitachi
2.5”	X1MCH	LB150S	149GB	SSD	Pliant
2.5"	DPF1J	LB806M	800GB	SSD	Pliant (SanDisk)
2.5”	6R5R8	LB206M	200GB	SSD	Pliant (SanDisk)
2.5”	8C38W	LB406M	400GB	SSD	Pliant (SanDisk)
2.5"	TPWNJ	LB206S	200GB	SSD	SanDisk
2.5"	8NW1H	LB406S	400GB	SSD	SanDisk
2.5"	5Y05N	LB806R	800GB	SSD	SanDisk
2.5"	F06P1	LB1606R	1.6TB	SSD	SanDisk
2.5"	3P3DF	ST900MM0007	900GB	10K	Seagate
2.5"	TNX32	ST900MM0036	900GB	10K	Seagate
2.5"	RMCP3	ST1200MM0007	1.2TB	10K	Seagate
2.5"	4RYFR	ST1200MM0027	1.2TB	10K	Seagate
2.5”	X160K	ST9146803SS	146GB	10K	Seagate
2.5”	PGHJG	ST300MM0006	300GB	10K	Seagate
2.5”	R744K	ST9300503SS	300GB	10K	Seagate
2.5”	T871K	ST9300603SS	300GB	10K	Seagate
2.5”	745GC	ST9300605SS	300GB	10K	Seagate
2.5”	7YX58	ST600MM0006	600GB	10K	Seagate
2.5”	8MP93	ST9600104SS	600GB	10K	Seagate
2.5”	7T0DW	ST9600204SS	600GB	10K	Seagate
2.5”	R72NV	ST9600205SS	600GB	10K	Seagate
2.5”	2RR9T	ST900MM0006	900GB	10K	Seagate
2.5”	XRRVX	ST9900605SS	900GB	10K	Seagate
2.5”	8JRN4	ST9900805SS	900GB	10K	Seagate
2.5”	W345K	ST973452SS	73GB	15K	Seagate
2.5”	U733K	ST9146752SS	146GB	15K	Seagate
2.5”	X162K	ST9146852SS	146GB	15K	Seagate
2.5”	61XPF	ST9146853SS	146GB	15K	Seagate
2.5”	81N2C	ST9300453SS	300GB	15K	Seagate
2.5”	H8DVC	ST9300653SS	300GB	15K	Seagate
2.5”	867CY	ST300MP0004	300GB	15K	Seagate
2.5”	R734K	ST9500430SS	500GB	7.2K	Seagate
2.5”	W335K	ST9500431SS	500GB	7.2K	Seagate
2.5”	55RMX	ST9500620SS	500GB	7.2K	Seagate
2.5”	9W5WV	ST91000640SS	1TB	7.2K	Seagate
2.5”	XKGH0	ST91000642SS	1TB	7.2K	Seagate
3.5"	FNW88	ST1000NM0023	1TB	7.2K	Seagate

3.5"	1P7DP	ST2000NM0023	2TB	7.2K	Seagate
3.5"	55H49	ST3000NM0023	3TB	7.2K	Seagate
3.5"	529FG	ST4000NM0023	4TB	7.2K	Seagate
3.5"	6P85J	ST4000NM0063	4TB	7.2K	Seagate
3.5”	R752K	ST3600002SS	600GB	10K*	Seagate
3.5”	F617N	ST3300657SS	300GB	15K*	Seagate
3.5”	W347K	ST3600057SS	600GB	15K*	Seagate
3.5”	T873K	ST3600957SS	600GB	15K*	Seagate
3.5”	X163K	ST3450757SS	450GB	15K*	Seagate
3.5”	R749K	ST3450857SS	450GB	15K*	Seagate
3.5”	U717K	ST3500414SS	500GB	7.2K	Seagate
3.5”	6VNCJ	ST500NM0001	500GB	7.2K	Seagate
3.5”	740YX	ST1000NM0001	1TB	7.2K	Seagate
3.5”	YGG39	ST1000NM0001	1TB	7.2K	Seagate
3.5”	U738K	ST31000424SS	1TB	7.2K	Seagate
3.5”	X164K	ST31000425SS	1TB	7.2K	Seagate
3.5”	67TMT	ST2000NM0001	2TB	7.2K	Seagate
3.5”	7RGK3	ST2000NM0001	2TB	7.2K	Seagate
3.5”	R755K	ST32000444SS	2TB	7.2K	Seagate
3.5”	4WKK8	ST32000444SS	2TB	7.2K	Seagate
3.5”	W350K	ST32000445SS	2TB	7.2K	Seagate
3.5”	1D9NN	ST32000645SS	2TB	7.2K	Seagate
3.5”	91K8T	ST33000650SS	3TB	7.2K	Seagate
3.5”	09JYJ	ST33000650SS	3TB	7.2K	Seagate
3.5”	698PM	ST33000652SS	3TB	7.2K	Seagate
2.5"	MTV7G	AL13SEB300	300GB	10K	Toshiba
2.5"	5TFDD	AL13SEB600	600GB	10K	Toshiba
2.5"	RC34W	AL13SEB900	900GB	10K	Toshiba
2.5”	740Y7	MBF2300RC	300GB	10K	Toshiba
2.5”	5R6CX	MBF2600RC	600GB	10K	Toshiba
2.5”	6DFD8	MK1401GRRB	146GB	15K	Toshiba
2.5”	NWH7V	MK3001GRRB	300GB	15K	Toshiba
2.5”	6K55X	MK2001GRZB	200GB	SSD	Toshiba
2.5”	R2PJ7	MK4001GRZB	400GB	SSD	Toshiba
3.5"	12GYY	MG03SCA400	4TB	7.2K	Toshiba
3.5”	GPP3G	MG03SCA100	1TB	7.2K	Toshiba
3.5”	829T8	MG03SCA200	2TB	7.2K	Toshiba
3.5”	14X4H	MG03SCA300	3TB	7.2K	Toshiba

3.5”	7KXJR	MK1001TRKB	1TB	7.2K*	Toshiba
3.5”	WDC07	MK2001TRKB	2TB	7.2K*	Toshiba
2.5”	X79H3	WD3000BKHG	300GB	10K	Western Digital
2.5”	CWHNN	WD3001BKHG	300GB	10K	Western Digital
2.5”	C5R62	WD6000BKHG	600GB	10K	Western Digital
2.5”	96G91	WD6001BKHG	600GB	10K	Western Digital
2.5”	4X1DR	WD9001BKHG	900GB	10K	Western Digital
3.5”	0V8G9	WD1000FYYG	1TB	7.2K	Western Digital
3.5”	440RW	WD1001FYYG	1TB	7.2K	Western Digital
3.5”	YY34F	WD2000FYYG	2TB	7.2K	Western Digital
3.5”	37MGT	WF2001FYYG	2TB	7.2K	Western Digital
3.5”	DPTW9	WD3001FYYG	3TB	7.2K	Western Digital
3.5”	202V7	WD4001FYYG	4TB	7.2K	Western Digital

NOTE: 3.5” 15K rpm drives,3.5” 10K rpm drives and 3.5” 7.2K rpm drives marked with (*) are not supported on MD dense arrays such as MD3260, MD3260i, MD3660i and MD3660f.

Supported Expansion Enclosures

MD 3x60 Series Dense Storage Arrays supports a maximum of 180 physical disk slots (with premium feature activation). For a system without premium feature activation, this physical disk slots limit is 120. The additional slots support can only be provided by up to 2 MD3060e expansion enclosures.

Table 13. Expansion Enclosures Supported on Dense (4U) Storage Arrays

Enclosure Model	Minimum Firmware Version
MD3060e	03.66

MD32xx/36xx series storage arrays support a maximum of 192 physical disk slots (with premium feature activation). For a system without premium feature activation, this physical disk limit is 120. The additional slots can be provided by up to 15 MD1200 expansion enclosures, seven MD1220 expansion enclosures, or a combination of both. When a combination of expansion enclosures is used, the total number of disk drive slots in the system cannot exceed 192.

Table 14. Expansion Enclosures Supported on Non-Dense (2U) Storage Arrays

Enclosure Model	Minimum Firmware Version
MD1200	1.05
MD1220	1.05

NOTE: Attaching a 4U (dense) expansion enclosure to a 2U (non-dense) RAID storage array is not supported; alternately, a 2U expansion enclosure cannot be attached to a 4U RAID storage array. All EMM's in an expansion stack must be at the same firmware level.

Supported Management Software

MD-Series Resource DVD and other supported management software details are shown in the following table.

Table 15. Supported Management Software (Windows)

Windows

Software Component	Version	Notes
MD32/36 Series Storage Arrays Resource DVD	5.0.0.70	
Modular Disk Storage Manager	11.10.0306.0005	
Modular Disk Configuration Utility	2.1.0.47	Supported on iSCSI only
MD32 series Hardware Provider VDS/VSS Providers*	D0.84.G6.02/S0.84.G6.02	
MD Storage Array vCenter Plug-in	see *v Center Plug -in* Support table below	
MD Storage Array VASA Provider (iSCSI and Fibre -Channel only)	see *VASA Provider Support* table below	Supported on: • Windows Server 2008 R2 SP1(64-bit version only) • Windows Server 2012 • Windows Server 2012 R2
MD Storage Array Storage Replication Adapter (SRA) (Fibre Channel only)	see *Storage Replication Adapter Support* table below	

* Maximum number of concurrent backups supported while using the HW provider VSS provider with Clustered Shared Volumes is 2

Table 16. Supported Management Software (Linux)

Linux

Software Component	Version	Notes
MD Series Dense Storage Arrays Resource DVD	5.0.0.70	
Modular Disk Storage Manager	11.10.0A06.0005	
Modular Disk Configuration Utility	2.1.0.47	Supported with iSCSI storage arrays only

Table 17. Supported Management Software (VMware vCenter Plug-in)

vCenter Plug-in Support

vCenter Plug-in Version	VMware version supported	Notes
2.7	All Protocols • EXSi 5.5 • EXSi 5.1 • EXSi 5.0	This is compatible only with firmware 7.84.53.60 only
2.5	All protocols • ESXi 5.1 • ESXi 5.0	This is compatible only with firmware 7.84.53.60 or newer

Table 18. Supported Management Software (VASA)

VASA Provider Support
(supported on Fibre Channel and iSCSI arrays only)

VASA Version	VMware version supported	Notes
5.1	vSphere™ Client 5.0/ 5.1/5.5 vCenter Server 5.0/5.1/5.5	Supported on 7.84 firmware only.
1.0	vSphere™ Client 5.0 vCenter Server 5.0	vCenter must be installed on separate server than the VASA Provider See the *MD Storage Array VMware VASA 1.0 Provider User's Guide* for more information

Table 19. Supported Management Software (Storage Replication Adapter)

Storage Replication Adapter Support
(supported on Fibre Channel and iSCSI arrays only)

SRA Version	VMware version supported	Notes
5.1	vSphere™ Client 5.0/ 5.1/5.5 vCenter Server 5.0/5.1/5.5	Supported on 7.84 firmware only
5.0	vSphere Client 5.0 vCenter Server 5.0 Site Recovery Manager (SRM) 5.0	See the *MD Storage Array VMware Storage Replication Adapter 5.0 Installation and Configuration Guide* for more information
1.1	vSphere™ Client 4.1 vCenter Server 4.1, 4.0 or 3.5	See the *MD Storage Array Storage Replication Adapter 1.1 Installation and Configuration Guide* for more information

Supported Operating Systems

Where clustering is supported by the operating system, it is also supported on the MD3200, MD3200i, MD3600i and MD3600f MD3260, MD3260i, MD3660i and MD3660f series storage arrays, subject to the following limitations:

Windows 2008 R2 SP1: Maximum iSCSI nodes is 16; maximum SAS nodes is 4; maximum FC nodes is 16

Table 20. MD-Series Operating System Support

Operating System	SAS Host Server	iSCSI Host Server	Management Station	Fibre Channel Host Server	Notes & Required Hotfixes
Windows Server 2012 R2*					
Standard Server and Core	✓	✓	✓	✓	
Datacenter Server and Core	✓	✓	✓	✓	
Foundation Server and Core	✓	✓	✓	✓	
Windows Server 2012 *					
Standard Server and Core	✓	✓	✓	✓	KB2822241
Datacenter Server and Core	✓	✓	✓	✓	KB2822241
Essentials Server and Core	✓	✓	✓	✓	KB2822241
Windows Server 2008 R2 SP1*					
Windows 2008 R2 SP1 Standard and Core	✓	✓	✓	✓	KB2522766
Windows 2008 R2 SP1 Enterprise and Core	✓	✓	✓	✓	KB2522766
Windows 2008 R2 SP1 Datacenter and Core	✓	✓	✓	✓	KB2522766
Windows 2008 R2 SP1 Foundation and Core	✓	✓	✓	✓	KB2522766
Windows 2008 R2 SP1 Web and Core			✓		KB2522766
Windows 2008 Storage Server R2 SP1 all editions	✓	✓	✓	✓	KB2522766
Windows 2008 R2 SP1 HPC Server	✓	✓	✓	✓	KB2522766
Red Hat Enterprise Linux (RHEL)					
Red Hat Enterprise Linux 6.5 (x64 only)	✓	✓	✓	✓	Basic Server install (Minimum)
Red Hat Enterprise Linux 6.4 (x64 only)	✓	✓	✓	✓	Basic Server install (Minimum)
Red Hat Enterprise Linux 5.10 (x86, x64)	✓	✓	✓	✓	Basic Server install (Minimum)

Red Hat Enterprise Linux 5.9 (x86, x64)	✓	✓	✓	✓	Basic Server install (Minimum)
SUSE Linux Enterprise Server (SLES)					
SUSE® Linux Enterprise Server 11.3(x64 only)	✓	✓	✓	✓	
SUSE® Linux Enterprise Server 11.2(x64 only)	✓	✓	✓	✓	
Virtualization Hosts / Hypervisors**					
VMware ESXi 5.5	✓	✓		✓	
VMware ESXi 5.1 U1	✓	✓		✓	* for supported array FW versions, please see VMware HCL *Supported path policies: MRU, RR
VMware ESXi 5.0 U2	✓	✓		✓	* for supported array FW versions, please see VMware HCL * Hardware iSCSI initiators are not supported. * Supported path policies: MRU, RR
Citrix XenServer	✓	✓		✓	for supported XS releases please see http://hcl.xensource.com/
Microsoft Server 2012 R2 with Hyper-V	✓	✓	✓	✓	
Microsoft Server 2012 with Hyper-V	✓	✓	✓	✓	
Microsoft Hyper-V Server 2012	✓	✓	✓	✓	
Microsoft Server 2008 R2 SP1 with Hyper-V	✓	✓	✓	✓	
Windows Desktop Operating Systems					
Windows 8 (x64 only) • Pro • Enterprise			✓		
Windows 7 (x86, x64)			✓		

*NOTE: Core editions Windows servers can only manage storage arrays via the SMcli client.

** NOTE: The VMware Hardware Compatibility List only shows support for RAID controller firmware version *07.84*. However, this indicates support for all firmware versions 07.84.*xx.xx* or later.

ALUA Support on Supported Host Operating Systems

The following operating systems supported by your MD Series storage arrays support ALUA natively. No configuration steps are required to enable ALUA on these operating systems.

- Microsoft Windows 2008 R2 SP1 and newer.
- Red Hat Enterprise Linux 6.3 and newer.
- SUSE Linux Enterprise Server 11.2 with Service Pack 2 and newer.

VMWare ESXi is not natively configured to support ALUA on the MD Series storage arrays. To enable ALUA you must manually configure it. Configuration details are provided in the MD Series Administrator's documents found on **dell.com/support**.

Supported Device Mapper Software

Table 21. Supported Device Mapper Software

Operating System	Component	Supported Version
SUSE Linux Enterprise Server 11.3	Native	Native *
SUSE Linux Enterprise Server 11.2	Native	Native *
Red Hat Enterprise Linux 6.5	Native	Native *
Red Hat Enterprise Linux 6.4	Native	Native *
Red Hat Enterprise Linux 5.10	Native	Native *
Red Hat Enterprise Linux 5.9	Native	Native *

Supported Fibre Channel Host Bus Adapters

Table 22. Supported Fibre Channel HBAs

Host Bus Adapter Name	Fabric Configuration	Direct-attach Configuration
Qlogic*		
QLE2660/62	✓	✓
QLE2560/62	✓	✓
QLE2460/62/64	✓	✓
QLE220**	✓	✓
QME2662	✓	✓
QME2572	✓	✓
QME2472	✓	✓
Emulex*		
LPe16000/2	✓	
LPe12000/2	✓	✓
LPe 11002	✓	✓
LPe 1150	✓	✓
LPe 1105-M4	✓	✓
LPe 1205-M	✓	✓
LPe 16002-M	✓	✓
Brocade*		

BR815/BR825	✓	✓ Device Driver Version 3.0.1.0 only

* See ***Required Timeout Settings for Fibre Channel Host Bus Adapters*** for required timeout settings by manufacturer.

Required Timeout Settings for Fibre Channel Host Bus Adapters

This table shows required timeout settings for all Dell-supported fibre channel (FC) HBAs, by manufacturer and OS. Make sure that any FC HBA connected to your MD36xxf storage array has these timeout values set as shown.

Use one of these manufacturer utilities to set these values on your HBA:

- Brocade© Command Line Utility (BCU)
- Emulex® HBAnyware® or OneCommand™ Manager
- QLogic SANsurfer FC HBA Manager

Table 23. Fibre Channel HBA Timeout Values (by Manufacturer)

HBA Manufacturer	Timeout Parameter	Required Value (in seconds)
Qlogic		
Windows Server 2008 R2 SP1	LinkDownTimeout	10
	PortDownRetryCount	10
Linux only	qlport_down_retry	10
Emulex		
Windows only	LinkTimeout	10
	NodeTimeout	10
Linux only	lpfc_devloss_tmo	10
Brocade		
Windows and Linux	pathtov	10

Supported Brocade and Dell PowerConnect FOS levels

Supported only on Fibre Channel storage arrays running most current RAID firmware versions.

Table 24. Supported Brocade and PowerConnect FOS

Switches	Firmware	Description
Brocade		
200E	FOS 6.2.2	Brocade 4Gb 16 port FC switch
4100	FOS 6.4.1a	Brocade 4Gb 32 port FC switch
4100	FOS 6.4.2	Brocade 4Gb 64 port FC switch
4900	FOS 6.4.1a	Brocade 4Gb 64 port FC switch
4900	FOS 6.4.2	Brocade 4Gb 64 port FC switch

5000	FOS 6.4.1a	Brocade 4Gb 32 port FC switch
5000	FOS 6.4.2	Brocade 4Gb 32 port FC switch
300	FOS 6.4.1a FOS 6.4.2 FOS 7.0.1	Brocade 8Gb 24 port FC switch
5100	FOS 6.4.1a FOS 6.4.2 FOS 7.0.1	Brocade 8Gb 40 port FC switch
5300	FOS 6.4.1a FOS 6.4.2 FOS 7.0.1	Brocade 8Gb 80 port FC switch
6505	FOS 7.0.1	Brocade 16Gb 24 port FC switch
6510	FOS 7.0.0b FOS 7.0.1	Brocade 16Gb 48 port FC switch
DCX & DCX-4S	FOS 6.4.1a FOS 6.4.2 FOS 7.0.1	Director class switch chassis
DCX8510-4	FOS 7.0.0b FOS 7.0.1	Director class switch chassis
DCX8510-8	FOS 7.0.0b FOS 7.0.1	Director class switch chassis
FC8-48		48 port 8Gb FC blade module for DCX an DCX8510 chassis
FC8-32		32 port 8Gb FC blade module for DCX an DCX8510 chassis
FC8-16		16 port 8Gb FC blade module for DCX an DCX8510 chassis
FC16-32		32 port 16Gb FC blade module for DCX8510 chassies
FC16-48		48 port 16Gb FC blade module for DCX8510 chassies
Dell PowerConnect B-DCX-4S	FOS 6.4.1a FOS 6.4.2 FOS 7.0.1	Dell PowerConnect Director class switch chassis
Dell PowerConnect DCX8510-4	FOS 7.0.0b FOS 7.0.1	Director class switch chassis
Dell PowerConnect DCX8510-8	FOS 7.0.0b FOS 7.0.1	Director class switch chassis
FC8-48		48 port 8Gb FC blade module
FC8-16		16 port 8Gb FC blade module
FC16-32		32 port 16Gb FC blade module
FC16-48		48 port 16Gb FC blade module

Supported Dell M1000e Fibre Channel IOMs

Table 25. Supported Fibre Channel I/O Modules

Supported on Fibre Channel storage arrays only.

Fibre Channels IOMs	Firmware	Description

M6505	FOS 7.0.1	Brocade 16Gb 24 port FC switch module
M5424	FOS 6.4.1a	24 port 8/4 Gb FC blade switch module
	FOS 6.4.2	
	FOS 7.0.1	
M5424-N	FOS 6.4.1a	24 port 8/4 Gb FC SAN module
	FOS 7.0.1	
FC8PT		16 port 8Gb FC Pass-through module

Tested Brocade, Cisco and Qlogic Fibre Channel Routers

Table 26. Supported Fibre Channel Routers

FCIP Routers	Description
Brocade	
7500	Brocade 7500 Extension switch
7800	Brocade 7800 Extension switch
Cisco	
9216i	MDS 9216i Multilayer Fabric Switch
Qlogic	
6142	SANbox 6142