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# INTRODUCING THE DELL SAS 6 FAMILY OF RAID CONTROLLERS

**The Dell™ Serial Attached SCSI (SAS) 6/iR family of integrated RAID controllers provides a cost-effective, entry-level RAID configuration and management solution for internal storage on Dell PowerEdge™ servers and Dell Precision™ workstations.**

**T**he Dell Serial Attached SCSI (SAS) 6/iR family of integrated RAID controllers provides integrated RAID capabilities for internal SAS and Serial ATA (SATA) drives on Dell PowerEdge servers and Dell Precision workstations. The controllers use high-performance 3 Gbps SAS technology to connect to the physical drives and PCI Express (PCIe) to connect to host servers. The Dell SAS 6/iR family comprises five different form factors to support different platforms: the SAS 6/iR adapter controller (a PCI card), the SAS 6/iR integrated controller with sled (used with internal-storage PCI 3.0 connections in PowerEdge rack servers), the SAS 6/iR integrated controller without sled (used with internal-storage PCIe connections in PowerEdge tower servers), the SAS 6/iR integrated blade controller, and the SAS 6/iR integrated workstation controller.

Dell SAS 6/iR controllers are designed as a cost-effective, entry-level solution for basic RAID-0 (integrated striping) and RAID-1 (integrated mirroring) functionality; they support only internal disks and do not provide the performance advantages of cache or battery backup. Administrators can choose between these controllers and the Dell

PowerEdge Expandable RAID Controller (PERC) 6 family to help optimize RAID configuration and management in their environments.<sup>1</sup>

## KEY FEATURES OF THE SAS 6/iR FAMILY

Dell SAS 6/iR controllers support internal SAS or SATA drives used with the following Dell platforms and operating systems:

- **Dell platforms:** Dell PowerEdge models 1950 III, 2900 III, 2950 III, 2970, M605, R200, R900, and T105, and Dell Precision models T3400, T5400, and T7400
- **Operating systems:** Microsoft® Windows Server® 2003 with Service Pack 1 (SP1) (32-bit and 64-bit), Red Hat® Enterprise Linux® 4 Update 5 and Red Hat Enterprise Linux 5 (32-bit and 64-bit), Novell® SUSE® Linux Enterprise Server 10 (64-bit), Microsoft Windows® XP with SP2 (32-bit and 64-bit), and Microsoft Windows Vista® (32-bit and 64-bit) operating systems

Figure 1 provides a basic feature comparison of Dell SAS 5/iR and SAS 6/iR controllers. Other key features include the following:

<sup>1</sup>For more information on Dell PERC 6 controllers, see "Introducing the Dell PERC 6 Family of SAS RAID Controllers," by Bhanu Prakash Dixit, Sanjay Tiwari, Kedar Vaze, and Joe H. Trickey III, in *Dell Power Solutions*, May 2008, DELL.COM/Downloads/Global/Power/ps2q08-20080255-Dixit.pdf.

- Speeds of up to 3 Gbps (half duplex) or 6 Gbps (full duplex) for each port
- Two internal x4 SAS connectors with four ports each, for a total bandwidth of 12 Gbps per connector
- Integrated ARM I/O processor for RAID operations
- SAS expander support, including support for up to 10 physical disks in the PowerEdge 2900 with a flex bay installed and up to 10 physical disks in RAID-0 configurations
- Global hot spare support, including support for up to two global hot spares for each virtual disk (dedicated hot spares are not supported)
- Enhanced storage enclosure processor and status LED support, including all LED status states except rebuild abort

Dell SAS 6/iR controllers do not support controller caching; disk caching depends on the host platform (see Figure 2). Administrators can only modify disk caching policies using the Dell OpenManage™ Server Administrator (OMSA) Storage Management command-line interface (CLI) or the Dell SAS RAID Storage Manager graphical user interface (GUI); they cannot modify these policies in the OMSA Storage Management GUI or Dell BIOS Configuration Utility.

## RAID CONFIGURATION AND MANAGEMENT SOFTWARE

Administrators can use different utilities to manage Dell SAS 6/iR controllers, depending on the host platform. With most supported Dell PowerEdge servers, they can use OMSA Storage Management and the Dell BIOS Configuration Utility. With PowerEdge servers and Dell Precision workstations, they can use Dell SAS RAID Storage Manager and the Dell BIOS Configuration Utility.

OMSA Storage Management (see Figure 3) provides enhanced configuration features for locally attached RAID and non-RAID disk storage, enabling

	<b>SAS 5/iR</b>	<b>SAS 6/iR</b>
<b>RAID levels</b>	0 and 1	0 and 1
<b>Disk interconnects</b>	SAS or SATA	SAS or SATA
<b>Supported disk types</b>	SAS or SATA	SAS or SATA
<b>Ports</b>	4	8 (4 per connector)
<b>Internal connectors</b>	1	2
<b>External connectors</b>	0	0
<b>On-board chipset</b>	LSISAS1068 with ARM processor and Fusion-MPT architecture	LSISAS1068E with ARM processor and Fusion-MPT architecture
<b>Maximum burst speed per channel or port</b>	3 Gbps	3 Gbps
<b>Host interface</b>	x4 PCIe	x8 PCIe
<b>Controller cache</b>	None	None
<b>Drive caching</b>	Not supported (all drive caching disabled by default)	Supported (depending on RAID level and platform)
<b>Maximum number of physical drives</b>	4	10
<b>Maximum number of virtual disks</b>	2	2
<b>Maximum size of a virtual disk</b>	2 TB	Typically limited only by available disk size
<b>Card dimensions</b>	Half length, standard profile	Half length, standard profile
<b>RAID disk data format</b>	N/A	512 MB on each disk
<b>Online configuration</b>		✓
<b>SAS expander support</b>		✓
<b>Global hot spare</b>	N/A	✓
<b>Native command queuing support</b>		✓ (for SATA drives only for performance improvement)
<b>Low-level format</b>	✓	Not an administrator-selectable option
<b>Self-Monitoring and Reporting Technology (SMART) physical drive support</b>	✓	✓
<b>Offline RAID roaming</b>		✓

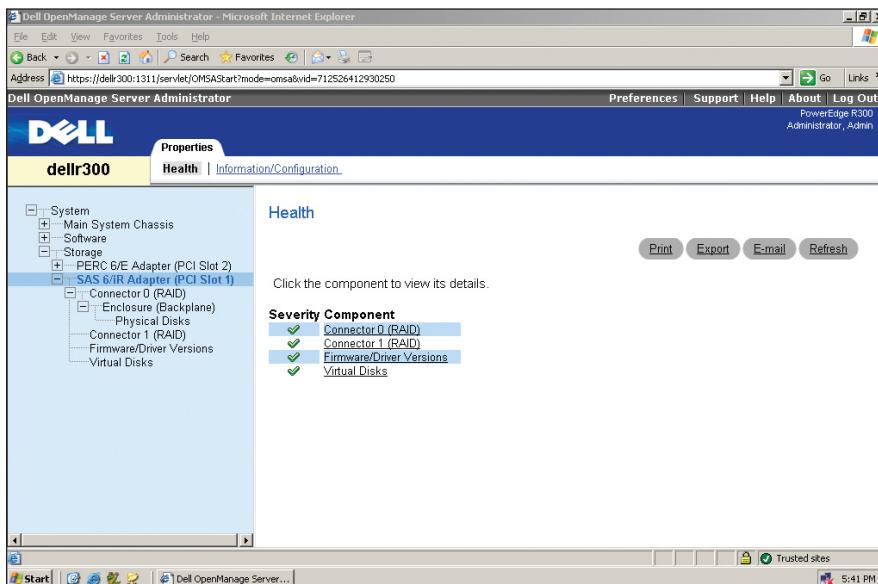
**Figure 1.** Feature comparison of Dell SAS 5/iR and SAS 6/iR controllers

administrators to perform controller and enclosure configuration through a GUI or CLI without using the controller BIOS utilities. The GUI is wizard based and

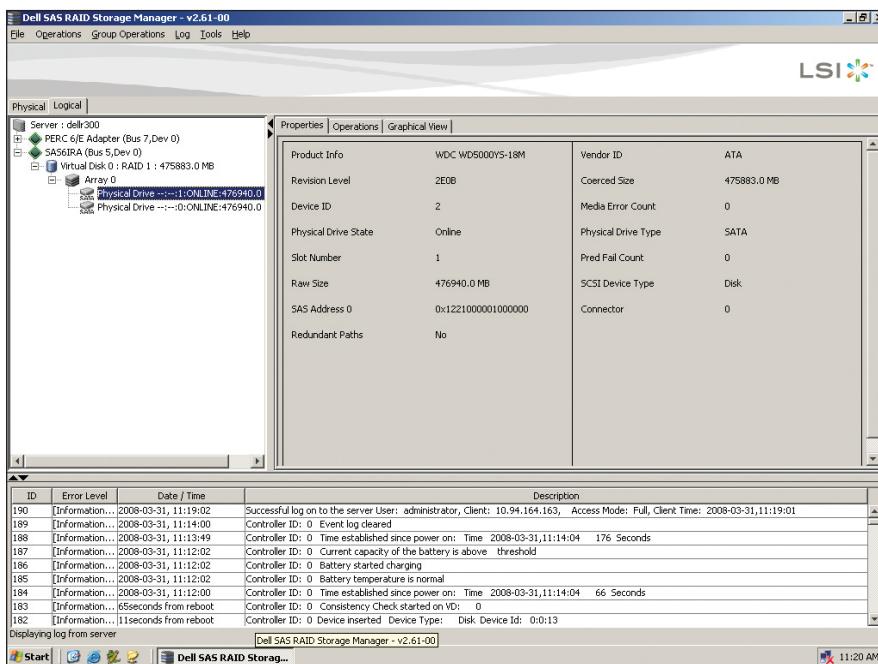
designed for both novice and advanced administrators, and includes detailed online help files; the CLI includes comprehensive functionality and is scriptable.

Disk and RAID type	Dell PowerEdge servers	Dell Precision workstations
SAS integrated striping (RAID-0)	Disabled	Enabled
SAS integrated mirroring (RAID-1)	Disabled	Disabled
SATA integrated striping (RAID-0)	Enabled	Enabled
SATA integrated mirroring (RAID-1)	Enabled	Disabled

**Figure 2.** Default disk caching policies for Dell SAS 6/iR RAID controllers



**Figure 3.** Dell OpenManage Server Administrator Storage Management for Dell SAS 6/iR controllers



**Figure 4.** Dell SAS RAID Storage Manager for Dell SAS 6/iR controllers

Administrators can use OMSA Storage Management to help protect their data by configuring data redundancy, assigning hot spares, and rebuilding failed drives, or to perform data-destructive tasks. OMSA Storage Management is supported on non-SC PowerEdge servers only. Dell SAS 6/iR controllers introduce enhanced OMSA Storage Management support, including the ability to create and delete virtual disks and hot spares as well as to import or clear foreign configurations.

Dell SAS RAID Storage Manager (see Figure 4) is designed to provide simplified RAID management functionality for SAS-based Dell PowerEdge SC servers and Dell Precision workstations. This utility helps eliminate the need to use OMSA management components on these systems.

The Dell BIOS Configuration Utility (see Figure 5) is a preboot utility limited to managing drives connected to a storage controller. Administrators can use this utility to manage virtual and physical disks as well as RAID controllers, including viewing controllers and their properties, viewing virtual disks and physical disks connected to a controller, creating new virtual disks, managing hot spares, restoring controller default settings, and deleting virtual disks.

## COST-EFFECTIVE RAID MANAGEMENT

The Dell SAS 6/iR family of RAID controllers provides a cost-effective, entry-level solution for RAID configuration and management for internal storage on Dell PowerEdge servers and Dell Precision workstations. By supporting RAID-0 (integrated striping) and RAID-1 (integrated mirroring) configurations and flexible, easy-to-use management options, these controllers can help administrators deploy basic data protection strategies in their environments.

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LSI Logic Config Utility  For Dell SAS 6  v6.14.10.00 (2007.09.29)
View Array -- SAS1068E

  Array          1 of 1
  Identifier      Dell  VIRTUAL DISK    1028
  Type            Integrated Mirror
  Scan Order      0
  Size(MB)        475883
  Status          Optimal

  Manage Array

Slot  Device Identifier          RAID  Hot   Drive   Pred  Size
Num          Disk  Spr   Status  Fail  (MB)
  0   ATA     WDC WD5000YS-18M2E0B  Yes  No   Secondary  No   476940
  1   ATA     WDC WD5000YS-18M2E0B  Yes  No   Primary   No   476940

Esc = Exit Menu      F1/Shift+1 = Help
Enter=Select Item   Alt+N=Next Array  C=Create an array

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**Figure 5.** Dell BIOS Configuration Utility for Dell SAS 6/iR controllers

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