SAS-Ready SATA: Value Today, Flexibility Tomorrow

It's no secret that Serial ATA (SATA) storage has taken the enterprise by storm. Boasting an unprecedented combination of high capacity and low cost, SATA disk drives have quickly established themselves as the bang-for-the-buck champions of server storage. But the situation is far less clear when choosing the controllers to connect those SATA drives.

Compared to its parallel ATA predecessor, SATA's modern serial architecture brings a host of improvements (greater scalability, no more master/slave and termination issues, compact cabling and connectors). Nevertheless, connecting SATA disk drives to SATA host bus adapters (HBAs) and RAID controllers can impose significant limitations in terms of performance, flexibility, and expansion.

Serial Attached SCSI (SAS) offers an immediate solution, thanks to its built-in compatibility with SATA. Equipping servers today with SAS HBAs or RAID controllers and SATA drives enables cost-effective, performance-oriented solutions with the added benefits of greater scalability, simplified cabling and more flexibility. Later, these "SAS-ready SATA" servers will allow cost-effective upgrades to SAS storage as SAS drive shipments increase and prices drop.

SAS/SATA Synergies

Because development of SAS began after the SATA 1.0 standard had started, the storage industry wisely chose to incorporate compatibility with SATA as a key feature of SAS. The authors of the SAS standard recognized the significance of SATA's growing role in the enterprise, and the synergies (both fiscal and physical) that would result if SAS and SATA drives could share the same storage infrastructure.

To that end, SAS cables/connectors, HBAs and RAID controllers are fully compatible with SATA drives. Furthermore, SAS controllers seamlessly identify and communicate with SATA devices. When data is directed to a SATA drive that's connected to a SAS controller, a connection is immediately opened to enable SATA frames to pass through the connection to the drive. A SAS controller is just as efficient at issuing SATA commands as a SATA controller.

SAS/SATA compatibility delivers compelling benefits for your SATA-based storage:

· Performance

SATA controllers support only one connection per port, limiting the maximum number of drives that can be connected to the physical number of ports on the controller.

SAS controllers overcome this 1:1 port/drive limitation by leveraging expander technology. Instead of being limited to a maximum of four drives on a four-port controller or eight drives on an eight-port controller, a single SAS controller supports the connection of up to 128 SATA or SAS devices.

In addition, SAS drives provide the maximum performance benefits, through the use of higher rotation speeds (up to 15k), larger caches, deeper queue depth, and lower command latency for better I/O and throughput.

· Reliability

SATA drives are single port and have no automatic failover capability; should the drive's host controller fail, communication with the drive is lost. SAS drives have two ports and can facilitate dual access from the controller, as long as there are two data paths from the controller.

SAS controllers are built to function in rigorous 24/7 enterprise storage environments, and are fundamentally more robust than SATA controllers; this is a critical consideration when no backup controller is available.

· Flexibility

SATA host controllers can only accept SATA drives; upgrading to SAS drives requires additional investment in redundant SAS infrastructure.

SAS controllers enable SATA and SAS drives to be freely intermixed in the same controller environment; complementing high-capacity SATA storage with enterprise-class SAS drives is literally a snap, with zero modifications of the existing infrastructure required.

SAS-Ready SATA Advantages

You can purchase servers equipped with SAS HBAs and RAID controllers for use with SATA drives now, secure in the knowledge that your equipment will not become obsolete when storage priorities shift and high-performance drives are needed. SAS drives can simply be plugged into your existing servers, with no modifications or upgrades necessary.

From the outset, investment in SAS controllers will pay dividends in terms of greater system performance and uptime. Then later, as SAS drive production volumes increase and prices commensurately fall, you will again see benefits. SAS-equipped servers will be able to take full advantage of high-performance (and now more affordable) SAS drives.

Benefits: SAS-Ready SATA vs. SATA				
	Performance	Reliability	Flexibility	Scalability
SAS-Ready SATA Server (SAS controller, SATA drives)	Superior; supports a much higher number of drives on a single system	Superior; SAS controllers can provide dual access and failover and are specifically engineered for online, high-availability enterprise applications	Superior; easily upgraded to enterprise-class SAS storage as needs/funds dictate	Superior; up to 128 devices
SATA Server (SATA controller, SATA drives)	Limited; One drive per port	Limited; single port means no failover capability; not built to withstand demanding use in 24/7 enterprise environments	Limited; no upgrade path to high-performance storage, must replace existing controllers	Limited; up to a maximum of 1 drive per port

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In short, SAS HBAs and RAID controllers extract greater value from SATA disk drives while ensuring long-term investment protection for servers.

Summary: SAS-Ready SATA vs. SATA		
	Drives Supported	**Applications Supported**
SAS-Ready SATA (SAS controller, SATA drives)	SATA and SAS	High-performance High-capacity
SATA (SATA controller, SATA drives)	SATA only	High-capacity only

Get SAS-Ready with Adaptec SAS HBAs and RAID Controllers

All Adaptec SAS controllers offer 100% SATA plug-and-play compatibility. Our latest IOP-based SAS controllers also include the Adaptec Advanced Data Protection Suite with premium RAID levels 6, 60, 1E, and 5EE, as well as Copyback Hot Spare and an optional Snapshot upgrade for the industry's most complete data protection.

Adaptec Serial Attached SCSI RAID 4800SAS/4805SAS Cards

Eight-port SAS half-size controllers integrate market-leading Adaptec RAID, connect SAS or SATA drives.

- Interface: 4800SAS:133MHz PCI-X; 4805SAS: 8-lane PCI-Express
- High performance: 128MB ECC-protected DDR data cache with an optional battery unit
- Protection: RAID 0, 1, 1E, 5, 5EE, 6, 10, 50, 60 with online RAID Level Migration; Copyback Hot Spare, optional Snapshot Backup
- Burst throughput: Eight 300MB/s port for a total burst-thoughput of up to 2400MB/s
- Optimized Disk Utilization: only Adaptec RAID controllers allow multiple LUNs per disk drive, with multiple array levels, while also making use of the additional capacity of dissimilar drive sizes in the array for full utilization of large-capacity SATA drives
- Centralized management: manage all Adaptec RAID with Adaptec Storage Manager

Adaptec Serial Attached SCSI 48300 Card

Eight-port SAS controller integrates market-leading Adaptec HostRAID™ technology in a low-profile design that maximizes server and workstation space. Key benefits include:

- Burst throughput: Eight 300MB/s ports for a total burst throughput of up to 2400MB/s
- Protection: RAID 0, 1, 10, JBOD with rapid disk rebuild
- Large drive support: 48-bit logical block addressing for drives larger than 137GB
- High bandwidth: up to 1056MB/s with a PCI-X/133MHz host interface
- Centralized management: manage all Adaptec RAID with Adaptec Storage Manager
- Additional features: bootable array support, background initialization

To learn more about Adaptec SAS products, go to www.adaptec.com/sas or contact Adaptec sales at 1-800-442-7274.

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