



Technology Paper

Unified Storage Architecture: The Path to Reducing Long-Term Storage Infrastructure Costs

Introduction

For many IT professionals, the term *enterprise storage* immediately brings to mind the never-ending quest for IT efficiency based on the following criteria:

- Performance
- Reliability
- Data integrity

Enterprise IT managers have traditionally met these requirements with a variety of discrete hard drive technologies in 3.5-inch form factors, with 10K- or 15K-RPM spindle speeds, over Fibre Channel (FC) or parallel SCSI interfaces. Recently several new technologies and standards in 2.5-inch form factors over Serial Attached SCSI (SAS), with encryption, have been added to the list. As a result, this disparate mix of technologies has led to overly complex and isolated islands in data centers with uncertain upgrade or maintenance roadmaps, often resulting in a complete rip-and-replace every few years.

Compounding this problem is today's enterprise landscape that is being reshaped by market forces and environmental concerns like shrinking floor space and energy responsibility, all of which demand better storage systems with broader capabilities and greater efficiencies to enable systems that can easily scale and sustain business growth.

Unified Storage Architecture: The Path to Reducing Long-Term Storage Infrastructure Costs



Storage Challenges

Arduous economic conditions, a plethora of regulatory requirements and greater emphasis on environmental and energy-related concerns are some of the key issues that create unprecedented challenges for IT professionals. For example:

- **Data Growth**
Enterprise data is growing exponentially. Adding capacity without long-term integration or expandability can lead to costly rip-and-replace disruptions later.
- **Data Integrity**
Enterprises have moved virtually all of their operations and assets into the digital realm, which makes ensuring the reliability and integrity of that data more critical than ever. In addition, the ability to promptly respond to commands is needed to prevent any degradation to system performance.
- **Data Security**
Data breaches, regulations with encryption *Safe Harbor*¹ provisions and lawsuits from lost data all underscore why companies must safeguard their data.
- **Green IT**
Experts predict that enterprise data centers will soon spend as much on energy (power and cooling) as they'll spend on hardware infrastructure.
- **Cost Containment**
Today's difficult economic climate makes reducing costs an urgent priority; virtualization, storage auto-tiering, and cloud infrastructures have raised expectations for in-house IT infrastructures.

These examples clearly illustrate the complicated storage issues that IT professionals wrestle with

each day. It's obvious that a simpler and more sustainable approach to storage is needed.

The New Requirement for Enterprise Storage: Convergence

With the introduction of solid state drives in the highest-performing storage tier and in combination with traditional enterprise hard drives servicing the tier 1 and tier 2/3 storage requirements, the foundation for enterprise storage will continue to underpin the migration toward more modern, efficient storage solutions.

The same enterprise demands for performance, reliability and data integrity must still be satisfied—more so now than ever.

Convergence toward a simpler, more interdependent infrastructure is vital to addressing the challenges of the new world of enterprise storage. By lowering total cost of ownership (TCO) and helping to improve return on investment (ROI), this convergence can enable enterprises of all sizes to ensure business sustainability and scalability.

Fewer, Better Enterprise Drives

Convergence is facilitated by a simplified but far more capable enterprise drive portfolio that combines three best-of-breed technologies: Serial Attached SCSI (SAS), small form factor (SFF) 2.5-inch storage devices, and drives with Self-Encrypting Drive (SED) security capabilities.

SAS Delivers Performance, Data Integrity

The field-proven enterprise SAS interface combines blazing high transfer rates, improved scalability, and the next generation of signal and data integrity features. The net result is greater performance and data protection than with parallel SCSI solutions, all at a lower cost and complexity than Fibre Channel.

¹ Allows companies the freedom from having to notify customers of a data breach if they can prove the data was encrypted

Unified Storage Architecture: The Path to Reducing Long-Term Storage Infrastructure Costs



SAS also supports SATA drives, which still have a place in some high-capacity/cost-efficient enterprise applications. While lacking some advantages of an all-SAS infrastructure, SAS/SATA deployments retain some of the benefits of convergence.

While nascent interface options exist, such as PCI Express, SAS has stood the test of time and has been well vetted throughout the enterprise ecosystem.

SFF Drives Cut Costs, Boost Efficiency

The market's rapid acceptance of 2.5-inch enterprise drives for servers has made their strengths well-known, including a compelling array of benefits when compared to 3.5-inch drives:

- Lower power consumption (up to 75 percent) reduces energy costs.
- Efficient design boosts system-level performance (IOPS/U, IOPS/W).
- Smaller chassis, low heat output enhances system airflow, cooling.

The SFF drive, with its industry-standard 15mm z-height, delivers a best-of-breed solution that is ideal for multi-drive servers in the data center, while reducing costs and design complexity for OEMs and other system builders. And with SFF drives now delivering capacities of 600GB, they'll become the accepted standard for DAS, SAN and NAS storage systems as well.

SED Secures Data, Eases Hard Drive Disposal

Self-Encrypting Drive (SED) technology adds data security where it did not exist before—on the hard drives themselves. Now enterprise storage managers can quickly and easily safeguard corporate data where it lives.

Providing government-grade, data-at-rest protection through a drive's entire life cycle, SED technology also enables enterprises to greatly reduce drive retirement expenses—a significant issue because the quantity of data (and number of associated drives that will reach end-of-life) is rising.

A Better Enterprise Drive Ecosystem

While the benefits of SAS, SFF and SED technology combine to produce a far better drive, the challenges of enterprise storage cannot be met with a drive-by-drive, or even rack-by-rack, approach. After all, one storage array being secure doesn't secure an enterprise's data, and a lone storage rack that cuts power use doesn't effectively reduce the overall energy needs of a data center.

Standardized storage devices form the foundation for best-of-breed, multi-drive servers and storage solutions that are simpler and less expensive to deploy and manage over time:

- A comprehensive family of SAS/SFF/SED drives satisfies all enterprise storage challenges with a single, converged set of devices, reducing spare parts and IT personnel training costs.
- The ability to mix and match drives when the needs of the enterprise change ensures greater growth capability and reduces costly disruptions and unplanned obsolescence.
- Standardizing on a converged SAS/SFF/SED platform ensures that every storage environment in an enterprise maintains a consistent level of data integrity (via SAS) and data security (via SED), which is a simple, prudent way to protect all of the data, all of the time.

Unified Storage Architecture: The Path to Reducing Long-Term Storage Infrastructure Costs



Solution: Seagate® Unified Storage Architecture

Seagate is meeting the new challenges and requirements of today's enterprise with a complete, integrated portfolio of true enterprise storage devices: Unified Storage architecture—a convergence to simpler, more reliable and secure storage.

Seagate Unified Storage architecture enables IT customers to:

- Decrease the number and type of technologies utilized, simplifying IT support tasks and enabling fewer personnel to support larger storage deployments
- Optimize data centers by maximizing scalability and improving performance
- Reduce TCO and help improve ROI by lowering power and cooling costs, as well as meet goals for a greener IT environment
- Incorporate government-grade security on every drive

The building blocks of the Seagate Unified Storage architecture strategy are fully compatible 2.5-inch SAS hard drives, each available

optionally with SED. These drives are true enterprise-class devices—purpose-built to meet the wide-ranging demands of enterprise storage environments.

Compatibility

By standardizing on a uniform and compatible platform throughout these drive families, Seagate enables enterprises to significantly increase their storage efficiency and cost-effectiveness in the data center:

All SAS Any drive can plug into any SAS backplane or HBA (Host Bus Adapter) anywhere in the storage infrastructure, enabling seamless drive relocation.

All SFF All drives can occupy the same drive slot configurations in servers or external storage enclosures, further boosting deployment freedom and efficiency in less data center floor space.

All SED When every drive is equipped with available SED² technology, data can be secured regardless of the type of drive on which it currently resides.

² Requires TCG-compliant host or controller support

Seagate® Unified Storage Architecture-Enabled Portfolio		
	Features	Benefits
All	SFF (2.5-inch) SAS interface SED technology available	Enormous energy savings, space efficiency, performance edge over 3.5-inch drives Blazing throughput, enhanced data integrity and vast scalability Easy-to-use, cost-effective security for enterprise data-at-rest
Seagate Savvio® 15K	Fastest enterprise drive on the market Industry-leading 15K-RPM enterprise drive with field-proven reliability	Superior performance in transaction-intensive enterprise environments Rock-solid dependability under the most punishing multi-user loads
Seagate Savvio 10K	Lowest-power, high-performance SFF enterprise drive High capacities PowerChoice™ on-demand power optimization	Delivers optimal blend of energy savings and system throughput for mainstream storage Exceptional capacity while meeting mainstream performance requirements Low idle power consumption
Seagate Constellation®	Fastest nearline enterprise drive on the market High-capacity SFF enterprise drive PowerChoice on-demand power optimization	System-level (more drives per rack U) performance is more than double that of 3.5-inch drives Seamlessly handles growing bulk storage Lowest idle power consumption of any enterprise drive

Unified Storage Architecture: The Path to Reducing Long-Term Storage Infrastructure Costs



For More Information

Want to learn more about Seagate® Unified Storage architecture and how it can benefit your enterprise? Visit www.seagate.com to see the 2.5-inch, 6Gb/s SAS portfolio (Savvio® 15K, Savvio 10K and Constellation® drives) at work.

Converged Storage Solutions on the Rise

The fundamental advantages of the SFF/SAS/SED solutions have not escaped the notice of major enterprise powers such as IBM, HP and Dell.

For example, IBM employs SFF/SAS/SED storage throughout its BladeCenter offerings and SED in its DS5000/8000 storage arrays. Dell has introduced its storage expansion enclosures designed with SFF/SAS drives. Similarly, HP is shipping SFF/SAS drives in its servers and storage arrays. Today all of these enterprise OEMs are leading with enterprise storage solutions built upon the Seagate Unified Storage architecture platform. Today over 50 percent of enterprise drive shipments are SFF/SAS-based solutions.

This widespread industry adoption underscores the compelling benefits of SFF/SAS/SED solutions and offers further evidence that such systems represent the future of enterprise storage.

The industry press has been equally enthusiastic in its predictions of a growing migration to SAS/SFF/SED storage solutions:

“With both internal and external storage systems eventually leveraging SAS architectures, it should lead to better economies of scale and lower costs for SAS storage system components. Given that external storage system OEMs are changing system designs to implement SAS, the time is right to also design for 2.5-inch performance-optimized HDDs.” IDC³

“IDC expects that migration to 2.5-inch HDDs for internal storage will accelerate in the near term and reach nearly 84 percent of performance-optimized HDD shipments for internal storage by 2010.” IDC⁴

“...within two to three years, every device that ships with a hard drive or solid-state disk will offer self-encrypting drives. Chief information security officers, purchasing managers, management software vendors and government agencies should plan for this inevitability.” Jon Oltsik, senior analyst at the Enterprise Strategy Group⁵

Conclusion

In addition to the traditional storage goals of performance, reliability and data integrity, today's enterprises must address growing demands for greater energy efficiency and data security. Compounding this challenge is the urgent need to significantly reduce the complexity—and the associated costs imposed by that complexity—of their storage infrastructures.

Convergence to an all-SAS, SFF, self-encrypting drive infrastructure is the ideal solution, creating one best-of-breed foundation for powerful, yet simple storage systems. With an unprecedented combination of performance, efficiency and security, such converged systems also reduce deployment, maintenance and upgrade costs. With a simple yet complete portfolio of compatible enterprise drives, Seagate now brings the benefit of converged storage to every IT manager.

³ *Transitioning from 3.5in. to 2.5in. Enterprise-Class HDDs: HDD Makers Are Making It Happen*, March 2010, IDC Doc #222289, Volume: 1 Storage Mechanisms: Disk: Insight

⁴ *IDC Worldwide Hard Disk Drive 2010–2014 Forecast: Sowing the Seeds of Change for Enterprise Applications*, April 2010, IDC Doc #222792

⁵ Self-encrypting drive standard gains momentum, March 4, 2009, 10:06 AM PST

AMERICAS Seagate Technology LLC 920 Disc Drive, Scotts Valley, California 95066, United States, 831-438-6550
ASIA/PACIFIC Seagate Singapore International Headquarters Pte. Ltd. 7000 Ang Mo Kio Avenue 5, Singapore 569877, 65-6485-3888
EUROPE, MIDDLE EAST AND AFRICA Seagate Technology SAS 16-18 rue du Dôme, 92100 Boulogne-Billancourt, France, 33 1-4186 10 00