IBM System Storage DS3500 Express

Affordable performance and flexibility without sacrificing scalability, efficiencies or ease of use

Highlights

- 6 Gbps SAS systems deliver midrange performance and scalability at entry-level prices

- Energy saving implementations for cost savings

- Management expertise built into an intuitive and powerful storage management software

- Mixed host interfaces for DAS and SAN tiering can reduce overall operation and acquisition costs

- Full Disk Encryption with local key management provides relentless data security

IBM has combined best-of-breed development with leading 6 Gbps host interface and drive technology in the IBM System Storage® DS3500 Express. With its simple, efficient and flexible approach to storage, the DS3500 is a cost-effective, fully integrated complement to System x® servers, BladeCenter® and Power Systems™. Offering substantial improvements at a price that will fit most budgets, the DS3500 delivers superior price to performance ratios, functionality, scalability and ease of use for the entry-level storage user.

DS3500 Express is designed to offer:

- Scalability to midrange performance and features starting at entry-level prices
- Efficiencies to help reduce annual energy expenditures and environmental footprint
- Simplicity that does not sacrifice control with the perfect combination of robustness and ease of use

6 Gbps SAS—midrange performance and scalability at entry-level prices

6 Gbps SAS is the enterprise version of SAS building on the solid foundation of 3 Gbps SAS technology. 6 Gbps SAS offers increased performance, scalability and reliability enhancements to support the ever-increasing reliance on information while delivering outstanding value that organizations are demanding.
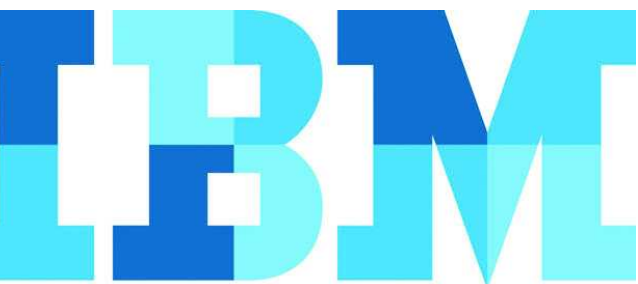
Delivering solid IOPS and throughput, the DS3500's controllers continue IBM's tradition of balanced and sustainable performance. The DS3500 can effectively double the performance of the current DS3000 series of storage systems in both throughput and IOPS. With up to 4,000 MB/s and 40,000 IOPs in sustained drive reads, the DS3500 is equally adept at delivering throughput to bandwidth-intensive applications and IOPs to databases and Exchange.

And with support up to 96 drives, scalability has doubled from the previous-generation systems. By dynamically adding drive enclosures (up to seven EXP3512, four EXP3524 expansion enclosures or a mix of the two) with virtually no downtime, you can quickly and seamlessly respond to growing capacity demands. This scalability also improves overall system performance by distributing the server's I/O requests across a greater number of drives.

Energy saving implementations for cost savings today and tomorrow

With rising energy expenses and IT space constraints, efforts to reduce power consumption in a small IT footprint have quickly come to the forefront as hot-button IT issues for many organizations. To respond to these challenges, IBM has made great strides in energy efficient implementations with the DS3500 by introducing new power saving features that do not impact performance, scalability, or functionality.

Smaller form-factor 2.5-inch SAS drives, one of multiple drives supported by the DS3500, provide up to three times the IOPs per watt in power consumption than 3.5-inch drives and enable twice as many drives to reside in the same 2U of rack space. 2.5-inch drives also deliver impressive IOPs performance in a small form-factor with minimal impact on IBM power consumption or heat dissipation.

Energy-efficient power supplies ensure just that—energy efficiency. By efficiently converting AC power from electric utilities into DC power used by the storage system, the DS3500 power supplies ensure that overall annual expenditures are lower than other less efficient implementations. And with low heat dissipation, the DS3500 can become a key component of an overall energy-saving and green solution.

The DS3500 continues in the tradition of superior disk utilization that enables IBM customers to achieve maximum ROI on their storage investment. The DS series can deliver almost up to two times the disk utilization of leading competitors allowing organizations to achieve maximum performance with fewer drives and less energy consumption.

Intuitive and simple storage management that doesn't sacrifice control

Blending the ease of use and intuitive nature of the DS3000 Storage Manager as well as the robustness and functionality previously only available on the DS5000 and DS4000, the new DS Storage Manager for the DS3500 delivers a simple storage management interface that provides great control while maintaining its simplicity. The DS3500 now offers dynamic and other high-functionality capabilities, which were

previously only available via the CLI with the earlier generation of the DS3000 Storage Manager allowing administrators to make changes to their configurations on the fly with no downtime. The new DS Storage Manager graphical user interface (GUI) was designed for both experienced full-time storage administrators who want complete control over their storage configuration as well as part-time system administrators who desire an intuitive interface that ensures optimal storage utilization with the least amount of effort.

A singular DS Storage Manager with remote mirroring

The DS3500's DS Storage Manager is the same management software offered with the DS5000 and DS4000 series. Now, any of these storage systems can be viewed and managed from a single interface. This allows for consolidated management of these various storage systems as well as a reduced learning curve. The DS3500 also supports enhanced remote mirroring over FC host ports, which is also compatible with the DS5000 and DS4000 series. This allows for low-cost backup and recovery with a DS5000 and DS4000 at a production site and a DS3500 at the secondary site.

Mixed host interfaces support enables DAS and SAN tiering

Administrators can now benefit from tiered DAS and SAN implementations with multi-protocol host connectivity. The DS3500 supports intermixing four 1 Gbps iSCSI or four 8 Gbps FC host ports with its native 6 Gbps SAS interfaces. This flexible and multi-purpose dual protocol approach allows organizations to implement a single storage system to support all of their shared storage requirements, thereby maximizing productivity, reliability, and cost.

Multiprotocol host connectivity offers a number of advantages for the system administrator:

- Low cost high speed SAS delivers the best value and performance for direct attach storage implementations
- Data centers with existing iSCSI or FC SAN infrastructures can cost-effectively implement these additional host interfaces as required. iSCSI is ideal for low cost implementations for secondary servers and FC is well positioned for high performance and robust deployments.

Relentless data security with local key management and full drive encryption

In the life cycle of a hard drive, it will at some point be out of the user's control either through theft, off-site service, repair or disposal. The DS3500 combines local key management and drive-level encryption for comprehensive data security that ensures that data is protected throughout the life of the drive without sacrificing storage system performance or ease of use.

- Full drive encryption (FDE) provides data security at the most basic level, the hard drive. FDE protects against many exposures and vulnerabilities all at once. This drive-level encryption ensures data security in the event of a drive loss, theft or retirement. The FDE engine performs encryption without a performance penalty, which allows organizations to achieve the highest levels of data security while retaining optimal performance.
- Fully integrated into the DS Storage Manager as a premium feature upgrade, the DS3500's local key management provides the necessary management and protection of SED (self-encrypting disk) drives by utilizing a single authorization scheme, or lock key, which can be set and applied to all SED drives within a DS3500. The DS Storage Manager maintains and controls the key linkage and communications with the SED drives, secures user-selected logical drive groups, and initiates the instant secure erase feature for customers desiring even more peace of mind when servicing, decommissioning, or repurposing drives. With local encryption services, FDE key management is transparent to day-to-day storage administration, making SED drives as easy to manage as traditional drives.

Tiered storage with high performance and nearline SAS drives and SAS SED drive intermix

The DS3500, similar to the DS3000, DS4000 and DS5000 storage systems, can cost-effectively support an organization's complete range of data capacity requirements—from nearline static data to highly utilized applications—through support for mixed drive types within a single storage system. The DS3500 accomplishes this with the additional support for nearline SAS drives, SAS SED drives and 2.5-inch SAS drives to its traditional 3.5-in drives. Nearline SAS drives are also the clear replacement of SATA drives. Competitively priced to SATA drives, nearline SAS drives significantly outperform SATA and do so with greater reliability at a comparable price.

Now, organizations can meet even more granular and specific requirements for their application needs, whether these requirements include security for data at rest, leading performance and/or energy efficiency. This exciting capability maximizes storage density and provides a more efficient utilization of enclosures when implementing a tiered storage solution.

Storage and Application Monitors now available with IBM Tivoli Storage

IBM Tivoli® Storage Productivity Center for Disk Midrange Edition V4.1 is designed to provide storage device configuration, performance monitoring, and management of Storage Area Network (SAN)-attached devices from a single console. In addition, it includes performance monitoring capabilities for the DS3500.

Tivoli Storage Productivity Center for Disk Midrange Edition V4.1:

- Offers continuous real-time monitoring and fault identification to help improve SAN availability
- Provides performance reporting across multiple arrays from a single console
- Helps monitor metrics such as throughput, input and output (I/O) and data rates, and cache utilization
- Receives timely alerts that can enable event action based on your policies when thresholds are exceeded
- Helps to improve storage return on investment by aiding to keep SANs reliably and dependably operational
- Can reduce storage administration costs by helping simplify the management of complex SANs.

Key applications/workloads

- **Consolidation/virtualization** Balanced performance, low-cost consolidation and unparalleled configuration flexibly make the DS3500 ideally suited for smaller consolidation and virtualization implementations where an individual storage system supports diverse workloads and application requirements.
- **Departmental and remote sites** Simple enough for a part-time administrator and at a price that won't break a corporations budget to support its departmental and remote sites, the DS3500 bring the right amount of performance, simplicity and functionality that will allow these locations to be self sufficient.
- **Transactional workloads** Efficient IOPS make the DS3500 well suited for transactional workloads (OLTP, databases, e-mail) that are the core of every company's critical applications.
- **Data warehousing** Solid throughput and 6 Gbps SAS and 8 Gbps FC interfaces make the DS3500 well suited for data warehousing environments where an individual storage system must process large amounts of data.
- **Business-critical applications** With bullet-proof reliability, support for SED drives and exceptional uptime, the DS3500 supports business-critical applications where data must be protected and available when needed.

- **Secondary storage** With support for RAID 6 and NL SAS drives, the DS3500 can store large amounts of data cost-effectively with confidence that it's fully protected.
- **Clustered topologies** SAS-based shared storage and FC or iSCSI SAN implementations are ideal for clustering solutions such as MSCS and Oracle RAC when transitioning from a DAS implementation.
- **Streaming video** Large-block I/O applications, such as world-class broadcasting, rich media storage networks, content creation, modeling, and publishing, will benefit from the additional bandwidth that the DS3500 series offers.
- **Data mining** With FC and SAS host connectivity, companies can accelerate and scale simulation, visualization, modeling, and rendering applications easily to accelerate large dataset I/O rates, as well as cost-effectively scale and share information across the organization for high-level collaboration.
- **Backup and restore** With the ability to mirror data between storage systems over FC, the DS3500 can support short backup windows and recovery time for high productivity.
- **Campus area replication** When replicating data across a high-speed FC SAN, data can be mirrored synchronously, ensuring that remote sites have the exact same data as the local site at all times.

IBM System Storage DS3500 Express at a glance

Characteristics	
Model	1746-C2A and 1746-C4A
RAID controller	Dual Active, hot-swappable controllers
Cache	1 GB cache per controller with 2 GB upgrade (battery-backed)
Host interface	Three options: -Four or eight 6 Gbps SAS ports -Eight 8 Gbps FC ports and four 6 Gbps SAS ports -Eight 1 Gbps iSCSI ports and four 6 Gbps SAS ports
Drive interface	Two 6 Gb SAS drive ports
Supported drives	6 Gbps SAS 3.5" drives: -300 GB 15k rpm, 450 GB 15k rpm, 600 GB 15k rpm -1 TB 7.2k rpm Nearline, 2 TB 7.2k rpm Nearline -600 GB 15k rpm SED 6 Gbps SAS 2.5" drives: -146 GB 15k rpm - 300 GB 10k rpm -500 GB 7.2k rpm Nearline -300 GB 10k rpm SED
RAID levels	0, 1, 3, 5, 6, 10
Storage partitions	Support for up to 64 storage partitions (levels: 4 standard with upgrades to 8, 16, 32, 64)
Maximum drives supported	-Up to 96 drives—high performance SAS drives, nearline SAS drives, and SED SAS drives -EXP3512 (2U 12 3.5-in drives) and EXP3524 (2U 24 2.5-in drive) enclosures, which can be intermixed behind a DS3500 enclosure
Fans and power supplies	Dual redundant, hot-swappable
Rack support	2U, 19-inch, industry-standard rack
Management software	IBM System Storage DS® Storage Manager
SAN support	Supported IBM FC switches and directors, and IP switches
Warranty	Three-year parts and labor warranty, 9x5 next business day, upgradeable to 24x7 with four-hour response

IBM System Storage DS3500 Express at a glance

Physical Characteristics			
Dimensions	DS3512: Height: 3.39 in./86.16 mm, Width: 18.99 in./482.47 mm, Depth: 21.72 in./551.60 mm DS3524: Height: 3.47 in./88.07 mm, Width: 18.98 in./482.10 mm, Depth: 19.60 in./497.93 mm		
Supported systems	For a list of currently supported servers, operating systems, host bus adapters, clustering applications and SAN switches and directors, refer to the DS3500 Express Interoperability Matrix available at **ibm.com**/systems/support/storage/config/ssic/ For availability dates, configuration options, and attachment capabilities, refer to: **ibm.com**/systems/storage/disk		
Model	Model description	Interface	Model includes
1746-E2A/EXP3512 1746-E4A/EXP3524	Drive Enclosure	6 Gb SAS	ESM-imbedded
Relative Humidity (no condensation)	EXP3512/EXP3524 Drive Enclosure		
Operating range	20% to 80%		
Storage range	10% to 90%		
Maximum dew point	79°F (26°C)		
Maximum gradient	10% per hour		
Altitude ranges			
Operating	100 ft (30.5 m) below sea level to 10,000 ft (3048 m) above sea level		
Storage	100 ft (30.5 m) below sea level to 10,000 ft (3048 m) above sea level		
Transit	100 ft (30.5 m) below sea level to 40,000 ft (12,000 m) above sea level		
The tabulated power and heat dissipation values are the maximum measured operating power.			
Acoustic noise	EXP3512/EXP3524 Drive Enclosure		
Sound power	6.5 bels		
Sound pressure	65 dBA		
Power input	EXP3512/EXP3524 Drive Enclosure		
Nominal voltage range	90 V ac to 264 V ac		
Frequency range	50 to 60 Hz		
Max operating current	3.90 A at 115 V ac 2.06 A at 230 V ac		

For more information

To learn more about the IBM System Storage DS3500 Express, please contact your IBM marketing representative or IBM Business Partner, or visit:
ibm.com/systems/storage/disk/ds3500

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