

IBM[®] Information Infrastructure Business Partner Guidebook

A Seller's Road Map
to IBM Storage
Solutions



Edited by Jim Hoskins

IBM Information Infrastructure Business Partner Guidebook

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IBM Information Infrastructure Business Partner Guidebook

Eleventh Edition

*A Seller's Road Map to IBM
Storage Solutions*

Edited by Jim Hoskins

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Your 8-Step Quick Start

If you are a new IBM Business Partner, take these eight steps to “hit the ground running.”

1. Check for Updated Editions of This Guidebook

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2. Apply for Your IBM PartnerWorld Membership

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- [Get plugged in to IBM product and program communications](#)
- [Barry Whyte \(Storage Virtualization\) blog](#)
- [Tony Pearson \(Inside IBM Storage\) blog](#)

4. Understand the Express Seller Program

Express Seller is designed to help IBM Business Partners accelerate sales of IBM products and services to small and medium businesses. IBM provides key offerings that meet your clients’ business needs at competitive prices and provides extensive marketing support including “air cover” advertising and customizable materials to help you generate leads.

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- [Express Seller Toolkit](#)

5. Learn to Quickly Find IBM Product Information

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- [System Storage section of IBM.com](#)

on all IBM products), and much more. Give it a try so you will know how to find what you need when you need it. Of course, you can also find product details on the System Storage section of IBM.com. This is a key resource for you and your customers.

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technically supporting the storage product portfolio. Now is a good time to make your plans. Select your role from the list of certifications. Follow the links to complete descriptions of each role, skills, recommended education, and more. You can select courses and build tailored enablement road maps with the help of Systems College (formerly the STG SMART Zone). This is your one stop for all education on IBM Systems offerings for servers and storage.

Introduction

About This Guidebook

This MaxFacts™ interactive guidebook brings together—all in one place—the resources you need to be successful as an IBM System Storage Business Partner. It contains information gathered and adapted with permission from multiple IBM and non-IBM sources. There are embedded links to more detailed and fast-changing information maintained on the Web so you can have the most current information at your fingertips. We are confident you will find this a useful tool. As we are always working to better help you succeed, please forward any suggested improvements to this guidebook to info@maxpress.com.

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1

You and IBM System Storage Offerings

In this chapter we take a look at some business basics about IBM and our System Storage Information Infrastructure offerings to consider as you move forward with your own business.

Why Team with IBM?

If you are seeking to truly differentiate yourself in the marketplace by extending your market reach with more profitable end-to-end solution offerings, IBM is uniquely positioned to help you make this happen. IBM provides you with an integrated portfolio of hardware, software, services, and channel programs that can take your business wherever you want it to go. IBM is committed to helping your clients realize business innovation through industry leading technology, open standards support, and proven best practices.

IBM is a trusted vendor, committed to helping you deliver measurable value to your SMB and enterprise clients. It is this dedication to the success of our channel partners that helped IBM earn a Five-Star Partner rating for 2007 from *VARBusiness Magazine* as well as a Channel Champion Award for Programs and Support in the SMB/Volume Server category from *Computer Reseller News Magazine*.



IBM collaborates across a worldwide ecosystem of business partners to deliver industry leading and cost efficient business solutions. By providing innovative technology that delivers flexibility and high performance, easy to administer programs, and flexible financing options, IBM has an unmatched understanding and appreciation of channel importance that translates into success and prosperity for our partners.

Consider these facts about IBM:

- One of the world's top 10 most valuable brands
- A market leader in the storage and server industries
- Second largest software business in the world
- In each year for over a decade, IBM has earned more patents than any competitor, according to the U.S. Patent Office.

It is an exciting time to be involved with information technology. The worlds of business and computer systems are blending in ways that will result in productivity breakthroughs greater than the sum of their parts. Teaming with IBM will allow you to provide the insight, solutions, and innovation that matter to help your customers succeed.

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50 Years of Disk Innovation (4:25)

A Smarter Planet

IBM has launched a new leadership agenda to help build a smarter planet that will help guide the development and



deployment of IBM hardware, software, and services. The Smarter Planet agenda is born out of the need for change. Our political leaders are not the only ones who have been handed a mandate for change. Leaders of businesses and institutions everywhere have a unique opportunity to transform the way the world works.

We find ourselves at this moment because the crisis in our financial markets has jolted us awake. We are seriously focused now on the nature and dangers of highly complex global systems. And this isn't our first such jolt. Indeed, the first decade of the twenty-first century has been a series of wake-up calls with a single theme: the reality of global integration. The world is becoming increasingly instrumented, interconnected, and intelligent.

The problems of global climate change and energy, global supply chains for food and medicine, new security concerns ranging from identity theft to terrorism—all issues of a hyper-connected world—have surfaced since the start of this decade. The world continues to get “smaller” and “flatter.” But we see now that being connected isn't enough. Fortunately, something else is happening that holds new potential: the planet is becoming smarter. That is, intelligence is being infused into the way the world literally works—into the systems, processes, and infrastructure that enable physical goods to be developed, manufactured, bought, and sold... that allow services to be delivered... that

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- [IBM CEO Sam Palmisano on A Smarter Planet](#)
- [A Smarter Planet info on IBM.com](#)



facilitate the movement of everything from money and oil to water and electrons... and that help billions of people work and live.

Dynamic Infrastructure

A key element of IBM's Smarter Planet initiative is known as the dynamic infrastructure. This is IBM's strategy to help IBM clients create an IT infrastructure that is designed for today's instrumented, interconnected, and intelligent world, transforming physical and digital assets into higher valued services. A dynamic infrastructure helps IBM clients transform their current business and IT infrastructure to address their top three imperatives (improve service, reduce costs, manage risk) through a structured approach. A dynamic infrastructure is highly optimized to achieve greater results and deliver superior business and IT services with agility and speed. IBM System Storage products and services help implement the information infrastructure element of a dynamic infrastructure.

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- [Dynamic infrastructure overview on IBM.com](#)
- [Dynamic infrastructure messaging guide](#)

Why IBM Information Infrastructure

IBM information infrastructure helps organizations manage the incredible explosion in the amount and types of digital information, even during difficult economic times. IBM information infrastructure can help clients lower storage acquisition



costs by up to 70 percent while improving data resiliency and security. Today, IBM expands its proven capabilities in core technologies such as deduplication, virtualization, encryption, and solid-state storage. New solutions are available for larger organizations using mainframes, as well as mid-size organizations. New Smart Business Systems simplify deployment of private cloud solutions for archiving and network file services.

IBM information infrastructure can do much more than help reduce costs. IBM information infrastructure is also an important enabler of information-led transformation, which is key to growth for many organizations. Information-led transformation is a process through which organizations turn information into a strategic driver for innovation, business optimization, and competitive differentiation. Information-led transformation can help clients use information more pervasively across the organization, leverage analytics to take a predictive view of the business, make real-time decisions, and discover new kinds of intelligence from the information at hand.

As organizations build new information-driven or information-based products and services, throughput and availability requirements will increase dramatically. IBM enables information-led transformation with innovative technology that breaks through traditional performance barriers, and best practice-based services to help clients manage the transition. An example is smart use of solid-state storage, where IBM storage arrays and virtualization controllers with a small amount of solid-state disk can deliver up to 300 percent more throughput.



The Information Explosion

We are experiencing an information explosion and businesses are struggling to keep up. Growing information infrastructures are taking an increasing amount of time and effort to manage. To reduce the cost and complexity of managing the information explosion, storage managers say that managing storage growth is a top issue. Related issues include forecasting, managing costs and complexity, and improving the back-up process.

Critical Success Factors

The success of an information infrastructure can be measured by the ability to drive continuous improvements in three core areas:

- Storage efficiency
- Data protection
- Service management

Because of rapid data growth and flat budgets, many organizations have been busy managing day-to-day workloads. Often, there wasn't time or resources to look at overall storage efficiency, service levels, and data protection policies. Now, as many organizations return to growth, these foundation infrastructure issues are becoming more relevant. Businesses with gaps in these core areas may feel their IT organization is an obstacle to growth or a high-cost service provider. The stakes are high. Now let's take a moment to look at each of these critical success factors.



Storage Efficiency

Smarter systems, and other new applications, are generating extremely rapid data growth. Storing all of this new data is quickly becoming a question of efficiency for clients. Organizations on a budget have no choice but to fix existing infrastructure inefficiencies—such as multiple copies of documents stored on company servers, storage devices sitting idle while waiting for data surges, and unnecessarily slow searches.

Organizations of all sizes are adopting new technologies that can handle information growth more efficiently. IBM has invested over \$2 billion in developing storage solutions that enable five essential technologies for improving efficiency:

- IBM virtualization can help clients increase utilization up to 30% and increase administrator productivity up to 2x.
- IBM thin provisioning increases efficiency with little or no performance penalty, and can support non-IBM storage.
- IBM data deduplication can reduce data up to 25:1 and deliver up to 1000 MB/sec throughput.
- IBM data compression is the only storage compression solution that can shrink primary, active data in real time, without performance degradation. IBM can compress data up to 80%.
- IBM automated storage tiering can improve performance up to 200%.



Companies that understand the changing nature of data on a smarter planet and employ these storage efficiency technologies... those that are adapting to the explosion of information... can find success and distance themselves from their competitors.

Data Protection

Data protection is a core capability not just because of its role in risk mitigation, but because there is usually more data stored on backup, archive, and flash copy volumes than on primary production storage. The information explosion hits the data protection environment too—yet backup and restore windows are expected to stay the same or shrink, even as data grows.

Old data protection processes may not be capable of meeting today's business requirements. New strategies and technologies can deliver the "always on" or "almost always on" capabilities your applications need, for a lot less than you might think. IBM helps businesses implement best practices for data protection and continuous operations with multi-site mirroring for small and large systems. Backup technologies, such as deduplication and virtual tape, can shrink bloated backup windows and speed restore times, without disrupting current backup procedures.

Archiving is a best practice for both business application management and data protection. Archiving helps consolidate and standardize retention and compliance policy management, to support data protection goals. Archived data can be stored on less expensive storage tiers reducing both capital and op-



erating expenses. Archiving is a best practice for email, SAP, and other applications because it can improve user response times and shrink maintenance windows by moving old records from the production database to a separate repository.

Service Management

Information infrastructures deliver the information needed for IT services. With more focus on service level agreements, more focus needs to be placed on the service management capabilities of the storage systems. People who build service management systems talk about the core management capabilities of visibility, control, and automation. Visibility—to understand what you're trying to manage; and control and automation—to respond quickly and accurately to changes.

People responsible for managing service levels talk about the importance of flexible delivery options. Such options create competition, which tends to drive down prices and improve features; whether services are managed in-house or with a new model like cloud computing or managed infrastructure services.

Attention to storage service levels helps in three fundamental ways:

- Service levels tend to increase when they're measured and analyzed.
- Service level reporting helps demonstrate the business value of IT.
- Confidence in service management is a prerequisite to hosting next generation "always on" applications.



IBM Core Technologies to Drive Your Information Infrastructure

IBM solutions are optimized for the unique needs of mid-size organizations, large enterprises, cloud computing providers, and others. Clients can get just what they need, saving time and money. A key benefit of selecting IBM for your next information infrastructure project is access to a broad portfolio of outstanding products and services. IBM offers highly rated, patented technology that delivers unique value.

Some IBM differentiating capabilities include:

- Storage virtualization—Reduce SAN disk costs by increasing utilization up to 30 percent or more.
- Data deduplication—Lower storage acquisition costs by up to 70 percent or more while reducing energy, cooling, floor space, management requirements, and maintenance costs.
- Solid-state storage architectures—Improve drive access response time up to 800 percent without application tuning.
- Next generation scaleable storage—Revolutionary disk systems can help deliver tier 1 functionality at tier 2 costs.
- Mainframe storage—Mainframe optimized tiered storage. First-to-market drive level encryption. Up to 300 percent increase in transaction throughput with only 5 percent solid-state storage.
- Self-encrypting storage and security management—Encryption at the drive level improves security with little or no performance impact.



- Information archiving—Optimize application performance and simplify application administration, while lowering total costs.
- Business intelligence platform integration—Correlate disparate information across the value chain up to 600 percent faster.
- Continuous data protection—Get applications and users up and running within minutes following a data loss.
- Storage infrastructure management—Improve storage utilization up to 20 percent and simplify administration.
- Real-time compression—Achieve up to 80% more storage utilization in the same footprint.

No other major vendor can match IBM's breadth of information infrastructure capabilities. IBM offers integrated solutions for consolida-

tion, data protection, storage management simplification, compliance support, and more. IBM technol-

ogy includes SAN and NAS disk systems, tape systems, SAN switches, storage management software, services, self-encrypting storage with key management, non-erasable non-rewriteable storage for regulatory compliance, and flexible financing for large and mid-size organizations.

MORE ON THE WEB

- [Overview sales kit for Business Partners](#)
- [Information infrastructure two-page leaflet](#)

2

Information Infrastructure Basics

In this chapter, we will quickly review the core capabilities of the IBM information infrastructure offerings.

IBM Core Technology Capabilities

IBM has developed significant capabilities in a number of critical technology areas that give clients the ability to manage their information more effectively. IBM investments in information infrastructure technology, both internal development and acquisitions, have exceeded \$3 billion in the past three years. Clients are now benefiting from the results.

Storage Virtualization

IBM storage virtualization solutions enable clients to overcome the limitations and frustrations of mixed storage environments and make information available where and when it's needed. IBM storage virtualization also enables clients to dramatically improve asset utilization and simplify administration by virtually consolidating different disk systems into pools of shared capacity. Storage virtualization helps administrators manage more with less effort, helping to control operating expenses as the infrastructure grows.



IBM storage virtualization is unique in the industry for the following reasons:

- SAN Volume Controller is a proven storage virtualization system with over 19,000 engines sold to date running in more than 6000 SVC systems.
- SVC is the first storage virtualization system to offer integrated support for solid-state disks delivered in a highly-scalable manner to suit both entry and large enterprise requirements.
- SAN Volume Controller delivers a common approach to storage virtualization for a wide range of virtualized server environments including IBM PowerVM, VMware, Hyper-V, and XEN.
- IBM has a comprehensive solution for storage virtualization. Virtualization offerings are available for all IBM server and storage platforms, and even non-IBM disks. Storage virtualization is available for disk, tape, storage networks, and file systems.

IBM has decades of experience developing innovative products and supporting clients with virtualized storage and servers. Benefits can include:

- Better application and information availability
 - Move applications without disruption to users
 - Deploy applications faster
 - Move data safely without disruption to applications
 - Simplify use of tiered storage



- More flexible disaster recovery
- Remove limitations of physical infrastructure
 - Enable information management without concern about information location
 - Increase flexibility and responsiveness to business requirements
 - Ease deployment of multi-vendor environments
- Simpler infrastructure and management
 - Logically consolidate without physical consolidation
 - Physically consolidate while keeping workloads separate
 - Simplify and standardize management
 - Improve administrator productivity
 - Improve resource utilization.

Storage virtualization solutions from IBM are available for several parts of the information infrastructure stack, including disk, tape, network, files, and file systems. Clients can implement 100 percent virtualized environments, or focus on one layer at a time, as needed, to relieve bottlenecks.

- Disk virtualization—SAN Volume Controller supports over 130 IBM and non-IBM storage systems
 - New SVC hardware delivers up to 2x better price/performance for most applications and can support up to



- 800,000 read IOPS at less than 1 ms response time with new SSD option.
- New IBM Tivoli Storage FlashCopy Manager provides tight integration between SVC replication and server software to speed backups and improve availability.
 - New IBM Storwize V7000 helps to increase administrator's productivity as the result of easier storage provisioning, load balancing, and data migration.
- Tape virtualization—IBM Virtualization Engines TS7600, TS7700, and VTFM
 - Accelerate backups and recalls by using a tiered hierarchy of disk and tape, making more efficient use of tape drives.
 - Network virtualization—IBM converged switches and adapters
 - Manage service levels with virtualized 10 Gb Fibre Channel over Ethernet (FCoE) switches and adapters. Larger SAN Directors also offer virtualization.
 - File and file system virtualization
 - IBM Scale Out Network Attached Storage (SONAS) is a petabyte-age system that can grow with unprecedented scale and deliver computing services that make the technology underlying user devices almost invisible.
 - Virtual File Manager delivers a simple user interface for multiple network file systems.



- Virtualized server support
- SAN Volume Controller supports a very wide range of virtualized server environments.
- N series offers integrated VMware support, including deduplication.
- IBM Proventia Virtualized Network Security Platform integrates security processes into the VMware provisioning process.

Data Deduplication

Data deduplication has emerged as a key technology in the effort to dramatically reduce the size and the cost associated with storing large amounts of data. Deduplication is the art of intelligently reducing storage needs better than common data compression techniques—through the elimination of redundant data so that only one instance of a data set is actually stored. IBM's new offerings enable customers to easily harness the power of deduplication without making radical changes to their computing environment.

IBM data deduplication solutions are unique in the industry for the following reasons:

- ProtecTIER Gateways and Appliances can deliver over 1000 MB/sec throughput, with 25:1 reduction in storage, up to 9x faster than competitors!
- N series offers primary storage deduplication, which reduces physical storage 50 percent, on average.



- TSM version 6 delivers powerful deduplication capabilities for disk storage pools with a simple software upgrade.

IBM has the broadest portfolio of deduplication solutions in the industry to solve customer issues with the most effective technology. Whether it's source or target, inline or post, hardware or software, disk or tape, IBM has a solution with the technology that best solves the problem.

Benefits of data deduplication can include:

- Reduced storage capacity required for a given amount of data
- The ability to store significantly more data on the same size disk
- Restoring from disk rather than tape may improve the ability to meet recovery time objective (RTO)
- Lower storage-management cost resulting from reduced storage resource requirements.

Data Deduplication and Data Reduction

Data deduplication is a method of reducing storage needs by eliminating redundant data. Only one unique instance of the data is actually retained on storage media, such as disk or tape. Redundant data is replaced with a pointer to the unique data copy.

Data reduction is the removal of old, stale, or orphaned data from an active disk AND the removal of duplicate data to save time and space, thus improving the ROI and TCO for an existing investment.



Data deduplication and data reduction solutions from IBM are available for several parts of the information infrastructure stack, including virtual tape, backup disk storage pools, email archives, and primary disk storage. IBM clients can launch a centralized deduplication project, or migrate to products that include deduplication over time, to reduce operating expenses.

Some examples include:

- High throughput in-line deduplication—ProtectTIER gateways and appliances
 - Independently measured at over 1000 MB/sec, with 20:1 reduction in storage
- Appliances are available in multiple sizes for simpler implementation in mid-size data centers.
- Primary NAS storage—N series Deduplication
 - Primary storage deduplication reduces physical storage 50 percent, on average.
- Backup and file archive—Tivoli Storage Manager
 - Deduplication in disk pools means more restores and retrievals happen from disk rather than tape. Included in TSM v6.
- Email archive—IBM Content Collector
 - Duplicate emails and attachments can be eliminated from archive storage.



MORE ON THE WEB

- [Red paper: N series A-SIS Deduplication Deployment and Implementation Guide](#)

- Data reduction—Tivoli Storage Productivity Center, Storage Enterprise Resource Planning (SERP), DB2
 - Reduce physical storage by up to 20 percent by identifying duplicate objects and potential wasted space in file systems and databases.
 - Reduce database storage requirements by over 50 percent with DB2 compression.
- IBM Tivoli Storage Manager
 - Automate data backup, restore, and archive functions. Centralize storage management operations. Includes deduplication for storage pools.
- N series Deduplication
 - Support deduplication for primary storage on easy-to-operate NAS storage.
- Content Collector
 - Better manage the growth of email and file systems, while mitigating information risks.



Solid-State Storage Architectures

Solid-state storage devices (SSDs) use memory-type devices for mass storage rather than spinning disk drives or tape drives. First-to-market SSDs are the same size as standard hard disks, so they plug easily into existing disk drive systems.

Solid-state storage is available for all IBM server platforms, DS8000 and DS5000 platforms, the IBM storage virtualization system, and SAN Volume Controller. IBM is developing techniques for applications to exploit solid-state storage more efficiently, starting with DB2.

Solid-state storage technology can have the following immediate benefits:

- Significantly improved performance for hard-to-tune, I/O bound applications
- Less floor space required
- SSDs can be filled to nearly 100 percent without performance degradation
- Faster access times
- More input/output operations per second
- Reduced energy use
- No code changes required.

IBM solid-state storage architectures are unique in the industry for the following reasons:

- IBM performs primary research to develop solid-state storage technology, resulting in several patents already.



- IBM is first to market with a storage virtualization system that
 - Includes solid-state storage.
 - Builds on IBM Quicksilver technology demonstration. Up to 800,000 read IOPS with no application tuning.
 - Moves data to solid-state storage without application disruption.
- Supports non-IBM storage as well.

IBM System Storage Easy Tier optimizes solid-state storage deployments simply, automatically, and economically. Easy Tier enables clients to deploy solid-state storage confidently, effectively, and economically by automatically and dynamically moving only the appropriate data to the SSDs in the system, based on ongoing performance monitoring. Such effective storage tiering will help clients enjoy the performance benefits of SSDs without requiring administrators to create and manage storage tier policies and without the excessive costs associated with placing too much of the wrong data on these relatively expensive drives. With less than 10 percent solid-state storage, smart data placement can deliver over 90 percent of the throughput increase of an all solid-state arrays infrastructure, substantially reducing capital expenses for high performance storage solutions.

Solid-state storage continues to be expensive relative to hard disks, putting it out of reach for all but the most important applications. IBM is making solid-state storage affordable



MORE ON THE WEB

- [Press release: Solid-State Drive Sets Speed Record, Sept. 2008](#)
- [White paper: IBM System z and System Storage DS8000: Accelerating the SAP Deposits Management Workload with Solid-State Drives, 2009](#)
- [White paper: Driving Business Value on Power Systems with Solid-State Drives, April 2009](#)
- [Red paper: Ready to Access DB2 for z/OS Data on Solid-State Drives, 2009](#)
- [Red paper: DS8000: Introducing Solid-State Drives, 2009](#)
- [Techdoc: IBM System Storage DS8000 with SSDs: An In-Depth Look at SSD Performance in the DS8000](#)
- [Press release: IBM Helps Companies Gain Control of Their Information with Solid-State Flash Technology, May 2009](#)

with innovative architectures, system and application integration, and management tools that enable effective use of solid-state storage.

Solid-state technologies will continue to evolve. IBM researchers have been making significant breakthroughs and will continue to bring the best implementations to IBM customers. Extensive work and innovation is still required to bring the full value of this technology to market.

Next Generation Scaleable Storage

Next generation applications need next generation storage. Many new applications manage rich data, need always-on availability, and have the potential for rapid scale up and



scale down. Next generation applications often start as ideas in a lab, but have the potential to grow very large. Traditional storage systems are optimized for entry, midrange, or enterprise workloads. While there is overlap, most traditional storage systems have a price/performance sweet spot in one of the three categories. Next generation applications are challenged by traditional storage because of the high entry cost of enterprise storage and the impracticality of changing from entry to enterprise storage in the middle of a growth spurt. IBM's Next Generation Storage Systems, including XIV and Scale Out File Services (SOFS), enable clients to leverage grid-based storage architectures to address critical "next generation" requirements such as the need for massive scalability, simplified operation complexity, improved administrator productivity, and lower overall IT costs and energy costs per TB of data. IBM's Next Generation Storage Systems solutions are unique in the industry for the following reasons:

- XIV can rebuild data from a 1 TB drive in 40 minutes or less for most workloads with minimal performance impact, compared to hours of degraded performance with other solutions.
- XIV has over 50 patents files.
- Scale-out File Services can manage 500 billion files with fast file retrieval and integrated data protection.
- Scale-out File Services leverages GPFS, a file system proven to scale with daily use in some of the largest supercomputer environments.



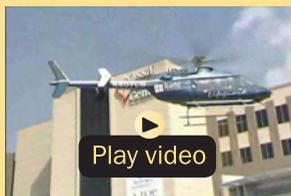
Next generation scalable storage solutions from IBM use grid architectures. The inherent benefits of grid storage address the inherent requirements of next generation applications:

- Ease of use
- Start small and grow
- Use standard hardware for lower acquisition and upgrade costs
- Scalability
- Nondisruptive upgrades.

The benefits are real. Some examples include:

- IBM was able to reduce costs by managing more than 92,000 worldwide users with one storage cloud and one management team.
- Iowa Health System saw a 90 percent lower cost for data management due to simplified operations and the use of standard high capacity hardware.
- HDMS, a subsidiary of Aetna, experienced a 70 percent performance increase in core SAS applications, while reducing floor space and energy and administrative expenses.
- Virginia Commonwealth University noticed an immediate 6°F drop in data center temperature after migration to IBM Next Generation scalable storage.

Grid solutions deliver near linear scalability because they allow the addition of new nodes. Nodes include CPUs, memo-



Iowa Health (3:29)



Spectrum Health (3:41)



Virginia Commonwealth University (3:49)

ry, network interfaces, and storage; connected to other nodes by a fast interface bus. IBM capabilities include:

- Scalable block storage—IBM XIV Storage System
 - Automated and virtualized data management and dramatically simplified systems management help tame your dynamic workloads.
- Scalable file storage—IBM Scale-out File Services
 - Simplify operations with one global namespace and one point of management for up to 500 billion files.
- Medical image management—IBM Grid Medical Archive Solution
 - Multi-node architecture and advanced replication enable high availability. Efficient components reduce operating expenses.



Mainframe Storage

Large applications that depend on high availability and short recovery time objectives can often improve efficiency and effectiveness with IBM Storage solutions. IBM offers comprehensive data protection capabilities, scalability, and reliability. IBM offers optimized enterprise storage solutions for Linux, UNIX, Windows, and z/OS environments. IBM solutions include disk, tape, virtualization, management software, and consulting services.

IBM enterprise storage solutions are unique in the industry for the following reasons:

- As the owner of System z architecture, IBM is in a unique position to leverage the strong synergy between System z hardware, software, and storage. The result is a number of first-to-market capabilities that drive additional client value. Examples include:
 - Solid-state disk tooling for DB/2 for breakthrough price/performance
 - Extraordinary performance for mainframe workloads
 - Leading business resiliency solutions
 - Multiple readers for improved z/OS Global Mirror throughput
 - Extended address volumes for very large data sets—Multitrack support for high performance FICON for increased channel utilization and higher data throughput.



- As the owner of POWER architecture, IBM is in a unique position to leverage CPU technology to drive storage array performance. The result is a number of capabilities that deliver improved price/performance, including:
 - Optimized use of cache
 - Improved recovery time objectives (RTO)
 - Optimized use of POWER and ASIC technology
 - Faster upgrades to new chip technology
 - IBM has been the market share leader for enterprise branded tape for several years in a row.
 - Media encryption at the drive level, for both disk and tape, enables a new way to improve data security with little or no performance impact.

Storage Encryption and Security Management

IT security is complex, but can be summed up very simply: Let the good guys in, keep the bad guys out... and be able to prove it. For many organizations, information privacy is an IT challenge that continues to defy simple answers and generate negative publicity. Because of mandatory disclosure laws in many countries, more data security breaches must be reported. In some countries, victims are entitled to compensation.

Companies are at risk from external hackers, accidental loss, and internal theft. Since 84 percent of security breaches are internal, we can't simply install better locks on the doors.

The total cost of security breaches can include:



- Loss of customer information
- Loss of customer confidence
- Loss of intellectual property
- Legal and regulatory exposures
- Loss of brand equity
- Cost of remediation
- Business disruption.

Lost business now accounts for 69 percent of data breach costs, up from 65 percent in 2007 and 54 percent in 2006, according to “2008 Annual Study: Cost of a Data Breach,” Ponemon Institute.

Think it can’t happen to you? In 2008, the UK Royal Air Force lost three unencrypted hard disks in a secure data center, on a secure military base. Failure to fully disclose the security breach for several months compounded the costs to the RAF and elected officials.

“The latest enhancement of the ‘thin provisioning’ for the high-end DS8000 is answering end users’ requirements for better storage economics, lower energy requirements, and better environment protection. The DS8000 is not missing any functionality, ensures advanced availability features, and all this at an excellent price/performance ratio.”

— Josh Krischer, Krischer and Associates, June 2009

IBM drive level encryption for both disk and tape addresses a security exposure at little or no cost, with little or no performance impact. The benefits of storage encryption and key management include:



- Enables secure sharing of information with employees, customers, and suppliers
- Less cost and risk from lost or stolen media
- Simple disk sanitization
- Simplified auditing and reporting
- Helps implement best practices and policies consistently.

IBM encryption and key management solutions are unique in the industry for the following reasons:

- IBM was first to market with drive level encryption for disk and tape, both enterprise and midrange.
- Drive level encryption and centralized key management is proven to be fast, scalable, and efficient:
 - Fast: Encryption has little or no performance impact
 - Scalable: Able to encrypt many devices in parallel
 - Efficient: Able to compress before encryption, reducing media expenses. Other external encryption designs create data streams that can't benefit from drive-level compression.
- IBM storage encryption can address PCI (payment card industry) data security standard requirements.

IBM information infrastructure offers a variety of information security solutions designed to help organizations address virtually any dimension of a secure infrastructure. IBM has



the knowledge and expertise to help customers deploy tactical security solutions, as well as design and implement full end-to-end security across the extended enterprise.

IBM is committed to providing the right technologies and expertise to deliver leading edge information security solutions to both large and small businesses, including identity and access management, intrusion protection, compliance monitoring, and professional services that customers can use to design and implement holistic solutions across the enterprise.

IBM Security Management solutions are unique in the industry for the following reasons:

- IBM Internet Security Systems (ISS) offers the industry's only security guarantee with managed security services providing up to 55 percent savings in IT security management costs.
- ISS was ranked number one in Managed Security Services and Vulnerability Assessment by Frost & Sullivan.
- IBM Tivoli was ranked number one for Identity Management by Frost & Sullivan.
- Tivoli is the market share leader in identity and access management, according to top analysts.
- IBM is the market share leader in application security vulnerability scanning, according to top analysts.
- In April 2009, NSS Labs, a leading global independent testing lab that focuses on security product testing and certification, awarded IBM Proventia Network Intrusion Prevention System (IPS) appliance GX6116 the highly coveted "Gold" award.



- IBM has the unmatched global and local expertise to deliver complete solutions—and manage the cost and complexity of security.

Self-Encrypting Storage

Self-encrypting storage is a design, pioneered by IBM, where an encryption chip is built into the storage device, rather than an external component. Self-encrypting storage has important advantages over other media encryption designs:

- **Fast:** Encryption has little or no performance impact
- **Scalable:** Able to encrypt many devices in parallel
- **Efficient:** Able to compress before encryption, reducing media expenses. Other external encryption designs create data streams that can't benefit from drive-level compression.

On May 9, 2008, the U.S. National Security Agency (NSA) reported that it evaluated the drive-level encryption used by IBM and determined it to be “acceptable for the protection of sensitive but unclassified information in national security system solutions, and acceptable for use with other approved assurance mechanisms in classified national security systems.”

The benefits of storage encryption and security management are:

- Enables secure sharing of information with employees, customers, and suppliers
- Less cost and risk from lost or stolen media
- Simple disk sanitization



- Simplified auditing and reporting
- Helps implement best practices and policies consistently
- Helps address security compliance standards.

IBM capabilities in self-encrypting storage and security management include:

- Drive level media encryption (disk: DS8000, DS5000; tape: LTO, TS1130)
 - Drive level media encryption has little or no performance impact, so clients can implement 100 percent encryption. Encryption means one less worry for risk managers.
 - IBM was first to market with drive level encryption for disk and tape, enterprise and midrange.
- Security management (Tivoli Key Lifecycle Manager, Tivoli Identity Manager, Tivoli Access Manager, Tivoli Security Information & Event Manager)
 - Open standards, ease of integration, simplified operations, and automated reporting help mitigate information risks efficiently and effectively.
 - Tivoli Key Lifecycle Manager generates keys for self-encrypting disk and tape drives.
- Security services and appliances (Internet security systems)
 - Comprehensive, flexible, and adaptable security solutions that provide visibility and control over the entire realm of IT security.



- The industry’s only security guarantee with managed security services offering up to 55 percent savings in IT security management costs.
- IBM has the unmatched global and local expertise to deliver complete solutions—and manage the cost and complexity of security.

Archiving

As today’s IT professionals consider the complex mix of issues brought on by information growth, archiving emerges as a logical solution to the challenges surrounding information storage and accessibility. Archiving can help improve productivity, control infrastructure and legal costs, and manage compliance and operational risks.

The IBM archiving and retention strategy supports a policy-based tiered storage environment that blends storage media—different types or tiers of storage, such as disk, tape, and optical—in order to create cost efficiencies. IBM solutions are designed to offer seamless migration between media and can optimize information availability and performance.

IBM has a breadth of capability to help clients with archiving projects. IBM offers a complete solution, or just the pieces needed.

- Archiving applications
 - Email, SAP, images, and business records—Content Collector, Content Manager, and FileNet



- Databases, database applications, mainframe applications—Optim
- Medical images—Grid Medical Archive Solution
- Archive/HSM infrastructure
 - System Storage Archive Manager/Tivoli Storage Manager
 - N series
 - Scale-Out File Services
- Information retention systems
 - IBM System Storage DR550
 - IBM Information Archive
 - N series with SnapLock
 - Tape, optionally with WORM or encryption
 - Disk, low cost high capacity SATA
 - Grid storage
- Expertise
 - IBM Enterprise Archive Services.

Business Intelligence Platform Integration

Organizations must tap into the intelligence of the entire value chain, correlating insights and anticipating opportunities and threats. IBM Business Intelligence platform integration solutions are unique in the industry for the following reasons:



- IBM is singularly able to address this need based on its ability to integrate a deep understanding of IT systems, cutting-edge technologies, the capabilities of partners, and meaningful business insights to drive better optimization.
- They offer improved performance and reduced storage requirements: performance improvements up to 600 percent and reduced storage requirements up to 70 percent.
- They offer proven scalability that supports thousands of users and petabytes of data.
- IBM is both a Business Intelligence platform provider, with DB2 and Cognos, and a partner with other BI platform providers including Oracle, SAP, and Sybase.

There is no bigger problem facing individuals and organizations today than the reality that they can't keep pace with the information explosion. Organizations must tap into the intelligence of the entire value chain, correlating insights and

MORE ON THE WEB

- [Business Intelligence info on IBM.com](#)

anticipating opportunities and threats. IBM is singularly able to address this need based on its ability to integrate a deep understanding of IT systems, cutting-edge technologies, the capabilities of partners, and meaningful business insights to drive better optimization. IBM provides the tightly integrated information infrastructure that clients require as a foundation for implementing this new intelligence.

IBM provides business intelligence platforms that allow companies to optimize their business processes, delivering:



- End-to-end solutions: IBM and ISV solutions that are pre-tested, preconfigured, easy to install and maintain, and right-sized for clients' environments
- Improved performance and reduced storage requirements: Performance improvements up to 600 percent and reduced storage requirements up to 70 percent
- Proven scalability that supports thousands of users and petabytes of data
- Improved decision-making, business insight, and time-to-business results.

Continuous Data Protection

Continuous data protection is a specific kind of storage management technology that gets applications and users back up and running within minutes following any data loss, while performing full data recovery in the background. This innovative technology eliminates the need for traditional backups and unpredictable restores by shadowing writes to a CDP server. Users can see their information on the CDP server, which minimizes disruption from disk failures.

Continuous data protection is available as a software offering, a hardware and software package, and as a pay-as-you-go cloud service. Continuous data protection currently supports recovery from Windows files and applications, including Microsoft Exchange, Microsoft SQL Server, Oracle, IBM DB2, and SAP.



Storage Infrastructure Management

Controlling the complexity of information infrastructures is critical for maintaining high availability at a reasonable cost. Monitoring and reporting tools typically have a rapid ROI because they automate tasks previously performed by specialists. With proper tools in place, specialists spend more time performing analysis, provisioning, and other more valuable tasks.

IBM Storage Infrastructure Management solutions are unique in the industry for the following reasons:

- End-to-end performance reporting across the storage stack can simplify problem determination and performance tuning.
- Management of both standard and virtualized storage, including non-IBM storage, means improved effectiveness and efficiency for administrators.
- Powerful storage resource management can identify up to 20 percent of storage for reclamation by identifying duplicate files across the enterprise.
- New continuous data protection solutions eliminate the need for traditional backups, and provide near-instant access to data in an emergency.

The benefits of storage infrastructure management can include:

- Simpler administration
- Improved performance, fewer bottlenecks



- More consistent configurations; fewer configuration errors
- Faster deployment
- Faster repairs
- Data reduction of up to 20 percent.

IBM Storage Infrastructure Management solutions support IBM and non-IBM storage, giving administrators fewer monitors and reports to manage. The results can be simpler infrastructure management, more automation, better service, and lower total costs. IBM capabilities include:

- Disk management—SAN Volume Controller, Tivoli Storage software, XIV, N series
 - Virtualized storage—SVC can increase utilization by 30 percent or more with block virtualization, online copy services, and thin provisioning.
 - Monitoring and management—Tivoli Storage Productivity Center can improve SAN disk utilization up to 20 percent with a powerful management console and reporting interface for virtualized, non-IBM, and IBM disks. The new performance management module from IBM Research generates heat maps to illustrate end-to-end storage throughput.
 - Block storage—XIV includes provisioning, virtualization, self-healing, and an easy-to-use GUI to simplify management of dynamic environments.



- NAS storage—N series includes a consistent GUI that simplifies operations for part-time or inexperienced administrators.
- Data protection—Tivoli Storage Manager and TSM FastBack
 - Comprehensive data protection with customizable operational reporting
 - Tivoli Storage Manager enables policy-based backup and retention and includes leading capabilities such as simple disk-tape migration, point-in-time recovery, disaster recovery management, and operational reporting.
 - TSM Fastback shadows disk writes to a recovery system, which enables near instant recovery of Windows files without the burden of performing Windows backups.
- Data migration—Data Mobility Services, Transparent Data Migration Facility
 - Transparent Data Migration Facility helps clients move application data across platforms with little or no downtime. TDMF runs on Windows, Unix/Linux, and mainframe z/OS.

3

General System Storage Resources

This chapter provides you with general information and valuable resources that will help you as you sell IBM products.

How to Sell IBM System Storage Products

In this section, we offer ideas that will help you identify and explore opportunities for selling IBM System Storage.

Identifying Storage Sales Opportunities

Following are some “triggers” that tell you there is a sales opportunity for IBM Storage.

General

- Is the customer buying servers? Server buyers tend to buy storage within three months of their server purchase.
- Is the number of users of the application increasing? Adding employees or upgrading applications generally leads to additional storage needs.
- Are existing storage assets coming off lease or nearing the end of the depreciation cycle? The data on multiple older storage controllers can often be consolidated onto a single newer, faster system with cost savings.



- Does the customer already have IBM external storage installed but is running out of capacity? This is an opportunity to upgrade the storage.

Storage Efficiency

- Is your data growing and are the costs of managing your storage infrastructure growing?
- Are you concerned about how well utilized your storage is or your staff's ability to support this growth?
- How satisfied are you with the cost effectiveness of your current storage?
- Is the management of your storage infrastructure complex?
- Are you looking for new functionality or help to manage your storage growth and costs?

Data Protection

- Are your data storage needs growing?
- How will this growth impact your ability to adequately protect critical data? With the data growth you are experiencing, what impact have you seen in your backup and recovery?
- Can you electronically locate critical business information, documents, email, attachments, and messages when required?



- Are you looking for help to improve your company's backup and recovery time and reliability?
- Do you need to store all types of information (structured and unstructured) in a single repository which can be configured to archive information with compliance and non-compliance retention needs?
- Do you have needs to keep data for long periods of time?

How to Facilitate a Storage Efficiency and Data Protection Discussion

Here are some pointers on how to start conversations with your clients and discover sales opportunities.

General Questions

- Are your data storage needs growing?
- Are you spending money on distributed storage capacity attached to your servers that is not being fully utilized?
- Do you have storage systems coming off lease or nearing the end of their depreciation cycle?
- Who is your current storage vendor and are you happy with the TCO that your current storage vendor is providing you?
- Can you benefit from storage virtualization?
- Storage virtualization can reduce administrative costs by up to 50 percent and increase disk utilization by up to 30 percent.
- Storage virtualization can improve throughput and help resolve bottlenecks.



- Can you benefit from storage consolidation?
- IBM System Storage XIV can decrease storage requirements by up to 90 percent and reduce power, cooling, and space costs by up to 59 percent.
- IBM System Storage DS8000 can consolidate storage across platforms: Windows, Unix, and System z.
- Can you benefit from data migration and storage tiering?
- Moving 4–5 percent of data to a solid-state disk can improve average response time by 70+ percent.
- IBM offers integrated multi-tier storage systems with simplified management, helping clients optimize price and performance.
- Can you benefit from data reduction and deduplication?
- IBM ProtecTIER deduplication can reduce and store 25 TB of data onto 1 TB of storage capacity with in-line throughput over 1000 MB/sec.
- Tivoli Storage Manager's integrated deduplication can store more backup data on disk for faster restores, without a separate deduplication solution.
- Can you benefit from improving your backup and restore processes?
- Reduce the amount of data at risk of loss, and shrink restore times.



- IBM ProtecTIER virtual tape solutions reduce backup infrastructure costs up to 45 percent over standard non-deduplicated virtual tape library systems.
- Can you benefit from implementing a smarter archive strategy?
- Blended disk and tape solutions cut TCO by 50 percent.
- Archiving is a best practice that makes most applications run better.

Typical Findings After Asking the Above Questions

- Multiple islands of storage are becoming hard to manage and are driving up costs.
- Performance is not always sufficient to meet users' needs.
- Reliability is not at desirable levels. Even a small outage is a big deal when it happens in a remote location.
- Storage capacity is not being used efficiently. Some users and servers need more storage, while capacity on other servers sits idle.
- Data backup is becoming hard to manage.
- Total storage costs are getting out of control as storage needs rise.
- Information is exposed to security risks that are not understood, or not managed.



- Regulatory requirements cannot consistently be met at the desired level.
- Personnel costs to manage storage are rising rapidly, or there is a shortage of manpower to complete all of the management work in a timely fashion.

Key Storage Efficiency Offerings

Here are some of the key offerings (all covered later in this guidebook) that are in the realm of storage efficiency.

- **SAN Volume Controller:** a storage virtualization system that enables a single point of control for storage resources to help support improved business application availability and greater resource utilization.
- **IBM Storwize V7000:** a powerful midrange disk system that has been designed to be easy to use and enable rapid deployment without additional resources. Storwize V7000 offers IBM storage virtualization, SSD optimization, and “thin provisioning” technologies built in to improve storage utilization and to enable the system to be reconfigured to meet changing business needs quickly and easily.
- **IBM XIV Storage System:** helps deliver consistently high performance through the elimination of hot spots and the full exploitation of system resources. Outstanding availability and reliability are delivered through a revolutionary redundancy scheme, enabling automated self-healing with exceptionally fast rebuild times.



- **IBM System Storage DS8000 Turbo series:** helps support the most demanding business applications with its exceptional performance and superior data throughput. This, combined with its world-class resiliency features and five-nines availability, make it an ideal storage platform for supporting today's 24x7 global business environment.
- **IBM System Storage DS5000 series:** delivers industry-leading performance, real reliability, multi-dimensional scalability, and unprecedented investment protection.
- **IBM Smart Business Storage Cloud:** a storage-virtualization solution designed to support your storage optimization efforts. It can help alleviate your data storage challenges by enabling quick implementation of a scalable, global file storage system with flexibility in deployment and management options.
- **IBM Tivoli Storage Productivity Center:** helps customers reduce the complexity of managing their storage environments by centralizing, simplifying, and automating storage tasks associated with storage systems, storage networks, replication services, and capacity management.
- **IBM Storage Optimization and Integration Services:** help to reduce complexity, optimize performance, and manage growth by creating a cost-effective, scalable, and resilient storage infrastructure.
- **IBM Scale Out Network Attached Storage:** centralize and virtualize your data in a single storage environment. SOFS are designed to eliminate your information sharing challenges



through swift implementation of a highly scalable, global, clustered NAS system.

Key Data Protection Offerings

Here are some of the key offerings (all covered later in this guidebook) that are in the realm of data protection.

- **IBM Information Archive:** a policy-driven, cloud-ready, next generation information retention solution that provides immediate archiving of all business information. Built-in deduplication, compression, and automated data migration to tape offer efficiency. Its scalable and flexible architecture is simple to use, manage, and expand. It offers tiered storage (disk and tape) archiving capability with built-in HSM for performance and longevity. Its enhanced security features allow for retaining information to support regulatory compliance.
- **IBM tape portfolio:** a broad portfolio of tape products to help your clients achieve efficiency and better TCO for the long term.
- **Comprehensive Data Protection Solution Express:** includes hardware and software that mid-size organizations need to enhance data protection capabilities in a Windows environment. This solution helps clients restore access to email, files, and databases within seconds rather than the hours or days it takes to restore using traditional backup solutions.
- **IBM Grid Medical Archive Solution:** integrates software, storage, and server products to deliver a flexible and scalable



virtualized storage solution for mid-size to large healthcare organizations and hospital networks.

- **IBM ProtecTIER data deduplication solutions:** employs an advanced form of data compression that identifies and eliminates redundant data across the data landscape, making it possible to significantly reduce the amount of data that needs to be protected.
- **IBM Information Lifecycle Management Services:** ILM Assessment, Enterprise Archive services, and Enterprise Content Management services assess a client's existing environment and help design a comprehensive strategy aligned with their business goals and performance needs.
- **IBM content collection and archiving:** enables a deeper understanding of what information to archive through discovery and analytics-based assessment technologies. Reduce point solution complexity and costs by unifying data and content archiving through common collection and classification technologies.

Qualifying Questions

Here are questions you can use to gauge a possible sales opportunity:

- Are you under pressure to control costs and IT expenditures?
- How many servers and what operating systems do you have?



- What are the key applications that drive your storage demand?
- Can your storage scale easily to meet growth and new application needs?
- Are you unable to add additional storage capacity because of budget constraints?
- Are you concerned that you can't predict future growth? Do you need a storage system that can be upgraded to higher capacity and performance without losing your initial investment?
- Do you often find that you are adding additional servers and associated storage to keep pace with your growth?
- Do you need more capacity and performance—at a better price?
- Does storage management cost you money for staffing, education, and time?
- How much benefit would you see from having a single interface—fewer tools to learn and use—for server and storage management?
- Are your storage needs satisfied by the internal storage in the server?
- Do you need to lower IT costs and complexity while still providing a computing infrastructure with high levels of server and storage performance typical for database and online transaction processing?



- Do you have a large number of server/storage platforms and/or operating environments?
- What competitive storage or server hardware is installed and which competitor(s) are bidding for the business (EMC, HP, Dell, Sun)?
- Do you need to run test applications against live data?
- Do you need the ability to set up a disaster recovery plan?
- Do you understand the risks and costs associated with data access delay or data unavailability? Do you have the skills to complete an analysis? (IBM does—storage study.)
- Are your backup windows getting shorter?
- Are you confronted with significant complexities of storage management and looking to simplify the environment?
- Do you need to improve the security of your information?

IBM PartnerWorld Web Site

IBM maintains a Web site called PartnerWorld, which has a great deal of information of use to all IBM Business Partners worldwide. On the site you will find the latest presentations and marketing materials (such as brochures, data sheets, and case studies) as well as competitive information,

MORE ON THE WEB

- [IBM PartnerWorld Web site](#)
- [IBM PartnerWorld news and newsletters](#)
- [Regional shortcut to U.S. PartnerWorld content](#)
- [Help with your IBM PartnerWorld user ID and password](#)



consultant reports, IBM white papers, education and events, tools, technical support, and much more.

In this ebook, we have summarized and provided direct links to much of the PartnerWorld information that is most important to IBM System Storage business partners. As such, this ebook is your personal “guide” to the PartnerWorld Web site. Just the same, we encourage you to spend some time just browsing the PartnerWorld site so you can get a feel for the full scope of resources available to you.

You will need your IBM-assigned user ID and password to access some areas of PartnerWorld. If you don’t have your user ID and password, you can contact IBM PartnerWorld help. (Follow the link in the “More on the Web” box.)

Storage News and Events

You can keep current with the fast paced world of IBM System Storage by frequently checking the link shown in the “More on the Web” box.

MORE ON THE WEB

- [IBM Storage news and events](#)

Incentives and Promotions

IBM offers many incentives and promotions for both business partners and your clients to help drive sales. You can find a list of the most current incentives and promotions by following the “More on the Web” links.

MORE ON THE WEB

- [Incentives and promotions for storage](#)
- [Cross brand incentives and promotions](#)



System Storage Education

As with almost any endeavor, time spent educating yourself and your team on appropriate topics such as selling techniques and storage product offerings will help you succeed. Here we discuss two ways you can get the education you need to succeed in selling IBM System Storage products.

PartnerWorld University

The IBM PartnerWorld University is a Web-based repository of information in many different formats. It provides technical and sales information to help you succeed as a storage business partner. You will need your PartnerWorld user ID and password to access these resources.

MORE ON THE WEB

- [PartnerWorld University](#)

IBM Training

IBM Training provides an array of education offerings including instructor-led training in traditional classrooms, customized training services at client locations, and IBM technical conferences built around IBM Systems platforms and solutions.

MORE ON THE WEB

- [IBM Training](#)

In addition, IBM also provides technical training offerings that build integration skills around the IBM Systems portfolio and complementary solutions from other strategic partners, such as Cisco, Linux, ISC(2), and VMware.



Systems College

IBM Systems College is a key education resource offering sales and technical training, education road maps, certification information, tools, resources, and much more. Take advantage of on-demand learning opportunities to help you become more successful today and over the long term.

MORE ON THE WEB

- [Systems College](#)

Within Systems College are the job role road maps, designed to build strong selling and product knowledge skills. The job role road maps categorize training under basic, intermediate, and advanced levels. Course and road map completion are automatically tracked to demonstrate progression through the various training paths.

IBM Professional Certification Program

The IBM Professional Certification program offers a business solution for skilled IT professionals who seek to develop and demonstrate their expertise to the world. It's designed to validate your skills and demonstrate your proficiency in the latest IBM technology and solutions. It helps to make certain that you have the capability to perform role-related tasks

MORE ON THE WEB

- [IBM Professional Certification info](#)

and activities at a specified level of competence. The program is beneficial for those who wish to validate their skills, as well as for

companies that wish to ensure certain performance levels for their employees. Skills attainment is a key element for business partner firms to move from Member to Advanced level in PartnerWorld.



IBM Professional Certifications are associated with an individual, not a company or an organization. The target audience for certification includes employees of business partner firms, customers, IBM employees, and independent consultants who sell, support, or service IBM products.

Here is your path to certification:

- Select the role that most closely represents your daily tasks—the test objectives will describe all skills tested for each role.
- Review those objectives.
- If you are comfortable with and have daily experience with all listed objectives, you are ready to enroll for the test on the Web at 2test.com.
- If you are not familiar or comfortable with some of the objectives, review the recommended education for related offerings. Secondly, check RedBooks.com for specific review materials.
- Schedule the exam at 2test.com. If your schedule permits, request an early morning appointment (scores tend to be higher during that period).
- Arrive early for the appointment. Try to relax.
- If you are not familiar with prometric testing, use the tutorial. It is free and does not count toward your time on the test.
- Once into the exam, answer each question as though asked by a trusted friend. Read the questions carefully, but do not over think the questions.



- Keep an eye on the time remaining and the number of remaining questions. If you start to run short of time, guess at all remaining questions. Blanks are always incorrect.
- Most candidates finish before time expires. If you wish to review the questions, do so only once and change only those that are clearly incorrect.
- When you have completed the single review, close the test and you will receive your score.

The three most common reasons for failure:

- **Lack of knowledge:** You will not learn the topics in the test center.
- **Over thinking the questions:** There is a single correct answer and three plausible but incorrect answers.
- **Over review:** Many failures are caused by candidates changing too many answers when they are stressed by the exam.

You are allowed to take a test twice in a 30-day period.

Sources for Competitive Marketing Information

IBM maintains information about competing products on the IBM COMP Web site and in the sales kits found on PartnerWorld. You can access a searchable set of reports/presentations/quick reference cards about the marketplace, competitors, and competitive products. You will find materials developed by IBM as well as outside sources such as Gart-

MORE ON THE WEB

- [IBM "Comp" Web site](#)
- [IBM PartnerWorld](#)



ner, IDC, DH Brown, IDEAS International, etc. You can also sometimes find “product-to-product comparison” information. Explore the links in the “More on the Web” box for competitive information.

Sales Kits for System Storage

Sales kits provide business partners with a package of key client-ready sales and marketing enablement resources. You’ll find client-ready presentations and brochures, education resources and opportunities, seller guides, client references, and more, all to help you unleash your selling potential and the power of our unique technologies (see the “More on Web” box).

MORE ON THE WEB

- [Listing of all System Storage sales kits](#)

Sales Plays

Sales plays are designed to help you generate new selling opportunities. Each play focuses on a set of common client pain points and recommends specific solutions to address them.

Find everything you need to know about the latest System Storage sales plays and initiatives—with a special focus on the small and mid-size market. Download the “reasons of call,” proposal letters, presentations, benchmarks, and sales tools to help you identify, progress, and close deals. Find tips for increasing deal size with services and relevant financing to improve your odds of winning the sale.

MORE ON THE WEB

- [Storage selling tools](#)



WebCollage

IBM Business Partners that market and sell IBM servers, storage, workstations, services, and software can improve their Web presence for FREE by leveraging syndicated Web content

MORE ON THE WEB

- [WebCollage and demo](#)

from IBM.com to their own Web sites. IBM has teamed with WebCollage, Inc. to provide the capability for Premier, Advanced, and Member level Partner-

World participants to receive Web content dynamically delivered to their Web sites.

Attach Connector Cross-Selling Tool

Attach Connector is designed to super-size your sales by helping you sell more IBM hardware, software, and services with each sales opportunity. This cross-selling tool carefully walks you through a sale by providing the right questions to ask to uncover new opportunities and deliver more complete

MORE ON THE WEB

- [Attach Connector cross-selling tool](#)

solutions. As you select an IBM point product, a list of the most common attach elements is suggested. The tool also provides

key play opportunities where you can pass discounts and promotions to clients, as well as the IBM Competitive Advantage—why IBM over other specific companies.

When you buy a suit, a salesman will undoubtedly ask if you want a shirt and tie. Likewise, when we sell servers, we want to ask if the client wants storage, software, or services, because underneath every product sale there is a much larger cross-brand opportunity. Attach Connector helps sales reps



mine that larger deal by showing natural product pairings to roll your own custom solution.

Tivoli Opportunity Maximizer (TOM) Tool

The IBM Tivoli Opportunity Maximizer (TOM) tool provides another easy way to uncover and identify new opportunities to cross-sell Tivoli products and maximize revenue from your new and existing customer base. This tool walks you through the process of identifying complementary products based on your customer’s current needs and provides a sales scenario for each recommended cross-sell opportunity.

MORE ON THE WEB

- [Tivoli Opportunity Maximizer tool](#)

IBM System Clothing Pointers

Whenever you are proposing the sale of a server, it only makes sense to include the needed storage devices in the original proposal. Selling storage solutions with servers is known as “clothing.” Clothing the servers with storage solutions is a proven key to selling success. Follow the links in the “More on the Web” box to see what storage devices to propose with each type of server.

MORE ON THE WEB

- [Compatibility/interoperability info for IBM storage products](#)
- [Storage products for Power Systems](#)
- [Storage products for System x and BladeCenter servers](#)
- [Storage products for System z servers](#)
- [Storage products for Sun](#)
- [Storage products for HP](#)
- [Storage software for managing the information infrastructure](#)



IBM Global Financing

IBM Global Financing (IGF) continues to focus on meeting customer needs by concentrating on key business areas: leasing and lending, remarketing and refurbishing, and asset management. IGF conducts business in more than 40 coun-

MORE ON THE WEB

- [IBM Global Financing](#)
- [Rapid Online Financing](#)

tries, financing IBM and non-IBM hardware, software, and services, with a full range of flexible, low-rate offerings. IGF's customers find that financing their information technol-

ogy solutions offers many advantages in both robust and difficult economic climates, because financing frees up their capital for other investments.

Many information technology installations, including those for customer relationship management, data mining, and e-business, require a substantial investment. IGF financing enables customers to pay for their new technology in affordable monthly payments during the life of the project. Our customers run the gamut from the smallest, family-owned business purchasing a single server and software to the largest, multinational corporation, acquiring tens of thousands of PCs for offices on several continents.

In addition to working directly with customers, we work with IBM Business Partners to provide financing for their clients and to help them build their own businesses. This includes a full suite of commercial financing offerings to support inventory and accounts payable and receivable financing needs, and state-of-the-art online tools, such as Rapid Online



Financing, which allows partners to request quotes and deliver ready-to-sign financing contracts in under one hour.

Why should business partners offer financing? Offering financing enhances your selling efforts and allows you to:

- Facilitate closing the entire solution without scaling back
- Close deals faster by overcoming budget issues
- Decrease discounting by making payments more affordable
- Differentiate your solutions from the competition
- Lock in future sales with upgrades and end-of-lease options

Financing can be beneficial to a partner's overall business in the following ways:

- Receive payment from IBM Global Financing faster than you would with a cash purchase (free up cash to fund your growth)
- Create an opportunity to receive an incentive for selling financing
- Eliminate client credit risk—IBM Global Financing assumes the risk
- Your firm can use our "rate buy-down" capability to offer below-market financing rates on your own solutions to avoid discounting, keeping your "street price" whole.



Systems Advisor Tool

Follow the links in the “More on the Web” box to explore the IBM Systems Advisor tool. This is invaluable in helping you define specific solutions that include servers and storage products.

MORE ON THE WEB

- [Systems Advisor tool](#)
- [More sizing guides and configuration tools](#)

IBM Business Value Analyst Tool

The IBM Business Value Analyst tool enables IBM Business Partners to articulate the return on investment of IBM solutions. The tool can be used with CIOs, IT leads, and LOB executives to make financial business cases for IBM products, both as individual products and/or solutions.

MORE ON THE WEB

- [IBM Business Value Analyst tool](#)

What Are “IBM Express Advantage” Offerings?

IBM Express Advantage offerings are a key component of IBM’s strategy for serving the IT opportunity in the mid-market sector. These easy-to-run and scalable hardware, middleware, services, and financing solutions are designed and priced for mid-size businesses (less than 1000 employees).

MORE ON THE WEB

- [IBM Express Advantage info on PartnerWorld](#)
- [Express Seller Toolkit info on PartnerWorld](#)



Each IBM Express Advantage offering must meet a stringent set of technical and go-to-market criteria in order to qualify. Business partners can be confident in selling or building solutions with IBM products that are easy to acquire, easy to implement, and easy to maintain.

You can already benefit from the features and functions of Express Advantage offerings to build solutions that meet the real-life, specific needs of your clients at a price they can afford.

What is Storage Virtualization?

Storage virtualization is technology used to insulate the details of a storage infrastructure (hardware and software) from the applications and users who use that storage infrastructure. By doing so, storage virtualization reduces cost and complexity.

IBM has a broad range of storage virtualization offerings including the SAN Volume Controller, virtualization engines, Virtual File Manager software, and more.

Follow the “More on the Web” links for more specifics on storage virtualization.

MORE ON THE WEB

- [IBM storage virtualization info on IBM.com](#)
- [Storage virtualization concepts on Wikipedia](#)

Technical Support for Business Partners

Technical Sales Support from IBM provides business partners with extensive pre-sales support through the PartnerWorld



MORE ON THE WEB

- [Contact Techline](#)
- [Technical Sales Library](#)
- [PartnerWorld technical resources & support](#)
- [PartnerWorld contact services](#)
- [CompeteCenter](#)

program online via the Web and by voice. Voice support can be accessed via PartnerWorld Contact Services, the single point of entry to all key support organizations. PartnerWorld Contact Services

provides access to Techline for hardware and software technical sales support, and to Competeline (Americas only) for win strategies and competitive information. CompeteCenter (Europe only) is accessed through the CompeteCenter Web site. Systems business partners entitled through the PartnerWorld program have access to IBM System x and IBM System Storage solutions and selected major competitive platform support including:

- Remote solution design assistance/review
- Technical marketing assistance
- Product and promotion information
- Configuration assistance
- Competitive product information
- Sales strategy information
- Solution assurance assistance.

Follow the links in the “More on the Web” box to access Technical Sales Support online (region selectable).



Hardware Configurator

The IBM Hardware Configurator is an integral part of IBM's Web-based shopping (e-commerce) offering. It enables online configuration of IBM products and services, provides detailed compatibility checking, provides key information such as price and availability that can affect selection decisions, and provides intelligent feedback and assistance related to configuration selections. It also serves as the aftermarket engine for identifying upgrade accessories and parts. The IBM Hardware Configurator can translate configuration results from type model features (TMFs) to the "best match" configuration in part numbers. In addition, you can start a TMF configuration from a part number.

MORE ON THE WEB

- [Hardware Configurator](#)

Social Media Resources for IBM Business Partners

Social media is quickly growing in importance for businesses of all sizes. Whether you are already involved in social media or just getting interested, the "More on the Web" box provides some links that will be of interest to you.

MORE ON THE WEB

- [IBM PartnerWorld communities](#)
- [Twitter search results for IBM Storage](#)
- [Search Twitter for mentions of your business or competitors](#)
- [Google blog search results for IBM Storage](#)
- [Search blog for mentions of your business or competitors](#)
- [LinkedIn social network \(has an IBM Business Partner Group\)](#)
- [Use Twitter to Grow Your Business \(IBM Software Business Partner Blog\)](#)

4

System Storage Quick Reference

In this chapter, we explore the IBM System Storage hardware, software, and packaged solutions you will be selling and offer some resources that will help you succeed.

MORE ON THE WEB

- [System Storage product guide](#)

Disk Storage

The IBM System Storage family includes a variety of disk storage products ranging from direct-attached disk drives to complete enterprise storage systems. In this section, we look at the product offerings in the disk storage arena.

Disk Storage Cross Reference by Workload Size

It is often a mistake to associate entry-level, midrange, and enterprise-class storage products with small, medium, and large size businesses respectively. For example, did you know that 30 percent of DS8000s are used by small and medium businesses? Did you know that 70 percent of SAN Volume Controllers are used by small and medium businesses?

Conversely, did you know that nearly every large enterprise uses entry-level and midrange storage products in addition to enterprise-class devices? For example, some large enterprises have branch offices or remote areas where small-



er storage systems are more appropriate. Measurements often used to classify business size, such as the number of employees or sales revenue, do not always correlate with the amount of information those businesses store. For this reason, product recommendations based on workloads often make more sense, though they still should be considered only as general guidelines. In this section, you will find a list of disk storage products organized by workload size (entry, mid-size, and enterprise) to help you find the best solution for your client.

Disk Storage for Entry-Level Workloads

Here is a list of disk storage products designed for businesses with entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

- [DS3200 Express](#)
- [DS3300 Express](#)
- [DS3400 Express](#)
- [DS3500 Express](#)
- [EXP3000 Expansion Enclosure](#)

MORE ON THE WEB

- [Disk storage for entry-level workloads](#)

Disk Storage for Mid-Size Workloads

Here is a list of disk storage products designed for mid-size workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).



- [DS3950 Express](#)
- [DS5000](#)
- [DS5020 Express](#)
- [Storwize V7000](#)
- [EXP3000 Expansion Enclosure](#)

MORE ON THE WEB

- [Disk storage for mid-size workloads](#)

Disk Storage for Enterprise Workloads

Here is a list of disk storage products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

- [DS8000](#)
- [XIV Storage System](#)

MORE ON THE WEB

- [Disk storage for enterprise workloads](#)

DS3000 series

Designed to deliver high availability, reliability, and scalability at a breakthrough price, the IBM System Storage DS3000 family of storage systems provides an exceptional solution for workgroup storage applications such as email, file, print, virtualization, and Web servers, as well as collaborative databases and remote boot for diskless servers. In this section, we take a look at the DS3000 series. Appendix A provides a useful DS3000 part number/model/feature cross reference.



DS3200 Express

The IBM System Storage DS3200 ([Figure D.1](#)) combines next-generation SAS technology with time-proven architecture for external storage and an intuitive management interface to create a robust, flexible, and scalable storage system ideally suited for small and medium businesses (SMBs) and remote offices. By moving storage outside the server and consolidating storage for several servers, businesses can increase the capacity, management efficiency, and availability of their data solution.

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configuration, and management. With this approach, even non-storage savvy administrators can quickly set up and deploy their storage solution with minimal effort.

With SAS host-interface technology, up to three servers can be directly attached to a single DS3200 storage system redundantly, ensuring high availability and simplicity. The DS3200 also supports up to 14 servers within an IBM BladeCenter using the BladeCenter SAS Connectivity Module for data access and boot support.

Tiered storage is the assignment of different categories of data to different types of disk drives in order to reduce total storage cost. A key attribute of the DS3000 series of disk systems is the integration of SAS and SATA technologies within a



Specifications

Models	1726-21X—single controller 1726-22X—dual controller
RAID controller	Dual active
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	One or three host ports per controller, Serial Attached SCSI (SAS) 3 Gbps
Drive interface	Serial Attached SCSI (SAS)
Supported drives	3 Gbps SAS: 146 GB, 300 GB, and 450 GB SAS drives at 15,000 rpm speeds; 6 Gbps SAS: 300 GB, 450 GB, 600 GB SAS drives at 15,000 rpm speeds; 3 Gbps SATA: 500 GB, 750 GB, 1.0 TB, 2.0 TB SATA drives at 7200 rpm speed
RAID levels	RAID-0, -1, -3, -5, -6, -10
Storage partitions	4, 8, 16, 32
Maximum drives supported	48 drives (utilizing three EXP3000 Expansion Units)
Fans & power supplies	Dual-redundant, hot-swappable
Rack support	19" industry-standard rack
Systems management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year parts and labor

- [DS3200 Express details on PartnerWorld](#)
- [DS3200 Express details on IBM.com](#)
- [DS3200 Express competitive info on COMP](#)
- [DS3200 blog search](#)
- [DS3200 Twitter search](#)

Figure D.1. IBM System Storage DS3200 Express at a glance (and links to more detail).



single enclosure. This simplifies purchasing and storage deployment with nearline applications using inexpensive SATA disk drives and highly-utilized applications deploying SAS disk drives.

Here are some quick DS3200 facts:

- One or three 3 Gbps SAS host connections per controller
- One 3 Gbps SAS drive interface per controller for capacity expansion
- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and/or part-time administrators
- Combination of 12 SAS or SATA 3.5-inch disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 28.8 TB of storage capacity with 600 GB SAS disk drives or up to 96.0 TB with 2.0 TB SATA disk drives
- Affordable for the SMB and entry-level budgets
- High availability features—dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Solution for IBM System x, IBM BladeCenter, Power Systems servers, and select third party servers
- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models



- RAID data protection—redundant I/O paths and components, hot spares
- Shared-storage benefits—consolidation, single management, increased efficiencies within the IT infrastructure.

DS3300 Express

The IBM System Storage DS3300 ([Figure D.2](#)) is designed to simply and cost-effectively meet the availability and consolidation needs for a wide range of users—from the entry-level SMB to an enterprise organization's remote sites or departments. The DS3300 provides organizations an affordable, reliable, and scalable storage solution that takes advantage of their current IP infrastructure equipment and in-house expertise. And as iSCSI is a routable transport with virtually no distance limitations, the DS3300 can extend its scope well beyond the corporate data center to remote locations as well.

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configuration, and management. With this approach, even non-storage savvy administrators can quickly set up and deploy their storage solution with minimal effort.

Here are some quick DS3300 facts:

- Two 1 Gbps iSCSI host connections per controller



Specifications

Models	1726-31X—single controller 1726-32X—dual controller
RAID controller	Dual active
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	Two host ports per controller, 1 Gbps iSCSI
Supported drives	3 Gbps SAS: 146 GB, 300 GB, and 450 GB SAS at 15,000 rpm speeds; 6 Gbps SAS: 300 GB, 450 GB, 600 GB SAS drives at 15,000 rpm speeds; 3 Gbps SATA: 500 GB, 750 GB, 1.0 TB, 2.0 TB SATA drives at 7200 rpm.
Host interface	Two host ports per controller, 1 Gbps iSCSI
RAID levels	RAID-0, -1, -3, -5, -6, -10
Storage partitions	4, 8, 16, 32
Maximum drives supported	48 SAS or SATA drives (using three EXP3000 expansion units)
Fans & power supplies	Dual-redundant, hot-swappable
Rack support	19" industry-standard rack
Systems management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year parts and labor

- [DS3300 Express details on PartnerWorld](#)
- [DS3300 Express details on IBM.com](#)
- [DS3300 Express competitive info on COMP](#)
- [DS3300 blog search](#)
- [DS3300 Twitter search](#)

Figure D.2. IBM System Storage DS3300 Express at a glance (and links to more detail).



- One 3 Gbps SAS drive interface for capacity expansion per controller
- Affordable, reliable, and well-understood IP SAN storage
- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and/or part-time administrators
- Combination of 12 SAS or SATA 3.5-inch disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 28.8 TB of storage capacity with 600 GB SAS disk drives or up to 96.0 TB with 2.0 TB SATA disk drives
- Affordable for the SMB, entry-level, and enterprise remote site and department budgets
- High availability features—dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Shared-storage benefits—consolidation, single management, and increased efficiencies within the IT infrastructure
- Solution for IBM System x, IBM BladeCenter, Power Systems servers, and select third party servers
- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models



DS3400 Express

The IBM System Storage DS3400 ([Figure D.3](#)) allows a business to consolidate and share data within a direct-attach or FC SAN solution. The DS3400 adds front-end 4 Gbps FC technology to IBM time-proven architecture for enterprise-class storage. With FC host connectivity and SAS back-end technology, the DS3400 is designed to improve productivity through data consolidation, availability, performance, and scalability for a wide range of organizations.

The IBM System Storage DS3000 Storage Manager software is designed to provide a friendly user interface from setup to administration. This intuitive software builds on generations of IBM software development to provide trusted and reliable data management. Its task-based user interface helps to significantly reduce the complexity of installation, configuration, and management. With this approach, even non-storage savvy administrators can quickly set up and deploy their storage solution with minimal effort.

Here are some quick DS3400 facts:

- 4 Gbps Fibre Channel (FC) interface technology
- One 3 Gbps SAS drive interface for capacity expansion per controller
- Direct-attach storage (DAS) or SAN solution—start with a DAS configuration and seamlessly transition to an FC SAN when ready



Specifications

Models	1726-41X—single controller 1726-42X—dual controller 1726-42T—dual controller Telco
Cache per controller	512 MB battery-backed cache with 1 GB upgrade option
Host interface	Two host ports per controller, Fibre Channel (FC) 4 Gbps auto-sensing 1 Gbps/2 Gbps
Drive interface	Serial Attached SCSI (SAS)
Supported drives	3 Gbps SAS: 146 GB, 300 GB, and 450 GB SAS drives at 15,000 rpm speeds, 6 Gbps SAS: 300 GB, 450 GB, 600 GB SAS drives at 15,000 rpm speeds, 3 Gbps SATA: 500 GB, 750 GB, 1.0 TB, 2.0 TB SATA drives at 7200 rpm speed
RAID levels	RAID-0, -1, -3, -5, -6, -10
Storage partitions	4, 8, 16, 32
Maximum drives supported	48 SAS or SATA drives (using three EXP3000 Expansion Units)
Fans & power supplies	Dual-redundant, hot-swappable
Rack support	19" industry-standard rack
Systems management software	IBM System Storage DS3000 Storage Manager
Warranty	Three-year limited warranty on parts and labor

- [DS3400 Express details on PartnerWorld](#)
- [DS3400 Express details on IBM.com](#)
- [DS3400 Express competitive info on COMP](#)
- [DS3400 blog search](#)
- [DS3400 Twitter search](#)

Figure D.3. IBM System Storage DS3400 Express at a glance (and links to more detail).



- Easy to deploy and manage with the DS3000 Storage Manager—ideal for inexperienced and or part-time administrators
- Combination of 12 SAS or SATA 3.5-inch disk drives per enclosure
- Expandable by attaching up to three EXP3000s, a total of 28.8 TB of storage capacity with 600 GB SAS disk drives or up to 96.0 TB with 2.0 TB SATA disk drives
- Affordable for the SMB, entry-level, and enterprise remote site and department budgets
- High availability features—dual-active RAID controllers, redundant hot-swappable components, online automated I/O path failover, and unlimited global hot spares
- Shared-storage benefits—consolidation, single management, and increased efficiencies within the IT infrastructure
- Solution for IBM System x, IBM BladeCenter, and select third party servers
- Telco model supports -48 V dc power supplies NEBS and ETSI compliance for AC and DC models.

DS3500 Express

IBM has combined best-of-breed development with leading host interface and drive technology in the IBM System Storage DS3500 Express ([Figure D.4](#)). The DS3500 storage system, with next-generation 6 Gbps SAS back-end and host technology, has improved performance, flexibility, scalability,



Specifications

Models	1746-C2A and 1746-C4A
RAID controller	Dual active, hot-swappable controllers
Cache per controller	1 GB cache per controller with 2 GB upgrade (battery-backed)
Host interface	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	RAID-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 & power supplies	Dual redundant, hot-swappable
Rack support	2U, 19", industry-standard rack
Systems management software	IBM System Storage DS Storage Manager
Warranty	Three-year parts and labor warranty, 9x5 next business day, upgradeable to 24x7 with four-hour response

- [DS3500 Express details on PartnerWorld](#)
- [DS3500 Express details on IBM.com](#)
- [DS3500 Express competitive info on COMP](#)
- [DS3500 blog search](#)
- [DS3500 Twitter search](#)

Figure D.4. IBM System Storage DS3500 Express at a glance (and links to more detail).



and ultra-low power consumption with no sacrifice of simplicity, affordability, or availability.

The DS3500 Express is designed to offer midrange performance and features at entry-level prices with a low annual energy expenditure and environmental footprint. It delivers these attributes while maintaining the simplicity and robustness needed for both the part-time and experienced IT administrator.

Here are some quick DS3500 facts:

- 6 Gbps SAS systems deliver mid-range performance and scalability at entry-level prices
- Supports up to 96 drives—high performance and nearline (NL) SAS, and SED SAS drives
- Energy saving implementations for cost savings today
- Intuitive and simple storage management that doesn't sacrifice control
- Investment protection with a single storage management interface
- Mixed host interfaces support enables concurrent host connectivity
- Relentless data security with local key management of full drive encryption disk drive support
- Tiered storage with high performance and nearline SAS drives and SAS FDE drive intermix as well as support for both a 2U 12 3.5-in drive enclosure and a 2U 24 2.5-in drive enclosure which can be intermixed behind a single DS3500



- Enhanced features and functionality to quickly and dynamically respond to changing business requirements.

DS3950 Express

The IBM System Storage DS3950 Express ([Figure D.5](#)) is designed to provide lower total cost of ownership, high performance, robust functionality, and unparalleled ease of use. Facing relentless data growth and shrinking budgets, companies continue to look for ways to reduce costs through efficiencies. The high-performance 8 Gbps capable Fibre Channel connections offered by the DS3950 allow companies to reduce the number of HBAs per server and the number of overall ports in their FC SAN infrastructure without sacrificing performance, thus saving acquisition and operational costs. Additionally, the DS3950's auto-negotiating 8 Gbps Fibre Channel interfaces allow it to seamlessly integrate into an existing 2 Gbps or 4 Gbps infrastructure, while providing the buyer with investment protection going forward when the SAN inevitably becomes 8 Gbps.

The DS3950's design avoids over-configuration for an affordable entry-point while offering seamless "pay-as-you-grow" scalability as requirements change. Its efficient storage utilization lowers raw capacity requirements, and support for intermixing high performance and high capacity drives enables enclosure-based tiered storage. These unique capabilities reduce the number of drives needed to meet performance and/or capacity demands—lowering acquisition and operational expenditures. The DS3950 is not available in the U.S. and Canada.



Specifications

Models	1814-94H and 1814-98H
RAID controller	Dual active
Cache	Model 94H: 2 GB; Model 98H: 4 GB battery-backed
Host interface	Model 94H: Four 8 Gb/s FC, Model 98H: Four 8 Gb/s FC and four 1 Gb/s iSCSI
Drive interface	4 drive ports—Fibre Channel (FC) Switched and FC Arbitrated Loop (FC-AL) standard, Auto-sensing 2 Gbps/4 Gbps
Supported drives	Supports 4 Gbps FC: 15k – 600 GB, 450 GB, 300 GB, 146.8 GB, E-DDM; Supports 4 Gbps SATA: 7.2K 750 GB/1 TB and 2 TB E-DDM Disk drives
RAID levels	RAID-0, -1, -3, -5, -6, -10
Storage partitions	4, 8, 16, 64 or 128 storage partitions
Maximum drives supported	112 FC or 112 SATA drives (using 6 EXP395 Expansion Units)
Fans & power supplies	Dual redundant, hot-swappable
Rack support	19" industry-standard rack
Systems management software	IBM System Storage DS Storage Manager version 10.xx
SAN support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 2026, 2027, 2031, 2032, 2034, 2042, 2054, 2061, and 2062, and IBM BladeCenter)
Warranty	Three year parts and labor warranty, 9x5 next business day, up-gradable to 24x7 with four hour response

- [DS3950 Express details on PartnerWorld](#)
- [DS3950 Express details on IBM.com](#)
- [DS3950 Express competitive info on COMP](#)
- [DS3950 Sales Kit on PartnerWorld](#)
- [DS3950 blog search](#)
- [DS3950 Twitter search](#)

Figure D.5. IBM System Storage DS3950 Express at a glance (and links to more detail).



Here are some quick DS3950 facts:

- Next-generation 8 Gbps FC interfaces enable infrastructure simplification
- Mixed host interfaces support (FC/iSCSI) enables SAN tiering
- Balanced performance well-suited for virtualization/consolidation
- Reduces the cost of consolidation
- Support for intermixing FC/SATA drives enables cost effective tiered storage
- Trusted storage that protects and delivers your data when needed
- Flexibility to address a wide range of storage needs
- Feature-rich management software that maximizes utilization and minimizes storage TCO
- Designed to support future product enhancements
- Key application certifications ensure confidence
- Centrally manage the DS series with the IBM System Storage DS Storage Manager
- Support up to 112 disk drive modules with the attachment of six EXP395 expansion units



EXP3000 Expansion Enclosure

The IBM System Storage EXP3000 Expansion Enclosure is a high-density 2U, 19-inch rack mount driven closure designed for supporting up to a total of twelve 3.5-inch SAS and/or SATA disk drives. Robust and flexible, the EXP3000 Expansion Enclosure is offered as an expansion enclosure behind the DS3000 series of storage systems including the DS3200, DS3300, and DS3400.

The EXP3000 can also be utilized as a direct-attach solution for IBM System x servers with support of MegaRAID or ServeRAID host bus adapters.

Multiple EXP3000s can be connected to expand capacity and help address storage needs for today and tomorrow. The addition of solid-state drives (supported with EXP3000 when attached to MegaRAID and ServeRAID only) presents an opportunity to simplify local storage infrastructure to help maintain overall maintenance and cooling costs, while considering remote storage solutions for end-to-end data availability as part of a System x ecosystem.

Solid-state drives are an appropriate solution for local OS booting, high performance input/output applications, and some local storage space. Increasingly, solid-state storage may be a practical component in balancing data center costs, reliability, and manageability.

Here are some quick EXP3000 Express facts:

- 3 Gbps SAS disk drive expansion technology

MORE ON THE WEB

- [EXP3000 info on PartnerWorld](#)
- [EXP3000 info on IBM.com](#)



- Support for up to 7.2 TB (with 600 GB SAS disk drives) or up to 24 TB (with 2.0 TB SATA disk drives) in a single enclosure
- SAS or SATA disk drive intermix supported with select IBM System x, IBM System p, and IBM BladeCenter servers using the DS3000 series of storage systems, MegaRAID, or ServeRAID host bus adapters
- 50 GB SATA Solid-State Disk drive supported in EXP3000 expansion units that are directly attached to System x servers via the ServeRAID MR10M SAS/SATA controller adapter installed in the System x server
- Three EXP3000s can be attached to a DS3000 storage system to expand up to 28.8 TB of physical storage capacity when utilizing 600 GB SAS disk drives or 96.0 TB of physical storage capacity when utilizing 2 TB SATA disk drives
- Telco model supports -48 V dc power supplies
- NEBS and ETSI compliance for AC and DC models.

DS3000 series Warranty, Maintenance, and Service

The standard warranty that is included with the purchase of a DS3000 series is a limited three years parts and labor. You can learn more details in the document “All About DS4000 Warranty, Maintenance, and Service Guide.” Yes... it is the same for both the DS3000 and the DS4000 families.



DS3000 series *Competitive Marketing*

Follow the “More on the Web” link to see the latest resources to help you overcome the competition when selling the DS3000 series.

MORE ON THE WEB

- [DS3000 competitive info on COMP](#)

DS5000 series

The IBM System Storage DS5000 series storage system ([Figure D.6](#)) is designed to meet today’s and tomorrow’s demanding open-systems requirements while establishing a new standard for life-cycle longevity. Building on many decades of design expertise, the DS5000 series’ seventh-generation architecture delivers industry-leading performance, real reliability, multidimensional scalability, and unprecedented investment protection.

The DS5000 series is equally adept at supporting transactional applications such as databases and OLTP, throughput-intensive applications such as HPC and rich media, and concurrent workloads for consolidation and virtualization.

With its relentless performance and superior reliability and availability, the DS5000 series storage system can support the most demanding service level agreements (SLAs).

The DS5000 series supports two storage expansion units to ensure data is stored on the technology that best meets performance, protection, and cost requirements. The EXP5000 allows SSD, FC, and SATA drives to be intermixed

MORE ON THE WEB

- [DS5000 details on PartnerWorld](#)



Specifications

Model	1818-51A, 1818-53A
RAID controller	Dual active
Cache	8 GB, 16 GB, 32 GB, or 64 GB
Host interface	8 or 16 host ports—Fibre Channel Switched (FC-SW) and FC arbitrated loop (FC-AL) standard, auto-sensing 1 Gbps/2 Gbps/4 Gbps or 2 Gbps/4 Gbps/8 Gbps
Drive interface	16 drive ports - 4 Gbps Fibre Channel
Supported drives with expansion units	4 Gbps SATA: 7.2k rpm—2 TB, 1 TB, and 750 GB; 4 Gbps FC: 15k rpm, 600 GB/450 GB/300 GB/146 GB (E-DDM); SSD: 73 GB/300 GB
RAID levels	RAID-0, -1, -3, -5, -6, and -10
Storage ports	8, 16, 32, 128, 256, or 512 storage partitions
Maximum disk drives	Model 5100: 480 drives; Model 5300: 480 drives
Fans & power supplies	Dual-redundant, hot-swappable
Rack support	19" industry standard rack mountable
Management software	IBM System Storage DS Storage Manager

- [DS5000 details on PartnerWorld](#)
- [DS5000 details on IBM.com](#)
- [DS5000 competitive info on COMP](#)
- [DS5000 blog search](#)
- [DS5000 Twitter search](#)

Figure D.6. IBM System Storage DS5000 series at a glance (and links to more detail).



in a single enclosure—providing cost-effective storage tiering and maximum flexibility.

For data-intensive applications and other environments that store vast amounts of data, the new EXP5060 expansion unit offers tremendous storage density and significant operational savings. This 60-drive enclosure provides up to three times greater density compared to traditional drive enclosures, enabling a 960 TB system to reside within a standard 19-inch rack. The increased density combined with highly-efficient power supplies and cooling fans enables the EXP5060 to reduce power consumption by more than 10 percent and floor space by more than 65 percent.

Here are some quick DS5000 facts:

- New seventh-generation architecture with extreme and balanced performance for increased application performance
- “Pay-as-you-grow” scalability up to 480 drives for the most demanding capacity requirements
- Up to 700,000 IOPs and 6400 MBps
- Unique host interface cards designed to provide investment protection and life-cycle longevity
- Support for self-encrypting drives secures data-at-rest
- Intermix of SSD, Fibre Channel, and SATA hard disk drives supported in the EXP5000 storage expansion unit
- EXP5060 supports up to 60 SATA drives for maximum storage density and lowest operational costs



- Designed to support high availability with dual active, hot-swappable controllers, power supplies, and many non-disruptive firmware upgrades
- Includes IBM System Storage DS Storage Manager to help centrally manage the DS5000, DS4000, and DS3000 series
- Heterogeneous support for the most common operating systems, including Microsoft Windows, UNIX, and Linux
- Architecture efficiently handles compute-intensive parity calculations, enabling exceptional disk-based performance that's ideally suited for RAID 5 and RAID 6 configurations

EXP5000 Storage Expansion Unit

The DS5000 EXP5000 (machine type 1818D1A) is the primary disk drive enclosure for the DS5000 series of products. This 3U enclosure has 4 Gbps Fibre Channel (FC) interfaces and supports up to 16 disk drives for up to 32 terabytes (TB) physical capacity per expansion unit using 2 TB SATA disk drives. The EXP5000 Storage Expansion Unit is designed to accommodate 4 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), 4 Gbps Serial ATA Enhanced Disk Drive Modules (E-DDM), and SSD Enhanced Drive Modules (E-DDM). The ability to intermix SSD, FC, and SATA drives in a single EXP5000 allows for cost-effective storage tiering and maximum flexibility. The EXP5000 supports redundant AC power and cooling modules and ESM interfaces and is available in a 19-inch rack mount package.

MORE ON THE WEB

- [EXP5000 details on PartnerWorld](#)



EXP5060 Storage Expansion Unit

The DS5000 EXP5060 (machine type 1818G1A) offers tremendous storage density and significant operational savings for data-intensive applications and other environments that store vast amounts of data.

This 4U enclosure has 4 Gbps Fibre Channel (FC) interfaces and supports up to 60 Serial

ATA Enhanced Disk Drive Modules for a maximum capacity of 120 TB using 2 TB drives. Its increased density combined with highly-efficient power supplies and cooling fans enables the EXP5060 to reduce power consumption by more than 10 percent and floor space by more than 65 percent (a 960 TB system can reside within a standard 19-inch rack). The EXP5060 supports redundant AC power and cooling modules and ESM interfaces and is available in a 19-inch rack mount package.

MORE ON THE WEB

- [EXP5060 details on PartnerWorld](#)

DS5020 Express

The IBM System Storage DS5020 Express ([Figure D.7](#)) is designed to provide lower total cost of ownership, high performance, robust functionality, and unparalleled ease of use.

Facing relentless data growth and shrinking budgets, companies continue to look for ways to reduce costs through efficiencies. Its 8 Gbps FC allows companies to reduce the number of HBAs per server and the number of overall ports in their FC SAN infrastructure without sacrificing performance, thus saving acquisition and costs.



Specifications

Model	1814-20A
RAID controller	Dual active
Host interface	Four 8 Gb/s FC; or eight 8 Gb/s FC; or four 8 Gb/s FC and four 1 Gb/s iSCSI
Drive interface	4 drive ports—Fibre Channel (FC) Switched and FC Arbitrated Loop (FC-AL) standard, Auto-sensing 2 Gbps/4 Gbps
Supported drives with expansion units	Supports 4 Gbps FC/FDE: 15k—600 GB, 450 GB, 300 GB, 146.8 GB, E-DDM; Supports 4 Gbps SATA: 7.2k 750 GB, 1 TB, and 2 TB E-DDM disk drives; Supports SSD: 73 GB and 300 GB
RAID levels	RAID-0, -1, -3, -5, -6, -10
Storage partitions	4, 8, 16, 64, or 128 storage partitions
Maximum disk drives	112 FC or 112 SATA drives (using six EXP520 Expansion Units)
Fans & power supplies	Dual redundant, hot-swappable
Rack support	19" industry-standard rack
Management software	IBM System Storage DS Storage Manager version 10.xx
SAN support	Supported IBM FC switches and directors (product numbers 2005, 2006, 2109, 2026, 2027, 2031, 2032, 2034, 2042, 2054, 2061 and 2062, and IBM BladeCenter)
Warranty	Three year parts and labor warranty, 9x5 next business day, upgradeable to 24x7 with four hour response

- [DS5020 Express details on PartnerWorld](#)
- [DS5020 Express details on IBM.com](#)
- [DS5020 Express competitive info on COMP](#)
- [DS5020 enhancements announced](#)
- [DS5020 blog search](#)
- [DS5020 Twitter search](#)

Figure D.7. IBM System Storage DS5020 Express at a glance (and links to more detail).



Additionally, the DS5020's auto-negotiating 8 Gbps Fibre Channel interfaces allow it to seamlessly integrate into an existing 2 Gbps or 4 Gbps infrastructure, while providing the buyer with investment protection going forward when the SAN inevitably becomes 8 Gbps.

The DS5020's design avoids over-configuration for an affordable entry-point, while offering seamless "pay-as-you-grow" scalability as requirements change. Its efficient storage utilization lowers raw capacity requirements, and support for intermixing high performance and high capacity drives enables enclosure-based tiered storage. These unique capabilities reduce the number of drives needed to meet performance and/or capacity demands—lowering acquisition and operational expenditures.

Here are some quick DS5020 Express facts:

- Next-generation 8 Gbps FC interfaces enable infrastructure simplification
- Mixed host interfaces support (FC/iSCSI) enables SAN tiering
- Balanced performance well-suited for virtualization/consolidation
- Reduces the cost of consolidation
- Self-encrypting drives secure data throughout your drive's lifecycle
- Support for intermixing FC/FDE/SATA drives enables cost effective tiered storage



- Trusted storage that protects and delivers your data when needed
- Flexibility to address a wide range of storage needs
- Feature-rich management software that maximizes utilization and minimizes storage TCO
- Designed to support future product enhancements
- Key application certifications ensure confidence
- Centrally manage the DS series with the IBM System Storage DS Storage Manager
- Support up to 112 disk drive modules with the attachment of six EXP520 expansion units

EXP520 Storage Expansion Unit

The EXP520 is the disk drive enclosure for the DS5020 disk system. This 3U enclosure has 4 Gbps Fibre Channel (FC) interfaces and supports up to 16 disk drives. The EXP520 Storage Expansion Unit is designed to accommodate 4 Gbps Fibre Channel Enhanced Disk Drive Modules (E-DDM), and 4 Gbps Serial ATA Enhanced Disk Drive Modules (E-DDM). It supports redundant AC power and cooling modules and ESM interfaces, and is available in a 19-inch rack mount package.

MORE ON THE WEB

- [EXP520 details on PartnerWorld](#)
- [EXP520 enhancements announced](#)



DS5000 series Warranty, Maintenance, and Service

The standard warranty that is included with the purchase of a DS5000 series is one year parts and labor.

DS5000 Competitive Marketing

Follow the “More on the Web” link to see the latest resources to help you overcome the competition when selling the DS5000 series.

MORE ON THE WEB

- [DS5000 competitive info on COMP](#)
- [DS5000 Sales Kit on PartnerWorld](#)

Storwize V7000 Midrange Disk System

The IBM Storwize V7000 Midrange Disk System ([Figure D.8](#)) is a powerful storage system that combines hardware and software components to provide a single point of control to help support improved storage efficiency. By enabling virtualization, consolidation, and tiering in mid-size organizations, it is designed to improve application availability and resource utilization. The system offers easy-to-use, efficient and cost-effective management capabilities for both new and existing storage resources in your IT infrastructure.

Easy Tier provides automatic migration of frequently accessed data to high performing solid state drives, enhancing utilization efficiencies. Operating at a fine-grained “sub-LUN” granularity, the Easy Tier function automatically repositions pieces of the data to the appropriate class of drives based on I/O patterns and drive characteristics with no further administrative interaction. Easy Tier also includes the ability to



Specifications

Host interface	SAN-attached 8 Gbps Fiber Channel (FC) host connectivity and 1 Gbps iSCSI host connectivity
User interface	Graphical User Interface (GUI)
Supported drives	3.5" disk drives: 2 TB 3.5" 7.2k Nearline SAS disk; 2.5" disk drives: 300 GB 2.5" 10k SAS disk, 450 GB, 2.5" 10k SAS disk, 600 GB, 2.5" 10k SAS disk, 300 GB, 2.5" E-MLC (enterprise-grade multilevel cell) SSD
RAID levels	RAID-0, -1, -5, -6, -10
Maximum drives supported	240
Fans & power supplies	Fully redundant, hot-swappable
Rack support	19" industry standard
Management software	IBM Storwize V7000 Software
Cache per controller/ cache total	8 GB/16 GB
Advanced features (standard)	IBM System Storage Easy Tier, IBM FlashCopy, Thin Provisioning
Advanced features (optional)	Remote Mirroring, External Virtualization, IBM FlashCopy Manager, TPC Midrange Edition, Tivoli Storage Manager FastBack, IBM Systems Director
Replication services	FlashCopy, FlashCopy Manager, Metro Mirror (Synchronous), Global Mirror (Asynchronous)
Warranty	Hardware: Standard is three-year 9x5 next business day, upgrade option to 24x7x4 or 24x7x2; software: one year

- [Storwize V7000 portal on PartnerWorld](#)
- [Storwize V7000 Express details on IBM.com](#)
- [Storwize V7000 competitive info on COMP](#)
- [Storwize V7000 blog search](#)
- [Storwize V7000 Twitter search](#)



IBM Storwize V7000 overview (6:27)

Figure D.8. IBM Storwize V7000 Midrange Disk System at a glance (and links to more detail).



manually and non-disruptively relocate full logical volumes, providing additional flexibility and control for organizations looking to more effectively align system performance with their application needs.

Using thin provisioning, applications can grow dynamically, while consuming only the space they are actually using. Designed to keep business overhead low, thin provisioning optimizes efficiency by allocating disk storage space in a flexible manner among multiple users, based on the minimum space required by each user at any given time. This reduces the use of storage hardware, but also can save electrical energy use, lower heat generation, and reduce hardware space requirements.

Here are some quick Storwise V7000 facts:

- Sophisticated enterprise-class storage function that is easy to use for mid-size businesses
- Integrated IBM System Storage Easy Tier function provides up to 200 percent performance improvement with automatic migration to high-performing solid state drives (SSD)
- Thin provisioning allows you to purchase only the disk capacity you need
- Dynamic migration provides continuous availability of applications while migrating critical data
- Faster and more efficient data copies for online backup, testing, or data mining with IBM FlashCopy



- IBM Systems Director provides flexible server and storage management capabilities.

DS8000 series (DS8100, DS8300, DS8700, DS8800)

The DS8000 series offers a unique combination of flexibility, resiliency, performance, and scalability, which can help address the many challenges stemming from the exponential growth of data across the enterprise. As organizations evolve their data centers to become smarter, they are looking for innovative ways to manage and adapt in today's increasingly competitive, global business environment, and the DS8000 series is designed to meet this challenge.

The DS8000 series includes multiple options that offer tremendous performance, automated storage tier optimization, outstanding scalability and broad server support. Together, these capabilities can help simplify the storage environment by consolidating disparate storage platforms onto a single system, while providing the flexibility to support a variety of distinct application workloads. Workload-optimized systems, such as the DS8000, are becoming more important for organizations looking to succeed in today's demanding global business climate.

Here are some quick DS8000 facts:

- Performance: New DS8800 model elevates performance with new IBM POWER6+ controllers, faster 8 gigabits per second (Gbp/s) host and device adapters, and 6 gigabits per second (Gb/s) SAS (serial\attached SCSI) drives



- **Availability and resiliency:** Greater than five-nines availability built on the lineage of the IBM POWER server architecture
- **Optimized storage tiering:** IBM System Storage Easy Tier feature automatically helps optimize solid-state storage deployments in multitier systems
- **Flexibility:** Support for an extensive variety of server platforms, drive tiers, and application workloads can help enable cost-effective storage consolidation
- **Scalability:** Models can scale up from the smallest configuration to the largest configuration—over two petabytes—non-disruptively.

DS8100 and DS8300 Models

Like the DS8700 (covered next), the DS8100 and DS8300 models ([Figure D.9](#)) boast the DS8000's three-tier processor architecture and switched connections to internal disks; however, they include the older generation IBM POWER5+ processors and the RIO-G internal component interconnect. The DS8700 model's IBM POWER6 processor and PCI-Express interconnect offer improvements in performance, reliability, and scalability beyond the capabilities of the DS8300 and DS8100.

DS8700 Model

The IBM System Storage DS8700 ([Figure D.10](#)) includes new dual IBM POWER6-based controllers that enable a new level of performance for the company's flagship enterprise disk platform. With overall performance improving up to



Specifications

Models	DS8100 (931)	DS8300 (932)
Shared SMP processor configuration	POWER5+ dual 2-way	POWER5+ dual 4-way
Other major processors	PowerPC, ASICs	PowerPC, ASICs
Processor memory for cache and NVS (min/max)	16 GB/128 GB	32 GB/256 GB
Host adapter interfaces	4-port 4 Gbps Fibre Channel/ FICON	4-port 4 Gbps Fibre Channel/ FICON
Host adapters (min/max)	2/16	2/32
Host ports (min/max)	4/64	4/128
Drive interface	FC-AL	FC-AL
Number of disk drives (min/max)	16/384	16/1024
Device adapters	Up to eight 4-port FC-AL	Up to 16 4-port FC-AL
Maximum physical storage capacity	384 TB	1024 TB
Disk sizes	73 GB solid-state drives, 146 GB solid-state drives, 300 GB (15,000 rpm), 450 GB (15,000 rpm)	73 GB solid-state drives, 146 GB solid-state drives, 300 GB (15,000 rpm), 450 GB (15,000 rpm)
RAID levels	RAID-5, -6, -10	RAID-5, -6, -10

- [DS8100 details on PartnerWorld](#)
- [DS8300 details on PartnerWorld](#)
- [DS8000 details on IBM.com](#)
- [DS8000 competitive info on COMP](#)
- [DS8000 blog search](#)
- [DS8000 Twitter search](#)

Figure D.9. IBM System Storage DS8100 and DS8300 models at a glance (and links to more detail).



Specifications

Models	DS8700 (941, 94E)
Shared SMP processor configuration	POWER6 dual 2-way or 4-way
Other major processors	PowerPC, ASICs
Processor memory for cache and NVS (min/max)	32 GB/384 GB
Host adapter interfaces	4-port 4 Gbps Fibre Channel/FICON
Host adapters (min/max)	2/32
Host ports (min/max)	8/128
Drive interface	4 Gb/s Fibre Channel arbitrated loop (switched FC-AL)
Number of disk drives (min/max)	8/1024
Device adapters	Up to 16 4-port, 2 Gb/s FC-AL
Maximum physical storage capacity	2048 TB
Disk sizes	73 GB solid-state drives; 146 GB solid-state drives; 600 GB solid-state drives; 146 GB (15,000 rpm); 300 GB (15,000 rpm); 450 GB (15,000 rpm); 600 GB (15,000 rpm); 2 TB (7200 rpm)
RAID levels	5, 6, 10

- [DS8700 details on PartnerWorld](#)
- [DS8700 details on IBM.com](#)
- [DS8700 competitive info on COMP](#)
- [DS8700 Easy Tier Redpaper](#)
- [DS8700 blog search](#)
- [DS8700 Twitter search](#)

Figure D.10. IBM System Storage DS8700 series at a glance (and links to more detail).



over 2.5 times, the new DS8700 is designed to support the most demanding business applications with its superior data throughput, unparalleled resiliency features, and five-nines availability. Moreover, with its tremendous scalability, new storage tier optimization, broad server support, and support for advanced IBM deduplication technology, the DS8700 can help simplify the storage environment by consolidating disparate storage platforms onto a single system while providing the availability and performance you've come to require for your most important business applications.

The new IBM System Storage Easy Tier feature enables more effective storage consolidation by taking the guesswork out of deploying solid-state drives by automatically and dynamically moving the appropriate data to the appropriate drive tier in the system, based on ongoing performance monitoring. While clients have come to appreciate the performance attributes of solid-state drives, they remain considerably more expensive than traditional spinning disks. Without the tools to manage the effective placement of data across the various drive tiers in the system, many clients have been unwilling to pay high premiums for SSDs without knowing exactly which data to place on them. Easy Tier addresses this challenge by fully automating the granular relocation of data to the appropriate drive tier, so clients can feel confident their SSDs are not being overprovisioned unnecessarily.

The new IBM System Storage DS8000 Storage Tier Advisor is an easy-to-use tool that can help clients determine which volumes are likely candidates for Easy Tier optimization by analyzing the performance of their current applica-



tion workloads. Even clients that have not activated the Easy Tier feature on the system can use the advisor tool to help identify where and how much data in the system can benefit from SSDs. This can help prevent unnecessary and costly over-provisioning of SSD technology for particular application workloads.

The new DS8700 model is a testament to IBM's legendary reputation for outstanding quality and world-class engineering. And in today's challenging economic climate, having an enterprise disk platform that combines the highest levels of system and application availability with superior performance, flexibility, and total cost of ownership is essential.

DS8800

IBM introduces the new IBM System Storage DS8800 ([Figure D.11](#)), the most advanced model in our high-end disk portfolio, with new hardware that offers faster performance and a significant reduction in floor space and energy requirements.

This fourth-generation DS8000 system includes high-density, 2.5-inch, 6 Gigabits per second (Gb/s) SAS drives that enable clients to pack almost 90% more drives in the same frame footprint. Fully configured with a base frame and two expansion frames, the new DS8800 can reduce floor space requirements by 40% and energy requirements by over 35%, all while supporting more drives than a five-frame DS8700 model. The benefits, of course, are that clients can work to reclaim some of their data center floor space while they consolidate more workloads onto a single system. These small-form-factor drives offer better performance at the same rotational speeds, as well as better energy usage per drive



Specifications

Models	DS8800 (951, 95E)
Shared SMP processor configuration	POWER6+ dual 2-way or 4-way
Other major processors	PowerPC, ASICs
Processor memory for cache and NVS (min/max)	32 GB/384 GB
Host adapter interfaces	4- and 8-port 8 Gbps; Fibre Channel/FICON
Host adapters (min/max)	2/16
Host ports (min/max)	8/128
Drive interface	6 Gb/s Serial Attached SCSI (SAS-2, connected to switched FC-AL)
Number of disk drives (min/max)	16/1056
Device adapters	Up to 16 4-port, 8 Gb/s FC-AL
Maximum physical storage capacity	634 TB

- [DS8800 details on PartnerWorld](#)
- [DS8000 details on IBM.com](#)
- [DS8000 competitive info on COMP](#)
- [DS8800 blog search](#)
- [DS8800 Twitter search](#)

Figure D.11. IBM System Storage DS8800 series at a glance (and links to more detail).



and at a lower cost per gigabyte than the large-form-factor enterprise Fibre Channel drives available on most high-end systems today.

The new DS8800 also includes new 8 Gb/s host adapters and RAID adapters, which enable higher performance throughput by as much as 40% over prior DS8000 models. The new RAID adapters offer up to four times the throughput of the previous adapters, and, like the new host adapters, they'll include dual core processors that will enable not only faster performance but also more effective automated tiering because the system will allow faster movement of data across the various drive tiers. Both the RAID adapters and the new host adapters also have four times the internal memory of those in the previous DS8000 models.

The result is that the new DS8800 balances the performance and energy efficiency benefits of new hardware upgrades throughout the system with the same, market-proven IBM POWER architecture that has been offering extraordinary system reliability and application high availability for over 10 years. Talk to us about how the DS8000 can help make your organization more efficient.

DS8000 series Warranty, Maintenance, and Service

The IBM System Storage DS8000 series offers leading Enterprise Choice warranties with one, two, three, or four years with IBM installation and 24x7 IBM on-site, same-day response on both hardware and advanced function software. Additional services for maintenance, configuration, data migration, and other stor-

MORE ON THE WEB

- [DS8000 warranty options](#)



age management needs are available to help organizations optimize their storage infrastructure and choose the length of service and support that is right for their needs.

DS8000 Competitive Marketing

Follow the “More on the Web” link to see the latest resources to help you overcome the competition when selling the DS8000 series.

MORE ON THE WEB

- [DS8000 competitive info on COMP](#)

XIV Storage System

The IBM XIV Storage System ([Figure X.1](#)) is a next-generation high-end open disk storage system. An integral part of IBM’s broad spectrum of system storage offerings, the XIV system has an innovative grid architecture designed to deliver the highest levels of reliability, performance, scalability, and functionality at low overall cost, while eliminating complexity and providing unprecedented ease of management.

Designed for exceptionally low total cost of ownership, the XIV system aims to tackle almost every aspect related to owning, operating, and maintaining a storage system, including backup and restore, acquisition, environmentals, administration, and downtime cost factors.

The XIV system is designed to deliver consistently high performance through the elimination of hot spots and full exploitation of all key system resources at all times. Its groundbreaking architecture delivers these performance levels while innovatively leveraging the capacity and cost benefits of Very High Density Slower Rotation (VHDSR) drives.



Specifications

Disks	<ul style="list-style-type: none">- Very High Density Slower Rotation (VHDSR) disk drives- 7200 RPM supported- Capacity: 1 TB or 2 TB
-------	---

- [XIV details on PartnerWorld](#)
- [XIV sales kit on PartnerWorld](#)
- [XIV details on IBM.com](#)
- [XIV competitive info on COMP](#)
- [XIV configuration and functionality table](#)
- [XIV blog search](#)
- [XIV Twitter search](#)

Figure X.1. IBM XIV Storage System at a glance (and links to more detail).

Here are some quick XIV Storage System highlights:

- A revolutionary, high-end disk storage system with a virtualized grid architecture designed to eliminate the complexity of storage administration.
- High reliability and data availability via active-active N+1 redundancy of all key components, partition mirroring,



unique self-healing, rapid rebuild times, and non-disruptive upgrades

- Unmatched total cost of ownership and environment-friendly attributes, with dramatic efficiencies in capacity, power, and space
- Enterprise-level, consistent performance through massive parallelism, disk utilization, and unique caching mechanisms.
- Open and integrated system, offering strong interoperability with open system servers and technologies
- Transparent, no-impact scalability, in on-demand increments, without the need for manual data migration or performance tuning, providing automatic online capacity growth
- Rich function set standard with the system software includes snapshots, thin provisioning, data migration, asynchronous and synchronous mirroring, and an intuitive management console.

XIV Warranty, Maintenance, and Service

The IBM XIV Storage System offers a flexible warranty choice with a one or three year hardware warranty that includes IBM installation and 24x7 IBM on-site, same-day-response. The IBM XIV Storage System software licenses include software maintenance (software subscription and technical support) for a period of one year from the date of acquisition. Coverage can be extended to cover two, three, four, or up to five years, if elected. Additional hardware and software services



are also offered to help organizations optimize their storage infrastructures.

SAN Volume Controller

IBM System Storage SAN Volume Controller (SVC) ([Figure V.1](#)) is a storage virtualization system that enables a single point of control for storage resources to help support improved business application availability and greater resource utilization. The objective is to manage storage resources in your IT infrastructure and to make sure they're used to the advantage of your business—and do it quickly, efficiently, in real time, while avoiding administrative costs.

SVC supports attachment to servers using iSCSI protocols over IP networks, which can help reduce costs and simplify server configuration. iSCSI attachment avoids the cost of Fibre Channel host bus adapters (HBAs) in servers and reduces the need for Fibre Channel switch ports. This capability may be particularly attractive for IBM BladeCenter server configurations.

SAN Volume Controller combines hardware and software into an integrated, modular solution that is highly scalable. An "I/O Group" is formed by combining a redundant pair of "storage engines" based on IBM System x server technology with an Intel Xeon 5500 2.4 GHz quad-core processor, 24 GB of cache, and four 8 Gbps Fibre Channel ports. Highly available I/O groups are the basic configuration element of a SAN Volume Controller cluster. Adding I/O groups to the cluster is designed to increase cluster performance and bandwidth.



Specifications

Shared SMP processor	Intel Xeon 5500 Series quad-core
Processor memory for cache	24 GB per engine
Host adapter interfaces	4-port 8 Gbps Fibre Channel
Drive interface	SAS
Number of disk drives	Up to four SSD devices per SVC node
Device adapters	SAS
Maximum physical storage capacity	Up to 600 GB usable SSD capacity per I/O group or up to 2.4 TB in an 8-node cluster
Disk sizes	146 GB

- [SAN Volume Controller sales kit on PartnerWorld](#)
- [SAN Volume Controller info on PartnerWorld](#)
- [SAN Volume Controller info on IBM.com](#)
- [SAN Volume Controller competitive info on COMP](#)
- [SAN Volume Controller blog search](#)
- [SAN Volume Controller Twitter search](#)

Figure V.1. IBM System Storage SAN Volume Controller Entry Edition (and links to more detail).

Here are some quick SAN Volume Controller facts:

- Simple and more productive management: by a single point access, anywhere on the network with a Web browser



- **Improve storage efficiency:** better utilization of storage capacity, enabling businesses to tap into previously unused disk capacity
- **Optimized storage tiering:** new IBM System Storage Easy Tier feature optimizes solid-state storage deployments simply and automatically
- **Flexibility and scalability:** systems can scale up without disruption from the smallest configuration to the largest
- **Easier to use:** With a fresh new user interface based on the popular IBM XIV interface, SVC helps speed deployments and improve productivity even more.

SVC Entry Edition

IBM System Storage SAN Volume Controller Entry Edition ([Figure V.2](#)) is a new storage virtualization system that is designed to deliver enterprise-class capabilities in a package optimized for mid-size businesses. SVC EE is based on IBM's SAN Volume Controller offering but is delivered in a more affordable package. Storage virtualization with SVC EE helps hide much of the complexity of storage environments both from servers and also from administrators. Servers and administrators are presented with a single type of storage system with a single management interface and common network-based replication functions, regardless of the type of physical storage being used. Storage virtualization with SVC EE helps you focus on using storage as a resource to support your business needs and not as boxes that must be managed.



- [SAN Volume Controller Entry Edition sales kit](#)
- [SAN Volume Controller Entry Edition info on PartnerWorld](#)
- [SAN Volume Controller Entry Edition info on IBM.com](#)
- [SAN Volume Controller competitive info on COMP](#)
- [SAN Volume Controller blog search](#)
- [SAN Volume Controller Twitter search](#)

Figure V.2. IBM System Storage SAN Volume Controller Entry Edition (and links to more detail).

SAN Volume Controller Entry Edition software is delivered pre-installed on SVC Storage Engines so it is quickly ready for implementation once the engines are attached to your storage area network (SAN). SVC Storage Engines are based on proven IBM System x server technology and are always deployed in redundant pairs, which are designed to deliver very high availability. SVC Entry Edition is designed to take control of existing storage, retaining all your existing information. This ability helps speed and simplify implementation while helping to minimize the need for additional storage. Once SVC EE is implemented, you can make changes to the configuration quickly and easily as needed.



Here are some quick SVC EE facts:

- Enterprise-class storage virtualization in a more affordable package for mid-size businesses
- Designed to combine storage capacity from multiple disk systems into a capacity reservoir that can be managed more efficiently
- Designed to help increase storage utilization by providing host applications with more flexible access to capacity
- Designed to help improve storage administrator productivity by automating provisioning and enabling management of heterogeneous storage systems using a simple common interface
- Designed to support improved application availability by practically eliminating storage-related causes of application downtime
- Designed to enable a tiered storage environment in which the cost of storage can be better matched to the value of data
- Designed to support advanced copy services from higher- to lower-cost devices and across storage systems from multiple vendors
- Designed to reduce costs and improve flexibility with iSCSI host attachment
- Designed to enable greater flexibility in storage acquisitions
- Supports a wide range of operating systems including Microsoft Windows, UNIX, Linux, and VMware.



N series

IBM N series unified storage products provide a wide range of network attachment capabilities to a broad range of host systems. IBM N series systems allow both SAN and NAS storage to be consolidated on to a single modular platform.

N3000 Express series

The IBM System Storage N3000 Express Modular Disk Systems ([Figure N.1](#)) are designed to provide primary and secondary storage for mid-size enterprises. Consolidating all of their fragmented application-based storage and unstructured data into one unified, easily managed and expandable platform can help IT generalists increase their effectiveness.

N3000 Express systems offer integrated block-level and file-level data access, intelligent management software and data protection capabilities—such as higher-end N series systems—in a cost-effective package. IBM N3000 Express series innovations include internal controller support for Serial-Attached SCSI (SAS) or SATA drives, expandable I/O connectivity and onboard remote management.

The IBM N3000 Express is compatible with the entire family of N series unified storage systems, which feature a comprehensive line-up from top-to-bottom of hardware and software designed to address a variety of possible deployment environments.

Here are some quick N3000 facts:

- High availability—Takes advantage of proven features including a high performing and scalable operating system, data management software, and redundancy features

**Specifications**

Product	N3300	N3300	N3400	N3400	N3600
Machine type-model	2859-A10	2859-A20	2859-A11	2859-A21	2862-A20
Controller configuration	Single	Dual active/active	Single	Dual active/active	Dual active/active
Processors speed and type	Intel 2.2 GHz Mobile Celeron	Intel 2.2 GHz Mobile Celeron	Intel 1.66 GHz Mobile Celeron	Intel 1.66 GHz Mobile Celeron	Intel 2.2 GHz Mobile Celeron
Number of processors	1	2	2	4	2
Random access memory	1 GB	1 GB	4 GB	8 GB	4 GB
Nonvolatile memory	128 MB	256 MB	256 MB	512 MB	512 MB
Fibre Channel ports (speed)	2 (4 Gbps)	4 (4 Gbps)	2 (4 Gbps)	4 (4 Gbps)	4 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)	4 (1 Gbps)	8 (1 Gbps)	4 (1-Gbps)
Maximum number of Fibre Channel loops	1	1	1	1	2
Maximum raw capacity	68 TB	68 TB	136 TB	136 TB	104 TB
Maximum number of internal drives	12	12	12	12	20
Maximum number of expansion drives	56	56	124	124	84
Maximum number of disk drives	68	68	136	136	104
Maximum volume size	16 TB	16 TB	16 TB	16 TB	16 TB
Maximum size of volumes/LUNs	1024	1024	1024	1024	1024

Figure N.1. IBM System Storage N3000 series at a glance and links to more detail (continued on next page).



- [N3000 Resource Kit on PartnerWorld](#)
- [N3000 details on PartnerWorld](#)
- [N3000 details on IBM.com](#)
- [N3000 competitive info on COMP](#)
- [N3000 blog search](#)
- [N3000 Twitter search](#)

Figure N.1. IBM System Storage N3000 series at a glance and links to more detail (continued from previous page).

- Simple replication, backup, and recovery—Designed to support disk-based backup, with file or application-level recovery with SnapMirror, Snapshot, and SnapRestore software features
- Management simplicity—Self-diagnosing systems designed to enable on-the-fly provisioning
- Versatile—Single, integrated architecture designed to support concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures.

N6000 series

The IBM N6000 series systems ([Figure N.2](#)) allows a business to simultaneously meet diverse needs—SAN and NAS, primary and secondary storage. And you get outstanding value: Our flexible systems offer excellent performance and impressive scalability at a low total cost of ownership. IBM N series systems enable easy provisioning, managing, and upgrading so you can quickly adapt your storage infrastructure to meet



Specifications

Product	N6040	N6040	N6060	N6070
Gateway machine type/model	2858-A10 (w/FC 9551)	2858-A20 (w/FC 9551)	2858-A22 (w/FC 9551)	2858-A21 (w/FC 9551)
Controller configuration	Single	Dual (active/active)	Dual (active/active)	Dual (active/active)
Processor speed and type	2.4 GHz AMD dual-core 64-bit Opteron			
Number of processors	1	2	4	4
Random access memory	4 GB	8 GB	16 GB	32 GB
Nonvolatile memory	512 MB	1 GB	4 GB	4 GB
Fibre Channel ports (speed)	4 (4 Gbps)	8 (4 Gbps)	8 (4 Gbps)	8 (4 Gbps)
Ethernet ports (speed)	2 (1 Gbps)	4 (1 Gbps)	4 (1 Gbps)	4 (1 Gbps)
Maximum number of Fibre Channel loops	10	10	10	10
Maximum raw capacity	420 TB	420 TB	672 TB	840 TB
Maximum number of disk drives	420	420	672	840
Maximum volume size	16 TB	16 TB	16 TB	16 TB
Maximum size of volumes/LUNs	2048	2048	2048	2048

- [N6000 Resource Kit on PartnerWorld](#)
- [N6000 details on PartnerWorld](#)
- [N6000 details on IBM.com](#)
- [N6000 competitive info on COMP](#)
- [N6000 blog search](#)
- [N6000 Twitter search](#)

Figure N.2. IBM System Storage N6000 series at a glance (and links to more detail).



your changing business and technical needs. To help you maximize staff productivity, all IBM N series systems use the Data ONTAP operating system and the same suite of application-aware management software.

The IBM N6000 series systems offer a versatile storage platform for handling the large amounts of diverse data moving through your business. With an N6000 series system, you can consolidate varied datasets simultaneously—block or file based—onto a single storage platform. With IBM N6000 series, you can unlock the full potential of your growing virtualized server environment by enabling virtual machine mobility and off loading the work of data protection. The N6000 systems enable you to connect your heterogeneous server environment (including Windows, UNIX, and Linux servers) and clients to one storage system by using standard storage protocols and interfaces.

Here are some quick N6000 facts:

- Meet diverse and changing needs—consolidate diverse data sets onto a unified storage platform that provides simultaneous block and file services.
- Perform when your applications need it most—outstanding performance with high bandwidth, 64-bit architecture, and the latest I/O technologies.
- Maximize your resources—highly efficient storage utilization makes it possible for you to dramatically reduce power, cooling, and space demands.



- Respond to growth—preserve investments in staff expertise and capital equipment with data-in-place upgrades to more powerful N series systems.
- Improve your business efficiency—take advantage of the N6000 series Gateway capabilities to reduce data management complexity in heterogeneous storage environments.

N7000 series

IBM System Storage N7000 series systems ([Figure N.3](#)) are designed to help you tackle the challenge of effective data management using virtualization technology and a unified storage architecture. The N7000 series is designed to deliver high-end enterprise storage and data management capabilities with midrange affordability. Built-in serviceability and manageability features help support your efforts to increase reliability, simplify and unify storage infrastructure and maintenance, and deliver exceptional economy. The N7000 series, like all N series systems, provides powerful virtualization and thin-provisioning capabilities to help you maximize storage utilization while minimizing the use of power, cooling, and floor space. At the same time, you can improve staff productivity with an integrated suite of application-aware manageability software offering policy-based automation to otherwise manual tasks.

Here are some quick N7000 facts:

- Scalable—Designed for non-disruptive expansion to more than 1.1 petabytes (1176 TB) storage capacity



Specifications

Machine type model	2867-A21
Gateway machine type model	2867-A21 (w/FC 9551)
Controller configuration	Dual (active/active)
Processors speed and type	2.6 GHz AMD Dual-core Opteron
Number of processors	8
Random access memory	64 GB
Nonvolatile memory	4 GB
Fibre Channel ports (speed)	16 (4-Gbps)
Ethernet ports (speed)	12 (1-Gbps)
Maximum number of Fibre Channel loops	14
Maximum raw capacity	1176 TB
Maximum number of disk drives	1176
Maximum volume size	16 TB
Maximum size of volumes/LUNs	2048

- [N7000 Resource Kit on PartnerWorld](#)
- [N7000 details on PartnerWorld](#)
- [N7000 details on IBM.com](#)
- [N7000 competitive info on COMP](#)
- [N7000 blog search](#)
- [N7000 Twitter search](#)

Figure N.3. IBM System Storage N7900 at a glance (and links to more detail).



- Versatile—Supports concurrent block I/O and file serving over Ethernet and Fibre Channel SAN infrastructures
- Efficient consolidation—FlexShare helps ensure that critical workloads get priority service
- Application availability—Supports application-level recovery in minutes, not hours
- Performance—Delivers high, consistent performance for mission-critical applications

N series Software

The IBM System Storage N series also provides a selection of features and functions delivered through software offerings which are designed to provide a comprehensive set of robust management and operational tools as well as high availability features, disaster recover, and data copy services that help the system administration provide a high level of support for environments requiring IP attached storage solutions.

MORE ON THE WEB

- [N series software info on IBM.com](#)

Here are a few examples of the many different N series software offerings:

- Deduplication A-SIS (Advanced Single Instance Storage)
 - Performs block level data deduplication on NearStore data volumes



- Volume data is automatically scanned and deduplicated, resulting in immediate space savings with minimal impact on operations
- Data ONTAP
 - N series storage operating system provides full-featured and unified data management for both block and file serving environments
 - Single architecture and user interface simplify data management and reduce costs for SAN and NAS deployment
- Disk sanitization
 - The process of physically obliterating data by overwriting disks with specified byte patterns or random data
 - Helps prevent recovery of current data by any known recovery methods
- FlexClone
 - Instantaneously creates LUN and volume clones without requiring additional storage
 - Accelerated test and development and storage capacity savings
- FlexShare
 - Prioritizes storage resource allocation to highest value workloads on a heavily loaded system
 - Ensures that best performance is provided to designated high-priority applications



- FlexVol
 - Creates flexibly sized LUNs and volumes across a large pool of disks and one or more RAID groups
 - Fast, simple, and flexible storage provisioning and high-capacity utilization
 - Regulatory compliance solution for spreadsheets, presentations, and other unstructured application data
- MetroCluster
 - An integrated high-availability/disaster recovery solution for campus and metro-area deployments
 - Ensures high data availability when a site failure occurs
- MultiStore
 - Securely partitions a storage system into multiple virtual storage appliances
 - Enables secure consolidation of multiple domains and file servers
- NearStore (near-line)
 - Increases the maximum number of concurrent data streams (per storage controller)
 - Enhances backup, data protection, and disaster preparedness by increasing the number of concurrent data streams between two N series systems



- Operations manager
 - Manages multiple N series systems from a single administrative console
 - Faster deployment and consolidated management of multiple N series systems
- Protection Manager
 - Backup and replication management software for N series disk-to-disk environment
 - Improves productivity through automation of data protection tasks; delivers higher assurance of data protection than with manual execution of tasks by reducing human errors
- RAID-DP
 - Double parity bit, RAID protection (N series RAID 6 implementation)
 - Protects against data loss due to double disk failures and media bit errors occurring during drive rebuild processes
- SecureAdmin
 - Authenticates both the administrative user and the N series system, creating a secure, direct communication link to the N series system
 - Helps protect administrative logins, passwords, and session commands from “clear text” snooping by replacing rsh and telnet with the strongly encrypted SSH protocol



- Single Mailbox Recovery for Exchange (SMBR)
 - Enables the recovery of a single mailbox from a Microsoft Exchange Information Store
 - Can extract a single mailbox or email directly in minutes compared to hours with traditional methods
 - Helps eliminate the need for IT staff
- SnapDrive
 - Provides host-based data management of N series storage from Windows, UNIX, and Linux servers
 - Simplifies host-consistent Snapshot copy creation and automates error-free restores
- SnapLock
 - Write-protects structured application data files within a volume to provide non-erasable, non-rewriteable disk storage
 - Provides storage enabling compliance with government records retention regulations
- SnapManager
 - Provides host-based data management of N series storage for databases and business applications (MS Exchange, SAP, Oracle, MS Sharepoint, VMware, and MS Hyper-V)
 - Simplifies application-consistent Snapshot copies, automates error-free data restores, and enables application-aware disaster recovery



- SnapMirror
 - Enables automatic, incremental data replication between systems: synchronous or asynchronous
 - Provides flexible, space- and network-efficient site-to-site mirroring for disaster recovery and data distribution
- SnapMover
 - Enables rapid reassignment of disks between controllers within a system without disruption
 - Enables fast, non-disruptive load balancing within an active-active controller system
- SnapRestore
 - Rapidly restores single files, directories, or entire LUNs and volumes from any Snapshot backup
 - Enables near-instantaneous recovery of files, databases, and complete volumes
- Snapshot
 - Makes incremental, data-in-place, point-in-time copies of a LUN or volume with minimal performance impact
 - Enables frequent, non-disruptive, space-efficient, and quickly restorable backups
- SnapValidator
 - Maximizes data integrity for Oracle databases
 - Enhances Oracle database resiliency in compliance with Oracle HARD initiative



- SnapVault
 - Exports Snapshot copies to another N series system, providing an incremental block-level backup solution
 - Enables cost-effective, long-term retention of rapidly restorable disk-based backups
- SyncMirror
 - Maintains two online copies of data with RAID-DP protection on each side of the mirror
 - Protects against all types of hardware outages, including triple disk failure.

Scale Out Network Attached Storage (SONAS)

The demand to manage and store massive amounts of file data continues to challenge data centers. For that reason, IBM has designed IBM Scale Out Network Attached Storage (SONAS) to embrace cloud storage and the petabyte age ([Figure N.4](#)). It can meet today's storage challenges with quick and cost-effective IT-enabled business enhancements designed to grow with unprecedented scale.

It can also deliver computing services that make the technology underlying user devices almost invisible. It enables applications and services to be uncoupled from the underlying infrastructure, enabling the business to adjust quickly to change. As a result, IBM SONAS can easily integrate with your organization's strategies to develop a more dynamic enterprise. IBM SONAS is a highly desired choice for large orga-



- [SONAS details on PartnerWorld](#)
- [SONAS details on IBM.com](#)
- [SONAS competitive info on COMP](#)
- [SONAS blog search](#)
- [SONAS Twitter search](#)

Figure N.4. IBM Scale Out Network Attached Storage (SONAS) at a glance (and links to more detail).

nizations seeking to better manage their growing demand for file-based storage.

IBM SONAS is designed to consolidate files that are scattered in multiple storage locations and allows them to be efficiently shared and managed. Often organizations with fast-growing file systems come face to face with the serious limitations of traditional NAS. This is when organizations realize that traditional NAS—even clustered NAS—has serious problems with managing and supporting massively



scaled storage containing millions to billions of active files. Such massive numbers of files require separate file systems served by separate servers. Consolidating a hundred or even hundreds of these file servers into high-end NAS becomes a necessity. This is where IBM SONAS helps. IBM SONAS is a multipetabyte scale out NAS storage offering for information storage and distribution. Designed to scale out to store millions to billions of active files in a single namespace, it offers operational efficiency and administrative savings. It combines massive scalability with automated file management to quickly deliver information around the world.

Here are some quick IBM SONAS facts:

- Manage multiple petabytes of storage and up to a billion files in a single file system
- Achieve operational efficiency with automated, policy-driven tiered storage
- Lower TCO with automated life-cycle management and migration to tape
- Scale-out performance to satisfy bandwidth-hungry applications
- Asynchronous replication for disaster recovery and business continuity

Tape Storage

Server systems are woven deeply into today's business processes and are at the core of day-to-day operations. This



information is thus a valuable corporate asset that must be protected. Tape storage provides a cost-effective and efficient means of backing up and archiving the information held on disk storage. Tape storage plays a vital role in reducing storage costs, maintaining data availability in the event of hardware failures, restoring data files accidentally or maliciously erased, restoring operations after a disaster, and so forth. In this section, we examine IBM's tape storage offerings.

MORE ON THE WEB

- [All tape offerings on IBM.com](#)

Tape Storage Cross Reference by Workload Size

It is often a mistake to associate entry-level, midrange, and enterprise-class storage products with small, medium, and large size businesses, respectively. The amount of data stored often does not correlate with the number of employees or revenue metrics often cited in determining size. For this reason, recommendations on products based on actual workloads often makes more sense, though still should be considered only a general guideline. In this section, you will find a list of tape storage products organized by workload size (entry, mid-size, and enterprise) to help you find the best solution for your client.

Tape Storage for Entry-Level Workloads

Here is a list of tape storage products designed for entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product.

- [TS2230 Express](#)



- [TS2240 Express](#)
- [TS2250 Express](#)
- [TS2340 Express](#)
- [TS2350 Express](#)
- [TS2900 Tape Autoloader](#)
- [TS3100 Express](#)
- [TS3200 Express](#)
- [7212 Enclosure](#)
- [7214 Enclosure](#)
- [7216 Enclosure](#)

MORE ON THE WEB

- [Tape for entry-level workloads](#)

Tape Storage for Mid-Size Workloads

Here is a list of tape storage products designed for mid-size workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

- [TS2340 Express](#)
- [TS2350 Express](#)
- [TS7610 ProtecTIER](#)
- [TS7650 ProtecTIER](#)
- [TS3100 Express](#)
- [TS3200 Express](#)
- [TS3310 Tape Library](#)
- [TS3400 Tape Library](#)

MORE ON THE WEB

- [Tape for mid-size business workloads](#)



- [TS3500 Tape Library](#)
- [7214 Enclosure](#)

Tape Storage for Enterprise Workloads

Here is a list of tape storage products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product (you can click on the back arrow to jump back to this page).

- [TS1120 Tape Drive](#)
- [TS1130 Tape Drive](#)
- [TS3400 Tape Library](#)
- [TS3500 Tape Library](#)
- [TS7650G ProtecTIER](#)
- [TS7680 ProtecTIER](#)
- [Virtualization Engine TS7700](#)

MORE ON THE WEB

- [Tape for enterprise workloads](#)

TS1120 Tape Drive

The IBM System Storage TS1120 Tape Drive ([Figure T.1](#)) offers a solution to address applications that need high-capacity, fast access to data or long-term data retention. It is supported in IBM tape libraries, IBM frames that support stand-alone installation, and in an IBM 3592 Tape Frame Model C20 (3592 C20 frame) attached to a Sun StorageTek 9310 library.

The tape drive uses IBM 3592 Cartridges, which are available in limited capacity (100 GB) for fast access to data, and



Specifications

Recording technique	Linear Serpentine
Number of tracks	896
Native capacity	700 GB (using JB/JX media), 3003/500 GB (using JA/JW media), or 60 3/100 GB (using JJ/JR media)
Native data rate	104 MBps
Adaptive data rates	104, 85, 70, 55, 41, and 35 MBps for 3592 cartridges initialized in Gen 2 format; 54, 41, 36, 31, and 27 MBps for 3592 cartridges initialized in Gen 1 format
Burst data rate	400 MBps
High-speed search	10 mps
Warranty	One year

- [TS1120 details on PartnerWorld](#)
- [TS1120 details on IBM.com](#)
- [TS1120 competitive info on COMP](#)
- [TS1120 blog search](#)
- [TS1120 Twitter search](#)

Figure T.1. IBM System Storage TS1120 at a glance (and links to more detail).



standard capacity (500 GB) or extended capacity (700 GB) that help to reduce resources to lower total cost. All three cartridges are available in re-writable or Write Once Read Many (WORM) format.

TS1120 tape drives can be shared among supported open system hosts on a storage area network (SAN) or between IBM FICON and ESCON mainframe hosts when attached to an IBM System Storage TS1120 Tape Controller. Sharing drives optimizes drive utilization and helps reduce infrastructure requirements.

Here are some quick TS1120 facts:

- Supports backup and archive for IBM Systems and selected open system platforms
- Helps support regulatory compliance requirements for records retention with WORM media
- Helps to enable secure sharing of information with support for data encryption and key management
- Offers a native data transfer rate of up to 104 MBps
- Supports native cartridge capacities of up to 700 GB.

TS1130 Tape Drive

The IBM System Storage TS1130 Tape Drive ([Figure T.2](#)) features storage capability to help you establish easy access to data, better security, long-term retention and data governance, and regulatory compliance. The TS1130 tape drive offers high-performance flexible data storage with support for data encryption. The TS1130 tape drive can help you protect



Specifications

Recording technique	Linear Serpentine
Number of tracks	1152
Native capacity (uncompressed)	1 TB (using JB/JX media), 640 GB (using JA/JW media), or 128 GB (using JJ/JR media)
Native sustained data rate (uncompressed)	160 MBps
Adaptive instantaneous data rates	163, 134, 109, 83, 56, 43 MBps for 3592 JB cartridges initialized in Gen 3 format; 150, 127, 104, 78, 52, 40 MBps for 3592 JB cartridges initialized in Gen 2 format; 71, 59, 47, 36, 24, 19, 13 MBps for 3592 JA cartridges initialized in Gen 1 format
Burst data rate	400 MBps
High-speed search (max)	12.4 mps
Warranty	One year

- [TS1130 details on PartnerWorld](#)
- [TS1130 details on IBM.com](#)
- [TS1130 competitive info on COMP](#)
- [TS1130 blog search](#)
- [TS1130 Twitter search](#)

Figure T.2. IBM System Storage TS1130 at a glance (and links to more detail).



your investments in tape automation by offering compatibility with existing automation. To further protect your investment, an upgrade model is available for your existing IBM System Storage TS1120 Tape Drives. And to support a heterogeneous server environment, the TS1130 offers multiplatform support.

The TS1130 Tape Drive supports IBM System Storage TS3400 and TS3500 Tape Libraries, IBM TotalStorage 3494 Tape Libraries, IBM Virtualization Engine TS7700, IBM racks that enable standalone installation, and IBM 3952 Tape Frames Model C20 (3952C20 frame) attached to a Sun 9310 library.

Here are some quick TS1130 facts:

- Provides information security with support for encryption and key management
- Optimizes information retention with support for existing IBM tape automation
- Supports write once read many (WORM) cartridges to help satisfy compliance requirements
- Offers high performance and high capacity for storage consolidation

TS2230 Tape Drive Express

The IBM System Storage TS2230 Tape Drive Express LTO3 HH model ([Figure T.3](#))—the entry-level IBM System Storage tape product family offering—is the answer to growing storage requirements and shrinking backup windows. By leveraging advanced linear tape-open technology and the half-high format, the TS2230 Tape Drive is suited for handling the backup,



save and restore, and archival data storage needs of a wide range of small systems.

The System Storage TS2230 Tape Drive Express LTO3 HH model is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival of their data within a small window of time. The TS2230 has a storage ca-



Specifications

Tape drive type	IBM LTO Ultrium 3 Half-High
Capacity per cartridge	Up to 800 GB compressed; 400 GB native
Sustained data transfer rate	Up to 60 MBps native
Media type	IBM Ultrium 3
Data cartridge	IBM TotalStorage LTO Ultrium 400 GB Data Cartridge (P/N 24R1922)
Cleaning cartridge	IBM TotalStorage LTO Cleaning Cartridge (P/N 35L2086)
Warranty	Three-year, customer replaceable unit (CRU) service in most countries

- [TS2230 Express details on PartnerWorld](#)
- [TS2230 Express details on IBM.com](#)
- [TS2230 Express competitive info on COMP](#)
- [TS2230 blog search](#)
- [TS2230 Twitter search](#)

Figure T.3. IBM System Storage TS2230 Tape Drive Express at a glance (and links to more detail).



capacity of up to 800 GB (with 2:1 compression) in conjunction with the IBM TotalStorage LTO Ultrium 400 GB data cartridge, which is double the capacity of the Ultrium 2 technology.

Along with its higher capacity, the performance of the TS2230 tape drive has more than doubled over the previous generation of half-high LTO drives on the market for a native data transfer rate of up to 60 MBps. The TS2230 tape drive provides an excellent alternative to slower and smaller capacity 1/4-inch, 4 mm, and 8 mm DLT/SDLT tape drives.

Here are some quick TS2230 facts:

- An entry-level Ultrium tape solution for the midrange and network tape storage environments
- Designed to provide cost-effective backup, save and restore, and archival storage external to the server
- Double the storage capacity of existing HH LTO2 drives on the market
- Adheres to widely supported linear tape-open (LTO) standards.

TS2240 Tape Drive Express

The IBM System Storage TS2240 Tape Drive Express ([Figure T.4](#))—the entry-level IBM System Storage tape product family offering—is the answer to growing storage requirements and shrinking backup windows. Incorporating the fourth generation of advanced Linear Tape-Open (LTO) technology, the TS2240 Tape Drive is suited for handling the backup, save and restore, and archival data storage needs of a wide range of small systems. In addition, the TS2240 provides added se-



curity features by supporting encryption of data with 3 Gbps SAS connectivity.

The System Storage TS2240 Tape Drive is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival storage of their data. The TS2240, with a half-high form factor, offers the same high capacity of



Specifications

Available configurations	Model 3580 H4S—One IBM Ultrium 4 Tape Drive, 3 Gbps SAS attach PN 3580S4E
Tape drive type	IBM LTO Ultrium 4
Physical capacity	Up to 1.6 TB per cartridge with 2:1 compression; 800 GB native
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 120 MB/sec native
Media type	IBM LTO Ultrium 4 IBM System Storage LTO Ultrium 800 GB Data Cartridge IBM System Storage LTO Cleaning Cartridge

- [TS2240 Express details on PartnerWorld](#)
- [TS2240 Express details on IBM.com](#)
- [TS2240 Express competitive info on COMP](#)
- [TS2240 blog search](#)
- [TS2240 Twitter search](#)

Figure T.4. IBM System Storage TS2240 at a glance (and links to more detail).



full-high LTO 4 tape drives. The TS2240 has a physical storage capacity of up to 1.6 TB (with 2:1 compression) in conjunction with the IBM System Storage LTO Ultrium 800 GB data cartridge, which provides up to double the capacity of Ultrium 3 cartridges. The native data transfer performance of the TS2240 Tape Drive has increased over the previous LTO half-high generation to up to 120 MB/sec.

Here are some quick TS2240 facts:

- Designed to provide high-capacity tape storage in a small half-high form factor to address backup and archiving requirements
- Available hardware encryption designed to offer highly secure data storage
- Native data transfer rate of up to 120 MB/sec.
- Designed for the midrange open systems environment.

TS2250 Tape Drive Express

The IBM System Storage TS2250 Tape Drive Express ([Figure T.5](#)) is the entry-level tape product family offering. Incorporating the latest generation of the industry-leading linear tape-open (LTO) technology, the TS2250 Tape Drive is suited for handling backup, save and restore, and archival data storage needs with higher capacity and higher data transfer rates than the previous generation. In addition, the IBM Ultrium 5 technology is designed to support media partitioning, and the new IBM Long Term File System technology. It also continues to support encryption of data and WORM media.



Specifications

Available configurations	Model 3580 H5S—One IBM Ultrium 5 Tape Drive, 6 Gbps SAS interface PN 3580S5E
Tape drive type	IBM LTO Ultrium 5
Physical capacity	1.5 TB Native; 3.0 TB with 2:1 compression
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 140 MBps native
Media type	IBM LTO 5 Data Cartridge IBM LTO Cleaning Cartridge
Warranty	Three-year, customer replaceable unit (CRU) in most countries

- [TS2250 Express details on PartnerWorld](#)
- [TS2250 Express details on IBM.com](#)
- [TS2250 Express competitive info on COMP](#)
- [TS2250 blog search](#)
- [TS2250 Twitter search](#)

Figure T.5. IBM System Storage TS2250 at a glance (and links to more detail).

The IBM System Storage TS2250 Tape Drive is an excellent tape storage solution for businesses requiring backup and low-cost archival storage of their data. The TS2250, with a half height form factor, offers more capacity than the full height LTO 4 tape drive in less space. The TS2250 provides a



physical storage capacity of up to 3.0 TB (with 2:1 compression) in conjunction with the new IBM Ultrium 1.5 TB data cartridge, nearly double the capacity of previous Ultrium 4 cartridges. The data transfer performance of the TS2250 Tape Drive has increased over the previous LTO half height generation with a transfer rate of up to 140 MBps with 6 Gbps SAS interface connectivity. It also now offers two SAS and one Ethernet port per drive to improve availability.

Here are some quick TS2250 facts:

- Helps reduce costs with lower power consumption, consolidation, and space reduction
- Supports media partitioning on LTO Ultrium 5 Media and new IBM Long Term File System technology
- Nearly doubles the cartridge capacity of the previous generation in a small half height form factor
- Designed to address backup and archiving requirements with lower cost implementation.

TS2340 Tape Drive Express

The IBM System Storage TS2340 Tape Drive ([Figure T.6](#))—the entry-level IBM System Storage tape product family offering—is the answer to growing storage requirements and shrinking backup windows. Incorporating the fourth generation of advanced linear tape-open (LTO) technology, the TS2340 Tape Drive is suited for handling the backup, save and restore, and archival data storage needs of a wide range of small systems.



In addition, the TS2340 provides added security features by supporting encryption of data with 3 Gbps SAS connectivity.



Specifications

Available configurations	Model L43—One IBM Ultrium 4 Tape Drive, LVD Ultra160 SCSI attach Model S43—One IBM Ultrium 4 Tape Drive, 3 Gbps SAS attach
Tape drive type	IBM LTO Ultrium 4
Physical capacity	Up to 1.6 TB per cartridge with 2:1 compression; 800 GB native
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 120 MB/sec native
Media type	IBM LTO Ultrium 4 IBM TotalStorage LTO Ultrium 800 GB Data Cartridge (PN TBD) IBM TotalStorage LTO Cleaning Cartridge (PN TBD)
Warranty	Three-year, customer replaceable unit (CRU) in most countries

- [TS2340 Express details on PartnerWorld](#)
- [TS2340 Express details on IBM.com](#)
- [TS2340 Express competitive info on COMP](#)
- [TS2340 blog search](#)
- [TS2340 Twitter search](#)

Figure T.6. IBM System Storage TS2340 at a glance (and links to more detail).



The IBM System Storage TS2340 Tape Drive is an excellent tape storage solution for businesses requiring backup or low-cost, real-time archival storage of their data within a small window of time—it offers high-capacity and performance to help address the most demanding requirements. The TS2340 has a physical storage capacity of up to 1.6 TB (with 2:1 compression) in conjunction with the new IBM Ultrium 800 GB data cartridge, which provides up to double the capacity of previous Ultrium 3 technology. Along with its higher capacity, the data transfer performance of the TS2340 Tape Drive has increased over the previous generation for a native data transfer rate of up to 120 MBps. The TS2340 Tape Drive continues to provide an excellent alternative to slower and smaller capacity 1/4-inch, 4 mm, and 8 mm DLT/SDLT tape drives.

Here are some quick TS2340 facts:

- Designed to provide high-capacity and performance to address the most demanding backup and archiving requirements
- Double the cartridge capacity of previous generation LTO drives
- Available hardware encryption designed to offer highly secure data storage along with high performance
- Native data transfer rate of up to 120 MBps
- Choice of SCSI or SAS interfaces.

TS2350 Tape Drive Express

The IBM System Storage TS2350 Tape Drive Express ([Figure T.7](#))—the entry-level IBM System Storage tape product fam-



Specifications

Available configurations	Model 3580 S53—One IBM Ultrium 5 Tape Drive, 6 Gbps SAS interface PN 3580S5X
Tape drive type	IBM LTO 5
Physical capacity	1.5 TB Native; 3.0 TB with 2:1 compression
Number of tape drives	1
Number of tape cartridges	1
Data transfer rate	Up to 140 MBps native
Media type	IBM LTO 5 Data Cartridge IBM LTO Cleaning Cartridge
Warranty	Three-year, customer replaceable unit (CRU) in most countries

- [TS2350 Express details on PartnerWorld](#)
- [TS2350 Express details on IBM.com](#)
- [TS2350 Express competitive info on COMP](#)
- [TS2350 blog search](#)
- [TS2350 Twitter search](#)

Figure T.7. IBM System Storage TS2350 Tape Drive Express at a glance (and links to more detail).

ily offering—supports these needs by leveraging the newest generation of linear tape-open (LTO) technology to help cost-effectively handle growing storage requirements.



The TS2350 tape drive is suited for handling backup, save and restore, and archival data storage needs with higher capacity and higher data transfer rate than previous generation. In addition, the IBM Ultrium 5 technology is designed to support media partitioning, and the new IBM Long Term File System technology. It also continues to support encryption of data and WORM media.

The TS2350 Tape Drive is an excellent tape storage solution for businesses requiring backup and archival storage of their data. The TS2350 offers high physical storage capacity of up to 3.0 TB (with 2:1 compression) in conjunction with the new IBM Ultrium 1.5 TB data cartridge, which provides nearly double the capacity of previous Ultrium 4 cartridges. The data transfer rate of the TS2350 tape drive has increased over the previous LTO generation to up to 140 MBps with 6 Gbps SAS interface connectivity. It also offers two SAS and one Ethernet port per drive to improve availability.

Here are some quick TS2350 facts:

- Helps reduce costs with lower power consumption, consolidation, and space reduction
- Supports media partitioning on LTO Ultrium 5 Media and new IBM Long Term File System technology
- Nearly doubles the cartridge capacity of previous-generation LTO Ultrium 4 drives
- Designed to provide greater capacity and performance to address the most demanding backup and archiving requirements.



TS2900 Tape Autoloader Express

The IBM System Storage TS2900 Tape Autoloader Express (Figure T.8) is designed for entry-level automated backup for rack system and small-to-medium business environments. With a low profile, high density storage capacity, the TS2900 is ideally suited for backup and archival operations. The TS2900 is available with IBM HH LTO 3 or HH LTO 4 tape technology for a reliable, low entry-priced solution.

The TS2900 is equipped with standard features designed to provide ease-of-use and secured data backup. Web-based remote management, a bar code reader, and a removable tape magazine help provide the autoloader flexibility in application. The TS2900 can be used in a rack system, or on a desktop next to the office server. These types of features help reduce the requirements of IT personnel staff, as well as help centralize backup in the data center. The TS2900 also is designed to support the encryption of sensitive user data in combination with HH LTO 4 tape technology from IBM. With 3 Gbps SAS attach, the TS2900 is supported on IBM Power Systems, IBM System x, Intel, and other competitive open system server platforms.

Here are some quick TS2900 facts:

- IBM Half-high LTO 4 supports the encryption of data for increased security with archived data
- Supports HH LTO 3 or HH LTO 4 tape technology from IBM with 3 Gbps SAS interface
- A single I/O station to help support continuous library operation



Specifications

Drive options	Ultrium 3 Half-high: 3 Gbps SAS Ultrium 4 Half-high: 3 Gbps SAS
Available models	PN 3572S3R (HH LTO3) PN 3572S3E (HH LTO3 with desktop kit) PN 3572S4R (HH LTO4) PN 3572S3E (HH LTO4 with desktop kit)
Deskside cover kit	PN 45E3789
Additional tape magazine	PN 45E3793
Rack mount kit	PN 45E3785
Number of tape drives	1
Tape cartridge capacity	9
I/O stations	1
Physical capacity	LTO 3: Up to 3.6 TB (7.2 TB with 2:1 compression) LTO 4: Up to 7.2 TB (14.4 TB with 2:1 compression)
Data transfer rate	LTO 3: Up to 60 MBps LTO 4: Up to 120 MBps

- [TS2900 Tape Autoloader Express details on PartnerWorld](#)
- [TS2900 Tape Autoloader Express details on IBM.com](#)
- [TS2900 Tape Autoloader Express competitive info on COMP](#)
- [TS2900 blog search](#)
- [TS2900 Twitter search](#)

Figure T.8. IBM System Storage TS2900 Tape Autoloader Express at a glance (and links to more detail).



- Removable magazine to facilitate the off-site relocation of media and archival data
- Features IBM half-high LTO technology designed for reliable performance in small-to-medium open system environments
- Adheres to LTO specifications
- IBM Half-high LTO 4 supports the encryption of data for increased security with archived data
- Standard features include remote management capability and bar code reader
- HH LTO 3 tape drives can read and write to LTO 2 media and read LTO 1 media; HH LTO 4 tape drives can read and write to LTO 3 media and read LTO 2 media
- Continues to support WORM media
- Adheres to LTO specifications.

TS3100 Tape Library Express

The IBM System Storage TS3100 Tape Library Express model ([Figure T.9](#)) and its storage management applications are designed to address capacity, performance, data protection, reliability, availability, affordability, and application requirements. It is designed as a functionally rich, entry tape-storage solution incorporating LTO tape technology. The IBM TS3100 Express model is an excellent solution for large-capacity or high-performance tape backup with or without ran-



Specifications

Available models	3573 2UL: TS3100 Tape Library Model L2U Driveless
Ultrium tape cartridges	Ultrium 5 media: 46C2084 or FC #8505; Ultrium 4 media: 95P4278 or FC #8405; Ultrium 3 media: 95P2020 or FC #8305
Ultrium cleaning cartridge	23R7008 or FC #8002
Tape drive type	IBM LTO Ultrium 5 Half-Height and Full Height; IBM LTO Ultrium 4 Half-Height and Full Height; IBM LTO Ultrium 3 Half-Height
Number of drives	1-2
Number of tape cartridges	24
Physical capacity	Up to 3.0 TB per cartridge compressed; 1.5 TB native with LTO 5 Up to 1.6 TB per cartridge compressed; 800 GB native with LTO 4 Up to 800 GB per cartridge compressed; 400 GB native with LTO 3 Up to 72 TB per tape library compressed; 36 TB native with LTO 5 Up to 38.4 TB per tape library compressed; 19.2 TB native with LTO 4 Up to 19.2 TB per tape library compressed; 9.6 TB native with LTO 3
Data transfer rate	Up to 140 MBps native with LTO 5 Full Height and Half-Height Up to 120 MBps native with LTO 4 Full Height and Half-Height

- [TS3100 Express details on PartnerWorld](#)
- [TS3100 Express details on IBM.com](#)
- [TS3100 Express competitive info on COMP](#)
- [TS3100 blog search](#)
- [TS3100 Twitter search](#)

Figure T.9. IBM System Storage TS3100 Tape Library Express at a glance (and links to more detail).



dom access. The TS3100 is also an excellent choice for tape automation for IBM Power Systems, IBM System x, and other open systems.

The IBM TS3100 Tape Library Express is well-suited for handling backup, save and restore, and archival data-storage needs for small to medium-size environments. With the use of one LTO full height tape drive or up to two LTO half-height tape drives and 24 tape cartridge capacity, the IBM TS3100 is designed to take advantage of LTO technology to cost-effectively handle growing storage requirements.

Here are some quick TS3100 facts:

- Designed to support the newest generation of LTO with one IBM Ultrium 5 Full Height Tape Drive or up to two IBM Ultrium 5 Half Height Tape Drives, to help increase capacity and performance
- Designed to support cost-effective backup, save and restore, and archival storage in sequential or random access mode with a standard bar-code reader
- Designed to offer outstanding capacity, performance, and reliability for midrange and network tape-storage environments in a 2U form factor with 24 data cartridge slots and a mail slot
- Remote library management through a standard Web interface supports flexibility and greater administrative control of storage operations



TS3200 Tape Library Express

The IBM System Storage TS3200 Tape Library Express Model (Figure T.10) supports these needs by leveraging the newest generation of LTO technology to help cost-effectively handle growing storage requirements. The TS3200 Express Model and its storage management applications are designed to address capacity, performance, data protection, reliability, availability, affordability, and application requirements. It is designed as a functionally rich, entry tape-storage solution incorporating LTO Ultrium tape technology. The IBM TS3200 Express model is an excellent solution for large-capacity or high-performance tape backup with or without random access. The TS3200 is also an excellent choice for tape automation for IBM Power Systems, IBM System x, and other open systems.

The IBM TS3200 Tape Library Express is well-suited for handling backup, save and restore, and archival data storage needs for small to medium-size environments. With the use of up to two LTO Full Height tape drives or up to four LTO Half-Height tape drives and 48 tape cartridge capacity, the IBM TS3200 model is designed to use LTO technology to cost-effectively handle growing storage requirements. The TS3200 tape library is configured with four removable cartridge magazines, two on the left side (24 data cartridge slots) and two on the right (24 data cartridge slots). Additionally, the lower left magazine includes a three-slot I/O station to help support continuous library operation while importing and exporting media. A bar-code reader is standard in the library, supporting the library's operation in sequential or random access mode.



Specifications

Available models	3573 4UL: TS3200 Tape Library Model L4U Driveless
Ultrium tape cartridges	Ultrium 5 media: 46C2084 or FC #8505; Ultrium 4 media: 95P4278 or FC #8405; Ultrium 3 media: 95P2020 or FC #8305
Ultrium cleaning cartridge	23R7008 or FC #8002
Tape drive type	IBM LTO 5 Full Height and Half-Height; IBM LTO 4 Full Height and Half-Height; IBM LTO 3 Half-Height
Number of drives	1–4
Number of tape cartridges	48
Physical capacity	Up to 3.0 TB per cartridge compressed; 1.5 TB native with LTO 5 Up to 1.6 TB per cartridge compressed; 800 GB native with LTO 4 Up to 800 GB per cartridge compressed; 400 GB native with LTO 3 Up to 144 TB per tape library compressed; 72 TB native with LTO Ultrium 5 Up to 76.8 TB per tape library compressed; 38.4 TB native with LTO Ultrium 4 Up to 38.4 TB per tape Library compressed; 19.2 TB native with LTO Ultrium 3
Data transfer rate	Up to 140 MBps native with LTO 5 Up to 120 MBps native with LTO 4 Up to 60 MBps native with LTO 3

- [TS3200 Express details on PartnerWorld](#)
- [TS3200 Express details on IBM.com](#)
- [TS3200 Express competitive info on COMP](#)
- [TS3200 blog search](#)
- [TS3200 Twitter search](#)

Figure T.10. IBM System Storage TS3200 Tape Library Express at a glance (and links to more detail).



The TS3200 also comes standard with remote management capabilities to allow for remote administration of the tape library through a Web interface. Path failover, an optional feature, is designed to provide automatic control path failover to a preconfigured redundant control path in the event that a host adapter or control path drive is lost without aborting the current job in process.

Here are some quick TS3200 facts:

- Designed to support the newest generation of LTO with up to two IBM Ultrium 5 Full Height Tape Drives or up to four IBM Ultrium 5 Half-Height Tape Drives, to help increase capacity and performance
- Designed to support cost-effective backup, save and restore, and archival storage in sequential or random access mode with a standard bar code reader
- Designed to offer outstanding capacity, performance, and reliability for midrange and network tape-storage environments in a 4U form factor with 48 data cartridge slots and a mail slot
- Remote library management through a standard Web interface supports flexibility and greater administrative control of storage operations.

TS3310 Tape Library

The IBM System Storage TS3310 Tape Library ([Figure T.11](#)) is a modular, scalable tape library designed to address the tape storage needs of rapidly growing companies that find them-



selves space and resource constrained with tape backup and other tape applications.

Designed around a 5U high modular base library unit, the TS3310 is designed to scale vertically with expansion for LTO



Specifications

Configuration	3576 base library	3576 base library and four E9U expansion units
LTO storage slots (max)	41	409
LTO input/output slots (max)	6	54
Maximum tape drives	2	18
Physical capacity (compressed)	123 TB	up to 1.2 PB
Capacity on demand increments	N/A	46 cartridges
Maximum logical libraries	2	18

- [TS3310 details on PartnerWorld](#)
- [TS3310 details on IBM.com](#)
- [TS3310 competitive info on COMP](#)
- [TS3310 blog search](#)
- [TS3310 Twitter search](#)

Figure T.11. IBM System Storage TS3310 Tape Library at a glance (and links to more detail).



tape cartridges, drives, and redundant power supplies. The base library module, model L5B, is the entry point for the product family. It contains all of the necessary robotics and intelligence to manage the 5U high library system, which houses up to 41 cartridges (35 storage slots and 6 input/output slots) and two LTO generation 5, generation 4 and/or generation 3 tape drives.

The TS3310 model L5B can be expanded with the addition of expansion units, the model E9U. Each model E9U contains 92 physical LTO cartridge storage cells and space for up to four LTO-5, LTO-4, and/or LTO 3 tape drives. Additionally, the E9U has space for up to two (one redundant) power supply modules. (At least one power supply module must be installed if a drive is present in the E9U.)

Here are some quick TS3310 facts:

- Modular, scalable tape library designed to grow as your needs grow
- Available in desktop, desk-side, and rack-mounted configurations
- Designed for optimal data storage efficiency with high cartridge density using standard or WORM LTO data cartridges
- Hot-swap tape drives and power supplies
- Redundant power and host path connectivity failover options
- Remote Web-based management and SMI-S interface capable.



TS3400 Tape Library

The IBM System Storage TS3400 Tape Library ([Figure T.12](#)) offers the high capacity and performance advantage of the IBM System Storage TS1130 or TS1120 Tape Drives in a smaller automation footprint for IBM Power Systems, Sys-



Specifications

Tape drive	TS1130 or TS1120 tape drives
Number of drives	Up to 2, no intermix of TS1130 and TS1120
Number of tape cartridges	Up to 18
Number of input/output slots	Up to 3
Number of logical libraries	Up to 2
Capacity	Up to 18 TB native capacity (54 TB with 3:1 compression)
Data transfer rate	Up to 320 MBps
Media type	IBM 3592 JA/JB/JJ and JW/JR/JX write once read many (WORM) cartridges
Warranty	One year on site repair

- [TS3400 details on PartnerWorld](#)
- [TS3400 details on IBM.com](#)
- [TS3400 competitive info on COMP](#)
- [TS3400 blog search](#)
- [TS3400 Twitter search](#)

Figure T.12. IBM System Storage TS3400 Tape Library at a glance (and links to more detail).



tem x, System z, and other open systems environments. The TS3400 tape library is an external 5U standalone or rack-mountable unit supporting one or two TS1130 tape drives with a data transfer rate of up to 160 MBps per drive or one to two TS1120 tape drives with a data transfer rate of up to 104 MBps per drive.

The TS3400 tape library is an excellent tape storage solution for organizations already using IBM enterprise tape drives in their data centers who want to use the same technology in remote locations. The TS3400 is also designed for organizations that have limited physical space in their IT environments. The TS3400 can be installed in a standard 19-inch rack, providing up to 54 TB of compressed tape storage in a 5U space.

Here are some quick TS3400 facts:

- Control path and data path automatic failover features are designed to keep data available
- Supports information retention using the high capacity and attractive performance of TS1130 or TS1120 tape drives in a smaller automation footprint
- Satisfies regulatory compliance requirements with support for non-erasable, non-rewritable cartridges
- Provides information security with support for encryption.

TS3500 Tape Library

The IBM System Storage TS3500 Tape Library ([Figure T.13](#)) is designed to provide a highly scalable, automated tape library



Specifications

Tape drive types	TS1130, TS1120 or 3592 tape drives or IBM LTO Ultrium 5, 4, 3, 2, or 1 tape drives
Number of frames	One base frame, up to 15 expansion frames. The TS3500 Model HA1 installation provides one of the two additional frames required as service bays in a dual accessor library
Number of drives	Up to 12 per frame (up to 192 per library)
Number of tape cartridges	L23—up to 260; D23—up to 400; S24— up to 1,000; Total supported: 15,000 L53—up to 287; D53—up to 440; S54—up to 1,320; Total supported: 20,000
Number of input/output slots	Up to 224 (16 I/O slots standard)
Number of logical libraries	Maximum of 192 (up to number of drives installed)
Number of 3953 systems	Maximum of four per TS3500 subsystem
Number of TS7700 Virtualization Engines	Maximum of eight per TS3500 subsystem
Capacity	IBM Ultrium 5 cartridges: up to 30 PB (up to 60 PB with 2:1 compression); 3592 extended capacity cartridges: up to 15 PB (45 PB with 3:1 compression)
Media type	L23/D23/S24: IBM 3592 JA/JJ/JB and JW/JR/JX write once read many (WORM) cartridges; L53/D53/S54: IBM LTO Ultrium 5, 4, 3, 2, 1 cartridges

- [TS3500 details on PartnerWorld](#)
- [TS3500 details on IBM.com](#)
- [TS3500 competitive info on COMP](#)
- [TS3500 blog search](#)
- [TS3500 Twitter search](#)

Figure T.13. IBM System Storage TS3500 Tape Library at a glance (and links to more detail).



for mainframe and open systems backup and archive in mid-range to enterprise environments.

The TS3500 tape library supports System z via the IBM 3953 Tape System (3953 tape system) or the IBM Virtualization Engine TS7740, which enable System z hosts to access the TS3500 tape library cartridge inventory and allow connection to TS1130, TS1120, and IBM TotalStorage 3592 Model J1A tape drives. The TS3500 tape library can support up to four 3953 tape systems, and up to eight IBM Virtualization Engine TS7740 subsystems per physical library.

The TS3500 tape library can also be ordered with a dual access or model option to help increase mount performance and overall system reliability and availability. The TS3500 Model HA1 allows two robotic accessors to operate simultaneously in configurations from two to 16 frames. The TS3500 tape library's entry base frame provides a more flexible upgrade path for users who want to expand their tape storage at time of need. Capacity on demand (CoD) configurations for TS3500 tape library L-frame models include the "entry-level" configuration, an "intermediate" configuration, and a "full capacity" configuration. S-frame models also allow two CoD configurations.

Here are some quick TS3500 facts:

- Supports highly scalable, automated data retention utilizing LTO Ultrium and IBM 3592 and TS1100 families of tape drives
- More than 30 PB of uncompressed storage capacity dramatically improves floor space utilization and reduces cost



- Optional second robotic accessor enhances data availability and reliability
- Granular configuration and capacity on demand options allow library to grow as the needs grow, to optimize capital investments
- Provides data security and regulatory compliance via support for tape drive encryption and WORM cartridges.

TS7610 ProtecTIER Deduplication Appliance Express

Designed for mid-size companies needing a more holistic approach to data protection, the IBM System Storage TS7610 ProtecTIER Deduplication Appliance Express ([Figure T.14](#)) leverages unique data deduplication technology to help you solve critical backup and recovery challenges. Available in two configuration options, the TS7610 ProtecTIER Deduplication Appliance Express is an integrated server and storage hardware platform that ships with the ProtecTIER deduplication software preinstalled and has a preconfigured repository and virtual tape library (VTL) interface. The TS7610 ProtecTIER Deduplication Appliance Express provides capacity, price/performance, and reliability/availability/scalability features your business demands.

Here are some quick TS7610 facts:

- Improve backup and recovery performance with high-speed disk-based data protection
- Accelerate recovery of mission-critical data
- Optimize storage infrastructure and reduce TCO



- [TS7610 details on PartnerWorld](#)
- [TS7610 details on IBM.com](#)
- [TS7610 competitive info on COMP](#)
- [TS7610 blog search](#)
- [TS7610 Twitter search](#)

Figure T.14. IBM System Storage TS7610 ProtecTIER Deduplication Appliance Express at a glance (and links to more detail).

- Achieve business resilience objectives without changing existing backup procedures and practices
- Simple-to-install, manage, and maintain data protection for mid-size IT environments.

TS7650 ProtecTIER Deduplication Appliance Solutions

The IBM System Storage TS7650 ProtecTIER Deduplication Appliance ([Figure T.15](#)) is a preconfigured solution of IBM storage, IBM server and IBM's revolutionary ProtecTIER data deduplication software designed to improve backup and recovery operations. This is not just a bundle of components, but a truly integrated solution that makes it easy to harness the power of deduplication without making radical changes



to the existing environment. The solution is available in four configurations designed to meet the disk-based data protection needs of a wide variety of organizations, from mid-size IT environments to enterprise data centers.

Here are some quick TS7650 facts:

- Designed to improve backup and recovery operations
- Helps protect valuable data more efficiently and reliably
- Reduced operational cost and energy usage can save you money



- [TS7650 details on PartnerWorld](#)
- [ProtecTIER Sales Kits on PartnerWorld](#)
- [TS7650 details on IBM.com](#)
- [ProtecTIER competitive info on COMP](#)
- [TS7650 blog search](#)
- [TS7650 Twitter search](#)

Figure T.15. IBM System Storage TS7650 ProtecTIER Deduplication at a glance (and links to more detail).



TS7650G ProtecTIER Deduplication Appliance Solutions

The IBM System Storage TS7650G ProtecTIER Deduplication Gateway (Figure T.16) is designed to meet the disk-based data protection needs of the enterprise data center while enabling significant infrastructure cost reductions. The solution offers industry leading inline deduplication performance and scalability up to 1 petabyte (PB) of physical storage capacity per system that can provide up to 25 PBs of storage capacity. Combined with IBM storage, the ProtecTIER Gateway solution provides a powerful disk-based repository to improve the retention and availability of backup and archive data.



- [TS7650G details on PartnerWorld](#)
- [ProtecTIER Sales Kits on PartnerWorld](#)
- [TS7650G details on IBM.com](#)
- [ProtecTIER competitive info on COMP](#)
- [TS7650G blog search](#)
- [TS7650G Twitter search](#)

Figure T.16. IBM System Storage TS7650G ProtecTIER Deduplication Gateway at a glance (and links to more detail).



Here are some quick TS7650G facts:

- Improves backup and recovery and simplifies disaster recovery operations
- Lowers operational costs and energy usage
- Manages more data with less infrastructure.

TS7680 ProtecTIER Deduplication Gateway for System z

The IBM System Storage TS7680 ProtecTIER Deduplication Gateway for System z ([Figure T.17](#)) combines a virtual tape library solution with IBM's unique and patented HyperFac-



- [TS7680 info on PartnerWorld](#)
- [ProtecTIER Sales Kits on PartnerWorld](#)
- [TS7680 info on IBM.com](#)
- [ProtecTIER competitive info on COMP](#)
- [TS7680 blog search](#)
- [TS7680 Twitter search](#)

Figure T.17. IBM System Storage TS7680 ProtecTIER Deduplication at a glance (and links to more detail).



tor deduplication technology and integrated native replication technology to provide users an optimal disk-based target for System z applications that traditionally use tape.

Designed to simplify and improve the performance and reliability of tape processing operations while reducing infrastructure costs, the TS7680 offers high-performance inline deduplication, highly available two node clustering and scalability to store up to 25 petabytes (PB) of tape data on high-speed disk capacity per system.

Here are some quick TS7680 facts:

- Manages more data with less infrastructure
- Simplifies and accelerates information protection
- Helps reduce operational costs and energy usage.

TS7700 Virtualization Engine

The IBM Virtualization Engine TS7700 is a family of main-frame virtual-tape solutions designed to optimize tape processing. With one solution, the implementation of a fully integrated tiered storage hierarchy of disk and tape leverages the benefits of both technologies to help enhance performance and provide the capacity needed for today's tape processing requirements. Deploying this innovative subsystem can help reduce batch processing time, total cost of ownership, and management overhead.

IBM offers two models of the TS7700 Virtualization Engine. The TS7720 Virtualization Engine ([Figure T.18](#)) provides high capacity for workloads that are cache friendly due to their rapid recall requirements. The TS7720 Virtualization



Engine features 1 TB SATA disk drives with RAID 6 to allow customers to scale their solution to meet the needs of growing workloads without affecting application availability.

The TS7740 Virtualization Engine ([Figure T.19](#)) supports attachment to and exploits the performance and capacity of



Specifications

	Single Node	2 Cluster GRID	3 Cluster GRID	4 Cluster GRID
Raw RAID array cache (TB)	Up to 444	Up to 888	Up to 1332	Up to 1776
Virtual drives	256	512	768	1024
Virtual volumes	1,000,000	1,000,000	1,000,000	1,000,000
FICON channels	4	8	12	16

- [TS7700 details on PartnerWorld](#)
- [TS7700 details on IBM.com](#)
- [TS7700 competitive info on COMP](#)
- [TS7720 blog search](#)
- [TS7720 Twitter search](#)

Figure T.18. IBM Virtualization Engine TS7720 at a glance (and links to more detail).



Specifications

	Single Node	2 Cluster GRID	3 Cluster GRID	4 Cluster GRID
Raw RAID array cache (TB)	Up to 28.8	Up to 57.6	Up to 86.4	Up to 115.2
Virtual drives	256	512	768	1024
TS1100 or 3592 tape drives	4 to 16	8 to 32	12 to 48	16 to 64
Virtual volumes	1,000,000	1,000,000	1,000,000	1,000,000
FICON channels	4	8	12	16

- [TS7700 details on PartnerWorld](#)
- [TS7700 details on IBM.com](#)
- [TS7700 competitive info on COMP](#)
- [TS7740 blog search](#)
- [TS7740 Twitter search](#)

Figure T.19. IBM Virtualization Engine TS7740 at a glance (and links to more detail).

the IBM System Storage TS1130 and TS1120 Tape Drives or the IBM TotalStorage 3592 Model J1A Tape Drive installed in an IBM System Storage TS3500 Tape Library or IBM TotalStorage 3494 Tape Library. Support for these tape drives may



help to reduce the number of cartridges and the size of the library by allowing the storage of up to 3 TB on a single 3592 JB cartridge, assuming 3:1 compression.

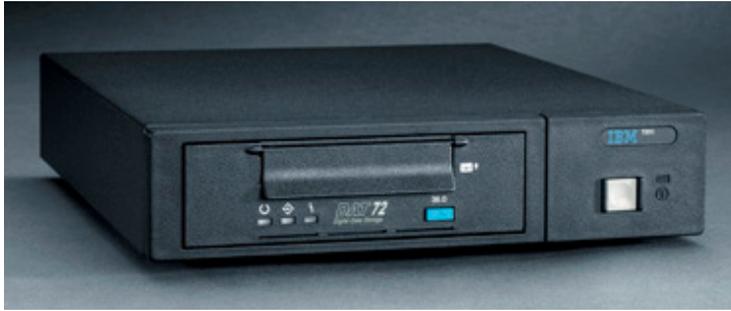
Here are some quick TS7700 facts:

- Can help reduce costs associated with power, maintenance, operations, and support staff
- Can help automate and simplify IT operations using advanced policy management
- Supports business continuity through GRID connectivity and automated replication
- TS7740 can help accelerate backups and recalls by using a tiered hierarchy of disk and tape to make more efficient use of tape drives
- TS7720 provides a cache-centric solution for frequently accessed data.

7206 Model 336 Tape Drive

The IBM 7206 Model 336 External DAT72 ([Figure E.1](#)) tape drive is designed to be a cost-effective tape drive featuring the popular DAT72 (DDS) tape technology. It is designed to offer improved data quality and performance and increased capacity compared to the IBM 7206 Model 220. The 7206 Model 336 supports a migration path to greater tape storage capacity at a price point similar to IBM 7206-220 DDS4 tape drives.

The 7206 Model 336 tape drive is designed to achieve a media capacity up to 72 GB with 2:1 data compression, nearly twice the capacity of the previous IBM 7206-220 DDS4



Specifications

Media	DAT72 (DDS Gen 5)
Native capacity	36 GB per cartridge
Compressed capacity	72 GB per cartridge
Data transfer rate	3 MBps (6 MBps with compression)
Interface	Ultra2 SCSI LVD (68-pin), Ultra3 SCSI LVD (68-pin), Ultra320 SCSI LVD (68-pin)
Warranty	One year, 24x7, IBM on-site repair

- [7206 Model 336 details on PartnerWorld](#)
- [7206 Model 336 details on IBM.com](#)
- [7206 Model 336 competitive info on COMP](#)
- [7602 blog search](#)
- [7602 Twitter search](#)

Figure E.1. IBM 7206 Model 336 External DAT72 Tape Drive at a glance (and links to more detail).

tape drive. The 7206 Model 336 is also designed to offer a sustained data transfer rate of up to 6 MB per second or 21 GB per hour.

Here are some quick 7206 Model 336 facts:

- DAT72 physical capacity of up to 36 GB is nearly twice the capacity of DDS-4 tape drives



- Designed for improved data rate compared to IBM 7206 Model 220
- Designed for read and write compatibility with previous generation 4 mm tape media
- Designed for compatibility with tape storage devices used internally on IBM System p and IBM System i servers.

7207 External Tape Drive

The IBM 7207 Model 330 30 GB External SLR60 tape drive ([Figure E.2](#)) can be an excellent low-cost solution if you use quarter-inch-cartridge tape format for save and restore of your data. The IBM TotalStorage 7207 Model 330 External SLR60 tape drive is designed to offer improved capacity, performance, and data reliability for IBM eServer iSeries/AS400 and pSeries RS6000 servers. Its LED and messaging features are similar to other external tape drive products on these servers.

To help protect the data availability of tapes written by older generation QIC drives, the 7207 Model 330 is designed to be capable of reading and writing tapes written on other systems that use SLR100, MLR3, and MLR1 tape formats; it is read-only compatible with SLR5 and DC9250 media. All this adds up to a flexible and cost-effective backup, restore, and archiving solution that can help provide an easy migration path to greater tape storage capacity. And since many iSeries and AS/400 customers use QIC technology as their internal tape drive, the 7207 Model 330 offers additional compatibility across that entire platform. The 7207 Model 330 can be used



Specifications

Capacity per cartridge	Up to 30 GB native; Up to 60 GB compressed (Part Number: 14P4209); Up to 5 GB native; Up to 10 GB compressed (Part Number: 35L0661)
Data transfer rate	Up to 4 MB/sec native; Up to 8 MB/sec compressed
Media	SLR (QIC)
Interface	SCSI Ultra2 LVD (68-pin)
Warranty	One year, 24x7, IBM on-site repair

- [7207 Model 330 details on PartnerWorld](#)
- [7207 Model 330 details on IBM.com](#)
- [7207 Model 330 competitive info on COMP](#)
- [7207 blog search](#)
- [7207 Twitter search](#)

Figure E.2. IBM 7207 Model 330 External Tape Drive at a glance (and links to more detail).

as a small, desktop save and restore tape drive, or in an IS facility up to 15 meters from the server. The Model 330 can also be located in a rack using the IBM rack mount feature (FC 8723).

Here are some quick 7207 facts:

- Designed to offer increased capacity of 30 GB (60 GB when compressed) per cartridge, a 7x capacity over its predeces-



or IBM TotalStorage 7207 Model 122 tape drive at a similar price point

- Sustained data rate of 4 MB/sec native and 8 MB/sec compressed
- Compatibility with 7207 Model 122 tape drives used on IBM eServer iSeries/AS400, IBM eServer pSeries/RS/6000 servers, and most iSeries/AS400 internal QIC drives.

7212 Storage Device Enclosure Express

The IBM System Storage 7212 Storage Device Enclosure Express model ([Figure E.3](#)) features the latest technology options in tape drives and a DVD-RAM optical drive. The 7212 Express model packaging features a low-profile, modular design that is an excellent choice for rack-mount or limited space desktop applications. The 7212 Express model offers customers a variety of choices for storage drives in either rack-mountable 1U or desktop configurations.

Here are some quick 7212 enclosure facts:

- Features a compact design that can be configured with up to two storage devices
- Can be configured for one EIA unit (1U) of a standard 19-inch server rack or as a low-profile desktop solution
- Offers several storage device options for both tape drives and optical drives
- Low-profile storage solution for environments in which cabling space and server storage bays are limited



Specifications

Number of storage devices	2 maximum
Typical compression	2:1 with tape devices
Color	Black
Warranty	One year, 24x7, IBM on-site repair

- [7212 Enclosure Express details on PartnerWorld](#)
- [7212 Enclosure Express details on IBM.com](#)
- [7212 Enclosure Express competitive info on COMP](#)
- [7212 blog search](#)
- [7212 Twitter search](#)

Figure E.3. IBM System Storage 7212 Storage Device Enclosure Express at a glance (and links to more detail).

- Connects to IBM System i and System p workstations and servers.

7214 Storage Device Enclosure

The IBM System Storage 7214 Tape and DVD Enclosure Express ([Figure E.4](#)) is designed to mount in one EIA unit of a standard IBM Power Systems 19-inch rack, and can be configured with one to three tape or DVD drives. The 7214 Express enclosure attaches to SAS-based models of the IBM Power Systems through external serial attached SAS adapters. The 7214 Express also attaches to some open system adapters.



Specifications

Drive options	DAT160: (feature code: 1401) DAT320: (feature code: 1402) IBM HH LTO 4 (feature code: 1404) DVD sled with one DVD-RAM drive: (feature code: 1420) DVD sled with one DVE-ROM drive: (feature code: 1421) DVD-RAM slim drive only: (feature code: 1422) DVD-ROM slim drive only: (feature code: 1423)
Number of storage devices	Option #1—two tape drives (feature codes 1401 to 1404) Option #2—one tape drive and up to two DVD (sled w/drives)
Data transfer rate	DAT160: up to 13.8 MBps DAT320: up to 24 MBps HHLTO4: up to 120 MBps

- [7214 Enclosure details on PartnerWorld](#)
- [7214 Enclosure details on IBM.com](#)
- [7214 Enclosure competitive info on COMP](#)
- [7214 blog search](#)
- [7214 Twitter search](#)

Figure E.4. IBM System Storage 7214 Storage Device Enclosure Express at a glance (and links to more detail).

The SAS electronic interface on the 7214 Express is designed to provide faster transfer rates, greater convenience, and a reduction in space required for system-to-device cabling.

Here are some quick 7214 enclosure facts:

- Features a 1U rack mountable easy-to-install design that can be configured with up to three storage devices



- Offers storage device options for both tape and DVD optical drives
- Provides performance enhancements with the new Serial SCSI interface and a control card sensor to track hardware function
- Connects to high performance IBM System p servers.

7216 Multi-Media Storage Enclosure

If you have desk-side or smaller rack-mount servers and need a reliable enclosure for data backup options, the IBM 7216 Multi-Media Storage Enclosure ([Figure E.5](#)) offers the flexibility and features you need. With a high-speed Serial Attached SCSI (SAS) and USB interface options, as well as compatibility with a range of storage devices, the 7216 enclosure can help protect the data on critical desk-side systems.

The 7216 Multi-Media Storage Rack-mount Enclosure features two drive bays that can hold one or two tape drives, one or two RDX Removable disk drives, or one tape drive, one RDX disk drive and up to four slim design DVD-RAM drives.

Here are some quick 7216 enclosure facts:

- Features a low-profile design that can be configured with up to four storage devices and mounted in 1U space in a 19-inch rack
- Offers the DAT320 4 mm format and Half-height LTO Ultrium 5 tape drives, DVD-RAM, or RDX Removable disk drives. DAT320 available with either Serial Attached SCSI (SAS) or USB electronic bus



Specifications

Number of storage devices	4 maximum (assumes four DVD drives)
Electronics	Optional Serial Attached SCSI (SAS) or USB electronic bus
Typical compression	2:1 for tape drives; 2:1 for RDX disk drives; 3:1 for DVD optical drives
Color	Black
Warranty options	One year

- [7216 Enclosure details on PartnerWorld](#)
- [7216 Enclosure details on IBM.com](#)
- [7216 Enclosure competitive info on COMP](#)
- [7216 blog search](#)
- [7216 Twitter search](#)

Figure E.5. IBM System Storage 7216 Storage Device Enclosure Express at a glance (and links to more detail).

- Connects to high performance IBM POWER7 Systems
- Provides performance and capacity enhancements of DAT320 and HH LTO 5 tape drives, and additional versatility of RDX removable disk drives
- Data encryption available on tape drives.



Archive and Retention

In this section, we explore IBM System Storage products that employ a combination of disk and tape storage to address business needs.

DR550

The IBM System Storage DR550 ([Figure A.1](#)) is designed to help businesses meet the growing challenge of managing and protecting business information with operational efficiency. Information growth poses a challenge for companies, and archiving inactive or just-in-case (JIC) data off the primary storage to a DR550, which uses low-cost disk, and tape, can help reduce the administrative burden of backing up and managing primary storage and leverage higher cost storage assets more effectively. Retaining business information on the DR550 reduces the cost of storing data over the long term and provides an alternative level of data protection.

Here are some quick DR550 facts:

- Repository for all kinds of content—structured and unstructured
- Policy-based and event-based data management protects information against intentional or accidental deletions or modifications
- Maintains data as non-erasable and non-rewritable until deletion is permitted by retention policy
- Scales up to 48.88 TB with disk and petabytes with attached tape



Specifications

Form factor	IBM 25U high rack Rack security feature Power control assembly (PCA)
Processor	Single IBM System p5 POWER5+ server running AIX, Version 5.3
Starting capacity	0.88 TB, with 8 TB increments
Maximum capacity supported	48.88 TB raw (For more information on usable capacity, contact your IBM representative or IBM Business Partner)
RAID support	Level 5 or 6
Systems management	IBM System Storage Archive Manager 1, Version 5.5.0
Options	LTO Gen 3 or Gen 4, TS1120, many others

- [DR550 details on PartnerWorld](#)
- [DR550 details on IBM.com](#)
- [DR550 competitive info on COMP](#)
- [DR550 blog search](#)
- [DR550 Twitter search](#)

Figure A.1. IBM System Storage DR550 at a glance (and links to more detail).



- Offers low total cost of ownership (TCO) by using multiple storage tiers (disk and tape) within an archive
- Enhanced security and protection with disk and tape encryption options
- Deletion Hold feature retains content for legal or audit reasons
- Supports major archiving applications
- Award winning and industry proven

Information Archive

IBM Information Archive ([Figure A.2](#)) is the next generation information retention solution. It is designed as an archiving repository for all types of content (structured or unstructured) to help organizations of any size address complete information retention needs—business, legal, or regulatory. IBM Information Archive is designed to help you reduce costs, improve operational efficiency, and manage risk.

Here are some quick Information Archive facts:

- Universal storage repository for all types of content, structured and unstructured, compliant or non-compliant
- Provides flexibility through its support of collections and through its information protection-level support option
- Stores information via multiple access methods
- Scales up to 608 TB (raw capacity)



Specifications

General IA Ingest - General Parallel File System (GPFS)	2U System x server Two quad-core processors 24 GB memory 2 x dual ported Fibre Channel (FC) Host Bus Adapter (HBAs) 4 1 GB copper Ethernet ports Redundant 146 GB 15k rpm Serial Attached SCSI (SAS) Optional: Dual ported 1 Gb Fibre Ethernet card (for Fibre customer infrastructure) Up to 3 nodes per cluster
Management node	1U System x server One quad-core processor 4 GB memory Ethernet daughter card (4 ports total on planar and daughter) Optional: Dual ported 1 Gb Fiber Ethernet card (for Fibre customer infrastructure)

- [Information Archive details on PartnerWorld](#)
- [Information Archive details on IBM.com](#)
- [Information Archive competitive info on COMP](#)
- [Information Archive blog search](#)
- [Information Archive Twitter search](#)

Figure A.2. IBM Information Archive at a glance (and links to more detail).



- Maintains information integrity until deletion is permitted by retention policy and increases information security through its enhanced tamper protection feature
- Helps optimize storage with its data deduplication and compression features
- Offers low total cost of ownership (TCO) by allowing use of mixed media (disk, tape, and virtual tape).

SAN Fabric

The growing importance of storage is fueling a model for storage infrastructures in which storage devices are not attached to a specific server, but rather make up an independent storage area network, or SAN. The storage devices (disk arrays, tape drives, SVC, etc.) residing in a SAN are shared among a group of servers that reside on the same network.

MORE ON THE WEB

- [SAN Fabric info on IBM.com](#)

In addition to storage devices and servers, IBM sells switches, directors, and routers used to build SAN fabrics. In this section, we look at these SAN fabric products. IBM SAN products and solutions provide integrated SMB and enterprise SAN solutions with multiple local, campus, metropolitan, and global storage networking options.

SAN Fabric Cross Reference by Business Size

In this section, you will find a list of SAN products organized by workload size (entry, mid-size, and enterprise) to help you find the best solution for your client.



SAN Fabric for Entry-Level Workloads

Here is a list of SAN fabric products designed for entry-level workloads. Click on the links and you will jump to the section of this ebook that describes the product.

- [SAN24B-4 Express](#)
- [Cisco MDS 9124 Express](#)
- [Cisco MDS 9148](#)

MORE ON THE WEB

- [SAN fabric for entry-level workloads](#)

SAN Fabric for Mid-Size Workloads

Here is a list of SAN fabric products designed for mid-size workloads. Click on the links and you will jump to the section of this ebook that describes the product.

- [SAN40B-4](#)
- [SAN80B-4](#)
- [Cisco MDS 9134](#)
- [Cisco MDS 9148](#)
- [Cisco MDS 9222i](#)

MORE ON THE WEB

- [SAN fabric for mid-size workloads](#)

SAN Fabric for Enterprise Workloads

Here is a list of SAN fabric products designed for large enterprise workloads. Click on the links and you will jump to the section of this ebook that describes the product.

- [SAN256B](#)
- [SAN384B](#)
- [SAN768B](#)

MORE ON THE WEB

- [SAN fabric for enterprise workloads](#)



- [Cisco MDS 9513](#)
- [Cisco MDS 9506](#)
- [Cisco MDS 9509](#)

San b-type Routers

IBM offers a line of SAN type-b routers, which we will explore in this section.

SAN04B-R

The IBM System Storage SAN04B-R multi-protocol router ([Figure S.1](#)) provides Fibre Channel over IP and FCIP Tunneling Service for distance extension, which can enable cost-effective and manageable metro and global business continuity solutions. This extended distance connectivity can help create consolidated remote tape vaulting data protection plus metro mirror and global mirror disk-based, disaster-tolerant solutions. Since the introduction of storage area networks,



- [SAN04B-R info on PartnerWorld](#)
- [SAN04B-R info on IBM.com](#)

Figure S.1. IBM System Storage SAN04B-R multi-protocol router (and links to more detail).



customers have built multiple SAN networks (or islands) for different applications, often with fabric switch components from different manufacturers. Some islands were built by different departments within a company, while other islands resulted from mergers, acquisitions, or reorganizations. Dissimilar SAN equipment with different capabilities or a desire to isolate important applications has constrained opportunities for enhanced infrastructure simplification and vital business continuity solutions.

Here are some quick SAN04B-R facts:

- Designed for high performance with 4 Gigabit per second (Gbps) Fibre Channel (FC) ports and hardware-assisted traffic processing for line-rate performance across Ethernet Internet Protocol (IP) ports
- Utilizes existing Internet, IP-based metropolitan area network (MAN) or wide area network (WAN) infrastructures for metro and global SAN extension for business continuity solutions
- Enables consolidation of storage area network (SAN) islands for infrastructure simplification without compromising security
- Hardware-based compression, large window sizes, and selective acknowledgement of IP packets designed to optimize performance of SAN extension over IP networks
- Eight virtual FCIP tunnels per IP port are enabled by the high-performance extension feature to help maximize scalability and utilization of MAN/WAN resources



- Integrated IBM System Storage SAN b-type (Brocade) switch management helps simplify installation and administration and helps provide fabric investment protection
- FICON Accelerator uses special emulation techniques to reduce or eliminate degradation for selected applications such as IBM z/OS Global Mirror (XRC) and tape pipelining.

SAN b-type Switches

The IBM System Storage SAN b-type family provides entry and midrange switches and enterprise directors.

SAN06B-R

The IBM System Storage SAN06B-R extension switch ([Figure S.2](#)) accelerates and optimizes replication, backup, and migration over any distance using next-generation Fibre Channel and Fibre Channel over IP (FCIP) networking technology. It combines class leading performance and reliability, “pay-as-you-grow” scalability, and flexible deployment options to address the most demanding disaster recovery, compliance, and data mobility requirements.

A wide range of IBM System Storage mid-range and enterprise storage area network (SAN) infrastructure simplification and business continuity solutions can be created with the IBM System Storage SAN06B-R extension switch. Solutions for the IBM Power Systems and System x families include disaster tolerance over metropolitan and global IP networks with IBM System Storage disk arrays, tape libraries, and IBM Tivoli Storage Manager data protection software. Support for Sys-



- [SAN06B-R info on PartnerWorld](#)
- [SAN06B-R info on IBM.com](#)

Figure S.2. IBM System Storage SAN06B-R multi-protocol router (and links to more detail).

tem z servers is provided via the optional Advanced Accelerator for FICON and FICON CUP licenses.

Here are some quick SAN06B-R facts:

- Designed for high performance with up to sixteen 8 Gbps Fibre Channel (FC) ports and six 1 Gigabit Ethernet (GbE) ports for faster data replication, backup, and recovery
- Utilizes existing IP-based metropolitan area network (MAN) or wide area network (WAN) infrastructures for cost-effective replication, backup, and recovery
- New FCIP trunking enables logical high-bandwidth FCIP tunnels spanning multiple physical ports to maximize bandwidth and WAN link resiliency
- New advanced compression architecture provides flexibility to optimize compression ratios to achieve performance, cost, or utilization objectives
- New adaptive rate limiting maximizes utilization and sharing of bandwidth



- Advanced functionality and hardware extensibility through simple licensing reduces entry cost, enabling “pay-as-you-grow” scalability
- Integrated IBM System Storage SAN b-type (Brocade) switch management helps simplify installation and administration and helps provide fabric investment protection.

SAN24B-4 Express

The IBM System Storage SAN24B-4 Express fabric switch ([Figure S.3](#)) is designed specifically to address the needs of small to medium-size SAN environments. It can be used to create a wide range of high-performance SAN solutions, from simple, single-switch configurations to larger, multi-switch configurations which support fabric connectivity and advanced business continuity capabilities. Infrastructure simplification solutions for IBM System x, BladeCenter, and IBM Power Systems servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity solutions include data protection with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software.

Here are some quick SAN24B-4 Express facts:

- Simple-to-use SAN switch with easy-to-install and easy-to-use features designed specifically for the needs of small to medium-size environments
- New levels of performance with 8 Gbps Fibre Channel (FC) technology



- [SAN24B-4 Express info on PartnerWorld](#)
- [SAN24B-4 Express info on IBM.com](#)

Figure S.3. IBM System Storage SAN24B-4 Express (and links to more detail).

- Ports on demand scalability from 8 to 16 to 24 ports
- Protection for existing 4, 2, and 1 Gbps infrastructure investment while positioning for future technologies
- Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, UNIX, Linux, and IBM AIX and OS/400 operating systems.

SAN40B-4

The IBM System Storage SAN40B-4 SAN fabric switch ([Figure S.4](#)) provides 24, 32, or 40 active ports and is designed for high performance with 8 Gbps link speeds and backward compatibility to support links running at 4, 2, and 1 Gbps link speeds. High availability features make it suitable for use as a core switch in midrange environments or as an edge switch in enterprise environments where a wide range of SAN infrastructure simplification and business continuity configurations are possible. IBM POWER Systems, System x, System z, and many non-IBM disk and tape devices are supported in many common operating system environments. Optional fea-



- [SAN40B-4 info on PartnerWorld](#)
- [SAN40B-4 info on IBM.com](#)

Figure S.4. IBM System Storage SAN40B-4 Express at a glance (and links to more detail).

tures provide specialized distance extension, dynamic routing between separate or heterogeneous fabrics, link trunking, FICON, performance monitoring, and advanced security capabilities.

Here are some quick SAN40B-4 facts:

- High port density design with up to 40 ports in an efficient, space saving 1U height
- Simple-to-use midrange and enterprise SAN fabric switch for IBM POWER Systems, System x, System z, and other server environments
- New levels of performance with 8 Gbps Fibre Channel (FC) technology
- Non-disruptive capacity activation from 24 to 32 to 40 ports with ports on demand scalability
- High availability with redundant, hot-swappable fans and power supplies, and non-disruptive software upgrades.

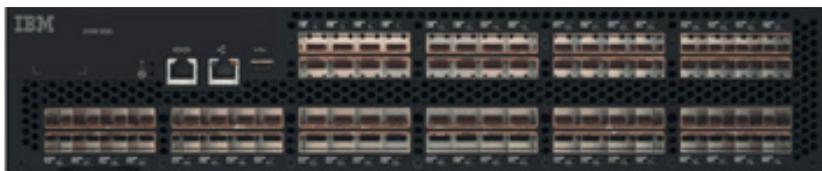


SAN80B-4

The IBM System Storage SAN80B-4 SAN fabric switch ([Figure S.5](#)) provides 48, 64, or 80 active ports and is designed for high performance with 8 Gbps link speeds and backward compatibility to support links running at 4, 2, and 1 Gbps link speeds. High availability features make it suitable for use as a core switch in midrange environments or as an edge switch in enterprise environments where a wide range of SAN infrastructure simplification and business continuity configurations are possible. IBM POWER Systems, System x, System z, and many non-IBM disk and tape devices are supported in many common operating system environments. Optional features provide specialized distance extension, dynamic routing between separate or heterogeneous fabrics, link trunking, FICON, performance monitoring, and advanced security capabilities.

Here are some quick SAN80B-4 facts:

- High port density design with up to 80 ports in an efficient, compact 2U height helps save rack space



- [SAN80B-4 info on PartnerWorld](#)
- [SAN80B-4 info on IBM.com](#)

Figure S.5. IBM System Storage SAN80B-4 (and links to more detail).



- Robust midrange and enterprise SAN fabric switch for IBM POWER Systems, System x, System z, and other server environments
- Provides new levels of performance with 8 Gbps Fibre Channel (FC) technology
- Ports-on-demand scalability supports non-disruptive capacity activation from 48 to 64 to 80 ports
- Designed to support high availability with redundant, hot-swappable fans and power supplies and non-disruptive software upgrades.

SAN b-type Directors

In this section, we will explore SAN b-type directors.

SAN256B

The IBM Total Storage SAN256B ([Figure S.6](#)) is designed to provide outstanding performance, enhanced scalability, and a design ready for high-performance 4 Gbps, 8 Gbps, and 10 Gbps capable hardware and expanded capability features. The SAN256B is well suited to address enterprise SAN customer requirements for infrastructure simplification and improved business continuity. The SAN256B director interoperates with other members of the IBM TotalStorage SAN b-type and m-type families. It can be configured with a wide range of highly scalable solutions that address demands for integrated IBM System z and open system server enterprise SANs.

Here are some quick SAN256B facts:



- High availability with built-in redundancy designed to avoid single points of failure
- Highly scalable director with 16, 32, or 48 Fibre Channel (FC) ports per port switch blade and from 16 to 384 ports in a single domain
- Multiprotocol router blade with 16 FC ports and two Internet Protocol (IP) ports for SAN routing and distance extension over IP
- iSCSI blade enables servers to access storage over IP (Ethernet)
- 10 Gbps Fibre Channel blade provides extended distance ISL connectivity between directors over dark fibre or DWDM



- [SAN256B info PartnerWorld](#)
- [SAN256B info on IBM.com](#)

Figure S.6. IBM Total Storage SAN256B (and links to more detail).



- Fibre Channel switch blades support either 4, 2, and 1 Gbps link speeds or 8, 4, 2, and 1 Gbps link speeds
- Sixteen and 32 port switch blades support IBM FICON.

SAN384B and SAN768B

The IBM System Storage SAN768B and IBM System Storage SAN384B fabric backbones ([Figure S.7](#)) are highly robust network switching platforms designed for evolving enterprise data centers. Each machine combines breakthrough performance, scalability, and energy efficiency with long-term investment protection. Supporting open systems and System z environments, they address data growth and server virtualization challenges; enable server, SAN, and data center consolidation; and reduce infrastructure and administrative costs.

Built for large enterprise networks, the SAN768B has eight vertical blade slots to provide up to 512 8-Gbps Fibre Channel ports. The SAN384B is ideal for mid-size core or edge deployments, providing four horizontal blade slots and up to 256 8-Gbps Fibre Channel ports. The flexible blade architecture also supports FCoE and SAN extension advanced functionality for high-performance server I/O consolidation and disaster recovery solutions.

Here are some quick SAN384B facts:

- Drive new levels of performance with 8 Gbps Fibre Channel (FC) and 10 Gbps Fibre Channel over Ethernet (FCoE) technologies
- Reduce total cost of ownership (TCO) through consolidation of network resources



- [SAN384B info on PartnerWorld](#)
- [SAN768B info on PartnerWorld](#)
- [SAN384B/SAN768B info on IBM.com](#)

Figure S.7. IBM Total Storage SAN384B and SAN768B (and links to more detail).

- Protect existing infrastructure investment while positioning for future technologies
- Manage your infrastructure with greater flexibility and scalability
- Unify management framework for consolidated and virtualized resources
- Improve energy efficiency by combining higher bandwidth with reduced power consumption.



Cisco MDS

The Cisco MDS family provides a full suite of switches, directors, and routers.

Cisco Nexus 5000

Cisco Nexus 5000 for IBM System Storage switches ([Figure S.8](#)) support Fibre Channel, Converged Enhanced Ethernet, and Fibre Channel over Ethernet (FCoE) to help data centers simplify their growing infrastructures.

The Cisco Nexus 5010 for IBM System Storage and Cisco Nexus 5020 for IBM System Storage FCoE switches help reduce costs through data center infrastructure simplification. A unified fabric over 10 Gigabit Ethernet (GbE) for server LAN and SAN traffic enables consolidation of server adapters, cables, and top-of-rack (TOR) switches by up to 50 percent. The Cisco Nexus 5000 for IBM System Storage FCoE switches provide up to sixteen 4 Gbps Fibre Channel ports along with up to 40 Converged Enhanced Ethernet (CEE) ports with 10 Gigabit Ethernet capabilities.

Here are some fast Cisco Nexus 5000 facts:

- Cisco Nexus 5020 provides up to 56 ports: 40 fixed 10GbE and FCoE ports and 16 optional Fibre Channel, FC ports
- Cisco Nexus 5010 provides up to 28 ports: 20 fixed 10 GbE and FCoE ports and eight optional FC ports
- Three expansion modules support 10Gbps Ethernet, 10 Gbps FCoE and 4, 2, 1 Gbps FC ports



- [Nexus 5000 info on PartnerWorld](#)
- [Nexus 5000 info on IBM.com](#)

Figure S.8. Cisco Nexus 5000 top-of-rack, 56-port and 28-port, multiprotocol switches (and links to more detail).

- Enterprise-class availability features such as hot-swappable, field replaceable, redundant power supplies, redundant fan modules, and port expansion modules
- Streamlines management by utilizing Cisco Fabric Manager Suite.

Cisco MDS 9100 series Switches

In this section, we will explore Cisco MDS 9100 series switches.

Cisco MDS 9124 Express

The Cisco MDS 9124 Express for IBM System Storage ([Figure S.9](#)) is designed to address the needs of small and mid-size businesses with a wide range of SAN capabilities. It can be



- [Cisco MDS 9124 info on PartnerWorld](#)
- [Cisco MDS 9124 info on IBM.com](#)

Figure S.9. Cisco MDS 9124 Express for IBM System Storage (and links to more detail).

used as part of SAN solutions from simple single-switch configurations to larger multi-switch configurations in support of fabric connectivity and advanced business continuity capabilities. Fabric connectivity capabilities can be the basis for infrastructure simplification solutions for IBM System i, System p, and System x servers and storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity capabilities can help businesses protect valuable data with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software.

Here are some fast Cisco MDS 9124 facts:

- Foundation for new infrastructure simplification and business continuity solutions for servers running Microsoft Windows, UNIX, Linux, NetWare, and IBM OS/400 operating systems
- High-performance 1, 2, and 4 Gigabit per second links with pay-as-you-grow scalability enable growth from 8 to 16 to 24 ports



- Designed for high availability with hot-swappable, dual power supplies and non-disruptive firmware upgrades
- Cisco MDS 9000 family compatibility supports scalability and consistent service as the SAN grows
- Enterprise Package and Fabric Manager Server Package provide added intelligence and value.

Cisco MDS 9134

A wide range of IBM System Storage medium-size and enterprise storage area network (SAN) IT simplification and business continuity solutions can be created with the Cisco MDS 9134 for IBM System Storage stackable fabric switch ([Figure S.10](#)). Infrastructure simplification solutions for the IBM System i, System p, System x, and System z families of servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity solutions include data protection with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software; and disaster protection with IBM System Storage disk metro and global mirroring disaster recovery solutions.

Here are some fast Cisco MDS 9134 facts:

- Simple-to-use 4 and 10 Gigabit per second performance for simplification and business continuity solutions with Windows, UNIX, Linux, NetWare, IBM OS/400, and IBM z/OS servers
- Cost-effective “green” switch requires up to 50 percent less power per port



- [Cisco MDS 9134 info on PartnerWorld](#)
- [Cisco MDS 9134 info on IBM.com](#)

Figure S.10. Cisco MDS 9134 for IBM System Storage (and links to more detail). This stackable design scales from 24-port fabric to 64-port fabric in 2U rack height.

- Stackable design provides pay-as-you-grow scalability and flexibility with On-Demand port activation features
- Designed to support high availability with redundant, hot-swappable power supplies and fans and non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, Mainframe and Fabric Manager Server Packages provide added intelligence and value.

Cisco MDS 9148

The Cisco MDS 9148 for IBM System Storage Multilayer Fabric Switch ([Figure S.11](#)) is designed to provide an affordable, highly capable and scalable storage networking solution for small, midrange, and large enterprise customers. The switch provides line rate 8-Gbps ports with high-performance, high-density, and enterprise-class availability. The switch is de-



signed to offer outstanding value by providing flexibility, high availability, security, and ease of use at an affordable price in a compact one-rack-unit (1RU) form factor. With the ability to expand from 16 to 48 ports in eight-port increments, the Cisco MDS 9148 can be used as the foundation for small, stand-alone SANs, as a top-of-rack switch, or as an edge switch in larger core-edge SAN infrastructures.

The Cisco MDS 9148 Multilayer Fabric Switch is designed to support quick configuration with zero-touch plug-and-play features and task wizards that allow it to be deployed quickly and easily in networks of any size. Powered by Cisco MDS 9000 NX-OS Software, it includes advanced storage networking features and functions and is compatible with Cisco MDS 9000 Series Multilayer Directors and Switches, providing transparent, end-to-end service delivery in core-edge deployments.

Here are some fast Cisco MDS 9148 facts:

- Extraordinary price/performance with 8 Gbps line rate ports in a compact 1 RU platform



- [Cisco MDS 9148 info on PartnerWorld](#)
- [Cisco MDS 9148 info on IBM.com](#)

Figure S.11. Cisco MDS 9148 for IBM System Storage (and links to more detail).



- Scales from 16 ports to 48 ports in eight-port increments
- Redundant power supplies and fans and other availability features help minimize downtime and improve business resiliency
- Built-in management, operational, and configuration tools and plug-and-play features support quick deployment and easy end-to-end SAN management
- All-in-one licensing with no hidden charges

Cisco MDS Routers

In this section, we will explore Cisco MDS routers.

Cisco MDS 9222i

A wide range of IBM System Storage medium-size and enterprise storage area network (SAN) IT simplification and business continuity solutions can be created with the Cisco MDS 9222i for IBM System Storage multiservice modular switch ([Figure S.12](#)). Infrastructure simplification solutions for the IBM Power Systems, System i, System p, System x and System z families of servers include storage consolidation and high-availability server clustering with IBM System Storage disk storage arrays. Business continuity solutions include data protection with IBM System Storage tape libraries and devices and IBM Tivoli Storage Manager data protection software; and disaster protection with IBM System Storage disk metro and global mirroring disaster recovery solutions.

Here are some quick MDS 9222i facts:



- [Cisco MDS 9222i info on PartnerWorld](#)
- [Cisco MDS 9222i info on IBM.com](#)

Figure S.12. Cisco MDS 9222i for IBM System Storage (and links to more detail).

- Multiservice design for high performance business continuity solutions with Windows, UNIX, Linux, NetWare, IBM OS/400, and IBM z/OS servers
- Cost-effective “green” switch design requires up to 27 percent less power per port
- Modular design provides scalability and configuration flexibility
- Excellent availability with redundant, hot-swappable components and non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, Mainframe and Fabric Manager Server Packages provide added intelligence and value.



Cisco MDS 9500 series Directors

In this section, we will explore Cisco MDS 9500 series directors.

Cisco MDS 9506

The Cisco MDS 9506 for IBM System Storage ([Figure S.13](#)) supports 1, 2, 4, 8, and 10 Gbps Fibre Channel switch connectivity and intelligent network services to help improve the security, performance, and manageability required to consolidate geographically dispersed storage devices into a large enterprise SAN.

The Cisco MDS 9506 for IBM System Storage utilizes two Supervisor-2 Modules designed for high availability and performance. The Supervisor-2 Module combines an intelligent control module and a high-performance crossbar switch fabric in a single unit. It uses Fabric Shortest Path First (FSPF)



- [Cisco MDS 9506 info on PartnerWorld](#)
- [Cisco MDS 9506 info on IBM.com](#)

Figure S.13. Cisco MDS 9506 for IBM System Storage (and links to more detail).



multipath routing, which provides intelligence to load balance across a maximum of 16 equal-cost paths and to dynamically reroute traffic if a switch fails.

Here are some fast MDS 9506 facts:

- Provides Fibre Channel throughput of up to 4 Gbps per port and up to 64 Gbps with each PortChannel Inter-Switch Link connection
- Offers scalability from 12 to 192 Fibre Channel ports
- Offers 10 Gbps ISL ports for inter-data center links over metro optical networks
- Offers Gigabit Ethernet IP, GbE ports for iSCSI, or FCIP connectivity over global networks
- High-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, SAN Extension over IP, Mainframe and Storage Services Enabler and Fabric Manager Server Packages provide added intelligence and value.

Cisco MDS 9509

The Cisco MDS 9509 for IBM System Storage ([Figure S.14](#)) provides 1, 2, 4, 8, and 10 Gbps Fibre Channel switch connectivity and intelligent network services to help improve the security, performance, and manageability required to con-



solidate geographically dispersed storage devices into a large enterprise SAN.

The Cisco MDS 9509 for IBM System Storage utilizes two Supervisor-2 Modules to support high availability and performance. The Supervisor-2 Module combines an intelligent control module and a high-performance crossbar switch fabric in a single unit. It uses Fabric Shortest Path First (FSPF) multipath routing, which supports load balancing across a maximum of 16 equal-cost paths that dynamically reroute traffic if a switch fails.

Here are some Cisco MDS 9509 facts:

- Provides Fibre Channel throughput of up to 8 gigabits per second (Gbps) per port and up to 64 Gbps with each PortChannel Inter-Switch Link connection



- [Cisco MDS 9509 info on PartnerWorld](#)
- [Cisco MDS 9509 info on IBM.com](#)

Figure S.14. Cisco MDS 9509 for IBM System Storage (and links to more detail).



- Offers scalability from 12 to 336 1, 2, 4, and 8 Gbps Fibre Channel ports
- Offers 10-Gbps ISL ports for inter-data center links over metro optical networks
- Offers Gigabit Ethernet IP (GbE) ports for iSCSI or FCIP connectivity over global networks
- High-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN islands on a single physical fabric
- Enterprise, SAN Extension over IP, Mainframe and Storage Services Enabler and Fabric Manager Server packages provide added function and value.

Cisco MDS 9513

The Cisco MDS 9513 for IBM System Storage ([Figure S.15](#)) provides 12 to 528 Fibre Channel ports, with 4 and 8 Gbps support and a high-availability design. It offers 4 to 44 10 Gbps ports for ISL connectivity across metro optical networks. It includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN “islands” on a single physical fabric. The Cisco MDS 9513 provides network security features for large-enterprise SANs deployment. The director also offers intelligent networking services to help simplify mainframe FICON and Fibre Channel SAN management and reduce total cost of ownership (TCO).

Here are some quick MDS 9513 facts:



- [Cisco MDS 9513 info on PartnerWorld](#)
- [Cisco MDS 9513 info on IBM.com](#)

Figure S.15. Cisco MDS 9513 for IBM System Storage (and links to more detail).

- Provides Fibre Channel throughput of up to 8 gigabits per second (Gbps) per port and up to 64 Gbps with each PortChannel Inter-Switch Link connection
- Offers scalability from 12 to 528 1, 2, 4, and 8 Gbps Fibre Channel ports
- Offers 10-Gbps ISL ports for inter-data center links over metro optical networks
- Offers Gigabit Ethernet (GbE) IP ports for iSCSI or FCIP connectivity over global networks
- Features high-availability design with support for non-disruptive firmware upgrades
- Includes Virtual SAN (VSAN) capability for SAN consolidation into virtual SAN “islands” on a single physical fabric



- Provides added function and value through Enterprise, SAN Extension over IP, Mainframe, Storage Services Enabler, and Fabric Manager Server packages.

Storage Software

Bringing together the best in infrastructure management, virtualization, and productivity software, IBM storage software utilizes the best in storage technology to answer your information on demand needs. In this section, we will examine some of the key storage software offerings.

MORE ON THE WEB

- [Browse all IBM storage software on IBM.com](#)

Tivoli Storage Manager

IBM Tivoli Storage Manager ([Figure W.1](#)) is part of a family of products that helps businesses manage and control the “information tidal wave” by delivering a single point of control and administration for storage management needs. This advanced, highly scalable product helps increase the efficiency of your IT operations and helps cut costs related to storage management by providing a wide range of data protection, recovery management, and monitoring capabilities using policy-based automation.

MORE ON THE WEB

- [Tivoli Storage Manager info on PartnerWorld](#)
- [Tivoli Storage Manager overview on IBM.com](#)



[Tivoli Storage Manager](#)—automates data backup and restore functions, supports a broad range of platforms and storage devices, and centralizes storage management operations.

[Tivoli Storage Manager Extended Edition](#)—expands on backup, restore, and archive abilities with data de-duplication and disaster recovery functionality.

[IBM Tivoli Storage Manager for Mail](#)—helps secure IBM Lotus Domino and Microsoft Exchange data, regardless of where or how it is stored.

[IBM Tivoli Storage Manager for Databases](#)—helps secure IBM Informix, Oracle, and Microsoft SQL data, no matter where or how it is stored.

[IBM Tivoli Storage Manager for Microsoft SharePoint](#)—offers granular backup and recovery of SharePoint business data and content.

[IBM Tivoli Storage Manager HSM for Windows](#)—provides hierarchical storage management with a policy-based management system for migrating Windows files economically and transparently.

[IBM Tivoli Storage FlashCopy Manager](#)—Integrated recovery management solution for IBM Storage systems.

[IBM Tivoli Storage Manager for Enterprise Resource Planning](#)—helps protect vital SAP R/3 system data efficiently, consistently, and reliably.

[IBM Tivoli Storage Manager for Space Management](#)—automatically moves inactive data to free online disk space for important active data.

[IBM Tivoli Storage Manager for Storage Area Networks](#)—allows SAN-connected Tivoli Storage Manager servers and client computers to make maximum use of their direct network connection to storage.

[IBM Tivoli Storage Manager for System Backup and Recovery](#)—offers a comprehensive system backup, restore, and reinstallation tool that provides bare-metal restore capabilities.

[IBM Tivoli Storage Manager FastBack](#)—provides a continuous data protection and recovery management platform for Microsoft Windows servers.

Figure W.1. IBM Tivoli Storage Manager family at a glance, with links to more detail (continued on next page).



[IBM Tivoli Storage Manager FastBack for Microsoft Exchange](#)—provides the ability to quickly and easily recover granular Microsoft Exchange data objects.

[IBM Tivoli Storage Manager FastBack for Bare Machine Recovery](#)—restores entire systems, whether to comparable hardware, dissimilar hardware, or a virtual machine.

[IBM Tivoli Storage Manager FastBack Center](#)—combines the features of the IBM Tivoli Storage Manager FastBack family of products into one solution.

[IBM Tivoli Continuous Data Protection for Files](#)—provides continuous, automated backup of desktop and laptop workstations.

Figure W.1. IBM Tivoli Storage Manager family at a glance, with links to more detail (continued from previous page).

Tivoli Storage Manager delivers centralized, Web-based administration and intelligent data move-and-store techniques to help ease storage management. The product scales from small to very large installations, and supports more than 50 operating system versions and hundreds of devices.

It also facilitates a multitude of connections, including Internet, wide area networks (WANs), local area networks (LANs), and storage area networks (SANs). Tivoli Storage Manager helps organizations improve business continuity and reduce the risks of data loss, minimize complexity, better manage costs, and address strict compliance requirements.

Here are some quick Tivoli Storage Manager facts:

- Helps simplify the protection and management of your data, even as it continues to grow exponentially
- Addresses business continuity by helping to shorten backup and recovery times and helping to maximize application availability with advanced data recovery management technologies



- Employs data deduplication and a hierarchy of storage to help increase efficiencies and conserve resources
- Helps enhance data security with innovative access and encryption features
- Helps adapt to changes within the IT infrastructure to minimize service disruptions and speed restorations and backups
- Helps control storage management costs with ease-of-use features and integration with IBM network attached storage (NAS) products.

Comprehensive Data Protection Solution Express

The new IBM Comprehensive Data Protection Solution Express includes hardware and software that mid-size organizations need to enhance data protection capabilities in a Windows environment. This solution helps clients restore access to email, files, and databases within seconds, rather than the hours or days it takes to restore using traditional backup solutions.

MORE ON THE WEB

- [Comprehensive Data Protection Solution info on PartnerWorld](#)
- [Comprehensive Data Protection Solution info on IBM.com](#)



*IBM Storwize V7000 overview
(6:27)*



The solution consists of Tivoli FastBack, System x3550 server, and IBM DS3000 Express, DS4000 Express, and DS5000 series storage. The solution offers Microsoft Windows Server-based customers the perfect balance of data protection and recovery. Companies relying on manual tape as their primary backup and recovery medium will have faster, more reliable recoveries. For companies with remote offices, the burden of backup and recovery is removed from the non-IT savvy staff and moved to the central data center where the expertise resides. With Fastback and IBM System Storage, downtime is greatly reduced. Tivoli Fastback is based on continuous, frequent, and scheduled policy-based backups, and when paired with IBM System Storage, data recovery is quick and easy for both remote workgroups and central office environments. And for those who need application and server level protection, Fastback makes recovery of transactions, emails, and even servers quick and simple.

Here are some quick facts about the Comprehensive Data Protection Solution Express:

- Tivoli Fastback provides you value with:
 - Patented express mount technology for instant, disk-based recovery: Tape can take hours or even days to recover lost data, which means expensive downtime and low success rates. Fastback and IBM Storage reduces recovery time to minutes and ensures recovery reliability to the transaction level.
 - Protection for both servers and applications: Fastback and IBM Storage protects Windows servers, offering bare



metal restores, and application level protection for Oracle, SQL, Exchange, and SAP.

- Easy administration: Eliminate user error and much of the time spent managing backup and restores. “Set it and forget it” policy engine.
- Granular data protection for Exchange and SQL Server: Fast, reliable recovery of individual files, emails, database transactions, as well as entire volumes. Recover data and get back to work in minutes.
- Regulatory compliance: Accurately retain and rapidly access data required by compliance and discovery policies.
- IBM System x server features include:
 - Dedicated server runs TSM FastBack server for high-performance that maximizes your IT investment.
 - Go green and save with new design and tools for optimized power management.
- IBM System Storage features include:
 - Easy-to-use storage management software common across the DS3000 and DS4000 families. Task-driven interface makes managing storage fast and easy.
 - The ASIC based RAID 6 protection with outstanding performance.
 - Single enclosure tiered storage: Put high performance Fibre Channel or SAS and high-capacity SATA drives in the



same enclosure, reducing costs by eliminating the need for multiple drive enclosures.

- Dynamic features enable flexible storage management with very fast provisioning times.
- DAC store: Volume group metadata is stored on all drives in the array, which allows drives to be relocated within the storage system to improve channel utilization/protection or even migrated as a complete volume group into another storage system.

Tivoli Storage Productivity Center

IBM Tivoli Storage Productivity Center can help you manage the capacity utilization of storage systems, file systems, and databases. It can help automate file-system capacity provisioning and perform device configuration and management of multiple devices from a single user interface. It can tune and proactively manage the performance of storage devices on the storage area network (SAN) and manage, monitor, and control your SAN fabric.

As the amount of data you need to store and retain explodes, you must find better ways to control the cost of storage. Managing storage infrastructure has grown in complexity as busi-

MORE ON THE WEB

- [Tivoli Storage Productivity Center info on PartnerWorld](#)
- [Tivoli Storage Productivity Center info on IBM.com](#)

nesses continue to acquire new storage infrastructures or a mix of multivendor storage assets via acquisitions or company



mergers. You need to be able to identify, evaluate, control, and predict the growth of data through its life-cycle in order to meet storage service levels in accordance with IT Information Library (ITIL) and data retention requirements. Both requirements—managing storage infrastructure and the data that resides there—are highly labor intensive. Storage infrastructure management tools such as IBM Tivoli Storage Productivity Center that are easy to deploy and use can help you reduce the complexity of managing your storage environments by centralizing, simplifying, and automating storage tasks associated with storage systems, storage networks, replication services, and capacity management.

The IBM Tivoli Storage Productivity Center suite of products includes:

- IBM Tivoli Storage Productivity Center Basic Edition
- IBM Tivoli Storage Productivity Center for Data
- IBM Tivoli Storage Productivity Center for Disk
- IBM Tivoli Storage Productivity Center for Disk Midrange Edition
- IBM Tivoli Storage Productivity Center for Replication
- IBM Tivoli Storage Productivity Center Standard Edition.

Here are some quick Tivoli Storage Productivity Center facts:

- Help centralize the management of your storage infrastructure from a single interface using role-based administration and single sign-on



- Provide a single management application with modular integrated components that are easy to install and provide common services for simple/consistent configuration and consistent operations across host, fabric, and storage systems
- Manage performance and connectivity from the host file system to the physical disk, including in-depth performance monitoring and analysis on SAN fabric performance.

Grid Access Manager

IBM System Storage Multilevel Grid Access Manager Software (Grid Access Manager Software) is built on an open, high-performance grid architecture that delivers data protection, information life-cycle management, simplified storage management and multi-site data access based. These features can help you save cost and improve operational efficiency.

Grid Access Manager Software is designed to help you improve storage utilization and investment across single or multiple sites with an enterprise-wide, fault-tolerant storage grid and real-time failover capabilities. Grid Access

MORE ON THE WEB

- [Grid Access Manager info on PartnerWorld](#)
- [Grid Access Manager info on IBM.com](#)

Manager Software can help protect enterprise data through automated replication, life-cycle management, and digital signature functionality.

Here are some quick Grid Access Manager facts:

- Intelligent information life-cycle management that can help deploy the right storage based on its relevance and value to the organization



- Automated data migration designed to eliminate disruption when moving data from obsolete resources to new resources
- Easy-to-use, proactive monitoring and management using a single, Web-based console
- Data integrity protection using digital fingerprints and proactive monitoring, verification, and WAN-optimized replication
- Scalable object-based storage system with global name space that helps eliminate storage silos.

General Parallel File System

The IBM General Parallel File System (GPFS) is a high-performance file management solution that provides fast, reliable access to a common set of file data from two computers or concurrently from hundreds of systems. GPFS integrates into your environment by

MORE ON THE WEB

- [General Parallel File System info on PartnerWorld](#)
- [General Parallel File System info on IBM.com](#)

bringing together mixed server and storage components to provide a common view to enterprise file data. GPFS provides online storage management, scalable access, and integrated information life-cycle tools capable of managing petabytes of data and billions of files. The proven GPFS file management infrastructure provides the foundation for optimizing the use of your computing resources.

Here are some fast GPFS facts:

- Scalable, high-performance file management for AIX and Linux systems



- Capable of supporting petabytes of storage and thousands of disks within a single file system
- Reliable platform with transparent node failover, data replication, and multi-site capabilities
- Information life-cycle toolkit simplifies the management of tiered storage, including tape
- More than 10 years of customer experience supporting some of the world's most demanding applications.

VTF Mainframe

IBM System Storage VTF Mainframe (VTFM) is an automated mainframe software product that is proven and has been accepted by Global 2000 companies across markets including financial services, automotive, and transportation, as well as the private sector including government and education. VTFM emulates IBM-compatible cartridge devices and tape volumes on z/OS platforms and transparently directs your tape data onto disk. While continuing to use tape as your apparent data storage target, VTFM enables you to leverage a cost-effective disk solution for tape data storage and retrieval.

VTFM seamlessly integrates within a physical tape environment without the need to change code or applications. VTFM is hardware agnostic—supporting all industry-standard z/OS compatible disk storage subsystems—giving customers the freedom of choice to use VTFM with their existing ESCON or

MORE ON THE WEB

- [VTF Mainframe announcement letter](#)
- [VTF Mainframe info on PartnerWorld](#)



FICON disk arrays. Emulating the widest range of tape devices (3480/3490/3590/3592), it is completely transparent to the host, applications, tape management systems, and users, while offering advanced features such as shared tape access using VTFM Parallel Access Tape, remote data protection using VTFM FTP-Vault, and advanced disk pool free-space management using the VTFM Destager.

Here are some quick VTF Mainframe facts:

- Supports up to 256 virtual tape drives per VTFM started task and an unlimited number of virtual tapes
- Emulates IBM 3480, 3490, 3590, and 3592 tape drives while supporting all tape commands
- Supports all industry-standard z/OS compatible tape management systems
- VTFM FTP-Vault supports z/OS mainframe FTP servers and open systems FTP servers
- VTFM Destager supports all industry-standard z/OS compatible disk space management systems.

Storage and Data Services

As business technology continues to evolve, the volume of information available to businesses continues to grow exponentially. Across all industries, more information needs to be stored, managed, and used by the business to drive future decisions. Main drivers for this information explosion include: compliance—the requirement for legal and regulatory needs to store key information; business value—the more a busi-



ness knows about its markets, customers, competition, and overall business climate, the better decisions they can make for the future; customer satisfaction—as business technology has increased, so too has consumer technology. Customers in all markets are becoming increasingly techno savvy, and demanding more from the businesses that serve them.

In today's environment, when thinking about Information Infrastructure, one needs to think global and have a world-wide perspective. Businesses operate 24x7x365, and there is no such thing as "real-time." It's about "all the time." Access to information is critical and an imperative that most companies cannot afford

to take a risk on. In the event of an outage or decreased perfor-

MORE ON THE WEB

- [Storage and data services info on IBM.com](#)

mance, the level of intensity rises exponentially and the problem dramatically shifts to information recovery and damage control. IBM Storage and Data Services can help customers prevent such tragedies and ensure information is securely available at any time, all the time.

By proactively establishing a well-organized approach to your storage and data environment, you can gain the advantages that come from an effective storage infrastructure. You can provide business users with required access to data, giving key decision makers the information they need to help innovate and grow your revenue. You can cost-effectively deliver storage performance that meets current needs, while laying a strong foundation for the future. And you can better manage business risks and uphold regulatory compliance.



IBM Global Technology Services offers services that can help you address storage and data needs from end to end, including assessment, planning, design, implementation, and management. [Figure C.1](#) lists some storage and data services along with links to more detail.

[Data migration services](#)—data migration services and tools that can enable non-disruptive, online migrations to reduce costs, optimize infrastructures, and increase productivity.

[Information lifecycle management service](#)—develop and execute best practices for managing information through its entire life-cycle to enable business growth and compliance.

[Smart Business Storage Cloud](#)—helps reduce costs and improve performance with a scalable storage-virtualization solution.

[Storage and data managed services](#)—leverage the expertise and pre-integrated storage and data management solutions of a service provider who can manage the environment on your behalf.

[Storage and data product services](#)—shorten the time to implement new storage technology or migrate data, while reducing risks.

[Storage optimization and integration services](#)—solutions for the next generation of storage management.

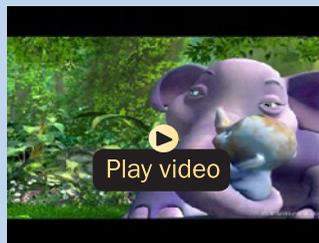


Figure C.1. IBM Global Technology Service offerings.



STG Lab Services and Training—Storage Consulting Services

Assessing a client's IT storage environment and developing a strategy/road map to optimize their storage infrastructure and control costs takes specialized skills, resources, and time that most businesses do not have readily available. IBM STG Lab Services and Training's team of storage consultants and architects is ready to conduct the following "Storage Sen\$e" services for your customers to assist you, our Business Partners, in your sales efforts.

Rapid Optimization Analysis (ROA)

- Provides a rapid evaluation of current storage footprint and issues, and can provide specific focus on core areas such as power/energy usage, tiering, virtualization, and data deduplication
- Conducted remotely over a one-week period, the ROA uses conference calls to kick off the engagement, gather data, and present the results
- Provides a 10–15 chart customized report with high-level recommendations, next steps, and a financial analysis showing potential cost savings versus using associated financial metrics (ROI, NPV, IRR, MIRR).



Optimization Workshop

- Focuses on storage best practices used to align the business value of information with the most appropriate and cost-effective IT infrastructure
- Conducted at the client site with STG storage architects professionally facilitating a one- or two-day workshop
- Can address transactional (all types of customers) and medical imaging/fixed content (healthcare providers) environments
- Provides a 40–50 chart customized report with recommendations, next steps, and a financial analysis showing potential cost savings using associated financial metrics (ROI, NPV, IRR, MIRR).

Optimization Study

- Focuses on storage best practices used to align the business value of information with the most appropriate and cost-effective IT infrastructure
- Conducted at the client site with STG storage architects meeting with key client personnel in detailed one-on-one interviews
- Can address transactional (all types of customers) and medical imaging/fixed content (healthcare providers) environments
- Provides an 80–100 chart customized report with detailed recommendations, in-depth analysis data, next steps, and



a financial analysis showing potential cost savings using associated financial metrics (ROI, NPV, IRR, MIRR).

More on the Phone

- For more information, contact one of our lab services opportunity managers:
 - Barbara Read (bmread@us.ibm.com, 206-290-7578)
 - Jim Surmacewicz, Jr. (jrurmac@us.ibm.com, 520-799-4519)
 - Bill O'Brien (wobrien@us.ibm.com, 919-301-8049).

5

Data Center Networking

In this chapter, we explore IBM's data center networking offerings.

Data Center Networking Basics

Networking is an essential element in a dynamic infrastructure and an integral part of the strategy to reduce costs, improve services, and manage risk. Organizations must

MORE ON THE WEB

- [Data center networking info on PartnerWorld](#)
- [Data center networking info on IBM.com](#)
- [Data center networking Sales Kit](#)

continue to focus on server and storage hardware optimization, technology enhancements, service management improve-

ment, security, resiliency, and integration projects between IT and extended business assets. However, it is important to realize that optimizing the network (including the hardware infrastructure as well as the network management) to support these initiatives is essential to ensuring that the maximum benefit is derived.

Two factors drive the increased demands on data center networks. First, as the number of intelligent devices in use increases, network traffic increases as the data from those



devices are delivered into systems that are used to drive intelligent business decisions. Secondly, a highly virtualized environment must move workloads around the network in order to share common physical hardware and increase utilization to achieve greater efficiencies. This means that the network must deliver greater and sustainable performance with greater security and resilience.

In a dynamic infrastructure, the term “networking” refers to more than just the hardware that interconnects IT and communicates with external devices. In this context, networking also includes the ability to monitor, manage, and automate network resources and tasks. Building an effective network requires the ability to leverage the capabilities offered by the hardware and to enable proper planning to ensure that the flexibility required is delivered. IBM has over 30 years of experience designing and integrating servers, storage, networks, and management solutions in the data center. IBM also has an unmatched portfolio of hardware, software, and service needed to build and manage networks capable of supporting dynamic infrastructures.

IBM delivers:

- A broad portfolio of networking services that enable cost-effective, secure networking including networking for data centers, campus and LAN, remote user connectivity, and application acceleration (GTG networking strategy, optimization, and integration services)
- A full suite of network security technologies and security services consulting and managed services for network and



business resiliency (GTS Security and Privacy and Business Resiliency Services and Proventia Network Security products)

- The Tivoli Netcool management suite offers unparalleled breadth, depth, and value in heterogeneous event, fault, and network management as the foundation of consolidated operations for dynamic infrastructure management
- Comprehensive network connectivity technology offerings (Ethernet, Fibre Channel, and FCoE) with heterogeneous management through IBM Tivoli Network Manager, IBM Tivoli Storage Manager, and IBM Director.

Data Center Networking Product Quick Reference

In this section, we will explore the IBM line of Ethernet switches and routers that provide an integrated end-to-end resiliency and security framework.

b-type Ethernet Switches and Routers

y-series Ethernet Switches

IBM Ethernet Switch B24Y (4002BY2), B48Y (4002BY4), and B24Y (4002CY2) provide new levels of performance, scalability, and flexibility required to support today's dynamic network infrastructures. Featuring advanced capabilities, these switches deliver performance and intelligence to the network access layer in a compact 1 RU form factor, helping reduce infrastructure and administrative costs.



Available in 24-port and 48-port models, these wire-speed and non-blocking switches are available with Power over Ethernet Plus (PoE+) to deliver up to 30 watts of power to edge devices, enabling next-generation campus applications. PoE+ models can utilize built-in 16 Gbps stacking ports, enabling organizations to stack up to eight switches into a single logical switch with up to 384 ports. These features enable progressive, scalable growth within an enterprise campus environment.

MORE ON THE WEB

- [y series info on PartnerWorld](#)
- [y-series info on IBM.com](#)

Here are some quick y-series facts:

- Convergence ready—power next-generation devices through a single cable with high-bandwidth data delivery
- Highly flexible—pay-as-you-grow expansion utilizing Iron-Stack technology delivers a 384-port logical switch
- Proven reliability—tested for interoperability with IBM systems technology
- Simplified deployment—increase operational efficiency with industry-standard CLI and automated management tools
- Fully featured—includes layer 3 routing functionality with no additional licensing required
- Superior scalability—supports a higher numbers of routes, addresses, and VLANs compared to other products in its class.



Converged Switch B32

The IBM b-type Converged Switch B32 is designed to provide outstanding performance with a reliable platform that helps

MORE ON THE WEB

- [Converged Switch B32 info on PartnerWorld](#)
- [Converged Switch B32 info on IBM.com](#)

reduce cabling complexity, equipment acquisition costs, and operational costs associated with space, power consumption,

and cooling. This multi-protocol top-of-rack switch features excellent space efficiency and low power consumption, leading the way toward a “greener” data center.

The B32 features eight 8 Gbps FC ports along with 24 CEE ports with 10 Gbps link speeds. The CEE ports are capable of transporting both FC storage area network (SAN) data and Ethernet LAN traffic—eliminating the need for separate SAN and LAN adapters and cables.

Here are some quick Converged Switch B32 facts:

- Outstanding performance with eight Fibre Channel (FC) ports concurrently active at 8 Gigabits per second (Gbps) and 24 Converged Enhanced Ethernet (CEE) ports concurrently active at 10 Gbps link speeds
- High density design with 32 ports in a 1U enclosure
- “Green” energy efficiency significantly reduces power consumption while generating less heat
- Enterprise-class availability features such as hot-swappable, redundant, and integrated fan and power supply assemblies



- Streamlines management by utilizing IBM System Storage Data Centre Fabric Manager (DCFM) and extensions for FCoE and CEE.

Ethernet Switch B24X

The IBM b-type Ethernet Switch B24X is a compact, high-performance, high-availability, and high-density 1 RU switch specifically designed for mission-critical data centers and HPC requirements. This switch provides 24 10/1 GbE (SFP+) ports plus four 10/100/1000 MbE (RJ45) ports of connectivity in an ultra-low-latency, cut-through, non-blocking architecture.

MORE ON THE WEB

- [x-series info on PartnerWorld](#)
- [x-series info on IBM.com](#)

This switch is an ideal cost-effective solution for server or compute-node connectivity. It can support 1 GbE servers until they are upgraded to 10 GbE-capable network interface cards (NICs), simplifying migration to 10 GbE server farms. In addition, the switch can be positioned as a 10 GbE aggregation switch behind 1 GbE access switches.

Here are some quick Ethernet Switch b-type x-series facts:

- A 1U, high-density top-of-rack data center switch for 10 GbE server access and aggregation with 24 10 GbE/1 GbE dual-speed (SFP+) ports plus four 10/100/1000 Megabit Ethernet (MbE) (RJ45) ports
- Flexibility to mix 10 GbE and 1 GbE servers, protecting investments and streamlining migration to 10 GbE-capable server farms



- Wire-speed performance with an ultra-low-latency, cut-through, non-blocking architecture that is ideal for HPC environments
- Highly efficient power and cooling with front-to-back airflow, automatic fan speed adjustment, and use of SFP+ and direct attached SFP+ copper (Twinax) for maximum flexibility
- High availability with redundant, load-sharing, hot-swappable, auto-sensing/switching power supplies and silent triple-fan assembly
- End-to-end quality of service (QoS) with hardware-based marking, queuing, and congestion management
- Embedded per-port sFlow capabilities to support scalable hardware-based traffic monitoring
- Can also be purchased with 24 Converged Enhanced Ethernet (CEE) ports concurrently active at 10 Gbps link speeds and optional activation of eight 8 Gbps Fibre Channel (FC) ports for a lower entry cost.

r-series Ethernet Switches

IBM b-type r-series Ethernet switches are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities that combine performance with rich functionality at the network edge. These switches offer network planners a broad set of high-performance Layer 2, IPv4

MORE ON THE WEB

- [r-series info on PartnerWorld](#)
- [r-series info on IBM.com](#)



unicast and multicast capabilities in the same device, and come in six different models.

The b-type r-series switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire-speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of spanning tree protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

Here are some quick Ethernet Switch b-type r-series facts:

- Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for a large data center and advanced carrier Ethernet applications
- Wire-speed, non-blocking performance in all models
- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (HybridFiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks



- MEF 9 and MEF 14 certified, with comprehensive operations, administration, and maintenance (OAM) capabilities based on IEEE 802.1ag-2007 and MEF Service OAM Framework.

c-series Ethernet Switches

The IBM b-type c-series Ethernet switches are a family of compact 1 RU, multi-service edge/aggregation switches with a powerful set of capabilities combining performance with rich functionality at the network edge. These switches offer network planners a broad set of high-performance Layer 2, IPv4 unicast, and multicast capabilities in the same device.

MORE ON THE WEB

- [c-series info on PartnerWorld](#)
- [c-series info on IBM.com](#)

b-type c-series Ethernet switches are designed to meet the challenges of large data centers and campus environments by providing a broad set of features, including wire speed performance, deep packet buffers (64 MB per 24-port 1 GbE or 2-port 10 GbE group), and low latency in a compact 1U form factor. To ensure a robust and scalable switching infrastructure, a wide variety of Spanning Tree Protocols are supported including SSTP, RSTP, MSTP, and PVST/PVST+ compatibility.

Here are some quick Ethernet b-type c-series facts:

- Compact 1 RU IP/MPLS/VRF-capable switch that is purpose-built for a large data center and advanced carrier Ethernet applications
- Wire-speed, non-blocking performance in all models



- Available 24-port and 48-port configurations in both 100/1000 MbE SFP (HybridFiber) and 10/100/1000 MbE RJ-45 configurations to suit versatile access/aggregation deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Available Full Layer 3 or Metro Edge upgrade enables maximum scalability or deployment into metro networks
- MEF 9 and MEF 14 certified, with comprehensive operations, administration, and maintenance (OAM) capabilities based on IEEE 802.1ag-2007 and MEF Service OAM Framework.

g-series Ethernet Switches

IBM b-type g-series Ethernet access switches provide enterprise organizations with a flexible and feature-rich solution for building a secure and converged network edge. The switches support 48x 1 GbE RJ45 ports including 4x 1 GbE SFP combination ports. The B48G is upgradeable with two 10 GbE uplink ports to consolidate connections into the enterprise aggregation point, campus LANs, or metro area networks. The B50G comes with 2x 10 GbE CX4 stacking ports, providing the flexibility of a “pay-as-you-grow” architecture.

MORE ON THE WEB

- [g-series info on PartnerWorld](#)
- [g-series info on IBM.com](#)

Both models enable a converged solution for vital network applications such as VoIP, wireless access, WebTV, video surveillance, building management systems, triple play (voice



+ video + data) services, and remote video kiosks in a cost-effective, high-performance, compact design. Support for the IEEE 802.1AB LLDP and ANSI TIA 1057 LLDP-MED standards enable organizations to deploy interoperable, multi-vendor solutions for unified communications. Configuring IP endpoints, such as VoIP stations, can be a complex task requiring manual and time-consuming configuration.

Here are some quick Ethernet switch b-type g-series facts:

- Compact 48-port 10/100/1000 Mbps access switches are field upgradeable to support Class 3 Power over Ethernet (PoE) providing 15.4 watts of power per port
- Full IPv4 Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge; supported features include: RIP v1/v2 route announcement, static IP routes, virtual and routed interfaces, DHCP relay, and VRRP
- Helps optimize network traffic with Layer 2 multicast support
- Available edge layer 3 upgrade extends routing to the network edge
- B50G model features advanced Iron Stack stacking technology over 2x 10 GbE CX4 ports, allowing up to eight systems to be stacked and managed as a single virtual chassis
- Highly available, hot-swappable, N+1 load-sharing AC power supplies



- Advanced suite of security capabilities, including ACLs, MAC filters, TCP SYN and ICMP denial of service (DoS) protection, Spanning Tree Protocol BPDU guard, root guard, unicast, broadcast and multicast rate limiting, 802.1X authentication, and enhanced lawful intercept features.

m-series Ethernet/IP Routers

IBM b-type m-series Ethernet routers provide high port density with up to 64 10 GbE, 320 1 GbE, or 128 OC-12/48 ports in a single system with either 4-, 8-, 16-, or 32-slot configurations. This series of switching routers offers a rich set of high-performance IPv4, IPv6, multiprotocol label switching (MPLS) and multi-virtual routing and forwarding (VRF) capabilities as well as advanced Layer 2 switching to address the diverse needs of environments ranging from large enterprises, data centers, government networks, education and research networks, high performance computing, and metro networks to ISPs.

MORE ON THE WEB

- [m-series info on PartnerWorld](#)
- [m-series info on IBM.com](#)

Designed to enable reliable converged infrastructures and support mission-critical applications, the m-series features an advanced N+1 redundant switch fabric architecture designed for very high availability, even in the case of a switch fabric card failure. The redundant fabric architecture is complemented by comprehensive hardware redundancy for the management modules, power supplies, and cooling system.

Here are some quick Ethernet Router b-type m-series facts:



- Up to 10 Gb/second Ethernet routing and switching with a variety of capacities and interface options to meet the expanding needs of high-end enterprises and service providers
- Designed for low power consumption and efficient heat dissipation
- Provides wire-speed performance for IP/MPLS routing and switching combined with advanced packet processing and traffic management capabilities
- High port density and compact size yields significant savings for network operators, including savings on power, cooling, and rack space costs
- Full IPv4 and IPv6 Layer 2 and Full Layer 3 capabilities for maximum deployment performance and versatility.

Ethernet Switches B08S and B16S

IBM b-type s-series Ethernet switches meet today's demanding requirements to protect, optimize, and grow the enterprise

MORE ON THE WEB

- [s-series info on PartnerWorld](#)
- [s-series info on IBM.com](#)

from basic connectivity to much higher levels of intelligent service-based infrastructures, providing even greater value to organizations.

A highly dense, resilient, and flexible architecture allows scaling up to 384 10/100/1000 Mbps Class 3 (15.4 watts) PoE capable ports or 36 ports of high-speed 10 GbE.

Designed to extend control from the network edge to the backbone, the switches provide intelligent network services, including superior quality of service (QoS), predictable perfor-



mance, advanced security, comprehensive management, and integrated resiliency. A common operating system and shared interface and power supply modules between the Ethernet Switch B08S and B16S help reduce the cost of ownership by minimizing operational expenses and improving return on investment (ROI).

Here are some quick Ethernet Switch b-type s-series facts:

- Optimized for total network convergence, supports industry-leading auto-detecting IEEE 802.3af class 1, 2, and (up to 15.4 watts) Power over Ethernet (PoE) interfaces
- Wire-speed, scalable, low-latency 10 Gigabit Ethernet (GbE) support along with advanced quality of service (QoS) ideal to carry the widest varieties of application traffic
- Highly available and resilient 1+1 management, fabric, and N+1 power architecture helps enable critical business continuity
- Robust PoE auto-detection enables support for PoE and non-PoE devices along with auto-configuration of VoIP endpoints to simplify device deployment
- Full Layer 2 switching capabilities facilitate network resiliency
- Base Layer 3 capabilities enable routed topologies to the network edge
- Helps optimize network traffic with Layer 2 multicast support



- Available Full Layer 3 and IPv6 options ensure maximum scalability for future network growth.

j-type Ethernet Switches and Routers

Ethernet Switch J08E and J16E

The IBM Ethernet Switch J08E and J16E offer eight and sixteen slots, respectively, supporting high-density Gigabit and 10 Gigabit Ethernet connections.

The IBM Ethernet Switch J08E and IBM Ethernet Switch J16E are designed to deliver the performance, scalability, and high availability required to support high-density data center, cloud computing, and enterprise campus environments.

The high-density, high-performance J08E and J16E are also used for aggregating access switches deployed in data center top-of-rack or end-of-row applications, as well as for sup-

porting Gigabit Ethernet server access in data center end-of-row deployments. The J08E delivers up to 960 million packets per second (Mpps) of high-density, wire-speed 10 GbE performance,

while the J16E delivers approximately 1.9 billion packets per second (Bpps) of 10 GbE performance. Both systems are designed to provide sufficient capacity to support the most demanding data center networks.

MORE ON THE WEB

- [J08E info on PartnerWorld](#)
- [J16E info on PartnerWorld](#)
- [J08E and J16E info on IBM.com](#)



Here are some quick J08E and J16E facts:

- High-performance 8-slot (J08E) and 16-slot (J16E) modular switches support data center and campus LAN core and aggregation deployments
- Scalable switch fabric delivers up to 320 Gbps per slot
- Carrier-class architecture includes redundant internal Routing Engines, switch fabrics, power and cooling, ensuring uninterrupted forwarding and maximum availability
- 48-port 10/100/1000BASE-T and 100BASE-FX/1000BASE-X line cards support up to 384 (J08E) or 768 (J16E) GbE ports per chassis
- Eight-port 10GBASE-X line cards with SFP+ interfaces deliver up to 64 (J08E) or 128 (J16E) 10 GbE ports per chassis
- All IBM j-type switches and routers run the same modular, fault-tolerant Juniper Networks JUNOS Software operating system.

Ethernet Switch J48E

Running Juniper Networks' JUNOS Software operating system, the IBM Ethernet Switch J48E was designed for high-performance server access deployments. A single switch can be deployed initially; as requirements grow, Virtual Chassis technology allows up to nine additional switches

MORE ON THE WEB

- [J48E info on PartnerWorld](#)
- [Ethernet Switch J-type e-series info on IBM.com](#)



to be interconnected over a 128 gigabit-per-second (Gbps) backplane and managed as a single device, with a single configuration file and OS image. Modular Gigabit Ethernet (GbE) and 10-Gigabit Ethernet (10 GbE) uplink module options enable Virtual Chassis technology to be extended to switches in different racks or even in different data centers.

The Ethernet Switch J48E combines the high availability (HA) and carrier-class reliability of modular systems, and it is designed to deliver:

- 1 RU, 320 watts with power over Ethernet
- 48 ports of 10/100/1000BASE-T ports
- Virtual chassis technology allowing up to 480 ports as a single logical device
- Optional 10 GbE uplink ports to j-series core switches (4274Exx and 4274-Mxx)
- Eight ports of Power over Ethernet
- Redundant, internal hot-swappable power supplies
- Hot-swappable fan tray with redundant blowers
- Consistent modular JUNOS control plane feature implementation
- Dual route engines with Graceful Routing Engine Switchover (GRES)
- Single management interface



- Scales from 48 to 480 ports with up to twenty 10 GbE up-links.

Ethernet Router J02M, J06M, and J11M

IBM Ethernet Routers j-type m-series offer powerful switching and security capabilities designed to deliver the reliability and flexibility needed to accelerate new business innovations. These routers offer innovations with advanced routing features and high performance application-specific integrated circuits (ASICs).

MORE ON THE WEB

- [Ethernet Switch j-type m-series info on PartnerWorld](#)
- [Ethernet Switch j-type m-series info on IBM.com](#)

Optimized for Ethernet, these routers are used to bring high performance, scalability, and availability for LAN aggregation and core and data center aggregation and core deployments.

All three j-type m-series routers are designed to address high performance networking requirements that benefit from advanced routing features such as network virtualization with MPLS, QoS, logical interface scalability, high availability (HA), and low-latency multicast.

IBM Ethernet Routers J02M, J06M, and J11M deliver high-port density as well as performance of up to 960 Gbps throughput, scalability, and reliability in a space-efficient package. The routers offer fully redundant hardware that includes a redundant switch control board (SCB) and routing engines (REs) plus fan trays and power supplies designed to increase system availability.



Here are more facts about the j-type m-series routers:

- J02M offers up to 120 Gigabit Ethernet or up to 12 10-Gigabit Ethernet ports
- J06M offers up to 240 Gigabit Ethernet or up to 24 10-Gigabit Ethernet ports
- J11M offers up to 480 Gigabit Ethernet or up to 48 10-Gigabit Ethernet ports
- J02M has three DPC slots—two with SCB redundancy and 40 Gbps per slot
- J06M has eight slots—two for fabric cards/REs; up to 240 Gbps (full-duplex) from six line cards
- J11M has 14 slots—two for fabric cards/REs with the option of one additional SCB for redundancy; up to 480 Gbps (full-duplex) from 12 line cards
- Throughput: J02M up to 240 Gbps; J06M up to 480 Gbps; J11M up to 960 Gbps.

Ethernet Appliance J34S and J36S

Based on an innovative Dynamic Services Architecture, the IBM Ethernet Appliance J34S and IBM Ethernet Appliance J36S reset the bar in price/performance for enterprise environments. Each multi-services appliance can support near-linear scalability with each additional Services Processing Card (SPC), enabling the J36S to support up to 30 Gbps of firewall throughput, 2.25 million concurrent sessions, and 175,000 new VPN connections per second. The appliances offer denial



of service (DoS), network address translation (NAT), virtual private network (VPN) support and quality of service (QoS). The SPCs are designed to support a wide range of services, enabling future support of new capabilities without the need for service-specific hardware. Using SPCs on all services ensures that there are no idle resources based on specific services in operation—maximizing hardware utilization. Market-leading flexibility and price/performance of the IBM Ethernet Appliance J34S and J36S come from the modular architecture. The IBM J34S and IBM J36S are next-generation multiservices appliances delivering leading scalability and service integration in a mid-size form factor. These appliances are suited for medium-to-large enterprise networks

MORE ON THE WEB

- [Ethernet Appliance J34S info on PartnerWorld](#)
- [Ethernet Appliance J36S info on PartnerWorld](#)
- [Ethernet Appliance J34S and J36S info on IBM.com](#)

Here are some quick J34S and J36S facts:

- Scalable multiservices security platform delivers superior performance and flexibility to protect high-speed data center network environments
- Network segmentation supports unique security policies to isolate guests and regional servers or databases
- Comprehensive threat management features on Junos software—including multi-gigabit firewall, IPsec VPN, DoS—support integrated protection of enterprise networks



- Data center-class hardware design and proven OS for reliable and resilient network deployments
- High availability interfaces to help achieve resiliency necessary to meet the critical demands of enterprise data centers.

Ethernet Appliance J56S and J58S

Based on the Dynamic Services Architecture, the IBM Ethernet Appliance J56S and J58S provide market-leading scalability.

MORE ON THE WEB

- [Ethernet Appliance J56S info on PartnerWorld](#)
- [Ethernet Appliance J58S info on PartnerWorld](#)
- [Ethernet Appliance J56S and J58S info on IBM.com](#)

Each multiservices appliance can support almost linear scalability, with each additional services processing card (SPC). A range of features including denial of service (DoS) protection, network address translation (NAT), virtual private network (VPN) support and quality of service

(QoS). The SPCs are designed to support a wide range of services enabling future support of new capabilities without the need for service-specific hardware. Using SPCs on all services ensures that there are no idle resources based on specific services being used—maximizing the utilization of equipped hardware. The IBM J56S and IBM J58S are next-generation multiservices appliances delivering leading scalability and service integration in a mid-size form factor. These appliances are suited for medium-to-large enterprise networks.

Here are some quick J56S and J58S facts:



- Scalable multiservices security platform delivers superior performance and flexibility to protect high-speed data center network environments
- Network segmentation supports unique security policies to isolate guests and regional servers or databases
- Comprehensive threat management features on Junos software—including multi-gigabit firewall, IPsec VPN, DoS—support integrated protection of enterprise networks
- Data center-class hardware design and proven OS for reliable and resilient network deployments
- High availability interfaces to help achieve resiliency necessary to meet the critical demands of enterprise data centers.

About the Editor

Jim Hoskins is the founder of Maximum Press, a premier publisher of books, ebooks, and rich media that help businesses apply technology profitably. Jim has been involved with computer technology design, implementation, and education for over 25 years. He is the author of many articles and books covering a wide range of technology and Internet business topics. Jim spent a decade with IBM designing computer systems and directly helping businesses of all sizes design and implement real-world solutions. He is the author/editor of the popular *Exploring IBM* series, which has sold over 350,000 copies in 12 languages. Jim has a degree in electrical engineering from the University of Florida and resides in Gulf Breeze, Florida, with his wife and five children. You can reach Jim via email at jimh@maxpress.com.

Appendix A: Storwize V7000

MTM/FC	MT	MDL/FT	Part No.	Description
2076_124-IBM System Storage Storwize V7000—SFF 24 drives (SSDs)	2076_124	IBM System Storage Storwize V7000—SFF 24 drives (SSDs)		IBM System Storage Storwize - SFF 24 drives (SSDs)
2076_112-IBM System Storage Storwize V7000—LFF 12 drives	2076_112	IBM System Storage Storwize V7000—LFF 12 drives		IBM System Storage Storwize - LFF 12 drives
2076_224-IBM System Storage Storwize V7000—SFF 24 drives (SSDs)	2076_224	IBM System Storage Storwize V7000—SFF 24 drives (SSDs)		IBM System Storage Storwize - SFF 24 drives (SSDs)
2076_212-IBM System Storage Storwize V7000—LFF 12 drives	2076_212	IBM System Storage Storwize V7000—LFF 12 drives		IBM System Storage Storwize - LFF 12 drives
2076_124-2200	2076_124	2200		Rack Mount in 2101
2076_124-3206	2076_124	3206		600 GB SAS SFF 10K HDD
2076_124-3204	2076_124	3204		450 GB SAS SFF 10K HDD
2076_124-3203	2076_124	3203		300 GB SAS SFF 10K HDD
2076_124-3504	2076_124	3504		300 GB SFF E-MLC SSD
2076_124-5301	2076_124	5301		1M Fibre Optic Cables
2076_124-5305	2076_124	5305		5M Fibre Optic Cables
2076_124-5325	2076_124	5325		25M Fibre Optic Cables
2076_124-6016	2076_124	6016		16 GB Cache (Default)
2076_124-9800	2076_124	9800		AC Power Supply (Default)
2076_124-0010	2076_124	0010		Storage Preload SW

2076_124-5608	2076_124	5608		8 Gbps LW SFPs
2076_124-9730	2076_124	9730		PDU Connection
2076_112-2200	2076_112	2200		Rack Mount in 2101
2076_112-3302	2076_112	3302		2 TB NL SAS LFF HDD
2076_112-5301	2076_112	5301		1M Fibre Optic Cables
2076_112-5305	2076_112	5305		5M Fibre Optic Cables
2076_112-5325	2076_112	5325		25M Fibre Optic Cables
2076_112-6016	2076_112	6016		16 GB Cache (Default)
2076_112-9800	2076_112	9800		AC Power Supply (Default)
2076_112-0010	2076_112	0010		Storage Preload SW
2076_112-5608	2076_112	5608		8 Gbps LW SFPs
2076_224-2200	2076_224	2200		Rack Mount in 2101
2076_224-3206	2076_224	3206		600 GB SAS SFF 10K HDD
2076_224-3204	2076_224	3204		450 GB SAS SFF 10K HDD
2076_224-3203	2076_224	3203		300 GB SAS SFF 10K HDD
2076_224-3504	2076_224	3504		300 GB SFF E-MLC SSD
2076_224-5401	2076_224	5401		1M SAS 6Gbps External Cable
2076_224-5403	2076_224	5403		3M SAS 6Gbps External Cable
2076_224-5406	2076_224	5406		6M SAS 6Gbps External Cable
2076_212-3302	2076_212	3302		2 TB NL SAS LFF HDD
2076_212-5401	2076_212	5401		1M SAS 6Gbps External Cable
2076_212-5403	2076_212	5403		3M SAS 6Gbps External Cable
2076_212-5406	2076_212	5406		6M SAS 6Gbps External Cable

Appendix B: DS3000 Machine Type/ Part Number Cross Reference

DS3000 Storage Controllers and Expansion Units

Description	PN/SEO ID	MTM	FC
DS3200 SAS Storage Controllers			
IBM System Storage DS3200 SAS Single Controller	172621X	1726-HC2	2603
IBM System Storage DS3200 SAS Dual Controller	172622X	1726-HC2	2604
IBM System Storage DS3200 SAS Dual Controller DC Power Model	172622T	1726-HC6	2627
IBM System Storage DS3200 SAS Single Controller Express Model	172621E	N/A	N/A
IBM System Storage DS3200 SAS Dual Controller Express Model	172622E	N/A	N/A
DS3300 iSCSI Storage Controllers			
IBM System Storage DS3300 iSCSI Single Controller	172631X	1726-HC3	2618
IBM System Storage DS3300 iSCSI Dual Controller	172632X	1726-HC3	2619
IBM System Storage DS3300 iSCSI Dual Controller DC Power Model	172632T	1726-HC7	2711
IBM System Storage DS3300 iSCSI Single Controller Express Model	172631E	N/A	N/A
IBM System Storage DS3300 iSCSI Dual Controller Express Model	172632E	N/A	N/A

DS3400 FC Storage Controllers

Description	P/SEO ID	MTM	FC
IBM System Storage DS3400 FC Single Controller	172641X	1726-HC4	2605
IBM System Storage DS3400 FC Dual Controller	172642X	1726-HC4	2606
IBM System Storage DS3400 FC Dual Controller DC Power Model	172642T	1726-HC8	2626
IBM System Storage DS3400 FC Single Controller Express Model	172641E	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Express Model	172642E	N/A	N/A
IBM System Storage DS3400 FC Single Controller Simple SAN Express Kit	172641U	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Simple SAN Express Kit	172642U	N/A	N/A
IBM System Storage DS3400 FC Single Controller Simple SAN Express Kit	172641S	N/A	N/A
IBM System Storage DS3400 FC Dual Controller Simple SAN Express Kit	172642S	N/A	N/A

DS3950

Description	Machine Type	Model	Part Number
DS3950 Express Model 94 (2 GB Cache, 1 GB per controller), Four 8 Gbps FC host ports	1814	94A	181494H
DS3950 Express Model 98 (4 GB Cache, 2 GB per controller) Four 8 Gbps FC host ports, Four 1 Gbps iSCSI host ports)	1814	98A	181498H
EXP395 Express Expansion Unit (16 drive bays)	1814	92A	181492H

EXP3000 Expansion Units

Description	PN/SEO ID	MTM	FC
IBM System Storage EXP3000 (Single Environmental Service Module)	172701X	1727-HC1	2676
IBM System Storage EXP3000 DC Power Model (Dual ESMs included)	172702T	1727-HC5	2628
IBM System Storage EXP3000 Express Model (for DS3000 attachment)	172701E	N/A	N/A
IBM System Storage EXP3000 Express Model (for MegaRAID attach)	172701M	N/A	N/A

DS3000 Hardware Options

Description	PN	MTM	FC
DS3000 1 GB Cache Memory Upgrade	39R6517	1726	4838
DS3000 System Memory Cache Battery Replacement	39R6519	1726	4839
DS3200 SAS 2-Port Daughter Card	39R6509	1726	4836
DS3200 SAS Controller Upgrade	39R6507	N/A	N/A
DS3300 iSCSI Controller Upgrade	39R6511	N/A	N/A
DS3400 FC Controller Upgrade	39R6513	N/A	N/A
EXP3000 Environmental Services Module	39R6515	1727	4802
Cable and Connector Options			
IBM 1 M SAS Cable	39R6529	1726	3708
IBM 3 M SAS Cable	39R6531	1726	3707
4 Gbps SW SFP Transceiver	39R6475	1726	4804
1 M LC-LC Fibre Channel Cable	39M5696	1726	3703
5 M LC-LC Fibre Channel Cable	39M5697	1726	3704
25 M LC-LC Fibre Channel Cable	39M5698	1726	3705

DS3000 Software Options

Description	PN	MTM	FC
DS3200 Software Feature Pack	39R6540	1726	4840
DS3300 Software Feature Pack	42C2142	1726	4856
DS3400 Software Feature Pack	42C2143	1726	4857
DS3000 EXP3000 Expansion License	39R6537	1726	4846
DS3000 4 to 8 Partition Expansion License	44W2138	1726	5068
DS3000 4 to 16 Partition Expansion License	39R6536	1726	4841
DS3000 4 to 32 Partition Expansion License	44W2140	1726	5069
DS3000 8 to 16 Partition Expansion License	44W2142	1726	5070
DS3000 8 to 32 Partition Expansion License	44W2144	1726	5071
DS3000 16 to 32 Partition Expansion License	44W2152	1726	5072
DS3000 FlashCopy Expansion License	39R6533	1726	4842
DS3000 VolumeCopy License	39R6534	1726	4843
DS3000 FlashCopy and VolumeCopy License	39R6535	1726	4844
DS3000 FlashCopy Plus Expansion License	44W2149	1726	5091
DS3000 AIX/VIOS Host Attach License	13N1923	1726	4923
DS3000 Linux on Power Host Attach License	44W2101	1726	4924
DS3000 Solaris Host Attach License	44W2136	1726	5073

Appendix C: DS5000 Part Number vs. Machine Type/Model Cross Reference

DS5000

Machine Type/Feature	Part Number	Description
1818-51A		DS5100
1818-53A		DS5300
1818-D1A		EXP5000
2030		2030 8 GB Cache Memory - (4 GB per controller/ 1 GB DIMM)
2031		2031 16 GB Cache Memory - (8 GB per controller/ 1 GB DIMM)
2040		2040 Cache Upgrade 8 GB to 16 GB
2050		2050 Two Quad 4 Gbps FC Host Port Cards
2412		Short Wave 4 Gbps SFP Transceiver Pair
5601		1 M LC-LC Fiber Optic Cable
5605		5 M LC-LC Fiber Optic Cable
5625		25 M LC-LC Fiber Optic Cable
7350		DS5000 Flash and Volume Copy
7353		DS5000 Enhanced Remote Mirror Activation
7356		DS5000 Enhanced Remote Mirror 64-128 Mirror Upgrade
7370		7370 - DS5100 Performance Upgrade (Emerald)
7510		7510 DS5000 Attach EXP810 Activation (Emerald)
7720		7720 DS5000 Windows Host Kit
7721		7721 DS5000 LINUX/INTEL Host Kit
7723		7723 DS5000 VMWARE ESX Host Kit
7731		7731 DS5000 AIX/VIOS Host Kit
7733		7733 DS5000 HP-UX Host Kit

Machine Type/Feature	Part Number	Description
7734		7734 DS5000 LINUX on Power Host
8900		8900 DS5000 8 STG Partitions IP0
8901		8901 DS5000 16 STG Partitions IP0
8902		8902 DS5000 32 STG Partitions IP0
8903		8903 DS5000 64 STG Partitions IP0
8904		8904 DS5000 128 STG Partitions IP0
8905		8905 DS5000 256 STG Partitions IP0
8906		DS5000 512 STG Partitions IP0
4710		750 GB/7.2 K SATA DDM
4711		1000 GB/7.2 K SATA DDM
5510		4 Gbps FC, 146.8 GB/15 K DDM
5511		4 Gbps FC, 300 GB/15 K DDM
5512		4 Gbps FC, 450 GB/15 K DDM
5530		16-Pak 146.8 GB/15 K DDM
5531		16-Pak 300 GB/15 K DDM
5532		16-Pak 450 GB/15 K DDM
5555		Bulk Ordering Feature Ind.
8930		8-16 Storage Partitions MES
8931		8-32 Storage Partitions MES
8932		16-32 Storage Partitions MES
8933		16-64 Storage Partitions MES
8934		32-64 Storage Partitions MES
8935		32-128 Storage Partitions MES
8936		64-128 Storage Partitions MES
8937		64-256 Storage Partitions MES
8938		128-256 Storage Partitions MES
8939		128-512 Storage Partitions MES
8940		256-512 Storage Partitions MES
2052		Two Quad Host Port Cards 8 Gbps FC
7358		DS5000 Disk Encryption Activation
5520		Encryption Capable 4 GBPS FC, 146.8 GB/15 K

Machine Type/Feature	Part Number	Description
5521		Encryption Capable 4 GBPS FC, 300 GB/15 K
5522		Encryption Capable 4 GBPS FC, 450 GB/15 K
5540		16 PK Encryption Capable 4 GBPS FC, 146.8 GB/ 15 K (IPO Only)
5541		16 PK Encryption Capable 4 GBPS FC, 300 GB/15 K
5542		16 PK Encryption Capable 4 GBPS FC, 450 GB/15 K

Appendix D: Tape Machine/Part Number Cross Reference

3580/3573

Part Number	Machine	Model	Description
23R1735	3580/3573	5610	10.0 m VHDCI/HD68 SCSI Cable
23R6981	3580/3573	9841	2.8 m Power Cord 250V Taiwan
23R6982	3580/3573	9842	2.8 m Power Cord 125V Japan
23R6983	3580/3573	9843	2.8 m Power Cord 250V Japan
23R6984	3580/3573	9844	2.8 m Power Cord 250V Korea
23R6985	3580/3573	9845	2.8 m Power Cord 250V India
23R6986	3580/3573	9846	2.8 m Power Cord 125V Brazil
23R6987	3580/3573	9847	2.8 m Power Cord 250V Brazil
23R6998	3573	7002	3573 Rack Mount Kit
23R6999	3573	8106	3753 Right Side Magazine
23R7000	3573	9848	Rack to PDU Line Cord
23R7007	N/A	N/A	Storage Bid Machine
23R7008	3580/3573	8002	Ultrium Cleaning Cartridge
23R7134	3580/3573	5604	4.5 m VHDCI/HD68 SCSI Cable
23R7137	3573	6013	13.0 m LC/LC Fibre Cable
23R7138	3573	6025	25.0 m LC/LC Fibre Cable
23R7140	3573	5096	LC-SC Fibre Cable Interposer
23R7141	3580/3573	9800	2.8 m Power Cord 125V U.S./CAN
23R7143	3580/3573	9986	1.8 m Power Cord 125V U.S./CAN
23R7145	3580/3573	9833	2.8 m Power Cord 250V U.S./CAN
23R7146	3580/3573	9820	2.8 m Power Cord 250V France
23R7147	3580/3573	9821	2.8 m Power Cord 250V Denmark
23R7148	3580/3573	9825	2.8 m Power Cord 250V UK
23R7149	3580/3573	9827	2.8 m Power Cord 250V Israel

Part Number	Machine	Model	Description
23R7150	3580/3573	9828	2.8 m Power Cord 250V Switzerland
23R7151	3580/3573	9829	2.8 m Power Cord 250V South Africa
23R7152	3580/3573	9830	2.8 m Power Cord 250V Italy
23R7153	3580/3573	9831	2.8 m Power Cord 250V Australia
23R7154	3580/3573	9834	2.8 m Power Cord 250V Uruguay
23R7155	3580/3573	9840	2.8 m Power Cord 250V China
23R7158	3580/3573	9835	2.8 m Power Cord 125V Taiwan
23R7260	3573	8043	3573 Ultrium 3 LVD SCSI Tape Drive
23R7261	3573	8044	3573 Ultrium 3 Fibre Tape Drive
23R7262	3573	1901	Additional Power Supply
23R7263	N/A	N/A	3580 Storage Bid Machine Select
23R7335	N/A	N/A	3573 Storage Bid Machine Select
3572S3R	N/A	N/A	IBM TS2900 Tape Library Model S3H w/ LTO3 HH SAS drive and rack mount kit
3572S4R	N/A	N/A	IBM TS2900 Tape Library Model S4H w/ LTO4 HH SAS drive and rack mount kit
35732UL	N/A	N/A	IBM TS3100 Tape Library w/o Drive
35734UL	N/A	N/A	IBM TS3200 Tape Library w/o Drive
3580S4E	N/A	N/A	TS2240 External half-high Ultrium 4 Drive
3580H3L	N/A	N/A	TS2230 Tape Drive Express Model H3L LTO3 half-high Tape Drive
3580L4X	3580	L43	TS2340 Tape Drive with LTO4 SCSI Tape Drive, with enclosure and power supply
3580S3E	3580	H3S	TS2230 Tape Drive Model H3S with LTO3 SAS half-high Tape Drive with enclosure and power supply
3580S4E	3580	H4S	Half-high LTO 4 SAS Tape Drive with encl- sure and power supply
3580S4X	3580	S43	TS2340 Tape Drive with LTO4 SAS Tape Drive, with enclosure and power supply
45E2225	3573	8106	3573 left upper 4U Magazine
45E2231	3573	8107	3573 left lower 4U Magazine
45E2237	3573	8108	3573 left side 2U Magazine
45E2243	3573	8109	LTO Ultrium 4 half-high SAS Drive

Part Number	Machine	Model	Description
45E3081	3573	6900	Transparent LTO Encryption
45E9503	3573	N/A	Path failover
95P2020	3573	8305	Ultrium 3 Data Cartridge (GEN 3) 5-Pack
95P4278	3573	8405	Ultrium 4 Data Cartridges (5-Pack)
95P4711	3580/3573	5402	2.0 M SAS/Mini-SAS 1X Cable
95P4713	3580/3573	5502	2.0 M Mini-SAS/Mini-SAS 1X Cable
95P4994	3573	5400	SAS/Mini-SAS 4X Interposer
95P4996	3573	5500	Mini-SAS/Mini-SAS Interposer
95P4998	3573	8046	Ultrium 3 half-high LVD SCSI Tape Drive
95P5000	3573	8047	Ultrium 3 half-high SAS Tape Drive
95P5002	3573	8143	Ultrium 4 LVD SCSI Drive
95P5004	3573	8144	Ultrium 4 Fibre Channel Drive
95P5006	3573	8145	Ultrium 4 SAS Channel Drive
95P5008	3573	9900	Encryption Configuration
96P1565	3573	7003	19-Inch Rack Mount Kit
96P1629	3580	5602	2.5 M SCSI VHDCI/HD68 Cable
96P1630	3580/3573	5604	4.5 M SCSI VHDCI/HD68 Cable
96P1631	3580/3573	5610	10.0 M SCSI VHDCI/HD68 Cable

TS2250/TS2350

Part number	Machine type	Model	Feature code	Description
3580S5E	3580	H5S		IBM TS2250 LTO4 HH SAS Tape Drive
3580S5X	3580	S53		IBM TS2350 LTO5 SAS Tape Drive
46X2682	3573	L2U/L4U	8244	Ultrium 5 Fibre Channel Drive
46X2683	3573	L2U/L4U	8245	Ultrium 5 SAS Drive
46X2684	3573	L2U/L4U	8248	Ultrium 5 HH Fibre Channel Drive
46X2685	3573	L2U/L4U	8247	Ultrium 5 HH SAS Drive
46C2084	3573	L2U/L4U	8505	Ultrium 5 Data Cartridges (5-pack)
45E9503	3573	L2U/L4U	1682	Path Failover

TS2900 Tape Autoloaders

Machine Type	Part Number	Model	Description
7006	45E3785		3572 Rack Mount Kit
7010	45E3789		3572 Desk-side Covers
8111	45E3793		3572 Additional Magazine
5901	45E3797		Transparent LTO Encryption
8002	23R7008		Ultrium Cleaning Cartridge
8305	95P2020		Ultrium 3 Data Cartridges 5-pack
8405	95P4278		Ultrium 4 Data Cartridges 5-pack
5402	95P4711		2 m SAS/Mini-SAS 1x Cable
5502	95P4713		2 m Mimi-SAS/Mini-SAS 1x Cable
9800	23R7141		2.8 m Power Cord 125v U.S./Canada
9986	23R7143		1.8 m Power Cord 125v Chicago
9833	23R7145		2.8 m Power Cord 250v U.S./Canada
9820	23R7146		2.8 m Power Cord 250v France/Germany
9821	23R7147		2.8 m Power Cord 250v Denmark
9825	23R7148		2.8 m Power Cord 250v UK
9827	23R7149		2.8 m Power Cord 250v Israel
9828	23R7150		2.8 m Power Cord 250v Switzerland
9829	23R7151		2.8 m Power Cord 250v S. Africa
9830	23R7152		2.8 m Power Cord 250v Italy
9831	23R7153		2.8 m Power Cord 250v Australia
9834	23R7154		2.8 m Power Cord 250v Uruguay/ Argentina
9835	23R7158		2.8 m Power Cord 125v Taiwan
9840	23R7155		2.8 m Power Cord 250v China (PRC)
9841	23R6981		2.8 m Power Cord 250v Taiwan
9842	23R6982		2.8 m Power Cord 125v Japan
9843	23R6983		2.8 m Power Cord 250v Japan
9844	23R6984		2.8 m Power Cord 250v Korea
9845	23R6985		2.8 m Power Cord 250v India
9846	23R6986		2.8 m Power Cord 125v Brazil/Japan
9847	23R6987		2.8 m Power Cord 250v Brazil

TS3100/TS3200 R4 Tape Library

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
R4 Announcement						
Ultrium 5 Fibre Channel Drive	3573	L2U/L4U	8244	Both	Yes	New #46X2682
Ultrium 5 SAS Drive	3573	L2U/L4U	8245	Both	Yes	New #46X2683
Ultrium 5 HH Fibre Channel Drive	3573	L2U/L4U	8248	Both	Yes	New #46X2684
Ultrium 5 HH SAS Drive	3573	L2U/L4U	8247	Both	Yes	New #46X2685
Ultrium 5 Data Cartridges (5-pack)	3573	L2U/L4U	8505	Plant	Yes	New #46C2084 (same as 3580)
Admin SEO Trans. Code 10	3573	L2U/L4U	0980	Plant	No	
Admin SEO Trans. Code 11	3573	L2U/L4U	0981	Plant	No	
Path Failover	3573	L2U/L4U	1682	Both	No	New #45E9503
R3C Announcement						
Xcc/HVEC: TS3100 Tape Library Driveless	3573	L2U		Plant	Yes	New #35732UL
Xcc/HVEC: TS3200 Tape Library Driveless	3573	L4U		Plant	Yes	New #35734UL
Path Failover	3573	L2U/L4U	1682	Both	No	New #45E9503
Driveless Unit	3573	L2U/L4U	9001	Plant		N/A
Admin SEO Trans. Code 9		L2U/L4U	0979	Plant	No	Use with R3C, Driveless Units
New Feature Codes (R3):						
Ultrium 4 HH SAS Drive		L2U/L4U	8147	Both	Yes	New #45E2243
Xcc/HVEC: TS3100 w/Ultrium 4 HH SAS Drive	3573	L2U	8147, 9800	Plant	Yes	New #3573S42 (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 4 HH SAS Drive	3573	L4U	8147, 9800	Plant	Yes	New #3573S44 (WDFM 10/30/09)
Express Seller: TS3100 w/Ultrium 4 HH SAS Drive and Rack Mount Kit	3573	L2U	8147, 9800, 7002	Plant	Yes	New #3573E42 (WDFM 5/29/09)
Express Seller: TS3200 w/Ultrium 4 HH SAS Drive and Rack Mount Kit	3573	L4U	8147, 9800, 7002	Plant	Yes	New #3573E44 (WDFM 5/29/09)
Admin SEO Trans. Code 7		L2U/L4U	0977	Plant	No	Use with R3, LTO4 HH
Admin SEO Trans. Code 8		L2U/L4U	0978	Plant	No	Use with R3, LTO4 HH Exp Seller w/rack

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
Left Side Upper 4U Magazine		L4U	8107	Both	Yes	New #45E2225
Left Side Lower 4U Magazine		L4U	8108	Both	Yes	New
Left Side 2U Magazine		L2U	8109	Both	Yes	New #45E2237
Tranparent LTO Encryption		L2U/L4U	5900	Both	No	New
Encryption Configuration		L2U/L4U	9900	Both	No	New #95P5008; WDFM 12/08
Xcc/HVEC: TS3100 w/Ultrium 4 Fibre Channel Drive	3573	L2U	8144, 9800	Plant	Yes	New #3573F4S (WDFM 10/30/09)
Xcc/HVEC: TS3100 w/Ultrium 4 SAS Drive	3573	L2U	8145, 9800	Plant	Yes	New #3573S4S (WDFM 10/30/09)
Xcc/HVEC: TS3100 w/Ultrium 4 LVD SCSI Drive	3573	L2U	8143, 9800	Plant	Yes	New #3573L4S (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 4 Fibre Channel Drive	3573	L4U	8144, 9800	Plant	Yes	New #3573F4H (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 4 SAS Drive	3573	L4U	8145, 9800	Plant	Yes	New #3573S4H (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 4 LVD SCSI Drive	3573	L4U	8143, 9800	Plant	Yes	New #3573L4H (WDFM 10/30/09)
Xcc/HVEC: TS3100 w/Ultrium 3 HH LVD SCSI Drive	3573	L2U	8046, 9800	Plant	Yes	New #3573L32 (WDFM 10/30/09)
Xcc/HVEC: TS3100 w/Ultrium 3 HH SAS Drive	3573	L2U	8047, 9800	Plant	Yes	New #3573S32 (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 3 HH LVD SCSI Drive	3573	L4U	8046, 9800	Plant	Yes	New #3573L34 (WDFM 10/30/09)
Xcc/HVEC: TS3200 w/Ultrium 3 HH SAS Drive	3573	L4U	8047, 9800	Plant	Yes	New #3573S34 (WDFM 10/30/09)

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
SAS/Mini-SAS 4x Interposer (from HBA with SFF-8470 to max 4 cables with SFF-8088)		L2U/L4U	5400	Both	Yes	New #95P4994
2 m SAS/Mini-SAS 1x Cable (from HBA with SFF-8470 to drive with SFF-8088)		L2U/L4U	5402	Both	Yes	New #95P4711
5.5 m SAS/Mini-SAS 1x Cable (from HBA with SFF-8470 to drive with SFF-8088)		L2U/L4U	5406	Both	Yes	New #95P4712 (HVEC WDFM 10/30/09)
Mini-SAS/Mini-SAS 4x Interposer (from HBA with SFF-8088 to max 4 cables with SFF-8088)		L2U/L4U	5500	Both	Yes	New #95P4996
2 m Mini-SAS/Mini-SAS 1x Cable (from HBA/Interposer SFF-8088 to drive with SFF-8088)		L2U/L4U	5502	Both	Yes	New #95P4713
5.5 m Mini-SAS/Mini-SAS 1x Cable (from HBA/Interposer SFF-8088 to drive with SFF-8088)		L2U/L4U	5506	Both	Yes	New #95P4714 (HVEC WDFM 10/30/09)
Ultrium 3 HH LVD SCSI Drive		L2U/L4U	8046	Both	Yes	New #95P4998
Ultrium 3 HH SAS Drive		L2U/L4U	8047	Both	Yes	New #95P5000
Ultrium 4 LVD Drive		L2U/L4U	8143	Both	Yes	New #95P5002
Ultrium 4 Fibre Channel Drive		L2U/L4U	8144	Both	Yes	New #95P5004
Ultrium 4 SAS Drive		L2U/L4U	8145	Both	Yes	New #95P5006
Ultrium 4 Data Cartridges (5-pack)		L2U/L4U	8405	Plant	Yes	New #95P4278
Consolidate Shipment Mfg Instruction		L2U/L4U	8031	Plant	No	Announced via EPIC
TAA Compliant		L2U/L4U	8067	Plant	No	Announced via EPIC
General Rack Solution - xSeries		L2U/L4U	8072	Plant	No	Announced via Blue Horizon 2.2 Apr EPIC

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
Integrate in Manufacturing		L2U/L4U	8971	Plant	No	Announced via Blue Horizon 2.2 Apr EPIC
TS3100 Tape Library w/Bar Code Reader	3573	L2U		Plant	Yes	
TS3200 Tape Library w/Bar Code Reader	3573	L4U		Plant	Yes	
Xcc/HVEC: TS3100 w/Ultium 3 Fibre Channel Drive	3573	L2U	8044, 9800, 7002	Plant	Yes	3573F3S WDFM 12/08
Xcc/HVEC: TS3100 w/Ultium 3 LVD SCSI Drive	3573	L2U	8043, 9800, 7002	Plant	Yes	3573L3S WDFM 12/08
Xcc/HVEC: TS3200 w/Ultium 3 Fibre Channel Drive	3573	L4U	8044, 9800, 7002	Plant	Yes	3573F3H WDFM 12/08
Xcc/HVEC: TS3200 w/Ultium 3 LVD SCSI Drive	3573	L4U	8043, 9800, 7002	Plant	Yes	3573L3H WDFM 12/08
SEO Options Routing		L2U/L4U	0789	Plant	No	
TAA Compliant Plant		L2U/L4U	0807	Plant	No	
Admin SEO Trans. Code 1		L2U/L4U	0971	Plant	No	Use with R1, LTO3 FH
Admin SEO Trans. Code 2		L2U/L4U	0972	Plant	No	Use with R2, LTO4 FH
Admin SEO Trans. Code 3		L2U/L4U	0973	Plant	No	Use with R2, LTO4 FH
Admin SEO Trans. Code 4		L2U/L4U	0974	Plant	No	Use with R2, LTO4 FH
Admin SEO Trans. Code 5		L2U/L4U	0975	Plant	No	Use with R2, LTO3 HH
Admin SEO Trans. Code 6		L2U/L4U	0976	Plant	No	Use with R2, LTO3 HH
Admin SEO Trans. Code 7		L2U/L4U	0977	Plant	No	Use with R3, LTO4 HH
Admin SEO Trans. Code 8		L2U/L4U	0978	Plant	No	Use with R3, LTO4 HH Exp Seller w/rack
Admin SEO Trans. Code 9		L2U/L4U	0979	Plant	No	Use with R3C, Driveless Units
Admin SEO Translation Code		L2U/L4U	0996	Plant	No	Use with R1, LTO3 FH

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
Storage Bid Machine Select		L2U/L4U	0997	Plant	No	23R7007
Path Failover		L4U only	1682	Both	No	N/A
Capacity Sched. Svc.		L2U/L4U	1772	Plant	No	
Custom SLA Sched. Svc.		L2U/L4U	1796	Plant	No	
Additional Power Supply		L4U only	1901	Both	Yes	23R7262
SC-LC Fibre Cable Interposer		L2U/L4U	5096	Both	Yes	23R7140 WDFM 12/08
2.5 m VHDCI/HD68 SCSI Cable		L2U/L4U	5602	Both	Yes	23R7133 WDFM 12/08
4.5 m VHDCI/HD68 SCSI Cable		L2U/L4U	5604	Both	Yes	23R7134
10 m VHDCI/HD68 SCSI Cable		L2U/L4U	5610	Both	Yes	23R7135
5 m LC/LC Fibre Channel Cable		L2U/L4U	6005	Both	Yes	23R7136 WDFM 12/08
13 m LC/LC Fibre Channel Cable		L2U/L4U	6013	Both	Yes	23R7137
25 m LC/LC Fibre Channel Cable		L2U/L4U	6025	Both	Yes	23R7138
Rack Mount Option		L2U/L4U	7002	Both	Yes	23R6998
1 Cleaning Cartridge		L2U/L4U	8002	Plant	Yes	23R7008
Ultrium 3 LVD SCSI Drive		L2U/L4U	8043	Both	Yes	23R7260
Ultrium 3 4Gb Fibre Drive		L2U/L4U	8044	Both	Yes	23R7261
Right Side Magazine		L2U/L4U	8106	Both	Yes	23R6999
Ultrium 3 Data Cart (5-Pack)		L2U/L4U	8305	Plant	Yes	95P2020
Attached to HP-UX		L2U/L4U	9210	Plant	No	N/A; use AAS #
Attached to Sun Solaris		L2U/L4U	9211	Plant	No	N/A; use AAS #
Attached to Windows System		L2U/L4U	9212	Plant	No	N/A; use AAS #
Attached to Linux System		L2U/L4U	9215	Plant	No	N/A; use AAS #
Attached to i5/OS or OS/400		L2U/L4U	9400	Plant	No	N/A; use AAS #
Attached to IBM AIX System		L2U/L4U	9600	Plant	No	N/A; use AAS #
2.8 m Power Cord 125v U.S./Canada		L2U/L4U	9800	Plant	Yes	23R7141
2.8 m Power Cord 250v France/Germany		L2U/L4U	9820	Plant	Yes	23R7146
2.8 m Power Cord 250v Denmark		L2U/L4U	9821	Plant	Yes	23R7147
2.8 m Power Cord 250v UK/China		L2U/L4U	9825	Plant	Yes	23R7148 (UK/India)

	Machine Type	Model	Feature Code	Plant or Field Install	HW content (major)	Part number (if SAP/HVEC only)
2.8 m Power Cord 250v Israel		L2U/L4U	9827	Plant	Yes	23R7149
2.8 m Power Cord 250v Switzerland		L2U/L4U	9828	Plant	Yes	23R7150
2.8 m Power Cord 250v S. Africa		L2U/L4U	9829	Plant	Yes	23R7151
2.8 m Power Cord 250v Italy		L2U/L4U	9830	Plant	Yes	23R7152
2.8 m Power Cord 250v Australia		L2U/L4U	9831	Plant	Yes	23R7153
2.8 m Power Cord 250v U.S./Canada		L2U/L4U	9833	Plant	Yes	23R7145
2.8 m Power Cord 250v Uruguay/Argentina		L2U/L4U	9834	Plant	Yes	23R7154
2.8 m Power Cord 125V Taiwan		L2U/L4U	9835	Plant	Yes	23R7158
2.8 m Power Cord 250v China (PRC)		L2U/L4U	9840	Plant	Yes	23R7155
2.8 m Power Cord 250V Taiwan		L2U/L4U	9841	Plant	Yes	23R6981
2.8 m Power Cord 125V Japan		L2U/L4U	9842	Plant	Yes	23R6982
2.8 m Power Cord 250V Japan		L2U/L4U	9843	Plant	Yes	23R6983
2.8 m Power Cord 250V Korea		L2U/L4U	9844	Plant	Yes	23R6984
2.8 m Power Cord 250V India		L2U/L4U	9845	Plant	Yes	23R6985
2.8 m Power Cord 125V Brazil		L2U/L4U	9846	Plant	Yes	23R6986
2.8 m Power Cord 250V Brazil		L2U/L4U	9847	Plant	Yes	23R6987
Rack to PDU Line Cord		L2U/L4U	9848	Plant	Yes	23R7000
1.8 m Power Cord 125v Chicago		L2U/L4U	9986	Plant	Yes	23R7143

Appendix E: Fibre Channel Switch and Director Offerings

IBM System Storage SAN b-type (Brocade) Switches and SAN routers

Machine Type	Model	HVEC Part Number	Description
2005	B5K	20055KB	IBM System Storage SAN16B-3 fabric switch
2005	R04		IBM System Storage SAN04B-R
2498	R06		IBM System Storage SAN06B-R
2498	B24	249824E	IBM System Storage SAN24B-4 Express fabric switch
2498	B40	249840E	IBM System Storage SAN40B-4
2498	B80		IBM System Storage SAN80B-4
2499	384		IBM System Storage SAN768B
2005	R18		IBM System Storage SAN18B-R router switch

Cisco MDS 9000 for IBM System Storage Switches and Routers

Machine Type	Model	HVEC Part Number	Description
2053	424	241724C	Cisco MDS 9124 Express for IBM System Storage fabric switch
2053	434		Cisco MDS 9134 for IBM System Storage fabric switch
2053	S34		Cisco MDS 9134 for IBM System Storage stacked switch
2054	E01		Cisco MDS 9222i for IBM System Storage modular router switch

IBM System Storage SAN b-type (Brocade) and m-type (McDATA) Directors

MachineType	Model	HVEC Part Number	Description
2109	M48		IBM TotalStorage SAN256B director
2109	C36		IBM TotalStorage SAN Cabinet C36
2499	384		IBM System Storage SAN768 fabric backbone

Cisco MDS 9500 for IBM System Storage Directors

MachineType	Model	HVEC Part Number	Description
2054	E04		Cisco MDS 9506 for IBM System Storage director
2054	E07		Cisco MDS 9509 for IBM System Storage director
2054	E11		Cisco MDS 9513 for IBM System Storage director