IBM System Storage DS8700 (Machine type 2423) high-performance flagship high-end disk, one-year warranty model addresses your business and financial needs

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- Upgraded device adapters
- Non-disruptive upgrade path for the DS8700 Model 941 and additional Model 94E expansion frames
- Enhancements to disk encryption key management with support for:
  - Encryption deadlock recovery key
  - Dual platform key server support
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For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Referee: YE001).

Overview

The IBM System Storage DS8000™ series encompasses the flagship disk enterprise storage products in the IBM System Storage portfolio. The DS8700 represents the latest in this series designed for high-performance, high-capacity, and resilient series of disk storage systems. Today's announcement continues the practice of an "enterprise choice" length of warranty option by allowing the high- performance flagship models (DS8700 Model 941 and associated DS8700 Expansion Unit Model 94E) to be ordered with a one- , two- , three- , or four-year warranty period. This flexibility enables you to select the option that best addresses your business and financial needs.

Additionally, the IBM System Storage DS8700 provides new functional capabilities, allowing you to choose the combination of price and efficiency that is right for your application needs.

New capabilities include:

- IBM POWER6™ processor technology: The DS8700 features IBM's POWER6 server technology to help support high performance. Compared to the POWER5+™ processor in previous models, the POWER6 processor can enable over a 50% performance improvement in I/O operations per second in transaction processing workload environments. Additionally, sequential workloads can receive as much as 150% bandwidth improvement. The DS8700 offers either a dual 2-way processor complex or a dual 4-way processor complex.
- PCI-e IO enclosures: To improve IOPS (IO Operations Per Second) and sequential read/write throughput, the new IO enclosures are directly connected to the servers via point-to-point PCI-e cables. IO enclosures no longer share common 'loops', they connect directly to each internal server via separate cables and link cards.
- Four-port device adapters: Device adapter processor hardware upgrade to processor resources for more IOPS performance to enable better utilization of SSD drives.
- Non-disruptive upgrade path for the DS8700 Model 941 and additional Model 94E expansion frames allows processor, cache, and storage enhancement to be performed concurrently without disrupting applications.
- Enhancements to disk encryption key management that can help address PCI-DSS (Payment Card Industry Data Security Standard) requirements:
  - Encryption deadlock recovery key - Supports the ability for IBM to restore access to a DS8700 when the encryption key for the storage is unavailable due to an encryption deadlock scenario.
  - Dual platform key server support - DS8000 requires an isolated key server in encryption configurations. The isolated key server currently defined is an IBM System x® server. Dual platform key server support allows two different server platforms to host the key manager with either platform operating in either "clear key" or "secure key" mode.
- Value-based pricing/licensing - Operating Environment License is usually priced based on the performance, capacity, speed, and other characteristics that provide value in customer environments.

Key prerequisites

All features and functions in this announcement are supported on the IBM System Storage DS8000 series. They require DS8000 Licensed Machine Code (LMC) 5.5.0.xx (bundle version 65.0.xx.xx), or later.

Planned availability date

October 23, 2009

For more information, refer to the Description section.

Description

The IBM System Storage DS8000 series encompasses the flagship disk enterprise storage products in the IBM System Storage portfolio. The DS8700 represents the latest in this series designed for high- performance, high-capacity, and resilient series of disk storage systems. Today's announcement continues the practice of "enterprise choice" length of warranty option by allowing the high- performance flagship models (DS8700 Model 941 and associated DS8700 Expansion Unit Model 94E) to be ordered with a one-, two-, three-, or four-year warranty period. This capability enables you to select the option that best addresses your business and financial needs.

Designed for high-performance, reliability, and enhanced connectivity

The IBM System Storage DS8700 models feature the following hardware and technology to enhance performance, connectivity, and reliability:

- IBM POWER6 processor technology: The DS8700 features the IBM POWER6 server technology to help support high performance. Compared to the IBM POWER5+ processor in previous models, the POWER6 processor can enable over a 50% performance improvement in I/O operations per second in transaction processing workload environments. Additionally, sequential workloads can receive as much as 150% bandwidth improvement. The DS8700 offers either a dual 2-way processor complex or a dual 4-way processor complex.
- PCI-e IO enclosures: To improve IOPS (IO Operations Per Second) and sequential read/write throughput, the new IO enclosures are directly connected to the internal servers via point-to-point PCI-e cables. IO enclosures no longer share common 'loops', they connect directly to each server via separate cables and link cards.
- Four-port device adapters: Device adapter processor hardware upgrade to processor resources for more IOPS performance to enable better utilization of SSD drives.
- Non-disruptive upgrade path for the DS8700 Model 941 and additional Model 94E expansion frames allowing processor, cache, and storage enhancements to be performed in a production concurrently.
- Industry-standard disk drives: The DS8700 offers a selection of disk drives, including Solid State Drives (SSD), SATA drives, and Fibre Channel Encrypting drives, allowing a DS8700 to scale up to 1,024 TB of capacity.
- Four-port Fibre Channel/FICON adapters: These adapters are designed not only to enhance connectivity, but to increase configuration flexibility because the individual ports can be configured to support Fibre Channel or FICON®.
- Processor memory offerings: The DS8700 model with 2-way configuration offers up to 128 GB of processor memory and the DS8700 model with 4-way configuration offers up to 384 GB of processor memory. In addition, the Non-Volatile Storage (NVS) scales to the processor memory size selected, which can also help optimize performance.
- Host attachments: The DS8700 model with 2-way configuration offers up to 16 host adapters and the DS8700 model with 4-way configuration offers up to 32 host adapters. Only Fibre Channel/FICON adapters are supported.
- High availability: The DS8700 model is designed and implemented with component redundancy to help avoid many potential single points of failure.

Logical Unit Number (LUN) and volume management

- Non-disruptive LUN and volume creation and deletion are supported. When a LUN or volume is deleted, the capacity can be reformatted and re-used.
- LUNs and volumes can be configured to span arrays. Therefore, the size of the volume or LUN is not constrained by the size of the array. LUNs up to 2 TB are supported. CKD volumes up to 223 GB (262,668 cylinders) supported.

Dynamic Volume Expansion supporting application data growth

The IBM System Storage DS8000 series supports Dynamic Volume Expansion, which allows the size of a logical volume to be increased while it is online to a host system. This capability can simplify management by enabling easier online volume expansion to support application data growth. The maximum volume size is limited to currently supported maximum size for DS8700:

- Open Systems (Fixed Block - FB) volumes - 2 TB
- System z® (CKD) volumes - 223 GB (262,668 cylinders)

Volumes that are expanded can be online during and after the execution of the function. Volumes may not be in Copy Services relationships (Point-in-Time Copy, FlashCopy® SE, Metro Mirror, Global Mirror, Metro/Global Mirror, and z/OS® Global Mirror functions) while expansion is taking place. The function can be managed and

configured via the DS Storage Manager, DS CLI, and DS Open API. IBM System z and System p® servers support and recognize the expanded volumes within the DS8000 series.

All other servers may require additional steps to be put into place in order to support and recognize the expanded volumes within the DS8000 series. Refer to the following IBM System Storage DS8000 series Interoperability Web site for more information.

http://www-03.ibm.com/systems/support/storage/config/ssic/index.jsp

The Dynamic Volume Expansion capability is provided with the DS8000 series at no additional charge.

Addressing capabilities

Support for Logical Subsystems (LSS), logical devices, and logical paths defined as:

- Up to 256 logical subsystems (LSS) :Li.
- Up to 65,280 logical devices
- Up to 130,560 FICON logical paths (1,280 logical paths per control unit image)
- Up to 8,000 process logins (509 per SCSI-FCP port)

Simplified storage management for System z with z/OS

For System z and z/OS environments, the DS8700 models can support 223 GB (262,668 cylinders) 3390 volumes. It can help relieve addressing constraints, improve disk resource utilization, and improve storage administrator productivity by providing the ability to consolidate multiple disk volumes into a single address.

Administration and management:

- Online configuration capability features a Web-based GUI designed to offer increased ease of use.
- A single command line interface (CLI) supports both logical configuration and copy services.

Technology and packaging

The DS8700 models feature technology, packaging, and capabilities designed to help improve availability and reduce costs.

- Packaging allows a single DS8700 model base frame to take up to 20% less floor space than an IBM TotalStorage® Enterprise Storage Server® (ESS) base frame. This can help reduce your costs for valuable floor space.
- Capabilities such as remote code distribution and e-mail notification of link failures can also improve availability.

Choice of models and features to meet your performance and configuration needs

The DS8700 Model 941 offers a dual 2-way processor complex and holds up to 128 disk drives for a maximum capacity up to 128 TB. The model also supports up to 128 GB of processor memory and up to 16 Fibre Channel/FICON adapters.

The DS8700 Model 941 also offers a dual 4-way processor complex as an optional feature and holds up to 128 disk drives for a maximum capacity of up to 128 TB. It also supports up to 384 GB of processor memory and up to 16 Fibre Channel/FICON adapters. With an optional Expansion Unit (DS8700 Model 94E), it scales as follows:

- With one DS8700 Model 94E Expansion Unit, the DS8700 Model 941 supports up to 384 disk drives, for a maximum capacity of up to 384 TB, and up to 32 Fibre Channel/FICON adapters.

- With two DS8700 Model 94E Expansion Units, the DS8700 Model 941 supports up to 640 disk drives, for a maximum capacity of up to 640 TB, and up to 32 Fibre Channel/FICON adapters.
- With three DS8700 Model 94E Expansion Units, the DS8700 Model 941 supports up to 896 disk drives, for a maximum capacity of up to 896 TB, and up to 32 Fibre Channel/FICON adapters.
- With four DS8700 Model 94E Expansion Units, the DS8700 Model 941 supports up to 1,024 disk drives, for a maximum capacity of up to 1,024 TB, and up to 32 Fibre Channel/FICON adapters.

Variety of configuration options

Physical capacity for the DS8000 series is purchased via disk drive sets. A disk drive set contains 16 identical disk drives (same capacity and rpm). Disk drive sets are available in many types as show in the table below. For additional flexibility, feature conversions are available to exchange existing disk drive sets when purchasing new disk drive sets with higher capacity.

Price, performance, and capacity flexibility to help address specific application and business requirements is provided through drive intermix support.

Size	Drive type	Drive speed	Encryption drive	Non-encryption drive	RAID support	Field supported
73 GB	SSD	N/A	No	Yes	5	Yes
146 GB	SSD	N/A	No	Yes	5	Yes
146 GB	FC	15K rpm	Yes	Yes	5, 6, 10	Yes
300 GB	FC	15K rpm	Yes	Yes	5, 6, 10	Yes
450 GB	FC	15K rpm	Yes	Yes	5, 6, 10	Yes
1 TB	SATA	7.2K rpm	No	Yes	6, 10	Yes

IBM Standby Capacity on Demand offering

The IBM Standby Capacity on Demand for the DS8000 series (Standby CoD) offering allows inactive disk drives to be installed that can be easily activated as business needs require.

IBM offers Capacity on Demand solutions that are designed to meet the changing storage needs of rapidly growing On Demand Businesses. The Standby CoD offering is designed to let you tap into additional storage and is particularly attractive if you have rapid or unpredictable growth, or if you simply want the knowledge that the extra storage will be there when you need it.

With this offering, up to four Standby CoD disk drive sets (64 disk drives) can be factory or field installed into your system. To activate, you simply logically configure the disk drives for use -- a nondisruptive activity that does not require intervention from IBM.

Upon activation of any portion of a Standby CoD disk drive set, you must place an order with IBM to initiate billing for the activated set. At that time, you can also order replacement Standby CoD disk drive sets.

This offering allows you to purchase licensed functions based upon your machine's physical capacity excluding unconfigured Standby CoD capacity. This can help improve your cost of ownership because your extent of IBM authorization for licensed functions can grow at the same time you need your disk capacity to grow.

This offering does not have an offering fee premium, helping improve your cost of ownership. A Standby CoD disk drive set must be activated within a 12-month period from the date of installation; all such activation is permanent. Contact your IBM representative to obtain additional information regarding Standby CoD offering terms and conditions.

Full disk encryption

IBM recognizes the requirement for data protection, not only from hardware or software failures, but also from physical relocation of hardware, theft, and re-tasking of existing hardware. Full disk encryption drive sets lets you encrypt data at rest on a DS8000 series storage controller, helping to mitigate the threat of theft or unauthorized business critical data.

The DS8000 series has the capability to allow you to install encrypted 146 GB 15,000 rpm, 300 GB 15,000 rpm, and 450 GB 15,000 rpm Fibre Channel drives with encryption capability and with key management services supported by Tivoli® Key Lifecycle Manager software (TKLM). The full disk encryption disk drive sets are optional to the DS8000 series and are available with feature numbers 5xxx. encryption drive set support must also be ordered via feature number 1751.

The full disk encryption support feature is available only as plant order. Plant-configured-encryption-supporting systems will be allowed to increase the number of drive sets installed at the installed location. Intermixing of drives is not supported, thus the entire subsystem is either encrypted drives (feature numbers 5xxx) or intermixed devices of Fibre Channel, SATA, and SSD devices (feature numbers 2xxx and 6xxx).

Additionally, you must complete an environment verification process to confirm best practice configuration of the encryption solution. This verification can be requested from IBM Lab Based Services (recommended), or completed by you, but is a prerequisite of the encryption solution activation process.

z/OS support of disk encryption will be available on z/OS V1.8, or later.

SATA Disk Drives (SATA)

1 TB 7,200 rpm Serial ATA (SATA) drive sets: The DS8000 series offers 1 TB 7,200 rpm SATA disk drive sets, providing additional price and capacity flexibility to address specific application and business requirements. The 1 TB 7,200 rpm SATA disk drives can be added to the DS8000 series models to support various fixed-content, data-archival, referee-data, and streaming applications that require large amounts of storage capacity at lower cost per MB.

SATA drives are not intended for use in applications that require drive utilization duty cycles greater than 20%. In addition, SATA drives are supported only in RAID-6 and RAID-10 configurations. SATA drives will not share sparing capability with non-SATA drives. The 1 TB 7,200 rpm SATA disk drive sets are optional to the DS8000 series and are available with feature numbers 28xx.

Solid State Drives (SSD)

To improve data transfer rate (IOPS) and response time, the IBM DS8000 series today provides support for SSD. SSDs have improved I/O transaction-based performance over traditional platter-based drives. The IBM DS8000 series will initially offer SSDs in 73 GB and 146 GB capacities with enhanced seek time performance.

SSDs are a high-IOPS class enterprise storage device targeted at Tier 0 applications that can use high level of fast-access storage. SSDs offer a number of potential benefits over hard disk drives, including better IOPS performance, lower power consumption, less heat generation, and lower acoustical noise. The SSDs are optional to the DS8000 series and are available with feature numbers 6xxx.

SSDs will be limited to 256 drives per the DS8700 system. Additionally, RAID-6 and RAID-10 are not supported for SSD arrays.

z/OS support of SSDs is available on z/OS V1.8, or later.

Flexibility with support for RAID-5, RAID-6, and RAID-10

Physical capacity on the DS8000 series can be configured as RAID-5, RAID-6, RAID-10, or a combination of the three. RAID-5 can offer excellent performance for most applications, while RAID-10 can offer better performance for selected

applications, in particular high random write content applications in an open systems environment. RAID-10 combines RAID-1 (mirroring) with RAID-0 (striping).

Each drive within a RAID-10 array is mirrored to a second drive within the array, and to improve performance, data is striped across the drives within the array. RAID-6 allows for additional fault tolerate by using a second independent distributed parity scheme (dual parity). Data is striped on a block level across a set of drives, similar to RAID-5 configurations, and a second set of parity is calculated and written across all the drives. With these two levels of parity, RAID-6 can support a high data fault tolerance.

The decision to configure capacity as RAID-6, RAID-5, or RAID-10, as well as the amount of capacity to configure for each type, can be made at any time. RAID-6, RAID-5, and RAID-10 arrays can be intermixed within a single system and the physical capacity can be logically reconfigured at a later date (for example, RAID-6 arrays can be reconfigured into RAID-5 arrays).

Connectivity with four-port Fibre Channel/FICON host adapters

The DS8000 series is designed to offer enhanced connectivity with the availability of four-port Fibre Channel/FICON host adapters. The 4Gb Fibre Channel/FICON host adapters, offered in longwave and shortwave, auto-negotiate to either 4Gb, 2Gb, or 1Gb link speeds. This flexibility enables you to exploit the potential benefits offered by higher performance, 2Gb and 4Gb SAN-based solutions, while also maintaining compatibility with existing 1Gb infrastructures.

In addition, the individual ports on the adapter can be configured with Fibre Channel Protocol (FCP) or FICON. This can help protect your investment in Fibre Channel adapters, and increase your ability to migrate to new servers. A DS8700 Model 941 can support up to a maximum of 32 host adapters which equates to a maximum of 128 Fibre Channel ports.

The DS8700 models offer extensive connectivity support -- including Fibre Channel, or FICON -- across a broad range of server environments -- including IBM System z, System p, System i®, and System x servers, as well as servers from Sun and Hewlett-Packard, and non-IBM Intel-based servers. This rich support of heterogeneous environments and attachments, along with the flexibility to easily partition the DS8000 series storage capacity among the attached environments, can help support storage consolidation requirements and dynamic, changing environments.

Improved performance with Storage Pool Striping (rotate extents)

The Storage Pool Striping (rotate extents) function optionally stripes new volumes across all ranks of an extent pool, which can help reduce the administration required to balance system loads. With multiple rank allocation support, the system can automatically perform close to the highest efficiency, requiring little or no performance administration.

The effectiveness of performance management is enhanced since imbalances tend to occur as isolated problems. The Storage Pool Striping function can help automate hotspot avoidance to enable improved performance and response time without special tuning.

The function can be managed and configured via the DS Storage Manager, DS CLI, and DS Open API. All host systems supported by the DS8000 series today are supported with Storage Pool Striping. The Storage Pool Striping function is provided with the DS8000 series at no additional charge.

Rich set of business continuance solutions

The DS8700 models support a rich set of copy service functions and management tools that can be used to build solutions to help address business continuance requirements.

Point-in-time copy solutions

The FlashCopy advanced function is designed to provide a point-in-time copy capability for logical volumes. The FlashCopy function creates a physical point-in-time copy of the data, with minimal interruption to applications, and makes it possible to access both the source and target copies immediately.

FlashCopy supports many advanced capabilities, including:

- Data Set FlashCopy: Allows a FlashCopy of a data set in a System z environment.
- Multiple Relationship FlashCopy: Allows a source to have FlashCopy relationships with multiple targets simultaneously. This flexibility allows you to initiate up to 12 FlashCopy establishes on a given logical unit number (LUN), volume, or data set without needing to first wait for or cause previous relationships to end.
- Incremental FlashCopy: Provides the capability to 'refresh' a LUN or volume involved in a FlashCopy relationship. When a subsequent FlashCopy establish is initiated, only the data required to bring the target current to the source's newly established point-in-time is copied. The direction of the "refresh" can also be reversed, in which case the LUN or volume previously defined as the target becomes the source for the LUN or volume previously defined as the source (and now defined as the target).
- Remote Mirror Primary FlashCopy: Lets you establish a FlashCopy relationship where the target is also a remote mirror primary volume. You can create full or incremental point-in-time copies at a local site and then use remote mirroring commands to copy the data to the remote site.
- Consistency Group Commands: Allows DS8700 model systems to hold off I/O activity to a LUN or volume until the FlashCopy Consistency Group command is issued. Consistency groups can be used to help create a consistent point-in-time copy across multiple LUNs or volumes, and even across multiple DS8700s.
- Inband Commands Over Remote Mirror Link: In a remote mirror environment, allows commands to manage FlashCopy at the remote site to be issued from the local or intermediate site and transmitted over the remote mirror Fibre Channel links. This eliminates the need for a network connection to the remote site solely for the management of FlashCopy.

FlashCopy is an optional feature of the DS8700 models, and is available with the point-in-time indicator feature numbers 72xx and 0720 and corresponding DS8000 series function authorization (2396-LFA feature numbers 72xx).

IBM FlashCopy SE offers price and efficiency options

Today, the DS8000 series Point-in-Time Copy (IBM FlashCopy) function requires space to be set aside equal to the size of the volumes that are to be copied. The IBM System Storage DS8000 series provides support for IBM FlashCopy SE (space efficient snapshot capability) which is intended to use only the amount of storage needed by the copy.

This capability can lower the amount of storage needed by many DS8000 series clients today, and help lower costs by reducing disk capacity needed for copies. Reducing capacity in the DS8000 can also mean fewer drives and less power required for the overall system.

IBM FlashCopy SE can be managed and configured via the DS Storage Manager, DS CLI, and DS Open API. All host systems supported by the DS8000 series today are supported with FlashCopy SE (IBM System z servers require z/OS 1.7, or later, for this support). For more information on implementation of this function, please refer to the IBM System Storage DS8000 FlashCopy SE Implementation Considerations and Recommendations document located at

http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/FLASH10617

IBM FlashCopy SE is an optional feature on the DS8000 series, available with the SE indicator feature numbers 0730 and 735x-736x and corresponding DS8000 series function authorization (2396-LFA SE feature numbers 735x-736x).

Remote mirror and copy solutions

The DS8700 models support several hardware-based remote mirror and copy solutions:

- IBM System Storage Metro Mirror: This solution is designed to provide real-time mirroring of logical volumes between two systems that can be located up to 300 km from each other. It is a synchronous copy solution where write operations are completed on both copies (local and remote site) before they are considered to be done.
- IBM System Storage Global Copy: This is a nonsynchronous long-distance copy option for data migration and backup.
- IBM System Storage Global Mirror: Global Mirror is a long-distance remote copy solution across two sites using asynchronous technology and is designed to provide the following:
  - Support for virtually unlimited distance between the local and remote sites, with the distance typically limited only by the capabilities of the network and channel extension technology being used. This helps you to choose your remote site location based on business needs and enables site separation to add protection from localized disasters.
  - A consistent and restartable copy of the data at the remote site, created with little impact to applications at the local site.
  - Data currency where, for many environments, the remote site lags behind the local site as little as 3 to 5 seconds, helping to minimize the amount of data exposure in the event of an unplanned outage. The actual lag in data currency experienced will depend upon a number of factors, including specific workload characteristics and bandwidth between the local and remote sites.
  - Dynamic selection of the desired Recovery Point Objective (RPO) based upon business requirements and optimization of available bandwidth.
  - Session support whereby data consistency at the remote site is internally managed across up to eight systems located across the local and remote sites.
  - Efficient synchronization of the local and remote sites with support for failover and failback modes, helping to reduce the time required to switch back to the local site after a planned or unplanned outage.
- Interoperability with existing and previous generations of DS8000 series

All of the previously described remote mirroring solutions use Fibre Channel as the communications link between the primary and secondary machines. The Fibre Channel ports used for remote mirror and copy can be configured as either a dedicated remote mirror link or as a shared port between remote mirroring and Fibre Channel Protocol (FCP) data traffic.

The remote mirror and copy solutions listed above are optional capabilities of the DS8700 Model 941. They are available as follows:

- Metro Mirror indicator feature numbers 75xx and 0744 and corresponding DS8000 series function authorization (2396-LFA MM feature numbers 75xx).
- Global Mirror indicator feature numbers 75xx and 0746 and corresponding DS8000 series function authorization (2396-LFA GM feature numbers 75xx).

DS8000 series systems can participate in remote mirror and copy solutions with the IBM TotalStorage ESS Model 750, IBM TotalStorage ESS Model 800, and IBM System Storage DS6000™ series systems.

Three-site Metro/Global Mirror (MGM)

The DS8000 series supports three-site MGM configurations. The MGM function utilizes synchronous mirroring (Metro Mirror) from a local A-site to a metro-distance B-site, and asynchronous mirroring (Global Mirror) from an intermediate B-site to a remote C-site. This function, referred to as MGM, is designed to provide planned and unplanned outage three-site enterprise disk data replication which can help meet rigorous three-site business resiliency needs of the enterprise data center. MGM can support synchronous replication at distances up to 303 km using IBM System

Storage Metro Mirror, and can maintain the asynchronous third site for out of region recovery, at a data currency that can be within 3 to 5 seconds (bandwidth permitting) using IBM System Storage Global Mirror.

MGM is designed to deliver:

- Fast failover/failback to any site
- Fast re-establishment of three-site recovery without production outages
- Quick resyhronization to any site with incremental changes only

MGM supports planned and unplanned switches from a local A-site to a remote B-site. With the cascading nature of MGM, during and after the metro-distance switch, this function can provide continuous asynchronous disaster recovery protection to the out of region remote C-site without the necessity of additional reconfiguration. Additionally, in the event of a loss of access to the B-site, MGM is designed to provide incremental resync from the local A-site to the remote C-site. The B-site can be brought back into the three-site configuration without a production outage, and with full failover and failback.

The MGM solution uses Fibre Channel as the communications link between the primary, secondary, and tertiary machines. The Fibre Channel ports used for remote mirror and copy can be configured as either a dedicated remote mirror link or as a shared port between remote mirroring and Fibre Channel Protocol (FCP) data traffic.

The MGM solution is an optional capability of the DS8000 series and is available with the MGM indicator feature numbers 74xx and 0742 and corresponding DS8000 series function authorization (2396-LFA MGM feature numbers 74xx).

Remote mirror and copy solutions for z/OS

Following are three remote mirror and copy solutions for the z/OS environment for the DS8700 models:

- IBM System Storage z/OS Global Mirror: This is a combined hardware and software business continuance solution for the System z environment providing asynchronous mirroring between systems at two sites located global distances apart. z/OS Global Mirror is an optional capability of the DS8000 series and is available with the remote mirror for z/OS indicator feature numbers 76xx and 0760 and corresponding DS8000 series function Authorization (2396-LFA RMZ feature numbers 76xx). z/OS Global Mirror also requires the purchase of the FICON attachment licensed feature.
- z/OS MGM (three-site z/OS Global Mirror and Metro Mirror): This mirroring capability utilizes z/OS Global Mirror to mirror primary-site data to a location that is a long distance away and also uses Metro Mirror to mirror primary-site data to a location within the metropolitan area. This enables a three-site high availability and disaster recovery z/OS solution for even greater protection from unplanned outages.

  z/OS MGM is an optional capability of the DS8000 series and is available with the remote mirror for z/OS indicator feature numbers 76xx and 0760 and corresponding DS8000 series function Authorization (2396-LFA RMZ feature numbers 76xx) Mirror and/or Global Mirror features. z/OS Metro/Global Mirror also requires the purchase of a FICON attachment licensed feature.

- z/OS MGM Incremental Resync (three-site z/OS Global Mirror and Metro Mirror with Incremental resync): This capability can eliminate the need for a full copy after a HyperSwap™ situation in three-site z/OS MGM configurations. The z/OS MGM Incremental Resync capability is intended to enhance RMZ by enabling resynchronization of data between sites using only the changed data from the Metro Mirror target to the z/OS Global Mirror target after a GDPS® HyperSwap. This can significantly reduce the amount of data to be copied after a Hyperswap situation and improve the resilience of an overall three-site disaster recovery solution by reducing resync times. z/OS MGM Incremental Resync is an optional feature of the DS8700 Model 941 and is available with the RMZ resync licensed feature indicator feature numbers 0763 and 76xx and DS8000 series function

Authorization (2396-LFA RMZ resync feature numbers 76xx). z/OS MGM also requires the purchase of the FICON attachment licensed feature.

IBM performance innovations for System z environments

FICON extends the ability of the DS8000 series system to deliver high-bandwidth potential to the logical volumes needing it, when they need it. Older technologies are limited by the bandwidth of a single disk drive, but FICON, working together with other DS8000 series functions, provides a high-speed pipe supporting multiplexed operation.

Support for FICON attachment is an optional feature of the DS8700 Model 941 and is available with the FICON attachment licensed feature indicator feature numbers 7091 and 0703 and corresponding DS8000 series function authorization (2396-LFA FICON attachment feature number 7091).

Parallel Access Volumes (PAV) enables a single System z server to simultaneously process multiple I/O operations to the same logical volume, which can help to significantly reduce device queue delays. This is achieved by defining multiple addresses per volume. With Dynamic PAV, the assignment of addresses to volumes can be automatically managed to help meet performance objectives and reduce overall queuing.

PAV is an optional feature on the DS8000 series and is available with the PAV indicator feature numbers 78xx and 0780 and corresponding DS8000 series function authorization (2396-LFA PAV feature numbers 78xx). PAV also requires the purchase of the FICON attachment licensed feature.

HyperPAV allows an alias address to be used to access any base on the same control unit image per I/O base. This capability also allows different HyperPAV hosts to use one alias to access different bases which reduces the number of alias addresses required to support a set of bases in a System z environment with no latency in targeting an alias to a base. This functionality is also designed to enable applications to achieve equal or better performance than possible with the original PAV feature alone while also using the same or fewer z/OS resources.

HyperPAV is an optional feature on the DS8000 series and is available with the HyperPAV indicator feature numbers 7899 and 0782 and corresponding DS8000 series function authorization (2396-LFA HyperPAV feature number 7899). HyperPAV also requires the purchase of PAV licensed feature(s) and the FICON attachment licensed feature.

IBM Extended Address Volumes (EAV) for System z environments

EVA function provides support for volumes that can scale up to approximately 223 GB (262,668 cylinders). This capability can help relieve address constraints to support large storage capacity needs in System z environments. Larger devices can help simplify storage management as it fosters management of fewer, large volumes as opposed to many small volumes.

The HyperPAV function available today, complements EAV by allowing scaling of I/O rates against a single, larger volume. In addition, Dynamic Volume Expansion can also allow non-disruptive migration to the larger volume sizes now available. The function is supported on DS8000 series running on IBM System z servers with z/OS V1.10, or later. The EAV capability is provided with the DS8000 series at no additional charge.

IPv6 support

The IBM System Storage DS8000 series has been designed to meet the requirements of the IPv6 Ready Logo program, indicating its implementation of IPv6 mandatory core protocols and the ability to interoperate with other IPv6 implementations. IBM DS8700 systems can be configured in native IPv6 environments.

Multiple allegiance expands the simultaneous logical volume access capability across multiple System z servers. This function, along with PAV, enables the DS8000 series to process more I/Os in parallel helping to improve performance and enabling greater use of large volumes.

z/OS Global Mirror Multiple Reader (Enhanced Reader) allows automatic load balancing over multiple readers in a z/OS Global Mirror (XRC) environment. This function can provide increased parallelism through multiple SDM readers and improved throughput for z/OS remote mirroring configurations. z/OS Global Mirror can also help maintain constant data consistency between mirrored sites and enable achievement of lower recovery point objectives. The function is supported on DS8000 series running on IBM System z servers with V1.7, or later.

z/OS Global Mirror Multiple Reader requires the purchase of z/OS Global Mirror which is an optional capability of the DS8000 series (RMZ indicator feature numbers 0760 and 76xx and corresponding DS8000 series function authorization - 2396-LFA feature numbers 76xx). z/OS Global Mirror also requires the purchase of the FICON attachment feature. The z/OS Global Mirror Multiple Reader function has no additional charge beyond the z/OS Global Mirror and FICON attachment feature charges.

Extended Distance FICON for System z environments

Extended distance FICON for System z environments is an enhancement to the industry-standard FICON architecture (FC-SB-3) that can help avoid degradation of performance at extended distances by implementing a new protocol for "persistent" Information Unit (IU) pacing. Control units that exploit the enhancement to the architecture can increase the pacing count (the number of IUs allowed to be in flight from channel to control unit).

Extended Distance FICON can allow the channel to remember the last pacing update for use on subsequent operations to help avoid degradation of performance at the start of each new operation. Improved IU pacing can help to improve the utilization of the link (for example, it can help keep a 4 Gbps link fully utilized at 50 km) and provide increased distance between servers and control units. Extended Distance FICON can reduce the need for channel extenders in DS8000 series two-site and three-site z/OS Global Mirror configurations by allowing an increased number of read commands to be in flight simultaneously. This can help reduce the total-cost-of-ownership of two-site and three-site z/OS Global Mirror configurations and give you the choice of selecting lower-cost channel extenders built on frame-forwarding technology. The Extended Distance FICON capability is provided with the DS8000 series at no additional charge.

High performance FICON multitrack for System z improves performance

IBM now delivers High performance FICON for System z. Previously, FICON working together with other DS8000 series functions provided a high-speed connection supporting multiplexed operation. High performance FICON takes advantage of the hardware available today with enhancements that are designed to reduce the overhead associated with supported commands. Enhancements are made to the z/Architecture® and the FICON interface architecture to deliver improvements for online transaction processing (OLTP) workloads. When exploited by the FICON channel, the z/OS operating system and the control unit, zHPF is designed to help reduce overhead and improve performance.

Additionally, the changes to the architectures offer end-to-end system enhancements to improve reliability, availability, and serviceability (RAS). Existing adapters will be able to handle an intermix of transactions using FCP, FICON, and High performance FICON protocols.

High performance FICON supports more than one track's worth of data in a single transfer. Applications using Media Manager for I/O with large data transfers are expected to benefit those using zFS, HFS, PDSE, and striped extended format data sets. This function is available on z/OS V1.9 and z/OS V1.10 with the PTFs for APARs OA26084 and OA29017.

This function is a modification to the FICON I/O architecture and is being worked on for inclusion into the Fibre Channel Standard by the IITS Fibre Channel (T11) Technical Committee's FC-SB-4 project.

Support for High performance FICON multitrack is an optional feature of the DS8700 Model 941 and is available with the High performance FICON licensed feature indicator feature numbers 7092 and 0709 and corresponding DS8000 series function Authorization (2396-LFA High performance FICON feature number 7092).

I/O priority queuing allows the DS8000 series to use I/O priority information provided by the z/OS Workload Manager to manage the processing sequence of I/O operations.

Licensing capabilities for copy functions

With the DS8700 models, licensing options are available for users of FlashCopy (point-in-time copy indicator feature) and Metro Mirror and Global Mirror indicator features as follows:

- If the function is used with open systems data only, a license is required for only the total physical capacity configured as Fixed Block (FB).
- If the function will be used with System z data only, a license is required for only the total physical capacity configured as Count Key Data (CKD).
- If the function is used with both open systems and System z data, a license is required for the total physical capacity of DS8000 series system.

In addition, the license scope (FB, CKD, or entire machine) client is managed through an IBM Web-based application. This allows you to change the license scope on a given machine as your business requirements change.

Additional DS8700 functions

- **End-to-end I/O priorities:** The DS8000 series host adapter allows preferential treatment to higher priority I/O and provides improved response time in the overall system operation while running in IBM System p AIX® and DB2® operating environments.
- **Cooperative caching:** The storage facility uses a cache hint to manage the retention period of cached data and provides improved overall system performance through more efficient use of the aggregate memory resources while running in IBM System p AIX and DB2 operating environments.
- **Intelligent Write Caching:** Write caches using fast, non-volatile storage are now widely used in modern storage controllers since they help reduce latency on writes. Effective algorithms for write cache management are extremely important to RAID architecture because one write can cause many disk seeks and write cache capacity is limited for overall system performance considerations.

  IBM Research conducts extensive investigations into improved algorithms for cache management and overall system performance improvements. Intelligent Write Caching utilizes a newly developed algorithm for write management to boost performance through improving utilization of both temporal locality (data most recently modified) and spatial locality (data located physically together).

  To increase aggregate throughput and reduce aggregate response times, the IBM DS8000 series now provides enterprise storage controllers utilizing the Intelligent Write Caching algorithm.

- **Long busy wait host tolerance:** Provides new protocol that allows a target to specify that it is busy and how long the initiator should wait before retrying. This avoids the initiator from failing I/O after numerous retries and receiving busy responses and avoids the initiator retrying too soon while running in the IBM System p AIX operating environments.
- **Audit logging:** The DS8700 supports audit logging and viewing of an exported log file. The DS8000 series audit logging capability includes information such as a list of users who have logged in and what the user did during their session. A separate log entry is added each time a resource is created, deleted, or modified providing enhanced administrator ease-of-use and additional security.

The above functions are provided with the DS8000 series at no additional charge.

Support for IBM Database Protection feature

The IBM System Storage DS8000 series offers the IBM Database (DB) Protection feature. The IBM DB Protection feature is an implementation of Oracle's Hardware Assisted Resilient Data (HARD) technology providing an end-to-end data validation mechanism between Oracle's relational database management system (RDBMS) software and the DS8000 series. The IBM DB Protection feature is an optional feature on the DS8000 series and is available with the DB protection indicator feature numbers 0708 and 7080 and corresponding DS8000 series function authorization (2396-LFA Database protection feature number 7080).

Refer to the Technical information section for more information on the IBM DB Protection feature.

Management tools and utilities for administrator productivity

The DS8000 series models support the following management tools and utilities:

- **IBM System Storage Management Console:** The Management Console is the focal point for maintenance activities. This dedicated laptop is physically located (installed) inside your DS8700 and can proactively monitor the state of your system, notifying you and IBM when service is required. It can also be connected to your network to enable centralized management of your system using the IBM System Storage DS® Command Line Interface or storage management software utilizing the IBM System Storage DS Open API.

  An external Management Console is available as a optional feature and can be used as a redundant management console for environments with high-availability requirements.

Support for System Storage Productivity Center (SSPC) provides the capability to consolidate your storage management infrastructure with a center-of-the-room management console. The DS8700 will support the SSPC, to simply and quickly configure their systems as well as manage multiple DS8000 series systems within a datacenter. The SSPC provides pre-loaded software including IBM Tivoli Storage Productivity Center (previously known as TotalStorage Productivity Center) Basic Edition, and the enhanced DS Storage Manager. The enterprise edition of the SSPC also supports the option to install the IBM Tivoli Storage Productivity Center for Replication. The Tivoli Storage Productivity Center for Replication is designed to support hundreds of replication sessions across thousands of volumes, supporting both open and z/OS attached volumes. In addition, it helps monitor performance of all copy session types and reports on the amount of data exposed at the disaster recovery site (not in synchronization with the source site). The Tivoli Storage Productivity Center for Replication Three-Site BC feature optionally provides three-site recovery management, supporting the IBM System Storage DS8000 Metro Global Mirror feature. The three-site feature is designed to support fast failover and failback, fast reestablishment of three-site mirroring, data currency at the remote site with minimal lag behind the local site, and quick resynchronization of mirrored sites using incremental changes only.

The SSPC is a separately purchased product (using Machine type 2805) for the DS8700 and is required for all new DS8700 machine orders.

Clients with currently installed DS8700 machines are not required to purchase the SSPC.

IBM System Storage DS Command Line Interface (CLI): The DS CLI is a single CLI that has the ability to perform a wide range of commands for both configuration and copy services activities. The application has three modes of execution:

- Single shot mode will connect, issue a single command, and then return to the user.
- Script mode will connect, execute a predefined customer script, and then return to the user.

- Interactive mode will place the you in a shell environment with a static connection to the storage subsystem so the user can execute multiple commands.

The CLI has the ability to dynamically invoke copy services functions. This can help enhance your productivity since it eliminates the previous requirement for you to create and save a task using the GUI. The DS CLI can also issue copy services commands to an ESS Model 750, ESS Model 800, or DS6000 series system.

The DS CLI is available with the DS8700 models at no additional charge. The DS CLI client is available for the AIX, HP-UX, Linux®, Novell NetWare, Sun Solaris, and Microsoft® Windows® operating system environments.

IBM System Storage DS Open API: The DS Open API supports routine LUN management activities, such as LUN creation, mapping and masking, and the management of point-in-time copy. It supports these activities through the use of a standard interface as defined by the Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S).

The DS Open API is implemented through the IBM System Storage Common Information Model Agent (CIM Agent) for the DS Open API, a middleware application designed to provide a CIM-compliant interface. The interface is designed to allow Tivoli and third-party CIM-compliant software management tools to discover, monitor, and control DS8000 series systems. The DS Open API and CIM Agent are provided with the DS8700 models at no additional charge.

IBM System Storage Multi-path SDD: SDD is designed to provide load balancing and enhanced data availability capability in configurations with more than one I/O path between the host server and the DS8000 series system. Load balancing can help reduce or eliminate I/O bottlenecks that occur when many I/O operations are directed to common devices via the same I/O path. SDD also helps eliminate a potential single point of failure by automatically rerouting I/O operations when a path failure occurs, thereby supporting enhanced data availability capability. SDD comes with the DS8700 models at no additional charge.

The IBM System Storage DS8700 model is also enhanced with the following:

- Enhancements to disk encryption key management that can help address PCI-DSS (Payment Card Industry Data Security Standard) requirements:
  - encryption deadlock recovery key - Supports the ability for IBM to restore access to a DS8700 when the encryption key for the storage is unavailable due to an encryption deadlock scenario.
  - Dual platform key server support - DS8700 requires an isolated key server in encryption configurations. The isolated key server currently defined is a Series x server. Dual platform key server support allows two different key server platforms to be configured with either platform operating in either 'clear key' or 'secure key' mode.
- Value based licensing - Operating Environment License is usually priced based on the performance, capacity, speed, and other characteristics that provide value in customer environments.

Planned availability dates:

Plant availability

October 23, 2009:

- New DS8700 Models 941 and 94E (A/B/C/D/E)
- Model 9xE position indicators
- Cache and processor options
- PCI-E I/O enclosure pair
- PCI-E cable groups
- PCI-E based host adapters
- Initial System Capacity indicators

- Value-based pricing/licensing
- AF Tiers
- Release 5.0 Bundle Family
- High performance FICON Multitrack support

Field availability

October 23, 2009:

- AF Tiers

January 6, 2010:

- Hardware installation MES
- Cache and processor options
- PCI-E I/O enclosure pair
- PCI-E cable groups
- PCI-E based host adapters
- Drive and adapter enclosures and cables
- Disk drives and adapters MES
- B/C/D/E expansion field merge
- Model Conversions

Accessibility by people with disabilities

A U.S. Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Section 508 of the U.S. Rehabilitation Act

The IBM System Storage DS8700 and IBM System Storage DS8700 Expansion Unit are capable, as of October 23, 2009, when used in accordance with IBM's associated documentation, of satisfying the applicable requirements of Section 508 of the Rehabilitation Act, provided that any assistive technology used with the product properly interoperates with it. A US Section 508 Voluntary Product Accessibility Template (VPAT) can be requested via IBM's Web site at:

http://www-3.ibm.com/able/product_accessibility/index.html

Reference information

For more information, refer to the following announcements:

- Software Announcement 209-017, dated February 10, 2009(IBM Tivoli Key Lifecycle Manager for z/OS V1.0)
- Hardware announcement 108-870, dated October 21, 2008(IBM System Storage DS8000 series (Machine types 2421, 2422, 2423, and 2424) delivers new functional capabilities (zHPF and RMZ resync))
- Hardware announcement 108-871, dated October 21, 2008(IBM System Storage DS8000 series (M/T 2244) function Authorization for zHPF and RMZ resync)
- Hardware announcement 108-327, dated August 12, 2008 (IBM System Storage DS8000 series (Machine types 2421, 2422, 2423, and 2424) delivers new flexibility and data protection options)
- Hardware announcement 109-702, dated October 20, 2009 (IBM System Storage DS8000 - Machine Type 239x - function Authorizations)

For IBM statement on compliance with European Union Directive on Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) ("RoHS"), visit

http://www.ibm.com/ibm/environment/products/rohs.shtml

Product number

Description	Machine	Model	Feature
DS8700	2421	941	
Model 9xE Merge Indicator:			
- 9xE Factory Merge			0001
DoD Indicator			0020
JEMT indicator			0021
Eligible for EU Shipment			0100
Shipping Weight Reduction			0200
Model 9xE Position indicators:			
- 941 - 94E position 1			0340
- 941 - 92E/94E position 2			0341
- 941 - 92E/94E position 3			0342
- 941 - 92E/94E position 4			0343
Licensed function indicators:			
- OEL indicator			0700
- FICON attach indicator			0703
- DB protection indicator			0708
- High performance FICON indicator			0709
- PTC indicator			0720
- SE indicator			0730
- MGM indicator			0742
- MM indicator			0744
- GM indicator			0746
- RMZ indicator			0760
- RMZ resync indicator			0763
- PAV indicator			0780
- HyperPAV indicator			0782
Initial System Capacity:			
- Up to 2.0 TB capacity			0800
- 2.1 to 5.0 TB capacity			0802
- 5.1 to 10.0 TB capacity			0805
- 10.1 to 25.0 TB capacity			0810
- 25.1 to 50.0 TB capacity			0815
- 50.1 to 75.0 TB capacity			0820
- 75.1 to 100.0 TB capacity			0825
- 100.1 to 150.0 TB capacity			0830
- 150.1 to 200.0 TB capacity			0835
- 200.1 to 250.0 TB capacity			0840
- 250.1 to 300.0 TB capacity			0845
- 300.1 to 350.0 TB capacity			0850
- 350.1 to 400.0 TB capacity			0855
- 400.1 to 450.0 TB capacity			0860
- 450.1 to 500.0 TB capacity			0865
- 500.1 to 550.0 TB capacity			0870
- 550.1 to 600.0 TB capacity			0871
- 600.1 to 700.0 TB capacity			0872
- 700.1 to 800.0 TB capacity			0873
- 800.1 to 900.0 TB capacity			0874
- 900.1 to 1000.0 TB capacity			0875

- 1000.1 to 1100.0 TB capacity	0876
Standby CoD indicators:	
- Non-Standby CoD	0900
- Standby CoD Indicator	0901
- Standby CoD Indicator	0902
- Standby CoD Indicator	0903
- Standby CoD Indicator	0904
Administrative indicators:	
- IBM/Openwave Alliance	0930
- IBM System i Indicator	0931
- IBM System p Indicator	0932
- IBM System x Indicator	0933
- IBM System z Indicator	0934
- Linux Indicator	0940
- Global Mirror Indicator	0950
Power:	
- Remote Power® Control	1000
- Battery Assembly	1050
- Extended PLD	1055
Single Phase Power Cords:	
- SPP cord group 1	1060
- SPP cord group 2	1065
- SPP cord group 3	1067
Line Cords:	
- Line Cord (US/LA/AP/Canada)	1090
- Line Cord (EMEA)	1091
- Line Cord (Japan)	1092
- Line Cord (US Chicago)	1093
Management Console:	
- Mgmt console - English Laptop internal	1120
- Mgmt console - Japanese Laptop internal	1121
- Mgmt console - English Laptop external	1130
- Mgmt console - Japanese Laptop external	1131
External Management Console - Line Cords:	
- MC Line Cord Standard Rack	1170
- MC Line Cord Group 1	1171
- MC Line Cord Group 2	1172
Disk Enclosure:	
- Disk Enclosure Pair	1210
Disk Cable:	
- Disk Drive Cable Group 1	1211
I/O enclosure pair PCIE	1301
I/O cables:	
- PCI-E cable group 1	1320
- PCI-E cable group 2	1321
Fibre Channel/FICON Cables:	
- 50 um Fibre Cable (LC)	1410
- 50 um Fibre Cable (LC/SC)	1411
- 50 um Fibre Cable (Jumper)	1412
- 9 um Fibre Cable (LC)	1420
- 9 um Fibre Cable (LC/SC)	1421

- 9 um Fibre Cable (Jumper)	1422
Microcode Bundle Family:	
- Release 5 Bundle Family	1711
Encryption Support:	
- Encrypted Drive Set Support	1751
Performance Accelerator	1980
Hardware Installation MES	1999
Disk Drive Sets:	
- 146 GB 15K Drive Set	2216
- 300 GB 15K Drive Set	2416
- 450 GB 15K Drive Set	2616
- 1 TB 7.2K SATA Drive Set	2816
Standby CoD Disk Drive Sets:	
- 146 GB 15K CoD Drive Set	2217
- 300 GB 15K CoD Drive Set	2417
- 450 GB 15K CoD Drive Set	2617
- 1 TB 7.2K SATA CoD Drive Set	2817
Disk Enclosure Filler Set	2999
Device Adapters:	
- Device Adapter Pair III	3043
Host Adapters:	
- 4Gb SW FCP/FICON Adapter PCIE	3143
- 4Gb LW FCP/FICON Adapter PCIE	3243
- 4Gb 10km LW FCP/FICON Adapter PCIE	3245
Processor Memory:	
- 32 GB Processor Memory (2-Way only)	4212
- 64 GB Processor Memory (2-Way only)	4213
- 128 GB Processor Memory (2-Way only)	4214
- 32 GB Processor Memory (4-Way only)	4222
- 64 GB Processor Memory (4-Way only)	4223
- 128 GB Processor Memory (4-Way only)	4224
- 256 GB Processor Memory (4-Way only)	4225
- 384 GB Processor Memory (4-Way only)	4226
Processor Cards:	
- 2 Way Processor Card	4301
- 4 Way Processor Card	4302
Encryption Disk Drive Sets:	
- 146 GB 15K FDE Drive Set	5016
- 300 GB 15K FDE Drive Set	5116
- 450 GB 15K FDE Drive Set	5216
nc Standby CoD Disk Drive Sets:	
- 146 GB 15K FDE CoD Drive Set	5017
- 300 GB 15K FDE CoD Drive Set	5117
- 450 GB 15K FDE CoD Drive Set	5217
SSD Disk Drive Sets:	
- 73 GB SSD Drive Set	6016
- 146 GB SSD Drive Set	6116

Function Authorization indicators:

- OEL - inactive	7030
- OEL - 1 TB unit	7031
- OEL - 5 TB unit	7032
- OEL - 10 TB unit	7033
- OEL - 25 TB unit	7034
- OEL - 50 TB unit	7035
- OEL - 100 TB unit	7040
- OEL - 200 TB unit	7045
- OEL - Value Unit inactive	7050
- OEL - 1 Value Unit	7051
- OEL - 5 Value Unit	7052
- OEL - 10 Value Unit	7053
- OEL - 25 Value Unit	7054
- OEL - 50 Value Unit	7055
- OEL - 100 Value Unit	7060
- OEL - 200 Value Unit	7065
- DB protection indicator	7080
- FICON indicator	7091
- zHPF indicator	7092
- PTC - inactive indicator	7250
- PTC - 1 TB indicator	7251
- PTC - 5 TB indicator	7252
- PTC - 10 TB indicator	7253
- PTC - 25 TB indicator	7254
- PTC - 50 TB indicator	7255
- PTC - 100 TB indicator	7260
- SE - inactive indicator	7350
- SE - 1 TB indicator	7351
- SE - 5 TB indicator	7352
- SE - 10 TB indicator	7353
- SE - 25 TB indicator	7354
- SE - 50 TB indicator	7355
- SE - 100 TB indicator	7360
- MGM - inactive indicator	7480
- MGM - 1 TB indicator	7481
- MGM - 5 TB indicator	7482
- MGM - 10 TB indicator	7483
- MGM - 25 TB indicator	7484
- MGM - 50 TB indicator	7485
- MGM - 100 TB indicator	7490
- MM - inactive indicator	7500
- MM - 1 TB indicator	7501
- MM - 5 TB indicator	7502
- MM - 10 TB indicator	7503
- MM - 25 TB indicator	7504
- MM - 50 TB indicator	7505
- MM - 100 TB indicator	7510
- GM - inactive indicator	7520
- GM - 1 TB indicator	7521
- GM - 5 TB indicator	7522
- GM - 10 TB indicator	7523
- GM - 25 TB indicator	7524
- GM - 50 TB indicator	7525
- GM - 100 TB indicator	7530
- RMZ - inactive indicator	7650
- RMZ - 1 TB indicator	7651
- RMZ - 5 TB indicator	7652
- RMZ - 10 TB indicator	7653
- RMZ - 25 TB indicator	7654
- RMZ - 50 TB indicator	7655
- RMZ - 100 TB indicator	7660
- RMZ resync - inactive indicator	7680
- RMZ resync - 1 TB indicator	7681
- RMZ resync - 5 TB indicator	7682
- RMZ resync - 10 TB indicator	7683
- RMZ resync - 25 TB indicator	7684
- RMZ resync - 50 TB indicator	7685
- RMZ resync - 100 TB indicator	7690
- PAV - inactive indicator	7820
- PAV - 1 TB indicator	7821

- PAV - 5 TB indicator			7822
- PAV - 10 TB indicator			7823
- PAV - 25 TB indicator			7824
- PAV - 50 TB indicator			7825
- PAV - 100 TB indicator			7830
- HyperPAV indicator			7899
IGF Transaction:			
- IGF transaction indicator			7999
Description	Machine	Model	Feature
DS8700 Expansion Unit	2421	94E	
Model 9xE Merge Indicator:			
- 9xE Factory Merge			0001
- 9xE Field Merge			0002
DoD Indicator			0020
JEMT indicator			0021
Eligible for EU Shipment			0100
Shipping Weight Reduction			0200
Model 9xE Position indicators:			
- 941 - 94E position 1			0340
- 941 - 92E/94E position 2			0341
- 941 - 92E/94E position 3			0342
- 941 - 92E/94E position 4			0343
Administrative indicators:			
- IBM/Openwave Alliance			0930
- IBM System i Indicator			0931
- IBM System p Indicator			0932
- IBM System x Indicator			0933
- IBM System z Indicator			0934
- Linux Indicator			0940
Power:			
- Power module - second pair			1020
- Battery Assembly			1050
- Extended PLD			1055
Single Phase Power Cords:			
- SPP cord group 1			1060
- SPP cord group 2			1065
- SPP cord group 3			1067
Line Cords:			
- Line Cord (US/LA/AP/Canada)			1090
- Line Cord (EMEA)			1091
- Line Cord (Japan)			1092
- Line Cord (US Chicago)			1093
Disk Enclosure:			
- Disk Enclosure Pair			1210
Disk Cable:			
- Disk Drive Cable Group 2			1212
- Disk Drive Cable Group 4			1214
I/O enclosure pair PCIE			1301

I/O cables:

- PCI-E cable group 3	1322

Fibre Channel/FICON Cables:

- 50 um Fibre Cable (LC)	1410
- 50 um Fibre Cable (LC/SC)	1411
- 50 um Fibre Cable (Jumper)	1412
- 9 um Fibre Cable (LC)	1420
- 9 um Fibre Cable (LC/SC)	1421
- 9 um Fibre Cable (Jumper)	1422
Performance Accelerator	1980
Hardware Installation MES	1999

Disk Drive Sets:

- 146 GB 15K Drive Set	2216
- 300 GB 15K Drive Set	2416
- 450 GB 15K Drive Set	2616
- 1 TB 7.2K SATA Drive Set	2816

Standby CoD Disk Drive Sets:

- 146 GB 15K CoD Drive Set	2217
- 300 GB 15K CoD Drive Set	2417
- 450 GB 15K CoD Drive Set	2617
- 1 TB 7.2K SATA CoD Drive Set	2817
Disk Enclosure Filler Set	2999

Device Adapters:

- Device Adapter Pair III	3043

Host Adapters:

- 4Gb SW FCP/FICON Adapter PCIE	3143
- 4Gb LW FCP/FICON Adapter PCIE	3243
- 4Gb 10km LW FCP/FICON Adapter PCIE	3245

Encryption Disk Drive Sets:

- 146 GB 15K FDE Drive Set	5016
- 300 GB 15K FDE Drive Set	5116
- 450 GB 15K FDE Drive Set	5216

Encryption Standby CoD Disk Drive Sets:

- 146 GB 15K FDE CoD Drive Set	5017
- 300 GB 15K FDE CoD Drive Set	5117
- 450 GB 15K FDE CoD Drive Set	5217

SSD Disk Drive Sets:

- 73 GB SSD Drive Set	6016
- 146 GB SSD Drive Set	6116

Model Conversions (Machine type 2421)

From Model	To Model	Returned Parts *
931	941 (2-way)	Yes
932	941 (4-way)	Yes
92E	94E	Yes

Limitations

- Expansion unit model 94E is not supported when converting Model 931 to 941 (2-way). The maximum of drives supported in a DS8700 2-way system after conversion is 128 within the Model 941 frame. The 931 - 92E Position 1 indicator (feature number 0311) to a Model 931 will need to be removed by following the RPO process.
- Expansion unit conversions will be limited to units in the second position, and those units must be converted when the controller system (Model 932) is converted. Only Model 932 units will support conversion to the Model 941 (4-way).

Feature Conversions (Machine type 2421 Model 941)

I/O Cables:

Feature From	To	Returned Parts *	Description
1320	1321	Yes	I/O cable conversion

Disk Drive Sets:

2216	2416	Yes	Disk drive set conversion
2216	2616	Yes	Disk drive set conversion
2216	2816	Yes	Disk drive set conversion
2416	2616	Yes	Disk drive set conversion
2416	2816	Yes	Disk drive set conversion
2616	2816	Yes	Disk drive set conversion

Standby CoD Disk Drive Sets:

Feature From	To	Returned Parts(5)	Description
2217	2216	No	CoD disk drive conversion
2417	2416	No	CoD disk drive conversion
2617	2616	No	CoD disk drive conversion
2817	2816	No	CoD disk drive conversion

Host Adapters:

3143	3243	Yes	Host adapter conversion
3143	3245	Yes	Host adapter conversion
3243	3143	Yes	Host adapter conversion
3243	3245	Yes	Host adapter conversion
3245	3143	Yes	Host adapter conversion
3245	3243	Yes	Host adapter conversion

Processor Memory:

4212	4213	Yes	Processor memory conversion
4212	4214	Yes	Processor memory conversion
4212	4222	Yes	Processor memory conversion
4213	4214	Yes	Processor memory conversion
4213	4223	Yes	Processor memory conversion
4214	4224	Yes	Processor memory conversion
4222	4223	No	Processor memory conversion
4222	4224	Yes	Processor memory conversion
4222	4225	Yes	Processor memory conversion
4222	4226	Yes	Processor memory conversion
4223	4224	Yes	Processor memory conversion
4223	4225	Yes	Processor memory conversion
4223	4226	No	Processor memory conversion
4224	4225	Yes	Processor memory conversion
4224	4226	Yes	Processor memory conversion
4225	4226	No	Processor memory conversion

Processor Cards:

4301	4302	Yes	Processor card conversion

Encryption Disk Drive Sets:

5016	5116	Yes	Encryption disk drive set conversion
5016	5216	Yes	Encryption disk drive set conversion
5116	5216	Yes	Encryption disk drive set conversion

Encryption Standby CoD Disk Drive Sets:

5017	5016	No	Encryption CoD disk drive conversion
5117	5116	No	Encryption CoD disk drive conversion
5217	5216	No	Encryption CoD disk drive conversion

SSD Disk Drive Sets:

6016	6116	Yes	SSD disk drive conversion

Feature Conversions (Machine type 2421 Model 94E)

Disk Drive Sets:

2216	2416	Yes	Disk drive set conversion
2216	2616	Yes	Disk drive set conversion
2216	2816	Yes	Disk drive set conversion
2416	2616	Yes	Disk drive set conversion
2416	2816	Yes	Disk drive set conversion
2616	2816	Yes	Disk drive set conversion

Standby CoD Disk Drive Sets:

Feature From	To	Returned Parts(5)	Description
2217	2216	No	CoD disk drive conversion
2417	2416	No	CoD disk drive conversion
2617	2616	No	CoD disk drive conversion
2817	2816	No	CoD disk drive conversion

Host Adapters:

3143	3243	Yes	Host adapter conversion
3143	3245	Yes	Host adapter conversion
3243	3143	Yes	Host adapter conversion
3243	3245	Yes	Host adapter conversion
3245	3143	Yes	Host adapter conversion
3245	3243	Yes	Host adapter conversion

Encryption Disk Drive Sets:

5016	5116	Yes	Encryption disk drive set conversion
5016	5216	Yes	Encryption disk drive set conversion
5116	5216	Yes	Encryption disk drive set conversion

Encryption Standby CoD Disk Drive Sets:

5017	5016	No	Encryption CoD disk drive conversion
5117	5116	No	Encryption CoD disk drive conversion
5217	5216	No	Encryption CoD disk drive conversion

SSD Disk Drive Sets:

6016	6116	Yes	SSD disk drive conversion

Feature Conversions (Machine type 2421 Model 931 or 932 to 941)

Model 9xE Position indicators:

Feature From	To	Returned Parts *	Description
0321	0340	Yes	Model 9xE position indicator conversion
0322	0341	Yes	Model 9xE position indicator conversion
0323	0342	Yes	Model 9xE position indicator conversion
0324	0343	Yes	Model 9xE position indicator conversion

I/O Enclosures:

1300	1301	Yes	I/O enclosure conversion

I/O Cables:

312	1320	Yes	I/O cable conversion
1313	1321	Yes	I/O cable conversion
1314	1322	Yes	I/O cable conversion
1316	1321	Yes	I/O cable conversion

Microcode Bundle Family:

1701	1711	No	Microcode bundle family conversion
1702	1711	No	Microcode bundle family conversion
1703	1711	No	Microcode bundle family conversion

Device Adapters:

3041	3043	Yes	Device adapter conversion

Host Adapters:

3113	3143	Yes	Host adapter conversion
3213	3243	Yes	Host adapter conversion
3215	3245	Yes	Host adapter conversion

Processor Memory:

4011	4212	Yes	Processor memory conversion
4012	4212	Yes	Processor memory conversion
4013	4213	Yes	Processor memory conversion
4014	4214	Yes	Processor memory conversion
4112	4222	Yes	Processor memory conversion
4113	4223	Yes	Processor memory conversion
4114	4224	Yes	Processor memory conversion
4115	4225	Yes	Processor memory conversion

Function Authorization indicators:

7000	7030	No	OEL function authorization indicator conversion
7001	7031	No	OEL function authorization indicator conversion
7002	7032	No	OEL function authorization indicator conversion
7003	7033	No	OEL function authorization indicator conversion
7004	7034	No	OEL function authorization indicator conversion
7005	7035	No	OEL function authorization indicator conversion
7010	7040	No	OEL function authorization indicator conversion
7015	7045	No	OEL function authorization indicator conversion
7090	7091	No	FICON function authorization indicator conversion
7200	7250	No	PTC function authorization indicator conversion
7201	7251	No	PTC function authorization indicator conversion
7202	7252	No	PTC function authorization indicator conversion
7203	7253	No	PTC function authorization indicator conversion
7204	7254	No	PTC function authorization indicator conversion
7205	7255	No	PTC function authorization indicator conversion
7210	7260	No	PTC function authorization indicator conversion
7230	7250	No	PTC Add function authorization indicator conversion
7231	7251	No	PTC Add function authorization indicator conversion
7232	7252	No	PTC Add function authorization indicator conversion
7233	7253	No	PTC Add function authorization indicator conversion
7234	7254	No	PTC Add function authorization indicator conversion
7235	7255	No	PTC Add function authorization indicator conversion
7240	7260	No	PTC Add function authorization indicator conversion

```
7300  7350   No       SE function  authorization indicator conversion
7301  7351   No       SE function  authorization indicator conversion
7302  7352   No       SE function  authorization indicator conversion
7303  7353   No       SE function  authorization indicator conversion
7304  7354   No       SE function  authorization indicator conversion
7305  7355   No       SE function  authorization indicator conversion
7310  7360   No       SE function  authorization indicator conversion
7330  7350   No       SE Add function  authorization indicator conversion
7331  7351   No       SE Add function  authorization indicator conversion
7332  7352   No       SE Add function  authorization indicator conversion
7333  7353   No       SE Add function  authorization indicator conversion
7334  7354   No       SE Add function  authorization indicator conversion
7335  7355   No       SE Add function  authorization indicator conversion
7340  7360   No       SE Add function  authorization indicator conversion
7420  7480   No       MGM function  authorization indicator conversion
7421  7481   No       MGM function  authorization indicator conversion
7422  7482   No       MGM function  authorization indicator conversion
7423  7483   No       MGM function  authorization indicator conversion
7424  7484   No       MGM function  authorization indicator conversion
7425  7485   No       MGM function  authorization indicator conversion
7430  7490   No       MGM function  authorization indicator conversion
7440  7500   No       MM function  authorization indicator conversion
7441  7501   No       MM function  authorization indicator conversion
7442  7502   No       MM function  authorization indicator conversion
7443  7503   No       MM function  authorization indicator conversion
7444  7504   No       MM function  authorization indicator conversion
7445  7505   No       MM function  authorization indicator conversion
7450  7510   No       MM function  authorization indicator conversion
7540  7500   No       MM Add function  authorization indicator conversion
7541  7501   No       MM Add function  authorization indicator conversion
7542  7502   No       MM Add function  authorization indicator conversion
7543  7503   No       MM Add function  authorization indicator conversion
7544  7504   No       MM Add function  authorization indicator conversion
7545  7505   No       MM Add function  authorization indicator conversion
7550  7510   No       MM Add function  authorization indicator conversion
7460  7520   No       GM function  authorization indicator conversion
7461  7521   No       GM function  authorization indicator conversion
7462  7522   No       GM function  authorization indicator conversion
7463  7523   No       GM function  authorization indicator conversion
7464  7524   No       GM function  authorization indicator conversion
7465  7525   No       GM function  authorization indicator conversion
7470  7530   No       GM function  authorization indicator conversion
7560  7520   No       GM Add function  authorization indicator conversion
7561  7521   No       GM Add function  authorization indicator conversion
7562  7522   No       GM Add function  authorization indicator conversion
7563  7523   No       GM Add function  authorization indicator conversion
7564  7524   No       GM Add function  authorization indicator conversion
7565  7525   No       GM Add function  authorization indicator conversion
7570  7530   No       GM Add function  authorization indicator conversion
7600  7650   No       RMZ function  authorization indicator conversion
7601  7651   No       RMZ function  authorization indicator conversion
7602  7652   No       RMZ function  authorization indicator conversion
7603  7653   No       RMZ function  authorization indicator conversion
7604  7654   No       RMZ function  authorization indicator conversion
7605  7655   No       RMZ function  authorization indicator conversion
7610  7660   No       RMZ function  authorization indicator conversion
7630  7680   No       RMZ resync function  authorization indicator conversion
7631  7681   No       RMZ resync function  authorization indicator conversion
7632  7682   No       RMZ resync function  authorization indicator conversion
7633  7683   No       RMZ resync function  authorization indicator conversion
7634  7684   No       RMZ resync function  authorization indicator conversion
7635  7685   No       RMZ resync function  authorization indicator conversion
7640  7690   No       RMZ resync function  authorization indicator conversion
7800  7820   No       PAV function  authorization indicator conversion
7801  7821   No       PAV function  authorization indicator conversion
7802  7822   No       PAV function  authorization indicator conversion
7803  7823   No       PAV function  authorization indicator conversion
7804  7824   No       PAV function  authorization indicator conversion
7805  7825   No       PAV function  authorization indicator conversion
7810  7830   No       PAV function  authorization indicator conversion
```

Feature Conversions (Machine type 2421 Model 92E to 94E)

Model 9xE Position indicators:

Feature From	To	Returned Parts *	Description
0321	0340	Yes	Model 9xE position indicator conversion
0322	0341	Yes	Model 9xE position indicator conversion
0323	0342	Yes	Model 9xE position indicator conversion
0324	0343	Yes	Model 9xE position indicator conversion

I/O Enclosures:

1300	1301	Yes	I/O enclosure conversion

I/O Cables:

1312	1320	Yes	I/O cable conversion
1313	1321	Yes	I/O cable conversion
1314	1322	Yes	I/O cable conversion
1316	1321	Yes	I/O cable conversion

Device Adapters:

3041	3043	Yes	Device adapter conversion

Host Adapters:

3113	3143	Yes	Host adapter conversion
3213	3243	Yes	Host adapter conversion
3215	3245	Yes	Host adapter conversion

* Parts removed or replaced become the property of IBM and must be returned.

Publications

The *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515) has been updated to reflect this announcement will be available by October 20, 2009.

The following publications are shipped with the DS8000 series:

Title	Order number
IBM System Storage DS8000 Introduction and Planning Guide	GC35-0515
IBM System Storage DS8000 Host Systems Attachment Guide	SC26-7917
IBM System Storage DS Command-Line Interface User's Guide	GC53-1127
IBM System Storage DS Open Application Programming Interface Referee	GC35-0516
IBM System Storage Statement of Limited Warranty	GC26-7919
IBM System Storage Licensed Machine Code Agreement	GC26-7918

For DS8000 publications, visit

http://www-1.ibm.com/servers/storage/support/disk/index.html

Publications can be ordered from your IBM representative, by direct order, or through the Publications Center Web site at

http://www.elink.ibmlink.ibm.com/public/applications/publications/ cgibin/pbi.cgi

The DS8000 information center is designed to provide comprehensive, browser-based information. It can help provide easy access to tasks, concepts, referee information, tutorials, code samples, scenarios, and other product information. It contains assistance for the tasks that users must perform and links to additional information. To find information, users can search, browse the contents, use the index, follow links from one topic to related topics, and print the topics they want to read offline.

The information center is available at

http://www.ibm.com/support/publications/us/library/

The IBM System Storage DS8000 Information Center allows you to browse and search documentation for the DS8000 series.

The IBM System Storage DS8000 Information Center is at

http://publib.boulder.ibm.com/infocenter/dsichelp/ds8000ic/index.jsp

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

http://www.ibm.com/services/

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM, you may link directly to Business Partner information for this announcement. A PartnerWorld ID and password are required (use IBM ID).

https://www.ibm.com/partnerworld/mem/sla.jsp?num=109-702

Technical information

Specified operating environment

Physical specifications

Refer to the *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515). This publication is available at

http://www-03.ibm.com/servers/storage/support/disk/

Operating environment

Disk drive systems

Model 941 (2-Way):

- Maximum physical storage capacity: 128 TB
- Power consumption: 6.7 KW

Model 941 (4-Way):

- Maximum physical storage capacity: 128 TB
- Power consumption: 7.3 KW

Model 94E with I/O:

- Maximum physical storage capacity: 256 TB
- Power consumption: 7.1 KW

Model 94E without I/O:

- Maximum physical storage capacity: 256 TB
- Power consumption: 5.7 KW

Limitations

Conversions between warranty machine types are not supported.

For the Dynamic Volume Expansion function, volumes that are expanded may not be in Copy Services relationships (Point-in-Time Copy, FlashCopy SE, Metro Mirror, Global Mirror, Metro/Global Mirror, and z/OS Global Mirror) while expansion is taking place.

The following activities are disruptive:

- Removal of an expansion unit model from the base unit model. Data may not be preserved during this activity.
- The amount of physical capacity within a 2421 system that can be logically configured for use will be enforced by the 2421 Licensed Machine Code to maintain compliance with the extent of IBM authorization established for licensed functions activated on the machine.

The deactivation of an activated licensed function, or a lateral change or reduction in the license scope, is a non-disruptive activity which will occur at the next machine IML.

- A lateral change is defined as changing the license scope from FB to CKD or from CKD to FB.
- A reduction is defined as changing the license scope from ALL to FB or from ALL to CKD.

If a third and fourth expansion unit are attached to a DS8700, the following considerations need to be made:

- If the primary in a Global Mirror relationship has a third and fourth expansion frame, then FlashCopy pairs are limited to 1,000
- Global Mirror and Metro/Global Mirror configurations are not supported in System i environments

Encryption Limitations

Plant configured systems with Encryption Drive Set support (feature #1751) can support field installation of encrypted drives. Existing DS8000 systems or systems lacking the Encryption Drive Set support feature will not support Encryption Drive sets.

Encryption Drive Sets are not supported with Fibre Channel Drive sets, SATA drive sets, or SSD Drive Sets.

SATA Limitations

1 TB 7,200 rpm SATA Drive sets are not supported in RAID-5 configurations.

SEFLC Repository data is not supported on 1 TB 7,200 rpm SATA drive sets.

SSD Limitations

SSD drive sets are not supported in RAID-6 or RAID-10 configurations.

Copy services limitations

- Thin Provisioning is not supported
- Remote Pair FlashCopy is not supported

Other limitations

- No GUI on the Hardware Management Console (HMC).

Model conversion/upgrade limitations

- No model conversion from 9B2 to 941.
- Model conversions from 931 and 932 to 941 is a factory model upgrade. The purchase of a Request for Price Quotation (RPQ) is required. This is highly disruptive and requires migration of data off and back on to the system. Additional requirements may be present depending on the configuration of the system to be converted. These requirements will be defined as part of the ordering process for the conversion and may be priced. Some system options are not supported as part of the model conversion process and will need to be removed prior to the upgrade.
- During a Model Upgrade in a supported configuration (931 or 932), any unsupported features will need to be removed via RPO MES or converted to supported features to allow the Model conversion to be ordered. Model Conversion are factory upgrades, and can only be performed in an IBM facility. Shipping arrangements, data migration or additional steps may be required.

Unsupported models conversions and features:

```
Unsupported Model Conversions

Model 9B2                       8300- LPAR
Model 9AE                       8300- LPAR Expansion Frame

Unsupported Feature Conversions

Feature 0311                    92E 1st Expansion on a 2way
Feature 0707                    Thin Provisioning Indicator
```

Feature 0723	PTC Add Indicator
Feature 0733	SE Add Indicator
Feature 0754	MM Add Indicator
Feature 0756	GM Add Indicator
Feature 1110	External Management Console
Feature 1173 - 1189	MC Line Cord Groups 3 - 19
Feature 1199	HMC Ethernet Cable Pair
Feature 1213	Disk Drive Cable Group 3
Feature 1430, 1431, 1432	ESCON® Cables
Feature 1440, 1441	ESCON PL Cables
Feature 1801, 1802, 1803	RM Ethernet Adapter Pairs
Feature 1906	Earthquake Resistance Kit
Feature 3311, 3321, 3331	ESCON Adapters
Feature 4011	16 GB Processor Memory
Feature 9090, 9091	AC Input Voltage
Feature 9110, 9111	External Management Console - Keyboard
Feature 1100	Management console - internal
Feature 9100	Internal management console keyboard - US English
Feature 9101	Internal management console keyboard - Japanese
Feature 3111	2Gb SW FCP/FICON adapter
Feature 3211	2Gb LW FCP/FICON adapter
Feature 1600	BSMI Certificate - Taiwan
Feature 3011	Device Adapter Pair
Feature 2016	73 GB 15K Drive Set
Feature 2017	73 GB 15K CoD Drive Set
Feature 2116	146 GB 10K Drive Set
Feature 2117	146 GB 10K CoD Drive Set
Feature 2316	300 GB 10K Drive Set
Feature 2317	300 GB 10K CoD Drive Set
Feature 2116	146 GB 10K Drive Set
Feature 2117	146 GB 10K CoD Drive Set
Feature 2316	300 GB 10K Drive Set
Feature 2317	300 GB 10K CoD Drive Set
Feature 7215	PTC - 200 TB indicator
Feature 7245	PTC Add - 200 TB indicator
Feature 7315	SE - 200 TB indicator
Feature 7345	SE Add - 200 TB indicator
Feature 7435	MGM - 200 TB indicator
Feature 7455	MM - 200 TB indicator
Feature 7475	GM - 200 TB indicator
Feature 7555	MM Add - 200 TB indicator
Feature 7575	GM Add - 200 TB indicator
Feature 7615	RMZ - 200 TB indicator
Feature 7645	RMZ resync - 200 TB indicator
Feature 7815	PAV - 200 TB indicator

Planning information

Customer responsibilities

Physical configuration planning

Physical configuration planning is a customer responsibility. Your disk marketing specialist can help you plan and select the DS8000 series physical configuration and features. Introductory information, including required and optional features, can be found in the *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515).

Capacity and performance planning assistance is also available. Through the use of Disk Magic, your disk marketing specialist can help you plan and anticipate performance characteristics for specific workloads by modelling proposed configurations.

Installation planning

Installation planning is a customer responsibility. Information about planning the installation of your DS8000 series, including equipment, site, and power

requirements, can be found in the *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515).

Logical configuration planning and application

Logical configuration planning is a customer responsibility. Logical configuration refers to the creation of RAID ranks, volumes, and/or LUNs, and the assignment of the configured capacity to servers.

Application of the initial logical configuration and all subsequent modifications to the logical configuration is a customer responsibility. The logical configuration can be created, applied, and modified using the DS Storage Manager, DS CLI, or DS Open API.

IBM Global Services (IGS) will also apply and/or modify your logical configuration (fee-based services).

Licensed Machine Code Planning and Application

IBM may release changes to the DS8000 series Licensed Machine Code. IBM plans to make most DS8000 series Licensed Machine Code changes available for download by the DS8000 series system from the IBM System Storage technical support worldwide Web. Please note that not all Licensed Machine Code changes may be available via the support Web site. If the machine does not function as warranted and your problem can be resolved through your application of downloadable Licensed Machine Code, you are responsible for downloading and installing these designated Licensed Machine Code changes as IBM specifies. IBM has responsibility for installing changes that IBM does not make available for you to download. The DS8000 series includes many enhancements to make the Licensed Machine Code change process simpler, quicker and more automated. If you would prefer, you may request IBM to install downloadable Licensed Machine Code changes; however, you may be charged for that service.

Calculating physical and effective capacity

Refer to the *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515) for capacity calculation guidelines.

Encryption planning

Encryption planning is a customer responsibility. There are three major planning components to the implementation of an encryption environment. Please review all planning requirements and include them in your installation considerations.

- Key Server Planning
- Tivoli Key Lifecycle Manager Planning
- Full Disk Encryption Activation Review Planning

Key server planning

Key server planning is a customer responsibility. Introductory information, including required and optional features, can be found in the *IBM System Storage DS8000 Introduction and Planning Guide* (GC35-0515).

IBM, according to encryption best practices, the DS8700 requires at least two key servers and associated software for each site which has one or more encryption-enabled DS8000 systems. One server must be isolated, the others can be of any supported key server configuration. Any site that operates independently of other sites must have key servers for the encryption enabled DS8000 systems at that site.

- An isolated key server is a separately purchased hardware product (using System Storage Productivity Center, Machine type 2805 MC3 or MC4) for the DS8700 (feature #0021). Isolated key servers will not support any additional hardware or software beyond supported key management software. An isolated server must only use internal disk for the operating system and for all files required for

key management operation. An isolated key server can be attached to multiple DS8000 systems.
- IBM requires at least two key servers to be configured to each DS8000 that is encryption enabled. At least one isolated key server must be attached to each encryption enabled DS8000.
- DS8000 Encryption environments are recommended to configure external Laptop HMC for high availability (feature #1130 or #1131).
- It is the customer's responsibility to replicate any key labels across all key servers attached to a given encryption-enabled DS8000 before configuring that key label on the DS8000.

Dual platform key server planning

DS8000 supports the ability to configure two independent key labels for each encryption-enabled DS8000. This capability allows the use of two independent key server platforms when one or both key server platforms are using secure-key mode key stores. This allows the isolated key server platform to be used in conjunction with a second key server platform that is operating with a secure-key mode key store.

For customers needing dual platform key server support on DS8000, the installation of TKLM IFIX 2 (TKLM Version 1.0.0.2) is recommended to support displaying both key labels in the GUI. Additionally, for customers who intend to replicate keys between separate zSeries® Sysplexes using ICSF with the JCECCARACFKS key store in secure key mode and with the secure key configuration flag set in TKLM, TKLM Fix Pack 3 (TKLM Version 1.0.0.3) is required.

Tivoli Key Lifecycle Manager planning

The DS8000 series supports:

- IBM Tivoli Key Lifecycle Manager V1.0

Program number	VRM	Program name
5724-T60	1.0.0	IBM Tivoli Key Lifecycle Manager
5608-A91	1.0.0	IBM Tivoli Key Lifecycle Manager (distributed for non-Passport Advantage)
		IBM Tivoli Key Lifecycle Manager for z/OS V1.0

Program number	VRM	Program name
5698-B35	1.0.0	IBM Tivoli Key Lifecycle Manager for z/OS

Isolated key servers ordered with feature number 0021, (Machine type 2805 Model MC3 or MC4) will have a Linux operating system and TKLM software pre-installed. Customers will need to acquire a TKLM license for use of the TKLM software, ordered separately from the standalone server hardware.

Refer to the following publications:

- IBM Tivoli Key Lifecycle Manager Quick Start Guide (GI11-8738)
- IBM Tivoli Key Lifecycle Manager Installation and Configuration Guide (SC23-9977)
- IBM Tivoli Key Lifecycle Manager Program Directory (for z/OS) (GI11-4300)

Full Disk Encryption Activation review planning

Full Disk Encryption Activation is a customer responsibility. IBM Full Disk Encryption offerings must be activated prior to use. This activation is part of the installation and configuration steps required for use of the technology. This installation and activation review is performed by the IBM Systems and Technology Lab Services group.

Send e-mail to

storsvcs@us.ibm.com

Visit the Web site below and click on "Contact now" to submit your inquiry or request.

http://www.ibm.com/systems/services/labservices/ labservices_storage. html

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Model conversions

DS8100, DS8300, and DS8700 model conversions are disruptive. In addition, data may not be preserved during the conversion. Data migration or backup/restore is a customer responsibility. Fee-based data migration services are available from IGS.

Implementation may require the purchase of certain Request for Price Quotations (RPQs) as a prerequisite. These RPQs would facilitate the relocation of installed features, such as disk drive sets, device adapters, disk enclosures, and I/O enclosures, within the machine or across the system. Contact your IBM representative for details.

The conversion of a Turbo Model 931 to a DS8700 Model 941 (2-way) may require the purchase of additional features including but not limited to:

- An upgrade to 32 GB of processor memory (feature number 4xxx) if the Turbo Model 931 has 16 GB of processor memory (feature number 4xxx)
- An upgrade to POWER6 2-way processor card (feature number 43xx)
- Additional cable and infrastructure features
- Additional Licensed Microcode Features (referred to as advanced function)

The conversion of a Turbo Model 932 to a DS8700 Model 941 (4-way) may require the purchase of additional features including but not limited to:

- An upgrade to POWER6 4-way processor card (feature number 43xx)
- Additional cable and infrastructure features
- Additional Licensed Microcode Features (referred to as advanced function)

You are responsible for downloading or obtaining from IBM, and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet Web site or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Cable orders

Cables are required to connect DS8000 series 4Gb FCP/FICON host adapters ports to server or fabric ports.

Cables can be purchased using DS8000 series feature numbers. Additional cable options, along with product support services such as installation, is offered by IBM Global Services' Networking Services.

Fibre Channel/FICON (shortwave): Shortwave Fibre Channel and FICON ports on the DS8000 series require a 50-micron (multimode) fiber optic cable terminated with an LC connector.

Fibre Channel cables can be purchased using feature numbers 141x for 50-micron cables.

Fibre Channel/FICON (longwave): Longwave Fibre Channel and FICON ports on the DS8000 series require either a 9-micron (singlemode) or 50-micron (multimode) fiber optic cable terminated with an LC connector. A 50-micron cable is required when the longwave port is operating at a 4Gb per second transfer rate.

Fibre Channel cables can be purchased using feature numbers 141x for 50-micron cables and numbers 142x for 9-micron cables.

Security, auditability, and control

This product uses the security and auditability features of the host hardware, host software, and/or application software to which it is attached.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

http://www.ibm.com/support/electronic

Terms and conditions

Volume orders: Contact your IBM representative.

IBM Global Financing

Yes

Warranty period

One year.

Warranty service

Warranty Service:IBM On-Site Repair (IOR) 24 hours a day, 7 days a week, same-day response.

Warranty service upgrades

Usage plan machine

No

IBM hourly service rate classification

Three.

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features

Yes

Model conversions

Yes

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the Machine. In the United States, contact IBM at 1-800-IBM-SERV (426-7378), in other countries contact the local IBM office.

The following activities are a customer responsibility:

- Installation planning.
- Retrieval and installation of feature activation codes.
- Logical configuration planning and application.

Refer to the Customer responsibilities section for more information.

Graduated program license charges apply

No

Licensed internal code

IBM Licensed Internal Code (LIC) is licensed for use by a customer on a specific machine, designated by serial number, under the terms and conditions of the IBM License Agreement for Machine Code, to enable a specific machine to function in accordance with its specifications, and only for the capacity authorized by IBM and

acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting

http://www-304.ibm.com/systems/support/machine_warranties/machine_code.html

Specific Machine LIC Type Model:

- 2421-941
- 2421-94E

IBM may release changes to the Licensed Internal Code. IBM plans to make the Licensed Internal Code changes available for download from the IBMDS8000 Code Bundle Information Web site

http://www-01.ibm.com/support/docview.wss?rs=1114&context=HW2C2&dc=500&q1=ssg1*&uid=ssg1S1002949&loc=en_US&cs=utf-8&lang=en

If the machine does not function as warranted and your problem can be resolved through your application of downloadable Licensed Internal Code, you are responsible for downloading and installing these designated Licensed Internal Code changes as IBM specifies. If you would prefer, you may request IBM to install the downloadable Licensed Internal Code changes; however, you may be charged for that service.

Educational allowance

A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 15% for the products in this announcement.

Prices

Product charges

Description	Machine Type	Model	Feature Number
System Storage DS8700	2421	941	
Model 9xE Merge Indicator:			
- 9xE Factory Merge			0001
DoD Indicator			0020
JEMT indicator			0021
Eligible for EU Shipment			0100
Shipping Weight Reduction			0200
Model 9xE Position Indicator:			
- 941 - 94E position 1			0340
- 941 - 92E/94E position 2			0341
- 941 - 92E/94E position 3			0342
- 941 - 92E/94E position 4			0343
Licensed function indicators:			
- OEL indicator			0700
- FICON attach indicator			0703
- DB protection indicator			0708
- High performance FICON indicator			0709
- PTC indicator			0720
- SE indicator			0730

- MGM indicator	0742
- MM indicator	0744
- GM indicator	0746
- RMZ indicator	0760
- RMZ resync indicator	0763
- PAV indicator	0780
- HyperPAV indicator	0782
Initial System Capacity:	
- Up to 2.0 TB capacity	0800
- 2.1 to 5.0 TB capacity	0802
- 5.1 to 10.0 TB capacity	0805
- 10.1 to 25.0 TB capacity	0810
- 25.1 to 50.0 TB capacity	0815
- 50.1 to 75.0 TB capacity	0820
- 75.1 to 100.0 TB capacity	0825
- 100.1 to 150.0 TB capacity	0830
- 150.1 to 200.0 TB capacity	0835
- 200.1 to 250.0 TB capacity	0840
- 250.1 to 300.0 TB capacity	0845
- 300.0 to 350.0 TB capacity	0850
- 350.1 to 400®.0 TB capacity	0855
- 400.1 to 450.0 TB capacity	0860
- 450.1 to 500.0 TB capacity	0865
- 500.1 to 550.0 TB capacity	0870
- 550.1 to 600.0 TB capacity	0871
- 600.1 to 700.0 TB capacity	0872
- 700.1 to 800.0 TB capacity	0873
- 800.1 to 900.0 TB capacity	0874
- 900.1 to 1000.0 TB capacity	0875
- 1000.1 to 1100.0 TB capacity	0876
Standby CoD indicators:	
- Non-Standby CoD	0900
- Standby CoD Indicator	0901
- Standby CoD Indicator	0902
- Standby CoD Indicator	0903
- Standby CoD Indicator	0904
Administrative indicators:	
- IBM/Openwave Alliance	0930
- IBM System i Indicator	0931
- IBM System p Indicator	0932
- IBM System x Indicator	0933
- IBM System z Indicator	0934
- Linux Indicator	0940
- Global Mirror Indicator	0950
Power:	
- Remote Power Control	1000
- Battery Assembly	1050
- Extended PLD	1055
Single Phase Power Cords:	
- SPP cord group 1	1060
- SPP cord group 2	1065
- SPP cord group 3	1067
Line Cords:	
- Line Cord (US/LA/AP/Canada)	1090
- Line Cord (EMEA)	1091
- Line Cord (Japan)	1092
- Line Cord (US Chicago)	1093
Management Console:	
- Mgmt console - English Laptop internal	1120
- Mgmt console - Japanese Laptop internal	1121

- Mgmt console - English Laptop external	1130
- Mgmt console - Japanese Laptop external	1131
External Management Console - Line Cords:	
- MC Line Cord Standard Rack	1170
- MC Line Cord Group 1	1171
- MC Line Cord Group 2	1172
Disk Enclosure:	
- Disk Enclosure Pair	1210
Disk Cable:	
- Disk Drive Cable Group 1	1211
I/O enclosure pair PCIE	1301
I/O cables:	
- PCI-E cable group 1	1320
- PCI-E cable group 2	1321
Fibre Channel/FICON Cables:	
- 50 um Fibre Cable (LC)	1410
- 50 um Fibre Cable (LC/SC)	1411
- 50 um Fibre Cable (Jumper)	1412
- 9 um Fibre Cable (LC)	1420
- 9 um Fibre Cable (LC/SC)	1421
- 9 um Fibre Cable (Jumper)	1422
Microcode Bundle Family:	
- Release 5 Bundle Family	1711
Encryption Support:	
- Encrypted Drive Set Support	1751
performance Accelerator	1980
Hardware Installation MES	1999
Disk Drive Sets:	
- 146 GB 15K Drive Set	2216
- 300 GB 15K Drive Set	2416
- 450 GB 15K Drive Set	2616
- 1 TB 7.2K SATA Drive Set	2816
Standby CoD Disk Drive Sets:	
- 146 GB 15K CoD Drive Set	2217
- 300 GB 15K CoD Drive Set	2417
- 450 GB 15K CoD Drive Set	2617
- 1 TB 7.2K SATA CoD Drive Set	2817
Disk Enclosure Filler Set	2999
Device Adapter:	
- Device Adapter Pair III	3043
Host Adapters:	
- 4Gb SW FCP/FICON Adapter PCIE	3143
- 4Gb LW FCP/FICON Adapter PCIE	3243
- 4Gb 10km LW FCP/FICON Adapter PCIE	3245
Processor Memory:	
- 32 GB Processor Memory (2-Way only)	4212
- 64 GB Processor Memory (2-Way only)	4213

- 128 GB Processor Memory (2-Way only)	4214
- 32 GB Processor Memory (4-Way only)	4222
- 64 GB Processor Memory (4-Way only)	4223
- 128 GB Processor Memory (4-Way only)	4224
- 256 GB Processor Memory (4-Way only)	4225
- 384 GB Processor Memory (4-Way only)	4226
Processor Cards:	
- 2 Way Processor Card	4301
- 4 Way Processor Card	4302
Encryption Disk Drive Sets:	
- 146 GB 15K FDE Drive Set	5016
- 300 GB 15K FDE Drive Set	5116
- 450 GB 15K FDE Drive Set	5216
Encryption Standby CoD Disk Drive Sets:	
- 146 GB 15K FDE CoD Drive Set	5017
- 300 GB 15K FDE CoD Drive Set	5117
- 450 GB 15K FDE CoD Drive Set	5217
SSD Disk Drive Sets:	
- 73 GB SSD Drive Set	6016
- 146 GB SSD Drive Set	6116
Function Authorization indicators:	
- OEL - inactive	7030
- OEL - 1 TB unit	7031
- OEL - 5 TB unit	7032
- OEL - 10 TB unit	7033
- OEL - 25 TB unit	7034
- OEL - 50 TB unit	7035
- OEL - 100 TB unit	7040
- OEL - 200 TB unit	7045
- OEL - Value Unit inactive	7050
- OEL - 1 Value Unit	7051
- OEL - 5 Value Unit	7052
- OEL - 10 Value Unit	7053
- OEL - 25 Value Unit	7054
- OEL - 50 Value Unit	7055
- OEL - 100 Value Unit	7060
- OEL - 200 Value Unit	7065
- DB protection indicator	7080
- FICON indicator	7091
- zHPF indicator	7092
- PTC - inactive indicator	7250
- PTC - 1 TB indicator	7251
- PTC - 5 TB indicator	7252
- PTC - 10 TB indicator	7253
- PTC - 25 TB indicator	7254
- PTC - 50 TB indicator	7255
- PTC - 100 TB indicator	7260
- SE - inactive indicator	7350
- SE - 1 TB indicator	7351
- SE - 5 TB indicator	7352
- SE - 10 TB indicator	7353
- SE - 25 TB indicator	7354
- SE - 50 TB indicator	7355
- SE - 100 TB indicator	7360
- MGM - inactive indicator	7480
- MGM - 1 TB indicator	7481
- MGM - 5 TB indicator	7482
- MGM - 10 TB indicator	7483
- MGM - 25 TB indicator	7484
- MGM - 50 TB indicator	7485
- MGM - 100 TB indicator	7490
- MM - inactive indicator	7500
- MM - 1 TB indicator	7501
- MM - 5 TB indicator	7502

- MM - 10 TB indicator			7503
- MM - 25 TB indicator			7504
- MM - 50 TB indicator			7505
- MM - 100 TB indicator			7510
- GM - inactive indicator			7520
- GM - 1 TB indicator			7521
- GM - 5 TB indicator			7522
- GM - 10 TB indicator			7523
- GM - 25 TB indicator			7524
- GM - 50 TB indicator			7525
- GM - 100 TB indicator			7530
- RMZ - inactive indicator			7650
- RMZ - 1 TB indicator			7651
- RMZ - 5 TB indicator			7652
- RMZ - 10 TB indicator			7653
- RMZ - 25 TB indicator			7654
- RMZ - 50 TB indicator			7655
- RMZ - 100 TB indicator			7660
- RMZ resync - inactive indicator			7680
- RMZ resync - 1 TB indicator			7681
- RMZ resync - 5 TB indicator			7682
- RMZ resync - 10 TB indicator			7683
- RMZ resync - 25 TB indicator			7684
- RMZ resync - 50 TB indicator			7685
- RMZ resync - 100 TB indicator			7690
- PAV - inactive indicator			7820
- PAV - 1 TB indicator			7821
- PAV - 5 TB indicator			7822
- PAV - 10 TB indicator			7823
- PAV - 25 TB indicator			7824
- PAV - 50 TB indicator			7825
- PAV - 100 TB indicator			7830
- HyperPAV indicator			7899
IGF Transaction:			
- IGF transaction indicator			7999

Description	Machine Type	Model	Feature Number
System Storage DS8700 Expansion Unit	2421	94E	
Model 9xE Merge Indicator:			
- 9xE Factory Merge			0001
- 9xE Field Merge			0002
DoD Indicator			0020
JEMT indicator			0021
Eligible for EU Shipment			0100
Shipping Weight Reduction			0200
Model 9xE Position indicators:			
- 941 - 94E position 1			0340
- 941 - 92E/94E position 2			0341
- 941 - 92E/94E position 3			0342
- 941 - 92E/94E position 4			0343
Administrative indicators:			
- IBM/Openwave Alliance			0930
- IBM System i Indicator			0931
- IBM System p Indicator			0932
- IBM System x Indicator			0933
- IBM System z Indicator			0934
- Linux Indicator			0940

Power:	
- Remote Power Control	1000
- Battery Assembly	1050
- Extended PLD	1055
Single Phase Power Cords:	
- SPP cord group 1	1060
- SPP cord group 2	1065
- SPP cord group 3	1067
Line Cords:	
- Line Cord (US/LA/AP/Canada)	1090
- Line Cord (EMEA)	1091
- Line Cord (Japan)	1092
- Line Cord (US Chicago)	1093
Disk Enclosure:	
- Disk Enclosure Pair	1210
Disk Cable:	
- Disk Drive Cable Group 2	1212
- Disk Drive Cable Group 4	1214
I/O enclosure pair PCIE	1301
I/O cables:	
- PCI-E cable group 3	1322
Fibre Channel/FICON Cables:	
- 50 um Fibre Cable (LC)	1410
- 50 um Fibre Cable (LC/SC)	1411
- 50 um Fibre Cable (Jumper)	1412
- 9 um Fibre Cable (LC)	1420
- 9 um Fibre Cable (LC/SC)	1421
- 9 um Fibre Cable (Jumper)	1422
Performance Accelerator	1980
Hardware Installation MES	1999
Disk Drive Sets:	
- 146 GB 15K Drive Set	2216
- 300 GB 15K Drive Set	2416
- 450 GB 15K Drive Set	2616
- 1 TB 7.2K SATA Drive Set	2816
Standby CoD Disk Drive Sets:	
- 146 GB 15K CoD Drive Set	2217
- 300 GB 15K CoD Drive Set	2417
- 450 GB 15K CoD Drive Set	2617
- 1 TB 7.2K SATA CoD Drive Set	2817
Disk Enclosure Filler Set	2999
Device Adapters:	
- Device Adapter Pair III	3043
Host Adapters:	
- 4Gb SW FCP/FICON Adapter PCIE	3143
- 4Gb LW FCP/FICON Adapter PCIE	3243
- 4Gb 10km LW FCP/FICON Adapter PCIE	3245

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Encryption Disk Drive Sets:

- 146 GB 15K FDE Drive Set                    5016
- 300 GB 15K FDE Drive Set                    5116
- 450 GB 15K FDE Drive Set                    5216

Encryption Standby CoD Disk Drive Sets:

- 146 GB 15K FDE CoD Drive Set                5017
- 300 GB 15K FDE CoD Drive Set                5117
- 450 GB 15K FDE CoD Drive Set                5217

SSD Disk Drive Sets:

- 73 GB SSD Drive Set                         6016
- 146 GB SSD Drive Set                        6116

 = No Charge
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ServiceSuite™ and ServiceElect (formerly ESA Maintenance)

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

Model conversion purchase price

Model Conversions (Machine type 2421)

Model From	Model To
931	941 (2-way)
932	941 (4-way)
92E	94E

Limitations

- Expansion unit model 94E is not supported when converting Model 931 to 941 (2-way). The maximum of drives supported after conversion is only 128. The 931 - 92E Position 1 indicator (feature number 0311) to a Model 931 will need to be removed by following the RPO process.
- Expansion unit conversions will be limited to units in the second position, and those units must be converted when the controller system (Model 932) is converted. Only Model 932 units will support conversion to the Model 941 (4-way).

Feature conversion purchase price

Machine Type 2421 Model 941

Feature From	Feature To	Returned Parts *	Description	Continuous Maintenance
1320	1321	Yes	I/O cable conversion	Yes
2216	2416	Yes	Disk drive set conversion	Yes
2216	2616	Yes	Disk drive set conversion	Yes
2216	2816	Yes	Disk drive set conversion	Yes
2416	2616	Yes	Disk drive set conversion	Yes
2416	2816	Yes	Disk drive set conversion	Yes
2616	2816	Yes	Disk drive set conversion	Yes
2217	2216	No	CoD disk drive conversion	Yes
2417	2416	No	CoD disk drive conversion	Yes
2617	2616	No	CoD disk drive conversion	Yes
2817	2816	No	CoD disk drive conversion	Yes
3143	3243	Yes	Host adapter conversion	Yes
3143	3245	Yes	Host adapter conversion	Yes
3243	3143	Yes	Host adapter conversion	Yes
3243	3245	Yes	Host adapter conversion	Yes
3245	3143	Yes	Host adapter conversion	Yes
3245	3243	Yes	Host adapter conversion	Yes

4212	4213	Yes	Processor memory conversion	Yes
4212	4214	Yes	Processor memory conversion	Yes
4212	4222	Yes	Processor memory conversion	Yes
4213	4214	Yes	Processor memory conversion	Yes
4213	4223	Yes	Processor memory conversion	Yes
4214	4224	Yes	Processor memory conversion	Yes
4222	4223	No	Processor memory conversion	Yes
4222	4224	Yes	Processor memory conversion	Yes
4222	4225	Yes	Processor memory conversion	Yes
4222	4226	Yes	Processor memory conversion	Yes
4223	4224	Yes	Processor memory conversion	Yes
4223	4225	Yes	Processor memory conversion	Yes
4223	4226	No	Processor memory conversion	Yes
4224	4225	Yes	Processor memory conversion	Yes
4224	4226	Yes	Processor memory conversion	Yes
4225	4226	No	Processor memory conversion	Yes
4301	4302	Yes	Processor card conversion	Yes
5016	5116	Yes	Encryption disk drive set conversion	Yes
5016	5216	Yes	Encryption disk drive set conversion	Yes
5116	5216	Yes	Encryption disk drive set conversion	Yes
5017	5016	No	Encryption CoD disk drive conversion	Yes
5117	5116	No	Encryption CoD disk drive conversion	Yes
5217	5216	No	Encryption CoD disk drive conversion	Yes
6016	6116	Yes	SSD disk drive conversion	Yes

Machine Type 2421 Model 94E

Feature From	To	Returned Parts *	Description	Continuous Maintenance
2216	2416	Yes	Disk drive set conversion	Yes
2216	2616	Yes	Disk drive set conversion	Yes
2216	2816	Yes	Disk drive set conversion	Yes
2416	2616	Yes	Disk drive set conversion	Yes
2416	2816	Yes	Disk drive set conversion	Yes
2616	2816	Yes	Disk drive set conversion	Yes
2217	2216	No	CoD disk drive conversion	Yes
2417	2416	No	CoD disk drive conversion	Yes
2817	2816	No	CoD disk drive conversion	Yes
3143	3243	Yes	Host adapter conversion	Yes
3143	3245	Yes	Host adapter conversion	Yes
3243	3143	Yes	Host adapter conversion	Yes
3243	3245	Yes	Host adapter conversion	Yes
3245	3143	Yes	Host adapter conversion	Yes
3245	3243	Yes	Host adapter conversion	Yes
5016	5116	Yes	Encryption disk drive set conversion	Yes
5016	5216	Yes	Encryption disk drive set conversion	Yes
5116	5216	Yes	Encryption disk drive set conversion	Yes
5017	5016	No	Encryption CoD disk drive conversion	Yes
5117	5116	No	Encryption CoD disk drive conversion	Yes
5217	5216	No	Encryption CoD disk drive conversion	Yes
6016	6116	Yes	SSD disk drive conversion	Yes

Feature Conversions (Machine Type 2421 Model 931 or 932 to 941)

Model 9xE Position indicators:

Feature From	To	Returned Parts *	Description	Continuous Maintenance
0321	0340	Yes	Model 9xE position indicator conversion	Yes
0322	0341	Yes	Model 9xE position indicator conversion	Yes
0323	0342	Yes	Model 9xE position indicator conversion	Yes
0324	0343	Yes	Model 9xE position indicator conversion	Yes

I/O Enclosures:

1300	1301	Yes	I/O enclosure conversion	Yes

I/O Cables:

1312	1320	Yes	I/O cable conversion	Yes
1313	1321	Yes	I/O cable conversion	Yes
1314	1322	Yes	I/O cable conversion	Yes
1316	1321	Yes	I/O cable conversion	Yes

Microcode Bundle Family:

1701	1711	No	Microcode bundle family conversion	Yes
1702	1711	No	Microcode bundle family conversion	Yes
1703	1711	No	Microcode bundle family conversion	Yes

Device Adapters:

3041	3043	Yes	Device adapter conversion	Yes

Host Adapters:

3113	3143	Yes	Host adapter conversion	Yes
3213	3243	Yes	Host adapter conversion	Yes
3215	3245	Yes	Host adapter conversion	Yes

Processor Memory:

4011	4212	Yes	Processor memory conversion	Yes
4012	4212	Yes	Processor memory conversion	Yes
4013	4213	Yes	Processor memory conversion	Yes
4014	4214	Yes	Processor memory conversion	Yes
4112	4222	Yes	Processor memory conversion	Yes
4113	4223	Yes	Processor memory conversion	Yes
4114	4224	Yes	Processor memory conversion	Yes
4115	4225	Yes	Processor memory conversion	Yes

Function Authorization indicators:

7000	7030	No	OEL function authorization indicator conversion	Yes
7001	7031	No	OEL function authorization indicator conversion	Yes
7002	7032	No	OEL function authorization indicator conversion	Yes
7003	7033	No	OEL function authorization indicator conversion	Yes
7004	7034	No	OEL function authorization indicator conversion	Yes
7005	7035	No	OEL function authorization indicator conversion	Yes

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7010  7040   No        OEL function authorization   Yes
                       indicator conversion
7015  7045   No        OEL function authorization   Yes
                       indicator conversion
7090  7091   No        FICON function authorization Yes
                       indicator conversion
7200  7250   No        PTC function authorization   Yes
                       indicator conversion
7201  7251   No        PTC function authorization   Yes
                       indicator conversion
7202  7252   No        PTC function authorization   Yes
                       indicator conversion
7203  7253   No        PTC function authorization   Yes
                       indicator conversion
7204  7254   No        PTC function authorization   Yes
                       indicator conversion
7205  7255   No        PTC function authorization   Yes
                       indicator conversion
7210  7260   No        PTC function  authorization  Yes
                       indicator conversion
7230  7250   No       PTC Add function authorization Yes
                       indicator conversion
7231  7251   No       PTC Add function authorization Yes
                       indicator conversion
7232  7252   No       PTC Add function authorization Yes
                       indicator conversion
7233  7253   No       PTC Add function authorization Yes
                       indicator conversion
7234  7254   No       PTC Add function authorization Yes
                       indicator conversion
7235  7255   No       PTC Add function authorization Yes
                       indicator conversion
7240  7260   No       PTC Add function authorization Yes
                       indicator conversion
7300  7350   No        SE function authorization     Yes
                       indicator conversion
7301  7351   No        SE function authorization     Yes
                       indicator conversion
7302  7352   No        SE function authorization     Yes
                       indicator conversion
7303  7353   No        SE function authorization     Yes
                       indicator conversion
7304  7354   No        SE function authorization     Yes
                       indicator conversion
7305  7355   No        SE function authorization     Yes
                       indicator conversion
7310  7360   No        SE function authorization     Yes
                       indicator conversion
7330  7350   No        SE Add function authorization Yes
                       indicator conversion
7331  7351   No        SE Add function authorization Yes
                       indicator conversion
7332  7352   No        SE Add function authorization Yes
                       indicator conversion
7333  7353   No        SE Add function authorization Yes
                       indicator conversion
7334  7354   No        SE Add function authorization Yes
                       indicator conversion
7335  7355   No        SE Add function authorization Yes
                       indicator conversion
7340  7360   No        SE Add function authorization Yes
                       indicator conversion
7420  7480   No        MGM function authorization    Yes
                       indicator conversion
7421  7481   No        MGM function authorization    Yes
                       indicator conversion
7422  7482   No        MGM function authorization    Yes
                       indicator conversion
7423  7483   No        MGM function authorization    Yes
                       indicator conversion
7424  7484   No        MGM function authorization    Yes
                       indicator conversion
7425  7485   No        MGM function authorization    Yes
                       indicator conversion
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7430	7490	No	MGM function authorization indicator conversion	Yes
7440	7500	No	MM function authorization indicator conversion	Yes
7441	7501	No	MM function authorization indicator conversion	Yes
7442	7502	No	MM function authorization indicator conversion	Yes
7443	7503	No	MM function authorization indicator conversion	Yes
7444	7504	No	MM function authorization indicator conversion	Yes
7445	7505	No	MM function authorization indicator conversion	Yes
7450	7510	No	MM function authorization indicator conversion	Yes
7540	7500	No	MM Add function authorization indicator conversion	Yes
7541	7501	No	MM Add function authorization indicator conversion	Yes
7542	7502	No	MM Add function authorization indicator conversion	Yes
7543	7503	No	MM Add function authorization indicator conversion	Yes
7544	7504	No	MM Add function authorization indicator conversion	Yes
7545	7505	No	MM Add function authorization indicator conversion	Yes
7550	7510	No	MM Add function authorization indicator conversion	Yes
7460	7520	No	GM function authorization indicator conversion	Yes
7461	7521	No	GM function authorization indicator conversion	Yes
7462	7522	No	GM function authorization indicator conversion	Yes
7463	7523	No	GM function authorization indicator conversion	Yes
7464	7524	No	GM function authorization indicator conversion	Yes
7465	7525	No	GM function authorization indicator conversion	Yes
7470	7530	No	GM function authorization indicator conversion	Yes
7560	7520	No	GM Add function authorization indicator conversion	Yes
7561	7521	No	GM Add function authorization indicator conversion	Yes
7562	7522	No	GM Add function authorization indicator conversion	Yes
7563	7523	No	GM Add function authorization indicator conversion	Yes
7564	7524	No	GM Add function authorization indicator conversion	Yes
7565	7525	No	GM Add function authorization indicator conversion	Yes
7570	7530	No	GM Add function authorization indicator conversion	Yes
7600	7650	No	RMZ function authorization indicator conversion	Yes
7601	7651	No	RMZ function authorization indicator conversion	Yes
7602	7652	No	RMZ function authorization indicator conversion	Yes
7603	7653	No	RMZ function authorization indicator conversion	Yes
7604	7654	No	RMZ function authorization indicator conversion	Yes
7605	7655	No	RMZ function authorization indicator conversion	Yes
7610	7660	No	RMZ function authorization indicator conversion	Yes
7630	7680	No	RMZ resync function authorization indicator	Yes

			conversion	
7631	7681	No	RMZ resync function authorization indicator conversion	Yes
7632	7682	No	RMZ resync function authorization indicator conversion	Yes
7633	7683	No	RMZ resync function authorization indicator conversion	Yes
7634	7684	No	RMZ resync function authorization indicator conversion	Yes
7635	7685	No	RMZ resync function authorization indicator conversion	Yes
7640	7690	No	RMZ resync function authorization indicator conversion	Yes
7800	7820	No	PAV function authorization indicator conversion	Yes
7801	7821	No	PAV function authorization indicator conversion	Yes
7802	7822	No	PAV function authorization indicator conversion	Yes
7803	7823	No	PAV function authorization indicator conversion	Yes
7804	7824	No	PAV function authorization indicator conversion	Yes
7805	7825	No	PAV function authorization indicator conversion	Yes
7810	7830	No	PAV function authorization indicator conversion	Yes

Feature Conversions (Machine type 2421 Model 92E to 94E)

Model 9xE Position indicators:

Feature From	To	Returned Parts *	Description	Continuous Maintenance
0321	0340	Yes	Model 9xE position indicator conversion	Yes
0322	0341	Yes	Model 9xE position indicator conversion	Yes
0323	0342	Yes	Model 9xE position indicator conversion	Yes
0324	0343	Yes	Model 9xE position indicator conversion	Yes

I/O Enclosures:

1300	1301	Yes	I/O enclosure conversion	Yes

I/O Cables:

1312	1320	Yes	I/O cable conversion	Yes
1313	1321	Yes	I/O cable conversion	Yes
1314	1322	Yes	I/O cable conversion	Yes
1316	1321	Yes	I/O cable conversion	Yes

Device Adapters:

3041	3043	Yes	Device adapter conversion	Yes

Host Adapters:

3113	3143	Yes	Host adapter conversion	Yes
3213	3243	Yes	Host adapter conversion	Yes
3215	3245	Yes	Host adapter conversion	Yes

* Parts removed or replaced become the property of IBM and must be returned.

IBM Global Financing

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