IBM System Storage DS8700 (Machine type 2424) high-performance flagship high-end disk; four-year warranty model addresses your business and financial needs

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At a glance

New capabilities for the new IBM® System Storage™ DS8700 models, offering greater choices in price and performance, include:

- IBM System Storage DS8700 high-performance flagship Model 941 and expansion Model 94E
- POWER6-based processors
- PCI-E-based internal fabric improvements
- 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
- Value-based licensing

For ordering, contact your IBM representative, an IBM Business Partner, or IBM Americas Call Centers at 800-IBM-CALL (Reference: 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, dates, for more information.

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)
- .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 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, reference-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 tolerance 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, 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 resynchronization 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 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 INCITS 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 Hardware Requirements 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.

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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                                     2424      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
```

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- 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


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    Model    Feature

DS8700  Expansion Unit               2424       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 2424)

From      To          Returned
Model     Model       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 2424 Model 941)

Feature      Returned
From    To   Parts *    Description

I/O Cables:

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:

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 2424 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      Returned
From   To    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 2424 Model 931 or 932 to
   941)

   Feature      Returned
```

```
From   To    Parts *   Description

Model 9xE Position indicators:

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

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 2424 Model 92E to 94E)


Feature      Returned
From   To    Parts *    Description


Model 9xE Position indicators:
```

```
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 Planning Guide* (GC35-0515) has been updated to reflect this announcement. .

The following publications are shipped with the DS8000 series:

```
Title                                    Order number

IBM System Storage DS8000 Introduction and   GC35-0515
 Planning Guide

IBM System Storage DS8000 Host Systems       SC26-7917
 Attachment Guide

IBM System Storage DS Command-Line           GC53-1127
 Interface User's Guide

IBM System Storage DS Open Application        GC35-0516
 Programming Interface Reference

IBM System Storage Statement of              GC26-7919
 Limited Warranty

IBM System Storage Licensed Machine          GC26-7918
 Code Agreement
```

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, reference 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=109-757

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 2424 system that can be logically configured for use will be enforced by the 2424 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

Four years.

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:

- 2424-941
- 2424-94E

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

```
                              Machine        Feature
Description                   Type    Model  Number

System Storage DS8700         2424    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 - 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 - 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	2424	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

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

NC = No Charge
```

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 2424)

```
    Model
  From    To

  931    941 (2-way)
  932    941 (4-way)
```

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

```
Feature     Returned                           Continuous
From  To    Parts *   Description               Maintenance

Machine Type 2424 Model 941

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   Yes
                       conversion
5016  5216   Yes     Encryption disk drive set   Yes
                       conversion
5116  5216   Yes     Encryption disk drive set   Yes
                       conversion
5017  5016   No      Encryption CoD disk drive   Yes
                       conversion
5117  5116   No      Encryption CoD disk drive   Yes
                       conversion
```

```
5217  5216  No    Encryption CoD disk drive    Yes
                    conversion
6016  6116  Yes   SSD disk drive conversion    Yes
Machine Type 2424 Model 94E

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
5016  5116  Yes   Encryption disk drive set    Yes
                    conversion
5016  5216  Yes   Encryption disk drive set    Yes
                    conversion
5116  5216  Yes   Encryption disk drive set    Yes
                    conversion
5017  5016  No    Encryption CoD disk drive    Yes
                    conversion
5117  5116  No    Encryption CoD disk drive    Yes
                    conversion
5217  5216  No    Encryption CoD disk drive    Yes
                    conversion
6016  6116  Yes   SSD disk drive conversion    Yes
```

Feature Conversions (Machine Type 2424 Model 931 or 932 to 941)

```
Model 9xE Position indicators:

0321  0340  Yes   Model 9xE position indicator Yes
                    conversion
0322  0341  Yes   Model 9xE position indicator Yes
                    conversion
0323  0342  Yes   Model 9xE position indicator Yes
                    conversion
0324  0343  Yes   Model 9xE position indicator Yes
                    conversion


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

```
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


Function Authorization indicators:

7000  7030    No        OEL function authorization   Yes
                          indicator conversion
7001  7031    No        OEL function authorization   Yes
                          indicator conversion
7002  7032    No        OEL function authorization   Yes
                          indicator conversion
7003  7033    No        OEL function authorization   Yes
                          indicator conversion
7004  7034    No        OEL function authorization   Yes
                          indicator conversion
7005  7035    No        OEL function authorization   Yes
                          indicator conversion
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 indicator conversion	Yes
7304	7354	No	SE function authorization indicator conversion	Yes
7305	7355	No	SE function authorization indicator conversion	Yes
7310	7360	No	SE function authorization indicator conversion	Yes
7330	7350	No	SE Add function authorization indicator conversion	Yes
7331	7351	No	SE Add function authorization indicator conversion	Yes
7332	7352	No	SE Add function authorization indicator conversion	Yes
7333	7353	No	SE Add function authorization indicator conversion	Yes
7334	7354	No	SE Add function authorization indicator conversion	Yes
7335	7355	No	SE Add function authorization indicator conversion	Yes
7340	7360	No	SE Add function authorization indicator conversion	Yes
7420	7480	No	MGM function authorization indicator conversion	Yes
7421	7481	No	MGM function authorization indicator conversion	Yes
7422	7482	No	MGM function authorization indicator conversion	Yes
7423	7483	No	MGM function authorization indicator conversion	Yes
7424	7484	No	MGM function authorization indicator conversion	Yes
7425	7485	No	MGM function authorization indicator conversion	Yes
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	Yes

			indicator conversion	
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 conversion	Yes
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 2424 Model 92E to 94E)

Model 9xE Position indicators:

0321  0340   Yes     Model 9xE position indicator  Yes
                       conversion
0322  0341   Yes     Model 9xE position indicator  Yes
                       conversion
0323  0342   Yes     Model 9xE position indicator  Yes
                       conversion
0324  0343   Yes     Model 9xE position indicator  Yes
                       conversion


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.
```

Machine Type	Model	Description	List Price
2424	941	System Storage DS8700	$81,938
2424	94E	System Storage DS8700	$75,000

Machine Type	Model	Feature	Description	List Price
2424	941	0001	9xE Factory Merge	$0
2424	941	0100	Eligible for EU Shipment	$0
2424	941	0200	Shipping Weight Reduction	$0
2424	941	0340	941 - 94E position 1	$0
2424	941	0341	941 - 92E/94E position 2	$0
2424	941	0342	941 - 92E/94E position 3	$0
2424	941	0343	941 - 92E/94E position 4	$0
2424	941	0400	BSMI Certificate - Taiwan	$0
2424	941	0700	OEL indicator	$0
2424	941	0703	FICON attach indicator	$0
2424	941	0708	DB protection indicator	$0

2424	941	0709	High Perf FICON indicator	$0
2424	941	0720	PTC indicator	$0
2424	941	0730	SE indicator	$0
2424	941	0742	MGM indicator	$0
2424	941	0744	MM indicator	$0
2424	941	0746	GM indicator	$0
2424	941	0760	RMZ indicator	$0
2424	941	0763	RMZ resync indicator	$0
2424	941	0780	PAV indicator	$0
2424	941	0782	HyperPAV indicator	$0
2424	941	0800	Up to 2.0 TB capacity	$0
2424	941	0802	2.1 to 5.0 TB capacity	$0
2424	941	0805	5.1 to 10.0 TB capacity	$0
2424	941	0810	10.1 to 25.0 TB capacity	$0
2424	941	0815	25.1 to 50.0 TB capacity	$0
2424	941	0820	50.1 to 75.0 TB capacity	$0
2424	941	0825	75.1 to 100.0 TB capacity	$0
2424	941	0830	100.1 to 150.0 TB capacity	$0
2424	941	0835	150.1 to 200.0 TB capacity	$0
2424	941	0840	200.1 to 250.0 TB capacity	$0
2424	941	0845	250.1 to 300.0 TB capacity	$0
2424	941	0850	300.0 to 350.0 TB capacity	$0
2424	941	0855	350.1 to 400.0 TB capacity	$0
2424	941	0860	400.1 to 450.0 TB capacity	$0
2424	941	0865	450.1 to 500.0 TB capacity	$0
2424	941	0870	500.1 to 550.0 TB capacity	$0
2424	941	0871	550.1 to 600.0 TB capacity	$0
2424	941	0872	600.1 to 700.0 TB capacity	$0
2424	941	0873	700.1 to 800.0 TB capacity	$0
2424	941	0874	800.1 to 900.0 TB capacity	$0
2424	941	0875	900.1 to 1000.0 TB capacity	$0
2424	941	0876	1000.1 to 1100.0 TB capacity	$0
2424	941	0900	Non-Standby CoD	$0
2424	941	0901	Standby CoD indicator	$0
2424	941	0902	Standby CoD indicator	$0

2424	941	0903	Standby CoD indicator	$0
2424	941	0904	Standby CoD indicator	$0
2424	941	0930	IBM/Openwave Alliance	$0
2424	941	0931	IBM System i indicator	$0
2424	941	0932	IBM System p indicator	$0
2424	941	0933	IBM System x indicator	$0
2424	941	0934	IBM System z indicator	$0
2424	941	0940	Linux indicator	$0
2424	941	0950	Global Mirror indicator	$0
2424	941	1000	Remote Power Control	$1,100
2424	941	1050	Battery Assembly	$1,700
2424	941	1055	Extended PLD	$7,800
2424	941	1060	SPP cord group 1	$1,900
2424	941	1065	SPP cord group 2	$1,900
2424	941	1067	SPP cord group 3	$1,900
2424	941	1090	Line Cord (US/ LA/AP/Canada)	$1,900
2424	941	1091	Line cord (EMEA)	$500
2424	941	1092	Line cord (Japan)	$1,100
2424	941	1093	Line cord (US Chicago)	$1,900
2424	941	1120	MC English Laptop internal	$10,000
2424	941	1121	MC Japanese Laptop internal	$10,000
2424	941	1130	MC English Laptop external	$10,000
2424	941	1131	MC Japanese Laptop external	$10,000
2424	941	1170	MC Line cord Standard Rack	$100
2424	941	1171	MC Line Cord Group 1	$100
2424	941	1172	MC Line Cord Group 2	$100
2424	941	1210	Disk Enclosure Pair	$10,000
2424	941	1211	Disk Drive Cable Group 1	$1,000
2424	941	1301	I/O enclosure pair PCIE	$12,500
2424	941	1320	PCI-E cable group 1	$3,000
2424	941	1321	PCI-E cable group 2	$4,100
2424	941	1410	50 um Fibre Cable (LC)	$100
2424	941	1411	50 um Fibre Cable (LC/SC)	$100
2424	941	1412	50 um Fibre Cable (Jumper)	$100

2424	941	1420	9 um Fibre Cable (LC)	$100
2424	941	1421	9 um Fibre Cable (LC/SC)	$100
2424	941	1422	9 um Fibre Cable (Jumper)	$100
2424	941	1711	Release 5 Bundle Family	$40,000
2424	941	1751	Encrypted Drive Set Support	$0
2424	941	1980	Performance Accelerator	$5,000
2424	941	1999	Hardware Installation MES	$20,000
2424	941	2216	146 GB 15K Drive Set	$48,500
2424	941	2416	300 GB 15K Drive Set	$92,500
2424	941	2616	450 GB 15K Drive Set	$133,000
2424	941	2816	1 TB 7.2K SATA Drive Set	$95,000
2424	941	2217	146 GB 15K CoD Drive Set	$4,850
2424	941	2417	300 GB 15K CoD Drive Set	$9,250
2424	941	2617	450 GB 15K CoD Drive Set	$13,300
2424	941	2817	1 TB 7.2K SATA CoD Drive Set	$9,500
2424	941	2999	Disk Enclosure Filler Set	$100
2424	941	3043	Device Adapter Pair III	$10,000
2424	941	3143	4Gb SW FCP/ FICON Adapt PCIE	$35,000
2424	941	3243	4Gb LW FCP/ FICON Adapt PCIE	$35,000
2424	941	3245	4Gb 10km LW FCP/FICON PCIE	$45,000
2424	941	4212	32 GB Proc Memory (2-way)	$50,000
2424	941	4213	64 GB Proc Memory (2-way)	$200,000
2424	941	4214	128 GB Proc Memory (2-way)	$400,000
2424	941	4222	32 GB Proc Memory (4-way)	$50,000
2424	941	4223	64 GB Proc Memory (4-way)	$200,000
2424	941	4224	128 GB Proc Memory (4-way)	$400,000
2424	941	4225	256 GB Proc Memory (4-way)	$800,000

2424	941	4226	384 GB Proc Memory (4-way)	$1,200,000
2424	941	4301	2 Way Processor Card	$0
2424	941	4302	4 Way Processor Card	$81,938
2424	941	5016	146 GB 15K FDE Drive Set	$57,230
2424	941	5116	300 GB 15K FDE Drive Set	$110,075
2424	941	5216	450 GB 15K FDE Drive Set	$155,610
2424	941	5017	146 GB 15K FDE CoD Drive Set	$5,723
2424	941	5117	300 GB 15K FDE CoD Drive Set	$11,007
2424	941	5217	450 GB 15K FDE CoD Drive Set	$15,561
2424	941	6016	73 GB SSD Drive Set	$637,000
2424	941	6116	146 GB SSD Drive Set	$980,000
2424	941	7030	OEL - inactive	$0
2424	941	7031	OEL - 1 TB unit	$0
2424	941	7032	OEL - 5 TB unit	$0
2424	941	7033	OEL - 10 TB unit	$0
2424	941	7034	OEL - 25 TB unit	$0
2424	941	7035	OEL - 50 TB unit	$0
2424	941	7040	OEL - 100 TB unit	$0
2424	941	7045	OEL - 200 TB unit	$0
2424	941	7050	OEL - Value Unit inactive	$0
2424	941	7051	OEL - 1 Value Unit	$0
2424	941	7052	OEL - 5 Value Unit	$0
2424	941	7053	OEL - 10 Value Unit	$0
2424	941	7054	OEL - 25 Value Unit	$0
2424	941	7055	OEL - 50 Value Unit	$0
2424	941	7060	OEL - 100 Value Unit	$0
2424	941	7065	OEL - 200 Value Unit	$0
2424	941	7080	DB protection indicator	$0
2424	941	7091	FICON indicator	$0
2424	941	7092	zHPF indicator	$0
2424	941	7250	PTC - inactive indicator	$0
2424	941	7251	PTC - 1 TB indicator	$0
2424	941	7252	PTC - 5 TB indicator	$0

2424	941	7253	PTC - 10 TB indicator	$0
2424	941	7254	PTC - 25 TB indicator	$0
2424	941	7255	PTC - 50 TB indicator	$0
2424	941	7260	PTC - 100 TB indicator	$0
2424	941	7350	SE - inactive indicator	$0
2424	941	7351	SE - 1 TB indicator	$0
2424	941	7352	SE - 5 TB indicator	$0
2424	941	7353	SE - 10 TB indicator	$0
2424	941	7354	SE - 25 TB indicator	$0
2424	941	7355	SE - 50 TB indicator	$0
2424	941	7360	SE - 100 TB indicator	$0
2424	941	7480	MGM - inactive indicator	$0
2424	941	7481	MGM - 1 TB indicator	$0
2424	941	7482	MGM - 5 TB indicator	$0
2424	941	7483	MGM - 10 TB indicator	$0
2424	941	7484	MGM - 25 TB indicator	$0
2424	941	7485	MGM - 50 TB indicator	$0
2424	941	7490	MGM - 100 TB indicator	$0
2424	941	7500	MM - inactive indicator	$0
2424	941	7501	MM - 1 TB indicator	$0
2424	941	7502	MM - 5 TB indicator	$0
2424	941	7503	MM - 10 TB indicator	$0
2424	941	7504	MM - 25 TB indicator	$0
2424	941	7505	MM - 50 TB indicator	$0
2424	941	7510	MM - 100 TB indicator	$0
2424	941	7520	GM - inactive indicator	$0
2424	941	7521	GM - 1 TB indicator	$0
2424	941	7522	GM - 5 TB indicator	$0
2424	941	7523	GM - 10 TB indicator	$0
2424	941	7524	GM - 25 TB indicator	$0
2424	941	7525	GM - 50 TB indicator	$0
2424	941	7530	GM - 100 TB indicator	$0
2424	941	7650	RMZ - inactive indicator	$0

2424	941	7651	RMZ - 1 TB indicator	$0
2424	941	7652	RMZ - 5 TB indicator	$0
2424	941	7653	RMZ - 10 TB indicator	$0
2424	941	7654	RMZ - 25 TB indicator	$0
2424	941	7655	RMZ - 50 TB indicator	$0
2424	941	7660	RMZ - 100 TB indicator	$0
2424	941	7680	RMZ resync - inactive indic	$0
2424	941	7681	RMZ resync - 1 TB indicator	$0
2424	941	7682	RMZ resync - 5 TB indicator	$0
2424	941	7683	RMZ resync - 10 TB indicator	$0
2424	941	7684	RMZ resync - 25 TB indicator	$0
2424	941	7685	RMZ resync - 50 TB indicator	$0
2424	941	7690	RMZ resync - 100 TB indic	$0
2424	941	7820	PAV - inactive indicator	$0
2424	941	7821	PAV - 1 TB indicator	$0
2424	941	7822	PAV - 5 TB indicator	$0
2424	941	7823	PAV - 10 TB indicator	$0
2424	941	7824	PAV - 25 TB indicator	$0
2424	941	7825	PAV - 50 TB indicator	$0
2424	941	7830	PAV - 100 TB indicator	$0
2424	941	7899	HyperPAV indicator	$0
2424	941	7999	IGF transaction indicator	$0
2424	94E	0001	9xE Factory Merge	$0
2424	94E	0100	Eligible for EU Shipment	$0
2424	94E	0200	Shipping Weight Reduction	$0
2424	94E	0340	941 - 94E position 1	$0
2424	94E	0341	941 - 92E/94E position 2	$0
2424	94E	0342	941 - 92E/94E position 3	$0
2424	94E	0343	941 - 92E/94E position 4	$0
2424	94E	0400	BSMI Certificate - Taiwan	$0
2424	94E	0930	IBM/Openwave Alliance	$0
2424	94E	0931	IBM System i indicator	$0

2424	94E	0932	IBM System p indicator	$0
2424	94E	0933	IBM System x indicator	$0
2424	94E	0934	IBM System z indicator	$0
2424	94E	0940	Linux indicator	$0
2424	94E	1000	Remote Power Control	$1,100
2424	94E	1050	Battery Assembly	$1,700
2424	94E	1055	Extended PLD	$7,800
2424	94E	1060	SPP cord group 1	$1,900
2424	94E	1065	SPP cord group 2	$1,900
2424	94E	1067	SPP cord group 3	$1,900
2424	94E	1090	Line Cord (US/ LA/AP/Canada)	$1,900
2424	94E	1091	Line cord (EMEA)	$500
2424	94E	1092	Line cord (Japan)	$1,100
2424	94E	1093	Line cord (US Chicago)	$1,900
2424	94E	1210	Disk Enclosure Pair	$10,000
2424	94E	1212	Disk Drive Cable Group 2	$1,900
2424	94E	1214	Disk Drive Cable Group 4	$2,400
2424	94E	1301	I/O enclosure pair PCIE	$12,500
2424	94E	1322	PCI-E cable group 3	$5,000
2424	94E	1410	50 um Fibre Cable (LC)	$100
2424	94E	1411	50 um Fibre Cable (LC/SC)	$100
2424	94E	1412	50 um Fibre Cable (Jumper)	$100
2424	94E	1420	9 um Fibre Cable (LC)	$100
2424	94E	1421	9 um Fibre Cable (LC/SC)	$100
2424	94E	1422	9 um Fibre Cable (Jumper)	$100
2424	94E	1980	Performance Accelerator	$5,000
2424	94E	1999	Hardware Installation MES	$20,000
2424	94E	2216	146 GB 15K Drive Set	$48,500
2424	94E	2416	300 GB 15K Drive Set	$92,500
2424	94E	2616	450 GB 15K Drive Set	$133,000
2424	94E	2816	1 TB 7.2K SATA Drive Set	$95,000
2424	94E	2217	146 GB 15K CoD Drive Set	$4,850
2424	94E	2417	300 GB 15K CoD Drive Set	$9,250

Machine Type	Model	Part number	Description	List Price
2424	94E	2617	450 GB 15K CoD Drive Set	$13,300
2424	94E	2817	1 TB 7.2K SATA CoD Drive Set	$9,500
2424	94E	2999	Disk Enclosure Filler Set	$100
2424	94E	3043	Device Adapter Pair III	$10,000
2424	94E	3143	4Gb SW FCP/ FICON Adapt PCIE	$35,000
2424	94E	3243	4Gb LW FCP/ FICON Adapt PCIE	$35,000
2424	94E	3245	4Gb 10km LW FCP/FICON PCIE	$45,000
2424	94E	5016	146 GB 15K FDE Drive Set	$57,230
2424	94E	5116	300 GB 15K FDE Drive Set	$110,075
2424	94E	5216	450 GB 15K FDE Drive Set	$155,610
2424	94E	5017	146 GB 15K FDE CoD Drive Set	$5,723
2424	94E	5117	300 GB 15K FDE CoD Drive Set	$11,007
2424	94E	5217	450 GB 15K FDE CoD Drive Set	$15,561
2424	94E	6016	73 GB SSD Drive Set	$637,000
2424	94E	6116	146 GB SSD Drive Set	$980,000

From Type	From Model	To Type	To Model	List Price
2424	931	2424	941	$200,000
2424	932	2424	941	$215,000
2424	92E	2424	94E	$100,000

Machine Type	Model	Part number	Description	List Price
2424	941	242413201321	I/O Cable Conversion	$4,100
2424	941	242422162416	Disk drive set conversion	$92,500
2424	941	242422162616	Disk drive set conversion	$133,000
2424	941	242422162816	Disk drive set conversion	$95,000
2424	941	242424162616	Disk drive set conversion	$133,000
2424	941	242424162816	Disk drive set conversion	$95,000
2424	941	242426162816	Disk drive set conversion	$95,000
2424	941	242422172216	CoD disk drive conversion	$43,650
2424	941	242424172416	CoD disk drive conversion	$83,250
2424	941	242426172616	CoD disk drive conversion	$119,700
2424	941	242428172816	CoD disk drive conversion	$85,500
2424	941	242431433243	Host adapter conversion	$34,750

2424	941	242431433245	Host adapter conversion	$44,750
2424	941	242432433143	Host adapter conversion	$34,750
2424	941	242432433245	Host adapter conversion	$44,750
2424	941	242432453143	Host adapter conversion	$34,750
2424	941	242432453243	Host adapter conversion	$34,750
2424	941	242442124213	Processor memory conversion	$150,000
2424	941	242442124214	Processor memory conversion	$350,000
2424	941	242442124222	Processor memory conversion	$0
2424	941	242442134214	Processor memory conversion	$200,000
2424	941	242442134223	Processor memory conversion	$0
2424	941	242442144224	Processor memory conversion	$0
2424	941	242442224223	Processor memory conversion	$150,000
2424	941	242442224224	Processor memory conversion	$350,000
2424	941	242442224225	Processor memory conversion	$750,000
2424	941	242442224226	Processor memory conversion	$1,150,000
2424	941	242442234224	Processor memory conversion	$200,000
2424	941	242442234225	Processor memory conversion	$600,000
2424	941	242442234226	Processor memory conversion	$1,000,000
2424	941	242442244225	Processor memory conversion	$400,000
2424	941	242442244226	Processor memory conversion	$800,000
2424	941	242442254226	Processor memory conversion	$400,000
2424	941	242443014302	Processor card conversion	$81,938
2424	941	242450165116	FDE disk drive set convers	$110,075
2424	941	242450165216	FDE disk drive set convers	$155,610
2424	941	242451165216	FDE disk drive set convers	$155,610
2424	941	242450175016	FDE COD disk drive set conv	$51,507

2424	941	242451175116	FDE COD disk drive set conv	$99,068
2424	941	242452175216	FDE COD disk drive set conv	$140,049
2424	941	242460166116	SSD Disk drive conversion	$980,000
2424	94E	242422162416	Disk drive set conversion	$92,500
2424	94E	242422162616	Disk drive set conversion	$133,000
2424	94E	242422162816	Disk drive set conversion	$95,000
2424	94E	242424162616	Disk drive set conversion	$133,000
2424	94E	242424162816	Disk drive set conversion	$95,000
2424	94E	242426162816	Disk drive set conversion	$95,000
2424	94E	242422172216	CoD disk drive conversion	$43,650
2424	94E	242424172416	CoD disk drive conversion	$83,250
2424	94E	242426172616	CoD disk drive conversion	$119,700
2424	94E	242428172816	CoD disk drive conversion	$85,500
2424	94E	242431433243	Host adapter conversion	$34,750
2424	94E	242431433245	Host adapter conversion	$44,750
2424	94E	242432433143	Host adapter conversion	$34,750
2424	94E	242432433245	Host adapter conversion	$44,750
2424	94E	242432453143	Host adapter conversion	$34,750
2424	94E	242432453243	Host adapter conversion	$34,750
2424	94E	242450165116	FDE disk drive set convers	$110,075
2424	94E	242450165216	FDE disk drive set convers	$155,610
2424	94E	242451165216	FDE disk drive set convers	$155,610
2424	94E	242450175016	FDE COD disk drive set conv	$51,507
2424	94E	242451175116	FDE COD disk drive set conv	$99,068
2424	94E	242452175216	FDE COD disk drive set conv	$140,049
2424	94E	242460166116	SSD disk drive conversion	$980,000
2424	941	242403210340	Model 9xE pos ind conversion	$0
2424	941	242403220341	Model 9xE pos ind conversion	$0
2424	941	242403230342	Model 9xE pos ind conversion	$0
2424	941	242403240343	Model 9xE pos ind conversion	$0
2424	941	242413001301	I/O enclosure conversion	$12,500
2424	941	242413121320	I/O cable conversion	$3,000
2424	941	242413131321	I/O cable conversion	$4,100

2424	941	242413141322	I/O cable conversion	$5,000
2424	941	242413161321	I/O cable conversion	$4,100
2424	941	242417011711	Microcode bundle family conv	$40,000
2424	941	242417021711	Microcode bundle family conv	$40,000
2424	941	242417031711	Microcode bundle family conv	$40,000
2424	941	242430413043	Device adapter conversion	$10,000
2424	941	242431133143	Host adapter conversion	$34,750
2424	941	242432133243	Host adapter conversion	$34,750
2424	941	242432153245	Host adapter conversion	$44,750
2424	941	242440114212	Processor memory conversion	$50,000
2424	941	242440124212	Processor memory conversion	$50,000
2424	941	242440134213	Processor memory conversion	$200,000
2424	941	242440144214	Processor memory conversion	$400,000
2424	941	242441124222	Processor memory conversion	$50,000
2424	941	242441134223	Processor memory conversion	$200,000
2424	941	242441144224	Processor memory conversion	$400,000
2424	941	242441154225	Processor memory conversion	$800,000
2424	941	242470007030	OEL function auth ind conv	$0
2424	941	242470017031	OEL function auth ind conv	$0
2424	941	242470027032	OEL function auth ind conv	$0
2424	941	242470037033	OEL function auth ind conv	$0
2424	941	242470047034	OEL function auth ind conv	$0
2424	941	242470057035	OEL function auth ind conv	$0
2424	941	242470107040	OEL function auth ind conv	$0
2424	941	242470157045	OEL function auth ind conv	$0
2424	941	242470907091	FICON function auth ind conv	$0
2424	941	242472007250	PTC function auth ind conv	$0
2424	941	242472017251	PTC function auth ind conv	$0

2424	941	242472027252	PTC function auth ind conv	$0
2424	941	242472037253	PTC function auth ind conv	$0
2424	941	242472047254	PTC function auth ind conv	$0
2424	941	242472057255	PTC function auth ind conv	$0
2424	941	242472107260	PTC function auth ind conv	$0
2424	941	242472307250	PTC function auth ind conv	$0
2424	941	242472317251	PTC function auth ind conv	$0
2424	941	242472327252	PTC function auth ind conv	$0
2424	941	242472337253	PTC function auth ind conv	$0
2424	941	242472347254	PTC function auth ind conv	$0
2424	941	242472357255	PTC function auth ind conv	$0
2424	941	242472407260	PTC function auth ind conv	$0
2424	941	242473007350	SE function auth ind conv	$0
2424	941	242473017351	SE function auth ind conv	$0
2424	941	242473027352	SE function auth ind conv	$0
2424	941	242473037353	SE function auth ind conv	$0
2424	941	242473047354	SE function auth ind conv	$0
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2424	94E	242403210340	Model 9xE pos ind conversion	$44,750
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2424	94E	242413001301	I/O enclosure conversion	$44,750
2424	94E	242413121320	I/O cable conversion	$44,750
2424	94E	242413131321	I/O cable conversion	$44,750
2424	94E	242413141322	I/O cable conversion	$44,750
2424	94E	242413161321	I/O cable conversion	$44,750
2424	94E	242430413043	Device adapter conversion	$44,750
2424	94E	242431133143	Host adapter conversion	$44,750
2424	94E	242432133243	Host adapter conversion	$44,750
2424	94E	242432153245	Host adapter conversion	$44,750

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