IBM DS8870 delivers resiliency functions to support multiple-site disaster recovery and additional capacity within the same space

Table of contents

At a glance

New features for IBM® DS8870 offer a greater choice in price and performance, including:

- Enhanced resiliency functions
- Advanced functions for System z® and z/OS®
- Seventh generation Easy Tier®
- Performance improvement
- Flash optimization III
- 600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch FDE SSD drives
- System configuration and monitoring enhancements
- Volume replication and volume retype for OpenStack

Overview

IBM DS8870 systems (machine types 2421, 2422, 2423, and 2424) deliver robust replication solutions and additional capacity options to meet the demands of environments in need of disaster tolerance and high data growth support.

Resiliency function enhancements

Multiple Target Peer-to-Peer Remote Copy (MT-PPRC) provides the capability to have two PPRC relationships on a single primary volume. With this enhancement, there will be another target available to provide additional data protection to act as a backup if a disaster occurs.

Multiple Increment FlashCopy® allows incremental copy of up to twelve volume targets from a single source. With this enhancement, additional data protection from the physical or logical failure of the source volume is provided since the amount of time required to take an incremental FlashCopy is much less than taking a full copy, thus, reducing the background copy time.

Advanced functions for System z and z/OS2

IBM zHyperwrite is a new technology that combines DS8000® and z/OS enhancements that deliver performance benefits for writing operations to DB2® logs in the Metro Mirror environment. This new technology can help reduce up to 43 percent of the DB2 log write time.

z/OS Global Mirror (XRC) workload-based write pacing with HyperPAV support is designed to work with workload manager to automatically tailor write pacing to the application, and avoid having to monitor the workload and adjust the pacing settings to suit the workload priority. The lower priority write requests can be requeued so that HyperPAV aliases can be used to execute read requests. The use of HyperPAV aliases is also paced when there is congestion to minimize low-priority work from consuming all the available aliases.

Seventh generation of Easy Tier

Easy Tier application for System z is a unified, software-defined storage API to help efficiently deploy storage by enabling applications running on System z to direct more optimal placement of data by communicating important information about current workload activity and application performance requirements.

Advanced controls are now available for a user to suspend learning at a pool or volume level to support specific workload requirements they may have.

Performance improvement

With the introduction of the 7.4 microcode, the DS8870 code has been optimized for greater IOP performance. Both the POWER7® and POWER7+™ processor versions of the DS8870 have been optimized to deliver improvement in maximum IOPS in random I/O workload environments of up to 35 percent.

Flash optimization III

The High-Performance Flash Enclosure (HPFE), which was previously announced for the base frame in hybrid configurations, is now available on the first expansion frame. The HPFE capacity in hybrid configurations has been doubled with an additional four HPFEs available in the first expansion frame.

The system performance enhancements with the HPFE enables improvement in maximum IOPS in random I/O workload environments of up to 35 percent.

This release delivers performance improvements geared for those analytic clients who desire greater IOPs performance. With the new DS8000 multi-thread performance accelerator feature, analytic data processing clients can achieve up to 940,000 IOPs/sec in Database Base Open (DBO) environments (70% read, 30% write, 50% hit ratio).

600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch FDE SSD drives

DS8870 now offers 600 GB 15K rpm SAS and 1.6 TB 2.5-inch SSD encryption drives for additional capacity and cost performance options to meet data growth demands within the same space.

System configuration and monitoring enhancements

The improved DS8000 Storage Management GUI simplifies storage management, monitors system health in real time, and enables faster configuration.

Volume replication and volume retype for OpenStack

DS8870 now supports features in the OpenStack Juno release such as volume replication and volume retype. Support is provided through the OpenStack Cinder driver that will be available for download on Fix Central in December 2014.

Key prerequisites

All announced features and functions are supported on the IBM System Storage® DS8000 series and require DS8000 LMC 7.7.40.xx.xx (bundle version 87.40.xxx.xx), or later.

Planned availability date

- December 5, 2014: General availability
- March 6, 2015: Field (MES) availability for 600 GB 15K FDE drives, 600 GB 15K FDE CoD drives, and 1.6 TB FDE SSD drives (feature numbers #5618, #5619, and #6358)

Refer to the Description section for further information.

Description

Companies depend on online information for their customers, products, and IT infrastructure to support day-to-day business operations. Companies use data replication functions for protection against any system failure or disaster that degrades system functionality to minimize impact to business operations which can heavily impact revenues, expose organizations to high risk, and cause many other problems. IBM DS8870 introduces MT-PPRC which enables organizations to preserve data by copying it to not just one secondary system but two. In addition to this functionality, DS8870 is also introducing Multiple Incremental FlashCopy which provides incremental FlashCopy with up to twelve targets from a single source.

DS8870 also delivers double the capacity size in high-performance flash with an additional four flash enclosures to help companies cope with enormous data growth which mainly originates from social media and continuous access of data with equal or better response time within the storage system.

Enhanced resiliency functions

IBM DS8870 now supports MT-PPRC to deliver the capability to mirror two targets from one primary volume. It enables the combination of two Metro Mirrors, two Global Copies, one Metro Mirror and one Global Mirror, one Metro Mirror and one Global Copy and one Metro Mirror and one Metro/Global Mirror relationship. In this initial release, two Global Mirror relationships are not supported. The capability of having multiple relationships of Metro Mirror, Global Copy, and Global Mirror allows for many different possible configurations.

This function will also support an incremental resynchronization capability between the two target volumes in both planned and unplanned HyperSwap® situations.

IBM Geographically Dispersed Parallel Sysplex™ (GDPS®) supports DS8000 Multi Target PPRC capabilities. The initial release of the GDPS/MT-PPRC product supports a configuration with two synchronous targets from the same primary device (only CKD devices are supported).

GDPS/MT-PPRC, in addition to the two synchronous legs, supports an asynchronous z/OS Global Mirror (XRC) leg to a remote, disaster recovery location.

Note: The GDPS/XRC incremental resynchronization capability is not supported in conjunction with GDPS/MT-PPRC.

MT-PPRC is supported on DS8870 series running on IBM System z servers with z/OS V2.1, or later, and GDPS V3.11, or later.

In addition to the MT-PPRC function, IBM DS8870 now supports Multiple Incremental FlashCopy which provides incremental FlashCopy with up to twelve targets from a single source. If any physical failure occurs with this feature activated, it will help to reduce the background copy time with less performance impact when background copy is initiated with better data protection from the source.

Advanced functions for System z and z/OS

IBM zHyperWrite is a new technology provided by IBM DS8870, exploited by z/OS and DB2 to accelerate DB2 log writes when using IBM GDPS or IBM Tivoli®

Storage Productivity Center for Replication HyperSwap technology. DB2 log data sets allocated to volumes which are replicated with Metro Mirror and are z/OS HyperSwap-enabled can take advantage of this support which is designed to deliver improved DB2 transactional response time and log throughput improvements while maintaining the continuous availability of secondary copies in support of disaster recovery. In IBM laboratory tests, up to 43 percent decrease in log write time was observed and is expected to provide improved DB2 transactional response time and log throughput improvements. zHyperWrite requires z/OS V2.1 with PTFs, and DB2 10 or DB2 11.

z/OS Global Mirror (XRC) workload-based write pacing with HyperPAV support is now designed to work with z/OS Workload Manager to automatically throttle low-priority write operations when they would cause significant delays that might affect response time. This new function is intended to make it unnecessary to manually adjust write pacing settings and monitor data set residency, and to help improve performance when write activity is high. Additionally, lower priority write requests can be requeued by z/OS so that HyperPAV aliases can be used to execute read requests. When write requests are requeued, the use of HyperPAV aliases is also paced by z/OS when there is congestion to minimize low-priority work from consuming all the available aliases. It requires z/OS V1.13, or later, with the PTFs.

Seventh generation Easy Tier

Easy Tier application z/OS integration will deliver the following capabilities:

- This delivered capability is able to be exploited by clients in this release for DB2 to provide hints to Easy Tier on the DS8000 when a database reorganize is done so that the target data set for the database will be reorganized and optimized based on the activity of the application.
- This capability includes a number of lower level APIs for the DS8000 and DFSMS which can also be exploited in the future by other applications and for other purposes.

In addition to the Easy Tier application z/OS integration capabilities, enhancements to the DSCLI version of the Easy Tier application include:

- Easy Tier application is extended to allow a volume to be prevented from being demoted to tier 2 storage, as well as pinning a volume to a specific tier, thus making it possible to prohibit the volume from being demoted to tier 2 and to promote any extents that might already be on tier 2 storage. This will enable clients to have a single pool with three tiers of storage and to choose by policy to have volumes which are:
  - Able to be located on all three tiers (Flash/Enterprise/nearline) depending on workload
  - Able to be located only on tier 0/tier 1 to avoid potential for lower nearline performance
  - Assigned to tier 0 to guarantee flash performance
  - Assigned to tier 1 storage or assigned to tier 2 storage (this is not generally a recommended use case for optimal system performance but might be appropriate in specific cases)
- Easy Tier Application also provides a number of controls operating at the storage pool level to override Easy Tier behavior in specific use cases. This includes the ability to perform the following actions at the storage pool level:
  - Pause Easy Tier learning and migration for specific time periods
  - Reset Easy Tier learning information and history

There are also a number of enhancements to Easy Tier algorithms to improve the overall use experience with Easy Tier and to handle specific situations that can arise in client environments.

Performance improvement

In this release, the DS8870 microcode has been optimized for greater IOP performance. Both the POWER7 and POWER7+ processor versions of the DS8870 have been optimized to deliver up to 35 percent improvement in maximum IOPS in random I/O workload environments. With the new DS8000 multi-thread performance accelerator feature (feature number 0605), a DS8870 system with 16 core POWER® 7 or POWER 7+ processors can achieve up to 940,000 IOPs/sec in the Database Open Environment.

Flash optimization III

The High-Performance Flash Enclosure (HPFE), which was previously announced for the base frame in hybrid configurations, is now available on the first expansion frame. The additional four HPFEs double the HPFE capacity in a hybrid configuration to 96 TB (120 flash cards in each the base frame and first expansion frame).

The base system performance enhancements with the HPFE enable up to 35 percent improvement in maximum IOPS in random I/O workload environments.

Refer to the following table for more details on supported flash and adapter counts with the available configuration options:

```
Per frame maximum configuration table:

Model               Physical Flash Processor Host    Flash
number    Processor capacity cards memory    adapters enclosures

Enterprise/Business class first expansion configuration:
96E       N/A       48 TB    120   N/A       16       4
```

600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch FDE SSD drives

DS8870 now offers 600 GB 15K rpm SAS and 1.6 TB 2.5-inch SSD encryption drive sets for additional capacity and cost performance options to meet data growth demands within the same space. Each set contains sixteen identical drives. The 1.6 TB 2.5-inch SSD drive set allows an increase in the overall maximum system flash capacity to 2.55 PB and the 1.6 TB 2.5-inch drives along with the flash tiering capability within Easy Tier provide uniform low latency, high IOPs performance, with improved cost per Gigabyte that is extremely desirable for large data warehouse applications.

Feature conversions are available for 600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch SSD drive sets to exchange existing disk drive sets when purchasing new sets with higher capacity. 600 GB 15K and 1.6 TB 2.5-inch GB SSD disk drive sets are optional to the DS8870 and are available with feature numbers 5618 and 6358, respectively.

The 600 GB 15K rpm FDE disk drives are also offered with Standby Capacity on Demand.

System configuration and monitoring enhancements

The improved DS8000 Storage Management GUI enables easier, faster, and more efficient storage system configuration, management, and monitoring. The new interface technology provides tools to monitor system health and events. These enhancements are based on the improved architecture and streamlined design of the new common-GUI format which delivers a uniform look and feel to DS8000, XIV®, Storwize® V7000, Tape, SONAS, and SAN Volume Controller work environments. This simplifies management of IBM Storage products, significantly reducing the costs associated with training system administrators and configuring storage systems.

Volume replication and volume retype for OpenStack

With the release of OpenStack Juno, cloud administrators can now take advantage of synchronous mirroring within the OpenStack Cinder framework. This feature is presented as a capability, allowing for a volume type to be assigned which allows a volume on one DS8870 to be replicated to a volume on another DS8870. As a volume type, the cloud administrator can define this capability to their tiers of storage, providing additional flexibility and protection for their block storage.

Additionally available in the DS8870 Cinder driver for OpenStack is the ability to concurrently change the type of a volume (volume retype). This capability gives cloud administrators better definition and movement of their data based on ever changing data requirements. Changing the type of a volume gives flexibility to move volumes between defined tiers and also provides the ability to maneuver data to the subsystem that best suits the workload.

All new functions in this release require Licensed Machine Code level 7.7.40.xx.xx, or later (feature numbers 1735 and 1835).

- **Plant availability:** December 5, 2014
  - Enhanced resiliency functions
  - Advanced functions for System z and z/OS
  - Seventh generation Easy Tier
  - Performance improvement
  - Flash optimization III
  - 600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch FDE SSD drives
  - System configuration and monitoring enhancements
  - Volume replication and volume retype for OpenStack
- **Field availability:** March 6, 2015
  - 600 GB 15K rpm FDE drives and 1.6 TB 2.5-inch FDE SSD drives

Accessibility by people with disabilities

A US 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 US Rehabilitation Act

The IBM DS8870 and IBM DS8870 Expansion Unit are capable, as of October 19, 2012, when used in accordance with associated IBM 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 at

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

Reference information

For more information, refer to the following announcements:

- Hardware Announcement 112-154, dated October 03, 2012, IBM System Storage DS8870 (Machine type 2421) high-performance flagship high-end disk, one-year warranty model addresses your business and financial needs
- Hardware Announcement 112-173, dated October 03, 2012, IBM System Storage DS8870 (Machine type 2422) high-performance flagship high-end disk, two-year warranty model addresses your business and financial needs

- Hardware Announcement 112-171, dated October 03, 2012, IBM System Storage DS8870 (Machine type 2423) high-performance flagship high-end disk, three-year warranty model addresses your business and financial needs
- Hardware Announcement 112-172, dated October 03, 2012, IBM System Storage DS8870 (Machine type 2424) high-performance flagship high-end disk, four-year warranty model addresses your business and financial needs
- Hardware Announcement 112-156, dated October 03, 2012, IBM System Storage DS8000 series high-performance flagship - Function Authorizations for machine type 239x

For the IBM statement on compliance with the 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 type	Model	Feature
DS8870	2421	961	
DS8000 multi-thread performance accelerator indicator			0605
Licensed Function indicators: - Multiple Target PPRC indicator			0745
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
DS8000 Licensed Machine Code: - DS8000 LMC R7.4			1735
Encryption disk drive sets: - 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets: - 600 GB 15K FDE CoD drive set			5619
Encryption SSD drive sets: - 1.6 TB SSD FDE drive set			6358
Function Authorization indicators: - Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature
DS8870 Expansion Unit	2421	96E	
High-performance flash enclosure placement indicators:			
- Enclosure position 1			0411
- Enclosure position 2			0412
- Enclosure position 3			0413
- Enclosure position 4			0414
- Enclosure position 1 Full			0511
- Enclosure position 2 Full			0512
- Enclosure position 3 Full			0513
- Enclosure position 4 Full			0514
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
High-performance flash card sets:			
- High-performance flash enclosure			1500
- 400 GB-1.8 inch flash card set A			1506
- 400 GB-1.8 inch flash card set B			1508
- Flash enclosure filler set			1599

```
DS8000 Licensed Machine Code:
- DS8000 LMC R7.4 indicator                              1835

Device adapters:
- High-performance flash adapter pair                    3054

Encryption disk drive sets:
- 600 GB 15K FDE drive set                               5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set                           5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                               6358
```

Description	Machine type	Model	Feature
DS8870	2422	961	
DS8000 multi-thread performance accelerator indicator			0605
Licensed Function indicators: - Multiple Target PPRC indicator			0745
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
DS8000 Licensed Machine Code: - DS8000 LMC R7.4			1735
Encryption disk drive sets: - 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets: - 600 GB 15K FDE CoD drive set			5619
Encryption SSD drive sets: - 1.6 TB SSD FDE drive set			6358
Function Authorization indicators: - Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature
DS8870 Expansion Unit	2422	96E	

```
High-performance flash enclosure placement indicators:
- Enclosure position 1                                   0411
- Enclosure position 2                                   0412
- Enclosure position 3                                   0413
- Enclosure position 4                                   0414
- Enclosure position 1 Full                              0511
- Enclosure position 2 Full                              0512
- Enclosure position 3 Full                              0513
- Enclosure position 4 Full                              0514

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator                      1257

High-performance flash card sets:
- High-performance flash enclosure                       1500
- 400 GB 1.8-inch flash card set A                       1506
- 400 GB 1.8-inch flash card set B                       1508
- Flash enclosure filler set                             1599

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4 indicator                              1835

Device adapters:
- High-performance flash adapter pair                    3054
```

```
Encryption disk drive sets:
- 600 GB 15K FDE drive set                                           5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set                                       5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                                           6358
```

Description	Machine type	Model	Feature
DS8870	2423	961	
DS8000 multi-thread performance accelerator indicator			0605
Licensed Function indicators: - Multiple Target PPRC indicator			0745
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
DS8000 Licensed Machine Code: - DS8000 LMC R7.4			1735
Encryption disk drive sets: - 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets: - 600 GB 15K FDE CoD drive set			5619
Encryption SSD drive sets: - 1.6 TB SSD FDE drive set			6358
Function Authorization indicators: - Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature
DS8870 Expansion Unit	2423	96E	
High-performance flash enclosure placement indicators:			
- Enclosure position 1			0411
- Enclosure position 2			0412
- Enclosure position 3			0413
- Enclosure position 4			0414
- Enclosure position 1 Full			0511
- Enclosure position 2 Full			0512
- Enclosure position 3 Full			0513
- Enclosure position 4 Full			0514
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
High-performance flash card sets:			
- High-performance flash enclosure			1500
- 400 GB 1.8-inch flash card set A			1506
- 400 GB 1.8-inch flash card set B			1508
- Flash enclosure filler set			1599
DS8000 Licensed Machine Code: - DS8000 LMC R7.4 indicator			1835
Device adapters: - High-performance flash adapter pair			3054
Encryption disk drive sets: - 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets: - 600 GB 15K FDE CoD drive set			5619

```
Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                                  6358


                                          Machine
Description                               type    Model   Feature


DS8870                                    2424    961

DS8000 multi-thread performance accelerator                 0605
 indicator

Licensed Function indicators:
- Multiple Target PPRC indicator                            0745

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator                         1257

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4                                           1735

Encryption disk drive sets:
- 600 GB 15K FDE drive set                                  5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set                              5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                                  6358

Function Authorization indicators:
- Multiple Target PPRC indicator                            7025


                                          Machine
Description                               type    Model   Feature


DS8870 Expansion Unit                     2424    96E

High-performance flash enclosure placement indicators:
- Enclosure position 1                                      0411
- Enclosure position 2                                      0412
- Enclosure position 3                                      0413
- Enclosure position 4                                      0414
- Enclosure position 1 Full                                 0511
- Enclosure position 2 Full                                 0512
- Enclosure position 3 Full                                 0513
- Enclosure position 4 Full                                 0514

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator                         1257

High-performance flash card sets:
- High-performance flash enclosure                          1500
- 400 GB 1.8-inch flash card set A                          1506
- 400 GB 1.8-inch flash card set B                          1508
- Flash enclosure filler set                                1599

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4 indicator                                 1835

Device adapters:
- High-performance flash adapter pair                       3054

Encryption disk drive sets:
- 600 GB 15K FDE drive set                                  5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set                              5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                                  6358
```

Feature conversions

Feature conversions (machine types 2421, 2422, 2423, and 2424
for Model 961 and 96E):

Disk enclosures:

```
Feature    Returned
From  To   parts      Description

1255  1257  No        HD 200 GB SSD enclosure indicator
                      to 1.6 TB SSD enclosure indicator

1245  1257  No        HD 400 GB SSD enclosure indicator
                      to 1.6 TB SSD enclosure indicator

1256  1257  No        HD 800 GB SSD enclosure indicator
                      to 1.6 TB SSD enclosure indicator
```

Encryption disk drive sets:

```
Feature    Returned
From  To   parts      Description

5108  5618  Yes       Encryption disk drive set conversion
5618  5768  Yes       Encryption disk drive set conversion
5618  5868  Yes       Encryption disk drive set conversion
5708  5618  Yes       Encryption disk drive set conversion
5768  5868  Yes       Encryption disk drive set conversion
```

Encryption Standby CoD disk drive sets:

```
Feature    Returned
From  To   parts      Description

5619  5618  No        Encryption CoD disk drive conversion
```

Encryption SAS to SSD drive sets:

```
Feature    Returned
From  To   parts      Description

5108  6058  Yes       Encryption SAS to SSD drive conversion
5108  6158  Yes       Encryption SAS to SSD drive conversion
5108  6258  Yes       Encryption SAS to SSD drive conversion
5108  6358  Yes       Encryption SAS to SSD drive conversion

5308  6058  Yes       Encryption SAS to SSD drive conversion
5308  6158  Yes       Encryption SAS to SSD drive conversion
5308  6258  Yes       Encryption SAS to SSD drive conversion
5308  6358  Yes       Encryption SAS to SSD drive conversion

5618  6058  Yes       Encryption SAS to SSD drive conversion
5618  6158  Yes       Encryption SAS to SSD drive conversion
5618  6258  Yes       Encryption SAS to SSD drive conversion
5618  6358  Yes       Encryption SAS to SSD drive conversion

5708  6058  Yes       Encryption SAS to SSD drive conversion
5708  6158  Yes       Encryption SAS to SSD drive conversion
5708  6258  Yes       Encryption SAS to SSD drive conversion
5708  6358  Yes       Encryption SAS to SSD drive conversion

5758  6058  Yes       Encryption SAS to SSD drive conversion
5758  6158  Yes       Encryption SAS to SSD drive conversion
5758  6258  Yes       Encryption SAS to SSD drive conversion
5758  6358  Yes       Encryption SAS to SSD drive conversion

5768  6058  Yes       Encryption SAS to SSD drive conversion
5768  6158  Yes       Encryption SAS to SSD drive conversion
5768  6258  Yes       Encryption SAS to SSD drive conversion
5768  6358  Yes       Encryption SAS to SSD drive conversion
```

Encryption SSD drive sets:

```
Feature     Returned
From  To    parts      Description

6058  6358  Yes        Encryption SSD drive conversion
6156  6358  Yes        Encryption SSD drive conversion
6158  6358  Yes        Encryption SSD drive conversion
6258  6358  Yes        Encryption SSD drive conversion
```

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=114-171

Publications

The following publication has been updated to reflect this announcement and will be
available October 6, 2014.

```
Title                                      Order number

IBM DS8870 Introduction and Planning Guide  GC27-4209
```

The following publications are shipped with the DS8000 series:

```
Title                                      Order number

IBM DS8000 Customer Series Publications     00RX756
  CDROM

IBM DS8000 Series License Documentation     00RX755
  CDROM
```

The publications CD contains the following documents:

```
Title                                      Order number

License Agreement for Machine Code          SC28-6872

IBM DS8870 Introduction and Planning        GC27-4209
  Guide

IBM DS8000 Host Systems Attachment          GC27-4210
  Guide

IBM DS Command-Line Interface User's        GC53-4212
  for DS8000 series

IBM System Storage Multipath Subsystem      GC52-1309
  Device Driver User's Guide

IBM DS Open Application Programming         GC27-4211
  Interface Installation and Reference

IBM DS8000 series                           GA32-2204
  Non-IBM_Licenses_and_Notices-Rel
  5.x-6.0, 6.1, 6.2, 6.3, 7.0, 7.1, 7.2, 7.3, 7.4

IBM Warranty Information                     GC26-7919

READ ME FIRST for IBM Products              GA32-1061

IBM System Storage Notice Regarding         45W6389
  Storage Encryption
```

The license CD contains the following documentation:

```
Title                                  Order number

IBM System Storage DS® Storage Mgr R7.4     GC27-3907
 & CIM Agent for DS Open Application
 Programming Interface 5.7.4

IBM International License Agreement for    98Y2827
 Non-Warranted Programs (ILAN)

Global Mirroring Utilities for ICKDSF Users  GC26-7644
 and Open Systems Environments License
 Information
```

DS8000 publications are available at

http://www.ibm.com/shop/publications/order/

IBM has a new way for you to search, view, and collaborate with documentation using the new IBM Knowledge Center. A single instance of IBM Knowledge Center will replace the 650+ separate information centers on ibm.com®.

IBM Knowledge Center is an IBM-wide view of technical information with multiple sources of offerings in a single location.

IBM Knowledge Center provides a centralized and consolidated way to access the information you need to use IBM products and also provides innovative ways to find information and to create your own set of information to cater to your needs. You will be able to personalize views, build customer documents, and interact with other information. Visit IBM Knowledge Center to learn more

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

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/ites.wss/zz/en?pageType=tp_search_new

Technical information

Specified operating environment

Homologation

This product is certified for connection to interfaces of public telecommunications networks in all countries **except** the following:

- Haiti
- Honduras
- Moldavia
- Mozambique
- Oman

And the embargoed countries:

- Iraq
- Sudan
- North Korea
- Syria

Hardware requirements

Licensed Machine Code

All announced features and functions are supported on the IBM System Storage DS8000 series and require DS8000 LMC 7.7.40.xx.xx (bundle version 87.40.xxx.xx), or later.

Some DS8000 series features and functions may not be available or supported in all environments. Current information on supported environments, prerequisites, and minimum operating system levels is available at

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

Planning information

Customer responsibilities

Physical configuration planning

Physical configuration planning is a customer responsibility. A marketing specialist can help plan and select the DS8000 series physical configuration and features. Introductory information, including required and optional features, can be found in the *IBM DS8870 Introduction and Planning Guide* (GC27-4209).

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

Installation planning

Installation planning is a customer responsibility. Information about planning the installation of a DS8000 series, including equipment, site, and power requirements, can be found in the *IBM DS8870 Introduction and Planning Guide* (GC27-4209).

Logical configuration planning and application

Logical configuration planning is a customer responsibility. Logical configuration refers to the creation of RAID ranks, volumes, and 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 will also apply or modify the logical configuration (fee-based service).

Licensed Machine Code planning and application

IBM may release changes to the DS8000 series Licensed Machine Code. IBM plans to make the most current DS8000 series Licensed Machine Code changes available for download by the DS8000 series system from the IBM System Storage technical support website. Not all Licensed Machine Code changes may be available through the support website. If the machine does not function as warranted and a problem can be resolved through the application of downloadable Licensed Machine Code, the customer is 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. A request can be made for IBM to install downloadable Licensed Machine Code changes, however there may be a charge for that service.

Calculating physical and effective capacity

Refer to the *IBM DS8870 Introduction and Planning Guide* (GC27-4209) 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. Review all planning requirements and include them in the installation considerations.

- Key server planning
- Security Key Lifecycle Manager planning
- FDE 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 DS8870 Introduction and Planning Guide* (GC27-4209).

DS8870 requires at least two key servers and associated software for each site which has one or more encryption-enabled DS8000 systems, according to encryption best practices. One server must be isolated and 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.

- DS8000 encryption environments are recommended to configure external Laptop HMC for high availability (feature number 1130).
- It is the customer's responsibility to replicate any key labels and their associated key material 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, allowing 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 desiring NIST 800-131a compliance, IBM Security Key Lifecycle Manager (formerly named IBM Tivoli Key Lifecycle Manager (TKLM)) V2.5, or higher is required.

For customers needing dual platform key server support on the DS8000 system, the installation of TKLM IFIX 2 (TKLM Version 1.0.0.2, or later) is recommended to support displaying both key labels in the GUI. Additionally, for customers who intend to replicate keys between separate z Series 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, or later) is required.

IBM Security Key Lifecycle Manager planning

The DS8000 series supports IBM Security Key Lifecycle Manager V2.5 and IBM Security Key Lifecycle Manager V1.1.

```
Program
number      VRM     Program name

5724-T60    2.5.0   IBM Security Key Lifecycle Manager

5608-A99    2.5.0   IBM Security Key Lifecycle Manager

Program
number      VRM     Program name

5698-B35    1.0.0   IBM Security Key Lifecycle Manager for z/OS
5698-B42    1.1.0   IBM Security Key Lifecycle Manager for Storage
```

To support enterprise-wide encryption-key management, a new set of pricing metrics is now available. These pricing metrics are simpler and more comprehensive for devices, users, and server capacity.

For self-encrypting disk drives, the metric is per client device with the disk drive feature number.

For more information on the licensing requirements and pricing of the metric, refer to 211-305, dated August 30, 2011.

Isolated key server ordering options:

- **SKLM isolated key server - feature number 1760:** Isolated key servers ordered with feature number 1760 will have a Linux™ operating system and SKLM software preinstalled.
- **Customer acquired isolated key server:** Refer to the *IBM Security Key Lifecycle Manager Installation and Configuration Guide* (SC27-5335) for hardware and operating system requirements.

Note: Regardless of the ordering method, customers will need to acquire a SKLM license for use of the SKLM software ordered separately from the stand-alone server hardware.

Note: The licensing for SKLM includes both an install license for the SKLM management software as well as licensing for the encrypting drives.

Refer to the following publications:

- *IBM Security Key Lifecycle Manager Quick Start Guide (GI13-2316)*
- *IBM Security Key Lifecycle Manager Installation and Configuration Guide (SC27-5335)*

FDE activation review planning

FDE activation is a customer responsibility. IBM FDE 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 email to

storsvcs@us.ibm.com

Visit the website below and click on **Contact now** to submit your inquiry or
request.

http://www-03.ibm.com/systems/services/labservices/platforms/
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 website 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

No cables required.

Direct customer support

Direct customer support for the DS8000 series is provided by IBM Operational
Support Services - Support Line. This fee service can enhance your productivity
by providing voice and electronic access into the IBM support organization. IBM
Operational Support Services - Support Line will help answer questions pertaining
to product and feature usage (how to), configuration, and product compatibility for
eligible products. For a list of the products supported via Support Line, visit

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

For more information on services, call 800-IBM-4YOU (426-4968).

Security, auditability, and control

This product uses the security and auditability features of the host hardware, host
software, and 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

Electronic Service Agent™ and the IBM Electronic Support web portal are dedicated
to providing fast, exceptional support to IBM Systems customers. The IBM Electronic
Service Agent tool is a no-additional-charge tool that proactively monitors and
reports hardware events, such as system errors, performance issues, and inventory.
The Electronic Service Agent tool can help you stay focused on your company's
strategic business initiatives, save time, and spend less effort managing day-to-day
IT maintenance issues. Servers enabled with this tool can be monitored remotely
around the clock by IBM Support all at no additional cost to you.

Now integrated into the base operating system of AIX® 5.3, AIX 6.1, and AIX
7.1, Electronic Service Agent is designed to automatically and electronically report
system failures and utilization issues to IBM, which can result in faster problem
resolution and increased availability. System configuration and inventory information
collected by the Electronic Service Agent tool also can be viewed on the secure
Electronic Support web portal, and used to improve problem determination and
resolution by you and the IBM support team. To access the tool main menu,
simply type "smitty esa_main", and select "Configure Electronic Service Agent." In
addition, ESA now includes a powerful Web user interface, giving the administrator

easy access to status, tool settings, problem information, and filters. For more information and documentation on how to configure and use Electronic Service Agent, refer to

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

The IBM Electronic Support portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The My Systems and Premium Search functions make it even easier for Electronic Service Agent tool-enabled customers to track system inventory and find pertinent fixes.

Benefits

Increased uptime: The Electronic Service Agent tool is designed to enhance the Warranty or Maintenance Agreement by providing faster hardware error reporting and uploading system information to IBM Support. This can translate to less wasted time monitoring the "symptoms," diagnosing the error, and manually calling IBM Support to open a problem record. Its 24 x 7 monitoring and reporting mean no more dependence on human intervention or off-hours customer personnel when errors are encountered in the middle of the night.

Security: The Electronic Service Agent tool is designed to be secure in monitoring, reporting, and storing the data at IBM. The Electronic Service Agent tool securely transmits either via the Internet (HTTPS or VPN) or modem, and can be configured to communicate securely through gateways to provide customers a single point of exit from their site. Communication is one way. Activating Electronic Service Agent does not enable IBM to call into a customer's system. System inventory information is stored in a secure database, which is protected behind IBM firewalls. It is viewable only by the customer and IBM. The customer's business applications or business data is never transmitted to IBM.

More accurate reporting: Since system information and error logs are automatically uploaded to the IBM Support center in conjunction with the service request, customers are not required to find and send system information, decreasing the risk of misreported or misdiagnosed errors. Once inside IBM, problem error data is run through a data knowledge management system and knowledge articles are appended to the problem record.

Customized support: Using the IBM ID entered during activation, customers can view system and support information in the "My Systems" and "Premium Search" sections of the Electronic Support Web site at

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

My Systems provides valuable reports of installed hardware and software using information collected from the systems by Electronic Service Agent. Reports are available for any system associated with the customer's IBM ID. Premium Search combines the function of search and the value of Electronic Service Agent information, providing advanced search of the technical support knowledge base. Using Premium Search and the Electronic Service Agent information that has been collected from your system, customers are able to see search results that apply specifically to their systems.

For more information on how to utilize the power of IBM Electronic Services, contact your IBM Systems Services Representative, or visit

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

Terms and conditions

Terms and conditions features section

MES discount applicable

No

Field installable feature

Yes

Warranty period

Machine type 2421: One year

Machine type 2422: Two years

Machine type 2423: Three years

Machine type 2424: Four years

This product is provided with 1 year of standard warranty and additional years of extended warranty services to make these offerings.

Customers should consult with their financial personnel on the appropriate financial treatment for this offering.

Customer setup

No

Licensed Internal Code

Same license terms and conditions as designated machine.

Prices

Description	Machine type	Model	Feature number
DS8870	2421	961	
DS8000 multi-thread performance accelerator indicator			0605
Licensed Function indicators: - Multiple Target PPRC indicator			0745
Disk drive enclosures: - HD 1.6 TB SSD enclosure indicator			1257
DS8000 Licensed Machine Code: - DS8000 LMC R7.4			1735
Encryption disk drive sets: - 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets: - 600 GB 15K FDE CoD drive set			5619
Encryption SSD drive sets: - 1.6 TB SSD FDE drive set			6358
Function Authorization indicators: - Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature number
DS8870 Expansion Unit	2421	96E	

High-performance flash enclosure placement indicators:
- Enclosure position 1			0411
- Enclosure position 2			0412
- Enclosure position 3			0413
- Enclosure position 4			0414
- Enclosure position 1 Full			0511
- Enclosure position 2 Full			0512
- Enclosure position 3 Full			0513
- Enclosure position 4 Full			0514

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator			1257

High-performance flash card sets:
- High-performance flash enclosure			1500
- 400 GB 1.8-inch flash card set A			1506
- 400 GB 1.8-inch flash card set B			1508
- Flash enclosure filler set			1599

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4 indicator			1835

Device adapters:
- High-performance flash adapter pair			3054

Encryption disk drive sets:
- 600 GB 15K FDE drive set			5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set			5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set			6358

Description	Machine type	Model	Feature number
DS8870	2422	961	

DS8000 multi-thread performance accelerator indicator			0605

Licensed Function indicators:
- Multiple Target PPRC indicator			0745

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator			1257

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4			1735

Encryption disk drive sets:
- 600 GB 15K FDE drive set			5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set			5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set			6358

Function Authorization indicators:
- Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature number

```
DS8870 Expansion Unit              2422    96E

High-performance flash enclosure placement indicators:
- Enclosure position 1                           0411
- Enclosure position 2                           0412
- Enclosure position 3                           0413
- Enclosure position 4                           0414
- Enclosure position 1 Full                      0511
- Enclosure position 2 Full                      0512
- Enclosure position 3 Full                      0513
- Enclosure position 4 Full                      0514

Disk drive enclosures:
- HD 1.6 TB SSD enclosure indicator              1257

High-performance flash card sets:
- High-performance flash enclosure               1500
- 400 GB 1.8-inch flash card set A               1506
- 400 GB 1.8-inch flash card set B               1508
- Flash enclosure filler set                     1599

DS8000 Licensed Machine Code:
- DS8000 LMC R7.4 indicator                      1835

Device adapters:
- High-performance flash adapter pair            3054

Encryption disk drive sets:
- 600 GB 15K FDE drive set                       5618

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD drive set                   5619

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set                       6358
```

Description	Machine type	Model	Feature number
DS8870	2423	961	
DS8000 multi-thread performance accelerator indicator			0605
Licensed Function indicators:			
- Multiple Target PPRC indicator			0745
Disk drive enclosures:			
- HD 1.6 TB SSD enclosure indicator			1257
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.4			1735
Encryption disk drive sets:			
- 600 GB 15K FDE drive set			5618
Encryption Standby CoD disk drive sets:			
- 600 GB 15K FDE CoD drive set			5619
Encryption SSD drive sets:			
- 1.6 TB SSD FDE drive set			6358
Function Authorization indicators:			
- Multiple Target PPRC indicator			7025

Description	Machine type	Model	Feature number
DS8870 Expansion Unit	2423	96E	

```
High-performance flash enclosure placement indicators:
```

```
        - Enclosure position 1                     0411
        - Enclosure position 2                     0412
        - Enclosure position 3                     0413
        - Enclosure position 4                     0414
        - Enclosure position 1 Full                0511
        - Enclosure position 2 Full                0512
        - Enclosure position 3 Full                0513
        - Enclosure position 4 Full                0514

     Disk drive enclosures:
        - HD 1.6 TB SSD enclosure indicator        1257

     High-performance flash card sets:
        - High-performance flash enclosure         1500
        - 400 GB 1.8-inch flash card set A         1506
        - 400 GB 1.8-inch flash card set B         1508
        - Flash enclosure filler set               1599

     DS8000 Licensed Machine Code:
        - DS8000 LMC R7.4 indicator                1835

     Device adapters:
        - High-performance flash adapter pair      3054

     Encryption disk drive sets:
        - 600 GB 15K FDE drive set                 5618

     Encryption Standby CoD disk drive sets:
        - 600 GB 15K FDE CoD drive set             5619

     Encryption SSD drive sets:
        - 1.6 TB SSD FDE drive set                 6358


                              Machine              Feature
     Description              type     Model       number

     DS8870                   2424     961

     DS8000 multi-thread performance accelerator   0605
      indicator

     Licensed Function indicators:
     - Multiple Target PPRC indicator              0745

     Disk drive enclosures:
     - HD 1.6 TB SSD enclosure indicator           1257

     DS8000 Licensed Machine Code:
     - DS8000 LMC R7.4                             1735

     Encryption disk drive sets:
     - 600 GB 15K FDE drive set                    5618

     Encryption Standby CoD disk drive sets:
     - 600 GB 15K FDE CoD drive set                5619

     Encryption SSD drive sets:
     - 1.6 TB SSD FDE drive set                    6358

     Function Authorization indicators:
     - Multiple Target PPRC indicator              7025


                              Machine              Feature
     Description              type     Model       number

     DS8870 Expansion Unit    2424     96E

     High-performance flash enclosure placement indicators:
        - Enclosure position 1                     0411
        - Enclosure position 2                     0412
        - Enclosure position 3                     0413
        - Enclosure position 4                     0414
```

```
       - Enclosure position 1 Full              0511
       - Enclosure position 2 Full              0512
       - Enclosure position 3 Full              0513
       - Enclosure position 4 Full              0514


     Disk drive enclosures:
       - HD 1.6 TB SSD enclosure indicator      1257


     High-performance flash card sets:
       - High-performance flash enclosure       1500
       - 400 GB 1.8-inch flash card set A       1506
       - 400 GB 1.8-inch flash card set B       1508
       - Flash enclosure filler set             1599


     DS8000 Licensed Machine Code:
       - DS8000 LMC R7.4 indicator              1835


     Device adapters:
       - High-performance flash adapter pair    3054


     Encryption disk drive sets:
       - 600 GB 15K FDE drive set               5618


     Encryption Standby CoD disk drive sets:
       - 600 GB 15K FDE CoD drive set           5619


     Encryption SSD drive sets:
       - 1.6 TB SSD FDE drive set               6358



     Feature change options
```

Description	Feature number	Install* type	Feature conversion	Feature exchange	Feature remove
High-performance flash enclosure placement indicators:					
- Enclosure position 1	0411	Both	No	No	Yes
- Enclosure position 2	0412	Both	No	No	Yes
- Enclosure position 3	0413	Both	No	No	Yes
- Enclosure position 4	0414	Both	No	No	Yes
- Enclosure position 1 Full	0511	Both	No	No	Yes
- Enclosure position 2 Full	0512	Both	No	No	Yes
- Enclosure position 3 Full	0513	Both	No	No	Yes
- Enclosure position 4 Full	0514	Both	No	No	Yes
DS8000 multi-thread performance accelerator indicator	0605	Both	No	No	Yes
Licensed Function indicators:					
- Multiple Target PPRC indicator	0745	Both	No	No	Yes
Disk drive enclosures:					
- HD 1.6 TB SSD enclosure indicator	1257	Both	Yes	No	Yes
High-performance flash card sets:					
- High-performance flash enclosure	1500	Both	No	No	No
- 400 GB 1.8-inch flash card set A	1506	Both	No	No	Yes
- 400 GB 1.8-inch flash card set B	1508	Both	No	No	Yes
- Flash enclosure filler set	1599	Both	No	No	Yes
DS8000 Licensed Machine Code:					
- DS8000 LMC R7.4	1735	Both	No	No	Yes
- DS8000 LMC R7.4 indicator	1835	Both	No	No	Yes
Device adapters:					
- High-performance flash	3054	Both	No	No	No

```
      adapter pair

Encryption disk drive sets:
- 600 GB 15K FDE drive set  5618     Both      Yes          No          Yes

Encryption Standby CoD disk drive sets:
- 600 GB 15K FDE CoD        5619     Both      Yes          No          Yes
  drive set

Encryption SSD drive sets:
- 1.6 TB SSD FDE drive set  6358     Both      Yes          No          Yes

Function Authorization indicators:
- Multiple Target PPRC      7025     Both      No           No          Yes
  indicator
```

	Feature number	CSU
High-performance flash enclosure placement indicators:		
- Enclosure position 1	0411	N/A
- Enclosure position 2	0412	N/A
- Enclosure position 3	0413	N/A
- Enclosure position 4	0414	N/A
- Enclosure position 1 Full	0511	N/A
- Enclosure position 2 Full	0512	N/A
- Enclosure position 3 Full	0513	N/A
- Enclosure position 4 Full	0514	N/A
DS8000 multi-thread performance accelerator indicator	0605	N/A
Licensed Function indicators:		
- Multiple Target PPRC indicator	0745	N/A
Disk drive enclosures:		
- HD 1.6 TB SSD enclosure indicator	1257	N/A
High-performance flash card sets:		
- High-performance flash enclosure	1500	No
- 400 GB 1.8-inch flash card set A	1506	No
- 400 GB 1.8-inch flash card set B	1508	No
- Flash enclosure filler set	1599	No
DS8000 Licensed Machine Code:		
- DS8000 LMC R7.4	1735	No
- DS8000 LMC R7.4 indicator	1835	N/A
Device adapters:		
- High-performance flash adapter pair	3054	No
Encryption disk drive sets:		
- 600 GB 15K FDE drive set	5618	No
Encryption Standby CoD disk drive sets:		
- 600 GB 15K FDE CoD drive set	5619	No
Encryption SSD drive sets:		
- 1.6 TB SSD FDE drive set	6358	No
Function Authorization indicators:		
- Multiple Target PPRC	7025	No

```
    indicator
```

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

```
CSU = Customer setup
```

- Feature Conversion: As necessary, IBM service personnel will remove components from the machine and/or install additional components required to complete the conversion.
- Feature Remove: This is an administrative transaction and only updates IBM machine and inventory records, except under the following condition:
  - IBM will remove components from the machine if the Feature Remove is ordered in conjunction with a Feature Add transaction.

Feature conversion purchase price

```
Feature conversions (machine types 2421, 2422, 2423, and 2424
for Model 961 and 96E):
```

```
Disk enclosures:
```

Feature conversion From	To	Returned parts *	Description	Continuous maintenance
1255	1257	No	HD 200 GB SSD enclosure Indicator to 1.6 TB SSD enclosure indicator	NA
1245	1257	No	HD 400 GB SSD enclosure indicator to 1.6 TB SSD enclosure indicator	NA
1256	1257	No	HD 800 GB SSD enclosure indicator to 1.6 TB SSD enclosure indicator	NA

```
Encryption disk drive sets:
```

Feature conversion From	To	Returned parts *	Description	Continuous maintenance
5108	5618	Yes	Encryption disk drive set conversion	Yes
5618	5768	Yes	Encryption disk drive set conversion	Yes
5618	5868	Yes	Encryption disk drive set conversion	Yes
5708	5618	Yes	Encryption disk drive set conversion	Yes
5768	5868	Yes	Encryption disk drive set conversion	Yes

```
Encryption Standby CoD disk drive sets:
```

Feature conversion From	To	Returned parts *	Description	Continuous maintenance
5619	5618	No	Encryption CoD disk drive conversion	Yes

Encryption SAS to SSD drive sets:

Feature conversion From	To	Returned parts *	Description	Continuous maintenance
5108	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5108	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5108	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5108	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5308	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5308	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5308	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5308	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5618	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5618	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5618	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5618	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5708	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5708	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5708	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5708	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5758	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5758	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5758	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5758	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5768	6058	Yes	Encryption SAS to SSD drive conversion	Yes
5768	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5768	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5768	6358	Yes	Encryption SAS to SSD drive conversion	Yes

Encryption SSD drive sets:

Feature conversion From	To	Returned parts *	Description	Continuous maintenance
6058	6358	Yes	Encryption SSD drive conversion	Yes
6156	6358	Yes	Encryption SSD drive conversion	Yes
6158	6358	Yes	Encryption SSD drive conversion	Yes
6258	6358	Yes	Encryption SSD drive conversion	Yes

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

```
be returned.
```

Pricing terms

Prices in the following PDF prices link are suggested list prices on day of announcement for the U.S. only. They are provided for your information only. Dealer prices may vary, and prices may also vary by country. IBM list price does not include tax or shipping and is subject to change without notice.

ENUS-114-171-LIST_PRICES_2014_10_06.PDF

Trademarks

POWER7+, Geographically Dispersed Parallel Sysplex and Electronic Service Agent are trademarks of IBM Corporation in the United States, other countries, or both.

IBM, System z, z/OS, Easy Tier, FlashCopy, DS8000, DB2, POWER7, System Storage, HyperSwap, GDPS, Tivoli, POWER, XIV, Storwize, PartnerWorld, System Storage DS, ibm.com, Global Technology Services and AIX are registered trademarks of IBM Corporation in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.

Terms of use

IBM products and services which are announced and available in your country can be ordered under the applicable standard agreements, terms, conditions, and prices in effect at the time. IBM reserves the right to modify or withdraw this announcement at any time without notice. This announcement is provided for your information only. Additional terms of use are located at:

http://www.ibm.com/legal/us/en/

For the most current information regarding IBM products, consult your IBM representative or reseller, or visit the IBM worldwide contacts page

http://www.ibm.com/planetwide/us/