



IBM DS8870 delivers expanded connectivity and extends cloud enablement support with z Synergy for integration of z Systems and Storage systems

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At a glance

IBM[®] DS8870 delivers the following enhancements:

- 16 GFC 4 port Fiber Channel/FICON host adapters
- New and improved z Synergy items
- Heat Map Transfer for Metro Global Mirror (MGM) environment
- REST API
- Performance monitoring

Overview

IBM DS8870 (MT 2421, 2422, 2423, and 2424) delivers expanded connectivity with support for 16GFC FC/FICON host adapters, enhanced Heat Map Transfer functionality, and cloud enablement support with z Synergy features to strengthen integration between z Systems[™] and Storage systems.

16GFC FC/FICON connectivity: DS8870 supports 16GFC FC/FICON connectivity with an optional four-port host adapter card. Model 961 supports four adapter card pairs and Model 96E supports four additional adapter card pairs, enabling a total of sixty-four 16GFC FC/FICON ports.

New and improved z Synergy features:

- **FICON[®] Dynamic Routing:** This feature supports Systems Business Class and Enterprise Class models and enables use of dynamic routing policies for cascaded directors in the SAN. Examples of dynamic routing policies include Brocade Exchange Based Routing (EBR) or Originator Exchange ID Load Balancing (OxID) across cascaded FICON Directors. The value of FICON Dynamic Routing is to help reduce cost by allowing Metro Mirror and FICON traffic to share the same set of ISLs. This can help reduce the number of ports required, fibers, and intercity bandwidth.
- **Forward error correction (FEC):** This feature helps to correct I/O errors and improve the reliability of 16 Gbs links, encouraging the adoption of faster link speeds. This feature also protects DS8870 Metro Mirror links connected to 16GFC host adapters and FCP links connected to switches that support standard FEC negotiation protocols.

- **zHPF Extended Distance II:** This feature delivers better zHPF large block write performance at longer distances (up to 100 Km) and improved FC fabric congestion management.
- **Fabric Priority for FICON, zHPF, and FCP:** z Workload Manager (zWLM) will assign a fabric I/O priority for every I/O operation executed by z/OS^(R) thus extending the scope of management into the SAN. The DS8870 exploits fabric priority by propagating it to the Metro Mirror traffic generated for write requests and by echoing back the priority to get the value on read requests. Fabric priority complements the FICON Dynamic Routing feature by insuring the FICON traffic and the Metro Mirror traffic are managed to a consistent set of policies.
- **Read Diagnostics Parameters (RDP) support:** RDP enables new standard link services for obtaining diagnostic information including link speeds and power levels from FC end points and switch ports to aid in link fault isolation.

Heat Map Transfer for MGM environments: With this release, heat map transfer supports MGM replication topology in addition to Metro Mirror/Global Copy/Global Mirror (MM/GC/GM) functions.

REST API: This release includes support for monitoring, configuring, and controlling aspects of the DS8870 system configuration by use of an industry-standard REST API.

Performance monitoring: The improved DS8000^(R) Storage Management GUI provides system performance monitoring in real time. A storage administrator can view performance metrics from up to one week earlier down to one minute intervals in order to troubleshoot a wide variety of issues. Supported graphs include the following:

- I/O, bandwidth, caching, capacity, and power/temperature monitoring at a system level
- Back-end I/O, back-end bandwidth, and capacity monitoring at a pool level
- Front-end I/O and bandwidth monitoring at a pool level

Simplified encryption setup: The improved DS8000 Storage Management GUI also provides simplified encryption setup and management through a simplified encryption paradigm matching other products. This enables a storage administrator to configure encryption within five minutes of finishing system setup.

Feature exchange

None

Key prerequisites

All announced features and functions are supported on the IBM System Storage^(R) DS8000 series and require DS8000 LMC 7.7.50.xx.xx (bundle version 87.50.xxx.xx), or later.

Planned availability date

May 22, 2015

Description

The industry is changing the way to handle business. Customers need to leverage digital technology, use mobile to handle business transactions, operate services

through cloud, and gain business insight from data through analytics. More than ever, infrastructure matters, not only for service excellence and operational efficiency, but for new value creation.

In the first quarter of 2015, IBM launched the new z13™ which delivers unprecedented performance, availability, and security protection to handle the digital business environment. To support existing clients with new services and offerings, an underlying, efficient, secure, adaptive, and integrated IT infrastructure is required. DS8870 enterprise storage is the only storage product that has deep integration with z Systems, developing and testing functionality together to provide robust end-to-end IT solutions to improve business performance and growth. This release delivers functionality to support IBM z Systems™.

16GFC FC/FICON offers expanded connectivity options

DS8870 Models 961 and 96E support 16GFC connectivity with the 4 Port 16GFC host adapter card. There are two options available for this adapter card; shortwave SFP transceivers (feature number 3353) and longwave SFP transceivers (feature number 3453). They can support up to 10 km unrepeated distance.

Models 961 and 96E can be configured with up to 16 host adapter cards providing up to sixty-four 16GFC ports or up to one hundred twenty-eight 8GFC ports. 16GFC host adapters can be intermixed with the 8GFC host adapter cards.

This flexibility enables exploitation of the potential benefits offered by the higher performance, 16GFC SAN-based solutions, while also maintaining compatibility with the existing 2GFC, 4GFC, and 8GFC infrastructures.

New and improved Storage leadership features for z Systems

The unique integration of DS8870 and the zEnterprise^(R) platform provides customers with optimized performance, high availability, and excellent quality of service with the following new features:

- z Systems platform enables the use of SAN dynamic routing policies such as Brocade's EBR or CISCO OxID supported across cascaded FICON directors. This is intended to help simplify configuration planning and reduce hardware cost by enabling the FICON and FCP (Metro Mirror) to share the same switch infrastructure without creating separate virtual switches and adding Inter Switch Links (ISLs). Metro Mirror technology from IBM uses FCP as the transport, so FICON and Metro Mirror can now flow over the same ISLs and be managed with consistent fabric priority as described below.

A new health check for z/OS is planned that will perform environmental checking for FICON dynamic routing. This health check will be designed to check all components of a dynamic routing fabric, the channel subsystem, and disk control units to make sure that dynamic routing requirements are met if dynamic routing has been enabled for one or more FICON switches. This support is planned at z13 FICON dynamic routing functional availability for z/OS V1.13, V2.1 and z/OS V2.2 with PTFs.

- zWLM is designed to assign high priority to operations that have strict response time requirements and to help reduce the variations in performance of SAN switches for these operations. DS8870 will provide easy access of data with SAN Fabric I/O Priority. DS8870 will also propagate the fabric priority for write operations to the resulting Metro Mirror traffic to provide a consistent prioritization with FICON when sharing the same SAN infrastructure and ISLs. This support planned to be available for z/OS V1.13, and V2.1 with PTFs and also planned for z/OS V2.2.
- With the introduction of 16 Gbs connectivity, faster links between DS8870 and zEnterprise will reduce the DB2^(R) log write latency up to 23 percent for single stream and up to 60 percent faster when running multiple streams, resulting in reduced DB2 transactional latency for the single stream write. It also helps to improve DB2 transactional latency for OLTP workloads.

The combination of zHyperWrite and z13 with FICON Express^(R) 16s channels and the DS8870 16 Gbs HBA will help to reduce DB2 log write latency by up to 61 percent and a reduction in DB2 commit elapsed time.

For the LSPR IMSTM work load, the WADS I/O service time is reduced by up to 22 percent and the OLDS I/O service times reduced by up to 14 percent. I/O bound batch jobs performing a mix of read and write operations will achieve up to a 32 percent reduction in elapsed times.

- FEC can help to correct up to 11 consecutive bit errors per block of 2112 bits resulting in higher loss margins and better link reliability when adopting the 16GFC link speed. The use of FEC aligns with T11 standards.
- With the new zHPF Extended Distance II, an improvement of up to 68 percent of the I/O service time when writing large block data across remote sites can be experienced, and is required especially for GDPS^(R) HyperSwap^(R) configurations where the secondary storage subsystem is in another site.
- IBM z13TM and the fourth subchannel help to facilitate the host configuration definition needed for exploiting HyperSwap with Multi Target PPRC. This support is available for z/OS V1.13, and V2.1 with PTFs and is planned for z/OS V2.2.
- RDP enables new standard link services for obtaining diagnostic information from FC end points and switch ports to aid in link fault isolation. The RDP ELS, brought to T11 standards by IBM, provides the ability to obtain SFP+ diagnostic information such as transmit and receive optical power, supported and current operating link speeds, and traditional Link Error Status information.

This integration will enable clients to find potential trouble spots in the SAN without manually inserting light meters around the machine room. This will help reduce false Repair Actions (no defect found, NDF) and allow diagnostic applications (in zOS) to automatically be able to differentiate when errors are caused by faulty components versus dirty optical connections.

FICON Dynamic Routing, Fabric Priority, FEC and zHPF Extended Distance II functionality will be available on 16GFC host adapter card.

For more details on z synergy support, refer to Software Announcement [215-006](#), dated January 14, 2015.

Heat Map Transfer for Metro Global Mirror (MGM) environment

DS8870 supports heat map transfer for MGM replication topology in addition to Metro Mirror/Global Copy/Global Mirror (MM/GC/GM) copy services relationships.

GDPS supports DS8870 multitarget heat map transfer capabilities for three site and four site MGM environment, as well as Metro Mirror/Extended Remote Copy/Global Mirror (MM/XRC/GM) copy services relationships.

REST API support

DS8870 support improves cloud deployment, using an industry standard API, enabling the following capabilities:

- Automated custom storage operations using the new DS8000 REST API
 - Create, update, delete, and query volumes, volume group, hosts, and host ports
 - Query extent pools, systems, FC ports, and LSS
 - Update and query thin provisioned attributes
 - Query FlashCopy^(R) and PPRC relationships
 - Query system level information and performance statistics
- Ability for the IBM Storage Mobile Dashboard iOS application to interface with the DS8870

Bandwidth savings

Clients with z/TPF and Global Mirror configurations can now take advantage of bandwidth savings dependent on workload when replicating information to a secondary. Transient data can avoid unnecessary replication, resulting in savings in bandwidth relative to the number of write I/Os marked as transient data by z/TPF.

Performance monitoring

The new interface delivers tools to monitor system performance and events, and storage administrators can view the metrics going back one week and down to one minute intervals in order to troubleshoot a wide variety of issues.

All new functions in this release require Licensed Machine Code level 7.7.50.xx.xx, or later (features numbers 1736 and 1836).

Plant and field availability: May 22, 2015:

- 16 Gb 4 port Fiber Channel/FICON host adapters
- New and improved z Synergy items
- Heat Map Transfer for MGM environment
- OpenStack - RESTful API
- Performance monitoring

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

IBM DS8870 and IBM DS8870 Expansion Units are capable as of October 19, 2012, 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 at

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

Reference information

For additional information on DS8870 2421, refer to Hardware Announcement [112-154](#), dated October 3, 2012.

For additional information on DS8870 2422, refer to Hardware Announcement [112-173](#), dated October 3, 2012.

For additional information on DS8870 2423, refer to Hardware Announcement [112-171](#), dated October 3, 2012.

For additional information on DS8870 2424, refer to Hardware Announcement [112-172](#), dated October 3, 2012.

For additional information on DS8870 Function Authorizations 239x, refer to Hardware Announcement [112-156](#), dated October 3, 2012.

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

Product number

Description	Machine type	Model	Feature
DS8870	2421	961	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870 Expansion Unit	2421	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870	2422	961	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870 Expansion Unit	2422	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870	2423	961	

Description	Machine type	Model	Feature
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870 Expansion Unit	2423	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870	2424	961	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature
DS8870 Expansion Unit	2424	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
- 16 Gb 4 port SW FCP/FICON adapter PCIE			3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE			3453

Feature conversions

From feature	To feature	Description
Host adapters:		
3353	3453	Host adapter conversion
3453	3353	Host adapter conversion

Parts removed as a result of a feature conversion become the property of IBM.

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^(R) ID and password are required (use IBM ID).

[BP Attachment for Announcement Letter 115-058](#)

Publications

The following publication has been updated to reflect this release and will be available May 11, 2015.

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 CDROM	00VN062
IBM DS8000 Series License Documentation CDROM	00VN063

The publications CD contains the following documents:

Title	Order number
License Agreement for Machine Code	SC28-6872
IBM DS8870 Introduction and Planning Guide	GC27-4209
IBM DS8000 Host Systems Attachment Guide	GC27-4210
IBM DS Command-Line Interface User's for DS8000 series	GC53-4212
IBM System Storage Multipath Subsystem Device Driver User's Guide	GC52-1309
IBM DS Open Application Programming Interface Installation and Reference	GC27-4211
IBM DS8000 series 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, 7.5	GA32-2204
IBM Warranty Information	GC26-7919
READ ME FIRST for IBM Products	GA32-1061
IBM System Storage Notice Regarding Storage Encryption	45W6389

The license CD contains the following documentation:

Title	Order number
IBM System Storage DS ^(R) Storage Mgr R7.5 & CIM Agent for DS Open Application Programming Interface 5.7.5	GC27-3907
IBM International License Agreement for Non-Warranted Programs (ILAN)	98Y2827
Global Mirroring Utilities for ICKDSF Users and Open Systems Environments License Information	GC26-7644

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 IBM Knowledge Center. A single instance of IBM Knowledge Center will replace the 650+ separate information centers on ibm.com^(R).

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/>

The IBM Publications Center Portal is located at

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

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. A large number of publications are available online in various file formats, which can currently be downloaded.

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:

- Chad
- Eritrea

- Guinea-Bissau
- Haiti
- Macau (China)
- Moldavia
- Sri Lanka

This product is also restricted for use in the embargoed countries:

- Cuba
- Iran, Islamic Republic of
- North Korea
- Sudan
- Syria (Syrian Arab Republic)

Hardware requirements

Licensed Machine Code

All announced features and functions are supported on the IBM System Storage DS8000 series and require DS8000 LMC 7.7.50.xx.xx (bundle version 87.50.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.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^(R) 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 Software Announcement [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 preinstalled and include SKLM software image CD.
- **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.

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

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

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 one 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 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870 Expansion Unit	2421	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353

Description	Machine type	Model	Feature number
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870	2422	961	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870 Expansion Unit	2422	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870	2423	961	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5			1736
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870 Expansion Unit	2423	96E	
DS8000 Licensed Machine Code:			
- DS8000 LMC R7.5 indicator			1836
Host adapters:			
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453
Description	Machine type	Model	Feature number
DS8870	2424	961	
DS8000 Licensed Machine Code:			

Description	Machine type	Model	Feature number			
- DS8000 LMC R7.5			1736			
Host adapters:						
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353			
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453			
Description	Machine type	Model	Feature number			
DS8870 Expansion Unit	2424	96E				
DS8000 Licensed Machine Code:						
- DS8000 LMC R7.5 indicator			1836			
Host adapters:						
-16 Gb 4 port SW FCP/FICON adapter PCIE			3353			
-16 Gb 4 port LW FCP/FICON adapter PCIE			3453			
Description	Feature number	Install type	Feature conversion	Feature exchange	Feature remove	CSU
DS8000 Licensed Machine Code:						
- DS8000 LMC R7.5	1736	Both	No	No	Yes	No
- DS8000 LMC R7.5 indicator	1836	Both	No	No	Yes	N/A
Host adapters:						
-16 Gb 4 port SW FCP/FICON adapter PCIE	3353	Both	Yes	No	Yes	No
-16 Gb 4 port LW FCP/FICON adapter PCIE	3453	Both	Yes	No	Yes	No

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

- 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.
- CSU = Customer setup
- N/A = Not applicable

Feature conversion purchase price

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

Host adapters:

Feature	Returned parts	Description	Feature conversion purchase price
From	To		
3353	3453	Yes	Yes
3453	3353	Yes	Yes

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

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