

IBM DS8900F four-year warranty all-flash offering built with IBM POWER9 technology

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At a glance

IBM^(R) DS8900F all-flash family is offering the following features and functions:

- DS8980F analytic-class Model 998
- Volume-level performance reporting
- Safeguarded Copy restore to production
- Consistent read from Metro Mirror secondary
- Fibre Channel connectivity report
- Encryption without key servers (local encryption)
- Unmap command for IBM i
- Expandable to 2 TB and 3.4 TB cache¹
- Transparent cloud tiering multicloud support

¹ For existing Model 996

Overview

IBM DS8900F all-flash family is designed to deliver comprehensive next-level cybersecurity, data stability, and system resiliency for mission-critical workloads across hybrid multicloud deployments. The DS8900F all-flash family offers DS8980F, an analytic-class storage system designed to expand mission-critical workload possibilities to AI, business intelligence, and machine learning.

IBM DS8980F Model 998 is a racked analytic-class solution delivering the following features:

- Two 11-core processors (22 cores) per central processor complex for a total of 44 cores per system
- A maximum of 192 flash cards
- 4.3 TB processor memory per system
- 128 GB non-volatile dual in-line memory module (NVDIMM) for write retention
- Up to 16 host adapters or 64 ports
- Single-phase and three-phase support
- Expansion Model E96 compatibility

The following functions are available for DS8900F family models:

- Volume-level performance reporting
- Safeguarded Copy restore to production
- Consistent read from Metro Mirror secondary site
- Fibre Channel connectivity reporting
- Encryption without key servers (local encryption)
- Unmap command for IBM i
- Expandable to 2 TB and 3.4 TB cache¹
- Transparent cloud tiering multicloud support

Key requirements

All announced features and functions that are supported on the IBM DS8000^(R) series require DS8000 LMC 8.9.20.xx.xx (bundle version 89.20.xx.xx), or later.

Planned availability date

August 20, 2021

Description

The DS8900F family is offering DS8980F analytics-class Model 998 as a replacement for DS8888F analytics-class models. This premium model continues the same fundamental theme as the previous models of the DS8900F family, focusing on availability, reliability, and performance.

IBM DS8980F has been designed to expand all workload possibilities to AI, business intelligence, and machine learning across hybrid multicloud deployments for IBM Z^(R), IBM LinuxONE, IBM Power^(R) Systems, and distributed environments under a single all-flash storage solution.

IBM DS8980F Model 998 is a racked analytic-class solution delivering the following features:

- Two 11-core processors (22 cores) per central processor complex for a total of 44 cores per system
- A maximum of 192 flash cards
- Increase maximum cache from 3.4 TB to 4.3 TB per system with 128 GB NVDIMM for write retention
- Up to 16 host adapters or 64 ports
- Single- and three-phase power support

Expansion Model E96 is compatible with Model 998 for additional capacity and host adapters:

- Up to 192 additional flash cards
- Up to 16 additional host adapter or additional 64 ports

The DS8900F family offers the following features and benefits:

- Volume-level performance reporting: This release delivers a detailed view of performance metrics per volume within the management GUI to help administrators simplify resource optimization tasks and improve their ability for problem resolution. IOPS, bandwidth and latency data from the logical subsystem, and host perspective will be easily accessible. Report files from both

the management GUI and DSCLI can be exported and uploaded into StorM for performance modeling and simulation. Enhanced graphing support will help users focus on the information that is needed, enabling faster troubleshooting for host applications and easier data analysis in the management GUI.

- Safeguarded Copy restore to production with incremental global copy: Before release 9.2, production environments recovering from a Safeguarded Copy on a mirrored secondary would be required to perform a full global copy of data from the recovery volume to restore data and back to the primary. With this enhancement, only the data that has been modified since the last recovery point is sent instead of the full volume. This *incremental copy* approach helps to greatly reduce the restore time, sometimes from hours to minutes, while achieving savings in bandwidth. Restore to production is supported for Metro Mirror, Global Mirror and Global Copy, and three- and four-site Metro Global Mirror environments. Copy Services Manager provides support for the restore to production functionality with release 6.3. For IBM Geographically Dispersed Parallel Sysplex^(R) (GDPS^(R)) support of this function, see the **Product Preview** section.
- Fast creation of Safeguarded Copy backup in physically isolated environment: This release optimizes Safeguarded Copy backup creation in a cascaded physical isolation environment through cascaded Global Mirror. In the previous cascaded solution through cascaded Global Copy, a back-up capture could have an RPO impact of roughly four minutes to the front Global Mirror leg. With cascaded Global Mirror and other enhancements, a backup can be created with an RPO impact of just 30 seconds to the front Global Mirror leg.
- Consistent read from the Metro Mirror secondary site: This release provides improved performance for read operations from a z/OS^(R) system where the Metro Mirror secondary has closer or better connectivity than the Metro Mirror primary. This capability enables reads for supported IO types to be performed from a Metro Mirror secondary volume over both FICON^(R) and zHyperlink. This delivers reduced latency and improved workload balance compared to reading from only the primary. This could be exploited in a metropolitan high availability and disaster recovery configuration where z/OS systems in a Sysplex are spread over multiple sites and enables all systems to perform reads to the local storage system within the site. It also provides additional value for zHyperlink configurations if a system is only connected by zHyperlink to the Metro Mirror secondary whether the Metro Mirror is across multiple sites or within a single data center. Consistent read from Metro Mirror secondary is supported for both Metro Mirror and multitarget Metro Mirror, as well as the Metro Mirror relationship in three- and four-site Metro Global Mirror configurations. This requires that the Metro Mirror environment is HyperSwap^(R)-enabled with either Copy Services Manager or GDPS and that the z/OS system has the required software support installed. Supported IO types include both Db2^(R) and Virtual Storage Access Method reads, and require that the software supports the Bypass Extent Serialization function.
- Fibre Channel connectivity report: This release enhances the IBM DS8900F management GUI, delivering the ability to generate a report identifying information for the attached port and for all host logins and replication logins for a selected port, including current configuration and the security status for each IBM Fibre Channel Endpoint Security login. This enhancement helps system administrators get a better understanding about the SAN configuration, making them more efficient in optimizing system resources and improving their ability for problem determination.
- Encryption without key servers: To enable encryption at rest, an external key manager server is typically needed, increasing complexity, capital expenses and operational costs. The IBM DS8900F family offers the option of a local key manager to enable and manage encryption at rest, protecting data while keeping expenses and operation costs low. The local key manager is only capable of handling encryption at rest. For encryption of data in-flight support using Fibre Channel Endpoint Security or for transparent cloud tiering, an external key manager is still required.
- Unmap command for IBM i: In an open system environment, hosts can issue unmap commands to indicate that a range of data filled with zeros can be freed. This might happen, for example, when formatting a new volume or deleting files. This release helps IBM i clients to efficiently reclaim deleted space on thin-

provisioned volumes and make it available for reuse to meet ongoing storage needs.

- Expandability and scalability: Additional 2 TB and 3.4 TB cache options¹ deliver an expandable, scalable solution.
- Transparent cloud tiering multicloud support: Currently there can only be a single cloud target defined per DS8000, such as a cloud object store target Amazon Simple Storage Service (Amazon S3) API or a TS7700. Starting with this release, transparent cloud tiering is supported for a larger combination of private clouds, public clouds, and TS7700. By defining multiple SMS cloud network connection constructs, clients can define DFSMSHsm management class policies that direct some types of data to a TS7700 object store and other types of data to private or public clouds. Clients can also use this capability to separate test data from production data. With this capability, both development and testing can configure systems to move data to various types of cloud targets without having to reconfigure the system every time.

¹ For existing Model 996

Product Preview

IBM plans to deliver GDPS support for Safeguarded Copy restore to production in fourth quarter of 2021.

IBM plans to deliver TS7700 enhanced object store functionality with grid-wide replication for IBM TS7700 in conjunction with IBM DS8000 and IBM Z. This is currently planned to consist of IBM TS7700 Advanced Object Store for DS8000. With the intent to be delivered as a feature code and part of the TS7770 VED model, the enhanced object store functionality with grid-wide replication is planned to be available on a future release of TS7700.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Section 508 of the US Rehabilitation Act

IBM DS8980F is capable as of August 20, 2021, 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 Accessibility Conformance Statement can be requested on the [Product accessibility information](#) website.

Reference information

For more information about available function authorizations, see Hardware Announcement [117-007](#), dated January 10, 2017.

Product number

The following are newly announced features and model on the specified model of the IBM System Storage 5334 machine type:

Description	Machine type	Model	Feature
Local Key Manager Enabled	5334	993	0405
DS8000 LMC R9.2	5334	993	1892
Local Key Manager Enabled	5334	994	0405
DS8000 LMC R9.2	5334	994	1892
Local Key Manager Enabled	5334	996	0405
DS8000 LMC R9.2	5334	996	1892
2048 GB v2 System Cache (20 core)	5334	996	4457
3.4 TB v2 System Cache (20 core)	5334	996	4458
IBM DS8980F	5334	998	
E96 factory merge	5334	998	0005
PPA Software Order Indicator	5334	998	0017
DoD Indicator	5334	998	0020
JEMT indicator	5334	998	0021
E96 - position 1	5334	998	0245
800GB 2.5" flash encl ind	5334	998	0261
1.6TB 2.5" flash encl ind	5334	998	0262
3.2TB 2.5" flash encl ind	5334	998	0263
1.92 TB 2.5" flash encl ind	5334	998	0264
3.8 TB 2.5" flash encl ind	5334	998	0265
7.68 TB 2.5" flash encl ind	5334	998	0266
15.36 TB 2.5 flash encl ind	5334	998	0267
Encryption not capable	5334	998	0403
TDCPP free indicator	5334	998	0404
Local Key Manager Enabled	5334	998	0405
Flash card sets custom placement indicator	5334	998	0606
Safe Guarded Copy Indicator	5334	998	0785
5.1 TB to 10 TB capacity	5334	998	0796
10.1 TB to 25 TB capacity	5334	998	0797
25.1 TB to 50 TB capacity	5334	998	0798
50.1 TB to 75 TB capacity	5334	998	0799
75.1 TB to 100.0 TB capacity	5334	998	0801
100.1 TB to 250 TB capacity	5334	998	0803
250.1 TB to 500 TB capacity	5334	998	0804
500.1 TB to 1250 TB capacity	5334	998	0806

Description	Machine type	Model	Feature
1250.1 TB to 3000 TB capacity	5334	998	0807
3000.1 TB to 6000 TB capacity	5334	998	0808
6000.1TB TO 12000TB CAPACITY	5334	998	0809
IBM/Openwave Alliance	5334	998	0930
IBM System i Indicator	5334	998	0931
IBM System p Indicator	5334	998	0932
IBM System x Indicator	5334	998	0933
IBM System z ^(R) Indicator	5334	998	0934
IBM System z B/C indicator	5334	998	0935
IBM System zEnterprise ^(R) Cloud indicator	5334	998	0936
Linux ^(R) Indicator	5334	998	0940
Storage Appliance indicator	5334	998	0952
IBM ProtecTIER ^(R) indicator	5334	998	0960
IBM Storwize ^(R) V7000 indicator	5334	998	0961
IBM N series indicator	5334	998	0962
IBM SAN Volume Controller indicator	5334	998	0963
IBM/EPIC attachment indicator	5334	998	0964
VMware ^(R) VAAI indicator	5334	998	0965
OpenStack indicator	5334	998	0966
US TAA compliance indicator	5334	998	0983
Remote code load exception	5334	998	0990
Remote code load	5334	998	0991
Front & rear door lock kit	5334	998	1014
Single Phase Power - 208V 30A NEMA L6-30P	5334	998	1038
Single Phase Power - 250V 30A/32A IEC 60309	5334	998	1039
3 Phase Wye Power - 380/220 - 415/240 V (LL/LN) 30A/32A, IEC 60309 (5 pin 3+N +PE)	5334	998	1041

Description	Machine type	Model	Feature
Single Phase Power - 250V 32A, Australia/New Zealand	5334	998	1042
Single Phase Power - 250V 30A, Korea	5334	998	1043
3 phase Delta Power - 200-240V (LL) 60A/63A IEC 60309 (4 pin 3+PE)	5334	998	1045
Overhead ladder - 5ft	5334	998	1101
Kick Step	5334	998	1103
DS8900F rack doors	5334	998	1105
SpaceSaver front/rear doors	5334	998	1106
Rack side cover pair	5334	998	1107
I/O enclosure pair PCIe 3	5334	998	1303
Rack management switch pair	5334	998	1310
Top exit bracket for fibre cable R9	5334	998	1401
50 um Fibre cable (LC)	5334	998	1410
50 um Fibre cable (LC/SC)	5334	998	1411
50 um Fibre cable (Jumper)	5334	998	1412
50 um Fibre cable 3m SW LC	5334	998	1413
9 um Fibre cable (LC)	5334	998	1420
9 um Fibre cable (LC/SC)	5334	998	1421
9 um Fibre cable (Jumper)	5334	998	1422
9 um Fibre cable 3m LW LC	5334	998	1423
40m zHyperlink cable	5334	998	1450
150m zHyperlink cable	5334	998	1451
HPFE Gen 2 adapter card	5334	998	1604
HPFE Gen 2 enclosure pair R9	5334	998	1605
800 GB 2.5-inch flash card set	5334	998	1611
1600 GB 2.5-inch flash card set	5334	998	1612
3200 GB 2.5-inch flash card set	5334	998	1613
1.92 TB 2.5-inch high capacity flash	5334	998	1622
3.8 TB 2.5-inch high capacity flash	5334	998	1623
7.68 TB 2.5-inch high capacity flash	5334	998	1624

Description	Machine type	Model	Feature
15.36 TB 2.5-inch high capacity flash	5334	998	1625
Flash enclosure filler set	5334	998	1699
1U Keyboard/Display	5334	998	1765
DS8000 LMC R9.2	5334	998	1892
Earthquake Kit DS8900F AC156	5334	998	1907
Hardware installation MES	5334	998	1999
16 Gb 4 port SW FCP/FICON ^(R) adapter PCIE	5334	998	3353
32 Gb 4 port SW FCP/FICON adapter PCIE	5334	998	3355
16 Gb 4 port LW FCP/FICON adapter PCIE	5334	998	3453
32 Gb 4 port LW FCP/FICON adapter PCIE	5334	998	3455
zHyperlink adapter	5334	998	3500
Transparent cloud tiering 10Gb/1Gb Ethernet pair V2 for 4U controllers	5334	998	3603
22 core processor pair indicator	5334	998	4344
4.3 TB System Cache (44 core)	5334	998	4456
BF 10TB increments from 0 to 100 TB	5334	998	8151
BF 15TB increments from 100.1 TB to 250 TB	5334	998	8152
BF 25TB increments from 250.1 TB to 500 TB	5334	998	8153
BF 75TB increments from 500.1 TB to 1250 TB	5334	998	8154
BF 175TB increments from 1250.1 TB to 3000 TB	5334	998	8155
BF 300TB increments from 3000.1 TB to 6000 TB	5334	998	8156
BF 600TB increments from 6000.1 TB to 12000 TB	5334	998	8160
CS - Inactive	5334	998	8250
CS 10TB increments from 0 to 100 TB	5334	998	8251
CS 15TB increments from	5334	998	8252

Description	Machine type	Model	Feature
100.1 TB to 250 TB			
CS 25TB increments from 250.1 TB to 500 TB	5334	998	8253
CS 75TB increments from 500.1 TB to 1250 TB	5334	998	8254
CS 175TB increments from 1250.1 TB to 3000 TB	5334	998	8255
CS 300TB increments from 3000.1 TB to 6000 TB	5334	998	8256
CS 600TB increments from 6000.1 TB to 12000 TB	5334	998	8260
zsS - Active	5334	998	8300
zsS - Inactive	5334	998	8350
zsS 10TB increments from 0 to 100 TB	5334	998	8351
zsS 15TB increments from 100.1 TB to 250 TB	5334	998	8352
zsS 25TB increments from 250.1 TB to 500 TB	5334	998	8353
zsS 75TB increments from 500.1 TB to 1250 TB	5334	998	8354
zsS 175TB increments from 1250.1 TB to 3000 TB	5334	998	8355
zsS 300TB increments from 3000.1 TB to 6000 TB	5334	998	8356
zsS 600TB increments from 6000.1 TB to 12000 TB	5334	998	8360
CSM on HMC - Active	5334	998	8451
IGF transaction indicator	5334	998	8999
Shipping and Handling NC	5334	998	AG00
Shipping and handling 998	5334	998	AGAN
BP Post-Sale Services	5334	998	SVBP
IBM Systems Lab Services Post-Sale Services	5334	998	SVCS
Other IBM Post-Sale Services	5334	998	SVNN

Description	Machine type	Model	Feature
DS8000 LMC R9.2 indicator	5334	E96	1992

Feature conversions

Feature conversions are available to clients for 5334-966 and 5334-998. The existing components being replaced during a model or feature conversion become the property of IBM and must be returned.

Feature conversions are always implemented on a "quantity of one for quantity of one" basis. Multiple existing features may not be converted to a single new feature. Single existing features may not be converted to multiple new features.

Feature conversions for 5334-996

From feature:	To feature:	Returned parts*
4452 - 512GB System Cache (10 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4453 - 1024GB System Cache (20 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4454 - 2048GB System Cache (20 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4452 - 512GB System Cache (10 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4453 - 1024GB System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4454 - 2048GB System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4455 - 3.4 TB system cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	No
4457 - 2048 GB v2 System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes

Feature conversions for 5334-998

From feature:	To feature:	Returned parts*
1611 - 800 GB 2.5-inch flash card set	1612 - 1600 GB 2.5-inch flash card set	Yes
1611 - 800 GB 2.5-inch flash card set	1613 - 3200 GB 2.5-inch flash card set	Yes
1612 - 1600 GB 2.5-inch flash card set	1613 - 3200 GB 2.5-inch flash card set	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1623 - 3.8 TB 2.5-inch high capacity flash	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1624 - 7.68 TB 2.5-inch high capacity flash	Yes
1623 - 3.8 TB 2.5-inch high capacity flash	1624 - 7.68 TB 2.5-inch high capacity flash	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes
1623 - 3.8 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes
1624 - 7.68 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes

*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 ID and password are required (use IBMid).

[BP Attachment for Announcement Letter 121-042](#)

Publications

DS8000 publications are available at the [IBM Publications Center](#).

You can search, view, and collaborate with documentation using [IBM Documentation](#). IBM Documentation is an IBM-wide view of technical information with multiple sources of offerings in a single location.

IBM Documentation 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.

To access the IBM Publications Center Portal, go to the [IBM Publications Center](#) website.

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

IBM Systems Lab Services

IBM Systems Lab Services offers a wide array of services available for your enterprise. It brings expertise on the latest technologies from the IBM development community and can help with your most difficult technical challenges.

IBM Systems Lab Services exists to help you successfully implement emerging technologies so as to accelerate your return on investment and improve your satisfaction with your IBM systems and solutions. Services examples include initial implementation, integration, migration, and skills transfer on IBM systems solution capabilities and recommended practices. IBM Systems Lab Services is one of the service organizations of IBM's world-renowned IBM Systems Group development labs.

For details on available services, contact your IBM representative or go to the [Lab Services](#) website.

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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 go to the [IBM Global Technology Services^{\(R\)}](#) website.

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or go to the [Resiliency Services](#) website.

Details on education offerings related to specific products can be found on the [IBM Skills Gateway](#) website.

Technical information

Specified operating environment

Physical specifications

Model 998

- 40U 19-inch EIA rack
- Height: 1927 mm (75.87 in.)
- Width:
 - Space saver 600 mm (23.62 in.)
 - Decorative covers 616 mm (24.25 in.)
- Depth:
 - Space saver 1169 mm (46 in.)
 - Standard door 1270 mm (50 in.)
- Weight: 793 kg (1748 lb)

Operating environment

- Temperature: 16°C to 32°C (60°F to 90°F)
- Relative humidity: 20% - 80%
- 29,742 BTU
- Electrical power (DS8980F Model 998): 7.5 kW
- Capacity of exhaust: 1,500 cubic feet/minute estimated
- Declared operating A-weighted sound power level: 8.4 bels estimated
- Leakage current: 30 mA max per line cord.

Power consumption

- Model 998 maximum config: 7.5 kW

DASD subsystems

- Maximum physical storage capacity: 2,937,600 Gigabytes with 15.3 TB flash drive sets
- Power consumption: 7,500 W
- DASD Energy Consumption Efficiency: 0.000025 W/Gigabytes

Hardware requirements

Licensed Machine Code

All announced features and functions are supported on the IBM System Storage DS8000 series and require DS8000 LMC 8.9.20.xx.xx (bundle version 89.20.xx.xx), or later.

Limitations

None.

Planning information

Client responsibilities

Physical configuration planning

Physical configuration planning is a client 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 DS8900F Introduction and Planning Guide (SC27-9560)* for the DS8980F analytic class Model 998.

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

Installation planning

Installation planning is a client responsibility. Information about planning the installation of a DS8000 series, including equipment, site, and power requirements, can be found in the *IBM DS8900F Introduction and Planning Guide (SC27-9560)* for models 993, 994, 996, 998, and E96.

Logical configuration planning and application

Logical configuration planning is a client responsibility. Logical configuration refers to the creation of RAID arrays, 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 DS8000 Storage Manager (GUI) and DS command-line interface.

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

For capacity calculation guidelines, see the *IBM DS8900F Introduction and Planning Guide (SC27-9560)* for models 993, 994, 996, 998, and E96.

Encryption planning

Encryption planning is a client 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.

- IBM Local Key Manager planning
- IBM Security™ Guardium^(R) Key Lifecycle Manager (GKLM) planning
- Encryption activation review planning

IBM Local Key Manager planning

To enable encryption at rest, an external key manager server is typically needed, increasing complexity, capital expenses, and operational costs. Starting from release 9.2, DS8900F has the option of an internal key manager to enable and manage encryption at rest, protecting data while keeping expenses and operation costs low.

The keys are generated and stored in DS8000. This internal key manager is only capable of handling encryption at rest, for example media encryption. An additional feature number 0405 is available for selection in e-config during ordering process.

For encryption of data in flight support or transparent cloud tiering to cloud encryption, an external key manager such as GKLM is still required. It is a client's responsibility to enable or disable internal key manager through econfig.

Dual storage appliance server planning

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

For clients desiring NIST 800-131a compliance, GKLM, formerly known as IBM Tivoli^(R) Key Lifecycle Manager 2.5, or later, is required.

GKLM planning

The DS8000 series supports GKLM 4.0 and 4.1.

Program number	VRM	Program name
5724-T60	3.0	IBM Security Key Lifecycle Manager (For PPA)
5641-GKL	3.0	IBM Security Guardium Key Lifecycle Manager -- 1 year (For AAS)
5641-GKM	3.0	IBM Security Guardium Key Lifecycle Manager -- 3 year (For AAS)

To support enterprise-wide encryption-key management, an updated set of pricing metrics is 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 about the licensing requirements and pricing of the metric, see Software Announcement [213-470](#), dated October 29, 2013.

Isolated key server ordering options

Client-acquired isolated key server: See the [IBM Security Guardium Key Lifecycle Manager](#) page in IBM Documentation for hardware and operating system requirements.

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

Note: The licensing for GKLM includes both an install license for the GKLM management software and a license for the encrypting drives.

IBM Security Guardium Key Lifecycle Manager English publications may be viewed online on the electronic availability date at the [IBM Security Guardium Key Lifecycle Manager documentation](#) website.

To access the IBM Publications Center portal, go to the [IBM Publications Center](#) website.

Encryption activation review planning

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

Send email to

storsvcs@us.ibm.com^(R)

Go to the [Storage Services](#) website 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

Cables are required to connect DS8000 series 16 Gbps and 32 Gbps FCP/FICON^(R) host adapter ports to server or fabric ports. Cables can be purchased using the appropriate DS8000 series feature numbers.

Additional cable options, along with product support services such as installation, are offered by IBM Global Services' Networking Services.

Fibre Channel/FICON (shortwave)

Shortwave Fibre Channel and FICON ports on the DS8000 series require a 50-micron (multimode) fiber optic cable terminated with a LC connector. Fibre Channel cables can be purchased using feature numbers 141x for 50-micron cables.

Fibre Channel/FICON (longwave)

Longwave Fibre Channel and FICON ports on the DS8000 series require a 9-micron (single mode) fiber optic cable terminated with a LC connector. Fibre Channel cables can be purchased using feature numbers 142x for 9-micron cables.

These are single 24-fiber cables with MTP connectors. Internally, a single cable houses 12 fibers for transmit and 12 fibers for receive.

Direct client 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 supported products, go to the [Support Line](#) website.

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

IBM Systems Lab Services

For details on available services, contact your IBM representative or go to the [Lab Services](#) website.

Terms and conditions

Volume orders

Contact your IBM representative.

IBM Global Financing

Yes

Products - terms and conditions

Warranty period

Warranty and additional coverage options	Coverage summary²
Warranty period:	1 year + 3 years Extended Support (4 years total)
Service level:	IBM On-Site, 24x7 Same Day
Service upgrade options	
Warranty Service Upgrade	Not applicable
Maintenance Services (Post-Warranty)	IBM On-Site Repair, 24x7 Same Day
IBM Hardware Maintenance Services - committed maintenance ³	Yes

² See complete coverage details below

³ Not offered in the US

Four years

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM. An IBM part or feature installed during the initial installation of an IBM machine is subject to the full warranty period specified by IBM. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Premium Support Services

IBM DS8900F models offer enhanced worldwide client care support, including the availability of one year Premium Support Services in a single machine type. Premium Support Services enhance client communications regarding problem status and actions, and will include the following service enhancements:

- Hardware installation and hardware configuration support

- Improved client problem management
- Faster initial response time to prioritize the resolution of high severity problems
- Improved coordination across support teams within IBM
- Technical Advisor support is included during the warranty period

Extended Warranty Service

This product is provided with one year of standard warranty. For your convenience, IBM has provided three additional years of extended warranty services to make this offering. Consult with your advisors about the appropriate financial treatment for this offering.

Warranty service

If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically through an IBM website. Certain machines contain remote support capabilities for direct problem reporting, remote problem determination, and resolution with IBM. You must follow the problem determination and resolution procedures that IBM specifies. Following problem determination, if IBM determines on-site service is required, scheduling of service will depend upon the time of your call, machine technology and redundancy, and availability of parts. If applicable to your product, parts considered Client Replaceable Units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country-specific and location-specific information.

On-site Service

At IBM's discretion, IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

Service level is:

- 24 hours per day, 7 days a week, same day response.

Usage plan machine

No

IBM hourly service rate classification

Three

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

General terms and conditions

Field-installable features

Yes

Model conversions

No

Machine installation

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

The following activities are a customer responsibility:

- Installation planning
- Retrieval and installation of feature activation codes
- Encryption planning

See the [Client responsibilities](#) section for more information.

Customer requests for installation of items not covered in the installation guide may be performed at IBM's hourly service rate designated for the machine.

Graduated program license charges apply

No

Licensed Machine Code

IBM Machine Code is licensed for use by a client on the IBM machine for which it was provided by IBM under the terms and conditions of the IBM License Agreement for Machine Code, to enable the machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the client. You can obtain the agreement from the [License Agreement for Machine Code and Licensed Internal Code](#) website.

Access to Machine Code updates is conditioned on entitlement and license validation in accordance with IBM policy and practice. IBM may verify entitlement through customer number, serial number, electronic restrictions, or any other means or methods employed by IBM in its discretion.

You may also obtain updated code by contacting your IBM representative.

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

Educational allowance

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

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

Prices

For additional information and current prices, contact your local IBM representative or IBM Business Partner.

The following are newly announced features and model on the specified model of the IBM System Storage 5334 machine type:

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
DS8980F	998		Both	No	

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
Local Key Manager Enabled	993	0405	Initial	No	No
DS8000 LMC R9.2	993	1892	Both	No	No
Local Key Manager Enabled	994	0405	Initial	No	No
DS8000 LMC R9.2	994	1892	Both	No	No
Local Key Manager Enabled	996	0405	Initial	No	No
DS8000 LMC R9.2	996	1892	Both	No	No
2048 GB v2 System Cache (20 core)	996	4457	Both	No	No
3.4 TB v2 System Cache (20 core)	996	4458	Both	No	No
E96 factory merge	998	0005	Initial	No	No
PPA Software Order Indicator	998	0017	Both	No	No
DoD Indicator	998	0020	Initial	No	No
JEMT indicator	998	0021	Initial	No	No
E96 - position 1	998	0245	Both	No	No
800GB 2.5" flash encl ind	998	0261	Both	No	No
1.6TB 2.5" flash encl ind	998	0262	Both	No	No
3.2TB 2.5" flash encl ind	998	0263	Both	No	No
1.92 TB 2.5" flash encl ind	998	0264	Both	No	No
3.8 TB 2.5" flash encl ind	998	0265	Both	No	No
7.68 TB 2.5" flash encl ind	998	0266	Both	No	No
15.36 TB 2.5 flash encl ind	998	0267	Both	No	No
Encryption not capable	998	0403	Initial	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
TDCPP free indicator	998	0404	Initial	No	No
Local Key Manager Enabled	998	0405	Initial	No	No
Flash card sets custom placement indicator	998	0606	Both	No	No
Safe Guarded Copy Indicator	998	0785	Both	No	No
5.1 TB to 10 TB capacity	998	0796	Both	No	No
10.1 TB to 25 TB capacity	998	0797	Both	No	No
25.1 TB to 50 TB capacity	998	0798	Both	No	No
50.1 TB to 75 TB capacity	998	0799	Both	No	No
75.1 TB to 100.0 TB capacity	998	0801	Both	No	No
100.1 TB to 250 TB capacity	998	0803	Both	No	No
250.1 TB to 500 TB capacity	998	0804	Both	No	No
500.1 TB to 1250 TB capacity	998	0806	Both	No	No
1250.1 TB to 3000 TB capacity	998	0807	Both	No	No
3000.1 TB to 6000 TB capacity	998	0808	Both	No	No
6000.1TB TO 12000TB CAPACITY	998	0809	Both	No	No
IBM/ Openwave Alliance	998	0930	Both	No	No
IBM System i Indicator	998	0931	Both	No	No
IBM System p Indicator	998	0932	Both	No	No
IBM System x Indicator	998	0933	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
IBM System z ^(R) Indicator	998	0934	Both	No	No
IBM System z B/C indicator	998	0935	Both	No	No
IBM System zEnterprise ^(R) Cloud indicator	998	0936	Both	No	No
Linux ^(R) Indicator	998	0940	Both	No	No
Storage Appliance indicator	998	0952	Both	No	No
IBM ProtecTIER ^(R) indicator	998	0960	Both	No	No
IBM Storwize ^(R) V7000 indicator	998	0961	Both	No	No
IBM N series indicator	998	0962	Both	No	No
IBM SAN Volume Controller indicator	998	0963	Both	No	No
IBM/EPIC attachment indicator	998	0964	Both	No	No
VMware ^(R) VAAI indicator	998	0965	Both	No	No
OpenStack indicator	998	0966	Both	No	No
US TAA compliance indicator	998	0983	Initial	No	No
Remote code load exception	998	0990	Both	No	No
Remote code load	998	0991	Both	No	No
Front & rear door lock kit	998	1014	Both	No	No
Single Phase Power - 208V 30A NEMA L6-30P	998	1038	Both	No	No
Single Phase Power - 250V 30A/32A IEC 60309	998	1039	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
3 Phase Wye Power - 380/220 - 415/240 V (LL/LN) 30A/32A, IEC 60309 (5 pin 3+N +PE)	998	1041	Both	No	No
Single Phase Power - 250V 32A, Australia/ New Zealand	998	1042	Both	No	No
Single Phase Power - 250V 30A, Korea	998	1043	Both	No	No
3 phase Delta Power - 200-240V (LL) 60A/63A IEC 60309 (4 pin 3+PE)	998	1045	Both	No	No
Overhead ladder - 5ft	998	1101	Both	No	No
Kick Step	998	1103	Both	No	No
DS8900F rack doors	998	1105	Both	No	No
SpaceSaver front/rear doors	998	1106	Both	No	No
Rack side cover pair	998	1107	Both	No	No
I/O enclosure pair PCIe 3	998	1303	Both	No	No
Rack management switch pair	998	1310	Both	No	No
Top exit bracket for fibre cable R9	998	1401	Both	No	No
50 um Fibre cable (LC)	998	1410	Both	No	No
50 um Fibre cable (LC/SC)	998	1411	Both	No	No
50 um Fibre cable (Jumper)	998	1412	Both	No	No
50 um Fibre cable 3m SW LC	998	1413	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
9 um Fibre cable (LC)	998	1420	Both	No	No
9 um Fibre cable (LC/SC)	998	1421	Both	No	No
9 um Fibre cable (Jumper)	998	1422	Both	No	No
9 um Fibre cable 3m LW LC	998	1423	Both	No	No
40m zHyperlink cable	998	1450	Both	No	No
150m zHyperlink cable	998	1451	Both	No	No
HPFE Gen 2 adapter card	998	1604	Both	No	No
HPFE Gen 2 enclosure pair R9	998	1605	Both	No	No
800 GB 2.5-inch flash card set	998	1611	Both	No	No
1600 GB 2.5-inch flash card set	998	1612	Both	No	No
3200 GB 2.5-inch flash card set	998	1613	Both	No	No
1.92 TB 2.5-inch high capacity flash	998	1622	Both	No	No
3.8 TB 2.5-inch high capacity flash	998	1623	Both	No	No
7.68 TB 2.5-inch high capacity flash	998	1624	Both	No	No
15.36 TB 2.5-inch high capacity flash	998	1625	Both	No	No
Flash enclosure filler set	998	1699	Both	No	No
1U Keyboard/Display	998	1765	Both	No	No
DS8000 LMC R9.2	998	1892	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
Earthquake Kit DS8900F AC156	998	1907	Both	No	No
Hardware installation MES	998	1999	MES	No	No
16 Gb 4 port SW FCP/FICON adapter PCIE	998	3353	Both	No	No
32 Gb 4 port SW FCP/FICON adapter PCIE	998	3355	Both	No	No
16 Gb 4 port LW FCP/FICON adapter PCIE	998	3453	Both	No	No
32 Gb 4 port LW FCP/FICON adapter PCIE	998	3455	Both	No	No
zHyperlink adapter	998	3500	Both	No	Yes
Transparent cloud tiering 10Gb/1Gb Ethernet pair V2 for 4U controllers	998	3603	Both	No	Yes
22 core processor pair indicator	998	4344	Initial	No	No
4.3 TB System Cache (44 core)	998	4456	Initial	No	No
BF 10TB increments from 0 to 100 TB	998	8151	Both	No	No
BF 15TB increments from 100.1 TB to 250 TB	998	8152	Both	No	No
BF 25TB increments from 250.1 TB to 500 TB	998	8153	Both	No	No
BF 75TB increments from 500.1 TB to 1250 TB	998	8154	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
BF 175TB increments from 1250.1 TB to 3000 TB	998	8155	Both	No	No
BF 300TB increments from 3000.1 TB to 6000 TB	998	8156	Both	No	No
BF 600TB increments from 6000.1 TB to 12000 TB	998	8160	Both	No	No
CS - Inactive	998	8250	Both	No	No
CS 10TB increments from 0 to 100 TB	998	8251	Both	No	No
CS 15TB increments from 100.1 TB to 250 TB	998	8252	Both	No	No
CS 25TB increments from 250.1 TB to 500 TB	998	8253	Both	No	No
CS 75TB increments from 500.1 TB to 1250 TB	998	8254	Both	No	No
CS 175TB increments from 1250.1 TB to 3000 TB	998	8255	Both	No	No
CS 300TB increments from 3000.1 TB to 6000 TB	998	8256	Both	No	No
CS 600TB increments from 6000.1 TB to 12000 TB	998	8260	Both	No	No
zsS - Active	998	8300	Both	No	No
zsS - Inactive	998	8350	Both	No	No
zsS 10TB increments from 0 to 100 TB	998	8351	Both	No	No
zsS 15TB increments from	998	8352	Both	No	No

Description	Model number	Feature numbers	Initial / MES / Both / Support	CSU	RP MES
100.1 TB to 250 TB					
zsS 25TB increments from 250.1 TB to 500 TB	998	8353	Both	No	No
zsS 75TB increments from 500.1 TB to 1250 TB	998	8354	Both	No	No
zsS 175TB increments from 1250.1 TB to 3000 TB	998	8355	Both	No	No
zsS 300TB increments from 3000.1 TB to 6000 TB	998	8356	Both	No	No
zsS 600TB increments from 6000.1 TB to 12000 TB	998	8360	Both	No	No
CSM on HMC - Active	998	8451	Both	No	No
IGF transaction indicator	998	8999	MES	No	No
Shipping and Handling NC	998	AG00	Initial	No	No
Shipping and handling 998	998	AGAN	Initial	No	No
BP Post-Sale Services	998	SVBP	Both	No	No
IBM Systems Lab Services Post-Sale Services	998	SVCS	Both	No	No
Other IBM Post-Sale Services	998	SVNN	Both	No	No
DS8000 LMC R9.2 indicator	E96	1992	Both	No	No

CSU = Customer setup

RP MES = Returnable parts MES

ServiceElect (ESA) charges

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

Feature conversion purchase price

Feature conversions for 5334-996

From feature:	To feature:	Returned parts*
4452 - 512GB System Cache (10 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4453 - 1024GB System Cache (20 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4454 - 2048GB System Cache (20 core)	4457 - 2048 GB v2 System Cache (20 core)	No
4452 - 512GB System Cache (10 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4453 - 1024GB System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4454 - 2048GB System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes
4455 - 3.4 TB system cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	No
4457 - 2048 GB v2 System Cache (20 core)	4458 - 3.4 TB v2 System Cache (20 core)	Yes

Feature conversions for 5334-998

From feature:	To feature:	Returned parts*
1611 - 800 GB 2.5-inch flash card set	1612 - 1600 GB 2.5-inch flash card set	Yes
1611 - 800 GB 2.5-inch flash card set	1613 - 3200 GB 2.5-inch flash card set	Yes
1612 - 1600 GB 2.5-inch flash card set	1613 - 3200 GB 2.5-inch flash card set	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1623 - 3.8 TB 2.5-inch high capacity flash	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1624 - 7.68 TB 2.5-inch high capacity flash	Yes
1623 - 3.8 TB 2.5-inch high capacity flash	1624 - 7.68 TB 2.5-inch high capacity flash	Yes
1622 - 1.92 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes
1623 - 3.8 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes
1624 - 7.68 TB 2.5-inch high capacity flash	1625 - 15.36 TB 2.5-inch high capacity flash	Yes

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

IBM Global Financing

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terms, offering type, equipment type and options, and may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension, or withdrawal without notice.

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