



IBM DS8880 storage family delivers a series of flash-enclosure models with one-year warranty

Table of contents

1 Overview	20 Publications
2 Key prerequisites	22 Technical information
2 Planned availability date	27 Terms and conditions
3 Description	30 Prices
6 Product number	57 Order now

At a glance

IBM[®] DS8880 offers six new models with support for High Performance Flash Enclosure Gen2 to deliver more processing power and flash capacity for software applications that require high performance. Clients have a choice to deploy flash with enterprise disk (DS8884 or DS8886) to handle their critical business data.

Overview

IBM DS8880 offers a new hardware peripheral, High Performance Flash Enclosure Gen2, to address the exploitation of high-performance online transaction processing (OLTP) and analytics and helping to optimize cost, maximize performance, and provide security.

The IBM DS8880 family offers High Performance Flash Enclosure Gen2 with the introduction of six new models that can be ordered with one, two, three, or four years of support which covers both the hardware and advanced function features:

- DS8884 Model 984 with its associated DS8884 Expansion Unit Model 84E
- DS8886 Model 985 with its associated DS8886 Expansion Unit Model 85E
- DS8886 Model 986 with its associated DS8886 Expansion Unit Model 86E

These new model systems include a one-year standard warranty. Up to three additional years of extended warranty services are available, offering flexible options to best address business and financial needs. Clients should consult with their financial personnel on the appropriate financial treatment for this offering.

These models will be the replacement of previous models 980 and 981. The details of the configuration supported for the new models can be found in the [Description](#) section.

High Performance Flash Enclosure Gen2

The flash enclosure and flash RAID adapter deliver improved performance and capacity compared to the previous generation of flash enclosure. The 2U flash enclosures are configured in pairs with each enclosure supporting up to twenty-four 2.5-inch flash cards in capacities ranging from 400 GB to 3.2 TB. The maximum flash capacity for the DS8886 increases from 96 TB to 614.4 TB, delivering reduced storage costs through lesser cost per IOPS with this new flash enclosure.

The next-generation flash RAID controller delivers significantly increased performance. Each flash adapter pair delivers up to 500K IOPS and up to 14 GBps and 10.5 GBps for read and write bandwidth respectively (for two High

Performance Flash Enclosure pairs). High Performance Flash Enclosure Gen2 offers up to four times better performance as compared to previous High Performance Flash Enclosure.

RAID 6 default RAID type

RAID 6 will be the default RAID type for all drive types available on the High Performance Flash Enclosure Gen2 models. RAID 6 will dramatically improve the availability of arrays, especially as drive capacity increases.

Other capabilities and enhancements

IBM DS8880 (machine types 2831, 2832, 2833, and 2834) also delivers more capabilities for new and existing customers, including:

- Customer-defined digital certificates for authentication
- Extends level space release support for z/OS^(R)
- Configurable Hardware Management Console (HMC) firewall support
- DSCLI support for z/OS environment
- FICON^(R) Information Unit (IU) pacing improvements

Product Preview

The IBM DS8880 family plans to release all-flash machine types that will further exploit the exceptional performance and economic benefits of flash storage while maintaining the proven enterprise-class reliability. These planned all-flash machine types will feature business class, enterprise class, and analytic class models that are expected to support all the advanced functions and security capabilities that are characteristic of IBM enterprise storage.

Preview announcements provide insight into IBM future plans and directions. General availability, prices, ordering information, and terms and conditions will be provided when the product is announced.

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.

Key prerequisites

All announced features and functions that are supported on the IBM DS8000^(R) series require DS8000 LMC 8.8.20.xx.xx (bundle version 88.20.xxx.xx), or later.

Planned availability date

December 9, 2016

Description

IBM DS8880 introduces six models integrated with the new High Performance Flash Enclosure Gen2 pair to handle complex workloads and deliver exceptional performance for mission-critical business environments.

The integration of the High Performance Flash Enclosure Gen2 delivers a new and even higher standard of flash performance compared with the previous high-performance flash enclosure. High Performance Flash Enclosure Gen2 is directly attached to the PCIe fabric, enabling increased bandwidth and transaction processing capabilities. The 4U enclosure pair contains two powerful, redundant flash RAID controllers and up to 48 SAS flash cards. The flash RAID controller is specifically designed to help unleash the performance capabilities of flash-based storage. The flash RAID controller design combines the technical expertise of IBM research and development resources, and includes common building blocks with the FlashSystem™.

The flash enclosure pair (feature number 1600) in these models offer up to four times the performance of current flash. The flash enclosure pair can support up to three drive sets, and each drive set has 16 flash cards.

These flash cards are offered in several capacity options:

- 400 GB (feature number 1610)
- 800 GB (feature number 1611)
- 1.6 TB (feature number 1612)
- 3.2 TB (feature number 1613)

The flash cards used in the High Performance Flash Enclosure Gen2 pair are packaged as 2.5-inch SAS encryption-capable cards which can be added or removed concurrently while the enclosure pair is in use. The flash cards can be configured as RAID 5, 6, and 10 arrays.

Each High Performance Flash Enclosure Gen2 pair supports a pair of RAID controllers in an active/active configuration. The pair of controllers are fully redundant and offer complete, nondisruptive maintenance. The DS8880 offers two types of configurations:

1. Up to 153.6 TB of raw capacity in a 4U space for DS8884 models 984 and 84E
2. Up to 307.2 TB of raw capacity in a 8U space for DS8886 models 985, 986, 85E, and 86E

Refer to the following table for more information about supported flash and adapter counts with the three available configuration options.

Per frame maximum configuration table:

Model	Core per Processor Complex	Physical capacity*	Disk drives/Flash cards	Processor memory	Host adapters	9xE attach	Flash enclosure pair
DS8884 configuration:							
984	6-core	499.2 TB	192/48	64 GB	8	0	1
984	6-core	1.69 PB	768/96	256 GB	16	0 to 2	2
DS8886 configuration (single phase power):							
985	8-core	566.4 TB	144/96	256 GB	16	0	2
985	16-core	3.38 PB	1,536/192	512 GB	32	0 to 4	4
985	24-core	3.38 PB	1,536/192	2048 GB	32	0 to 4	4

Model	Core per Processor Complex	Physical capacity*	Disk drives/ Flash cards	Processor memory	Host adapters	9xE attach	Flash enclosure pair
DS8886 configuration (three phase power):							
986	8-core	480 TB	96/96	256 GB	16	0	2
986	16-core	3.21 PB	1,440/192	512 GB	32	0 to 4	4
986	24-core	3.21 PB	1,440/192	2048 GB	32	0 to 4	4
DS8884 configuration first expansion:							
84E	N/A	585.6 TB	240/48	N/A	8	984	1
DS8884 configuration second expansion:							
84E	N/A	604.8 TB	336	N/A	0	984	0
DS8886 configuration first expansion:							
85E	N/A	739.2 TB	240/96	N/A	16	985	2
DS8886 configuration second/third expansions:							
85E	N/A	777.6 TB	432	N/A	0	985	0
DS8886 configuration fourth expansion:							
85E	N/A	518.4 TB	288	N/A	0	985	0
DS8886 configuration first expansion:							
86E	N/A	652.8 TB	192/96	N/A	16	986	2
DS8886 configuration second/third/fourth expansions:							
86E	N/A	691.2 TB	384	N/A	0	986	0

N/A = Not applicable

* Physical capacity calculated with 1.8 TB SFF HDDs and 3.2 TB flash cards

RAID 6 default for all storage types

In this release, the default RAID type that will be configured for all types of drives is RAID6. This will deliver significant improvements in reliability compared to RAID5. RAID5 can be configured for drives of less than 1 TB, but this is not recommended and will require a risk acceptance. RAID10 will continue to be an option for all drive types.

Customer-defined digital certificates for authentication

DS8000 supports customer-defined digital certificates to control authentication for GUI, CSM, and Key Server network connections. A digital certificate can be loaded onto the DS8000 to replace the default factory certificate or to replace a previously uploaded certificate that is now obsolete.

Thin provisioning enhancements

Space release functionality at the extent level for ECKD™ volumes is now supported both for simplex volumes and Metro Mirror primaries in full duplex. Software support for this function will be provided on z/OS V2.1 and V2.2 with the program temporary fix OA50675. This functionality fulfills part of the statement of direction from the DS8880 R8.1 Hardware Announcement [116-044](#), dated May 31, 2016.

In order to provide additional options for data migration, Peer to Peer Remote Copy (Global Copy, Metro Mirror or Global Mirror) is fully supported between provisioned and thin-provisioned volumes. A thin-provisioned target device will become fully allocated during the synchronization process, but the space can be later released using the space release functionality.

Configurable HMC firewall

The configurable DS8880 HMC firewall enables you to restrict external network traffic such that only certain IP addresses can be communicated with. This is especially useful for configuring and securing remote access to the DS8880 HMC by accepting incoming network traffic from certain IP addresses only, for example customer-owned proxies and gateways.

DS8000 Series Command-Line Interface (DSCLI) support for z/OS environment

The DSCLI can be installed through Copy Services Manager (CSM) System Modification Program/Extended (SMPE) and run directly under UNIX™ System Services in a mainframe environment. With this enhancement, you can manage various DS8000 functions such as logical configuration and copy services, without having to perform multiple steps under a separate operating system. The DSCLI SMPE installable package is available when CSM (5698-E01 or 5698-E02) is ordered. DSCLI commands can also be executed directly through the DS8000 GUI.

Improvement of FICON IU pacing

IU pacing provides a flow control mechanism for FICON to manage the transmission of data across the Fibre Channel fabric. Once pacing credits for a port are exhausted, a frame pacing delay occurs which can limit the performance of a single read or write process. To improve FICON read and write performance, especially at longer distances and higher link rates, the IU pacing credits are increased to quadruple the current capability. The increased of pacing credits will only be supported on 4-port 16Gbps Fibre Channel adapters.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be found on the [IBM Accessibility](#) website.

Section 508 of the US Rehabilitation Act

IBM DS8880 storage family is capable as of December 9, 2016, 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 found on the [IBM Accessibility](#) website.

Reference information

For more information about available function authorizations, refer to Hardware Announcement [115-138](#), dated October 20, 2015.

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), go to the [IBM and the Environment](#) website.

Product number

Description	Machine type	Models	Feature numbers
DS8884	2831	984	
DS8884 Expansion Unit	2831	84E	
DS8886	2831	985	
DS8886 Expansion Unit	2831	85E	
DS8886	2831	986	
DS8886 Expansion Unit	2831	86E	
Model 8xE merge indicators:			
- 8xE factory merge	2831	984, 985, 986, 84E, 85E, 86E	0003
- 8xE field merge	2831	84E, 85E, 86E	0004
- PPA Software Order Indicator	2831	984, 985, 986, 84E, 85E, 86E	0017
- DoD indicator	2831	984, 985, 986, 84E, 85E, 86E	0020
- JEMT indicator	2831	984, 985, 986, 84E, 85E, 86E	0021
- Cables indicator	2831	98E, 85E, 86E	0110
- Shipping weight reduction	2831	984, 985, 986, 84E, 85E, 86E	0200
Custom features:			
- Top Expansion	2831	985, 986, 85E, 86E	0170
Model 8xE position indicators:			
- 98x - 8xE position 1	2831	984, 985, 986, 84E, 85E, 86E	0241
- 98x - 8xE position 2	2831	984, 985, 986, 84E, 85E, 86E	0242
- 98x - 8xE position 3	2831	985, 986, 85E, 86E	0243
- 98x - 8xE position 4	2831	985, 986, 85E, 86E	0244
Encryption not capable	2831	984, 985, 986	0403
All-flash indicator	2831	984, 985, 986	0600
SAS-SSD mix indicators	2831	984, 985, 986, 84E, 85E, 86E	0603
SSD custom placement indicators	2831	984, 985, 986, 84E, 85E, 86E	0604
Initial system capacity:			

Description	Machine type	Models	Feature numbers
- Up to 5 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0795
- 5.1 TB to 10 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0796
- 10.1 TB to 25 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0797
- 25.1 TB to 50 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0798
- 50.1 TB to 75 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0799
- 75.1 TB to 100 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0801
- 100.1 TB to 250 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0803
- 250.1 TB to 500 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0804
- 500.1 TB to 1250 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0806
- 1250.1 TB to 3000 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0807
- 3000.1 TB to 6000 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0808
- 6000.1 TB to 10000 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0809
Attachment indicators:			
-IBM/Openwave Alliance indicator	2831	984, 985, 986, 84E, 85E, 86E	0930
-IBM System i ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0931
-IBM System p indicator	2831	984, 985, 986, 84E, 85E, 86E	0932
-IBM System x indicator	2831	984, 985, 986, 84E, 85E, 86E	0933
-IBM System z ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0934
-IBM System z B/C indicator	2831	984, 985, 986, 84E, 85E, 86E	0935
-IBM System zEnterprise ^(R) Cloud indicator	2831	984, 985, 986, 84E, 85E, 86E	0936
-Linux TM indicator	2831	984, 985, 986, 84E, 85E, 86E	0940
- Storage Appliance indicator	2831	984, 985, 986	0952
-IBM ProtecTIER ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0960
-IBM Storwize ^(R) V7000 indicator	2831	984, 985, 986, 84E, 85E, 86E	0961
-IBM N series indicator	2831	984, 985, 986, 84E, 85E, 86E	0962
-IBM SAN Volume Controller indicator	2831	984, 985, 986, 84E, 85E, 86E	0963
-IBM/EPIC attachment indicator	2831	984, 985, 986, 84E, 85E, 86E	0964
- VMware VAAI indicator	2831	984, 985, 986, 84E, 85E, 86E	0965
- OpenStack indicator	2831	984, 985, 986, 84E, 85E, 86E	0966

Description	Machine type	Models	Feature numbers
- US TAA compliance indicator	2831	984, 985, 986, 84E, 85E, 86E	0983
Power:			
- Single phase DC-UPS	2831	984, 985, 84E, 85E	1050
- Three phase DC-UPS	2831	986, 86E	1052
- Extended PLD	2831	984, 985, 986, 84E, 85E, 86E	1055
Single phase line cords:			
- SPP cord, 200-240V, 60A, 3-pin connector	2831	984, 985, 84E, 85E	1062
- SPP cord, 200-240V, 63A, no connector	2831	984, 985, 84E, 85E	1063
Three phase line cords:			
- Three phase power cord, 380-415V, 30A, 5 pin connector	2831	986, 86E	1086
- Three phase power cord, 200-240V, 30A, 4 pin connector	2831	986, 86E	1087
- Three phase power cord, 380-415V, 40A, no connector	2831	986, 86E	1088
- Three phase power cord, 200-240V, 60A, 4 pin connector	2831	986, 86E	1089
Special tool:			
- Overhead ladder - 5ft	2831	984, 985, 986	1101
- Ladder - Top Expansion - 3ft	2831	985, 986	1102
Management Console:			
- Mgmt console - Primary	2831	984, 985, 986	1140
- Mgmt console - Secondary	2831	984, 985, 986	1150
Disk drive enclosures:			
- HD disk enclosure pair	2831	984, 985, 986, 84E, 85E, 86E	1241
- HD STD enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1242
- 3.5-inch disk enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1244
- HD 400 GB SSD enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1245

Description	Machine type	Models	Feature numbers
- HD 800 GB SSD enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1256
- HD1.6 TB SSD enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1257
Disk drive cables:			
- Disk drive cable group A	2831	985, 986	1246
- Disk drive cable group B	2831	85E, 86E	1247
- Disk drive cable group C	2831	85E, 86E	1248
- Disk drive cable group D	2831	85E, 86E	1249
- Disk drive cable group E	2831	85E, 86E	1251
- Extended HD disk drive cable group C	2831	85E, 86E	1252
- Extended HD disk drive cable group D	2831	85E, 86E	1253
- Extended HD disk drive cable group E	2831	85E, 86E	1254
- BC Disk drive cable group A	2831	984	1261
- BC Disk drive cable group B	2831	84E	1262
- BC Disk drive cable group C	2831	84E	1263
- Extended BC disk drive cable group C	2831	84E	1266
I/O enclosure pair PCIe 3	2831	984, 985, 986, 84E, 85E, 86E	1303
I/O cables:			
- PCI-E cable group 1	2831	985, 986	1320
- PCI-E cable group 2	2831	985, 986	1321
Top exit bracket:			
- Top exit bracket for Fibre cable	2831	984, 985, 986, 84E, 85E, 86E	1400
Fibre Channel/ FICON cables:			
- 50 um Fibre cable (LC)	2831	984, 985, 986, 84E, 85E, 86E	1410
- 50 um Fibre cable (LC/SC)	2831	984, 985, 986, 84E, 85E, 86E	1411
- 50 um Fibre cable (Jumper)	2831	984, 985, 986, 84E, 85E, 86E	1412
- 9 um Fibre cable (LC)	2831	984, 985, 986, 84E, 85E, 86E	1420
- 9 um Fibre cable (LC/SC)	2831	984, 985, 986, 84E, 85E, 86E	1421
- 9 um Fibre cable (Jumper)	2831	984, 985, 986, 84E, 85E, 86E	1422

Description	Machine type	Models	Feature numbers
High Performance Flash Enclosure Gen2 family:			
- High Performance Flash Enclosure Gen2 pair	2831	984, 985, 986, 84E, 85E, 86E	1600
-400 GB 2.5-inch flash card set	2831	984, 985, 986, 84E, 85E, 86E	1610
- 800 GB 2.5-inch flash card set	2831	984, 985, 986, 84E, 85E, 86E	1611
- 1600 GB 2.5-inch flash card set	2831	984, 985, 986, 84E, 85E, 86E	1612
- 3200 GB 2.5-inch flash card set	2831	984, 985, 986, 84E, 85E, 86E	1613
- Flash enclosure filler set	2831	984, 985, 986, 84E, 85E, 86E	1699
DS8000 Licensed Machine Code:			
-DS8000 LMC R8.2	2831	980, 981, 982, 984, 985, 986	1882
-DS8000 LMC R8.2 indicator	2831	98B, 98E, 98F, 84E, 85E, 86E	1982
Earthquake kit	2831	984, 985, 986, 84E, 85E, 86E	1906
Hardware installation MES	2831	984, 985, 986, 84E, 85E, 86E	1999
Disk enclosure filler sets:			
- 3.5-inch disk enclosure filler set	2831	984, 985, 986, 84E, 85E, 86E	2997
- 2.5-inch disk enclosure filler set	2831	984, 985, 986, 84E, 85E, 86E	2999
Device adapters:			
- Device adapter pair I	2831	984, 985, 986, 84E, 85E, 86E	3053
Host adapters:			
- 8 Gb 4 port SW FCP/FICON adapter PCIe	2831	984, 985, 986, 84E, 85E, 86E	3153
- 8 Gb 8 port SW FCP/FICON adapter PCIe	2831	984, 985, 986, 84E, 85E, 86E	3157
- 8 Gb 4 port LW FCP/FICON adapter PCIe	2831	984, 985, 986, 84E, 85E, 86E	3253
- 8 Gb 8 port LW FCP/FICON adapter PCIe	2831	984, 985, 986, 84E, 85E, 86E	3257
- 16 Gb 4 port SW FCP/FICON adapter PCIE	2831	984, 985, 986, 84E, 85E, 86E	3353
- 16 Gb 4 port LW FCP/FICON adapter PCIE	2831	984, 985, 986, 84E, 85E, 86E	3453

Description	Machine type	Models	Feature numbers
Processor memory:			
- 64GB PROCESSOR MEMORY 6COR	2831	984	4223
- 128GB PROCESSOR MEMORY 6CO	2831	984	4224
- 256GB PROCESSOR MEMORY 6CO	2831	984	4225
- 128 GB Processor memory (8-core only)	2831	985, 986	4324
- 256 GB Processor memory (8-core or 16-core)	2831	985, 986	4325
- 512 GB Processor memory (16-core only)	2831	985, 986	4326
- 1 TB Processor memory (24-core only)	2831	985, 986	4327
- 2 TB Processor memory (24-core only)	2831	985, 986	4328
Processor license indicators:			
- 6-core processor indicator	2831	984	4421
- 8-core processor indicator	2831	985, 986	4422
- 16-core processor indicator	2831	985, 986	4423
- 24-core processor indicator	2831	985, 986	4424
Encryption disk drive sets:			
- 300 GB 15K drive set	2831	984, 985, 986, 84E, 85E, 86E	5308
- 600 GB 15K drive set	2831	984, 985, 986, 84E, 85E, 86E	5618
- 600 GB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5708
- 1.2 TB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5768
- 1.8 TB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5778
- 4 TB 7.2K half drive set	2831	984, 985, 986, 84E, 85E, 86E	5868
- 6 TB 7.2K half drive set	2831	984, 985, 986, 84E, 85E, 86E	5878
Encryption SSD drive sets:			
-400 GB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6158
- 800 GB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6258

Description	Machine type	Models	Feature numbers
- 1.6 TB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6358
Function Authorization indicators			
Base Function (BF):			
- BF - Up to 100 TB capacity	2831	984, 985, 986	8151
- BF - 100.1 TB to 250 TB capacity	2831	984, 985, 986	8152
- BF - 250.1 TB to 500 TB capacity	2831	984, 985, 986	8153
- BF - 500.1 TB to 1250 TB capacity	2831	984, 985, 986	8154
- BF - 1250.1 TB to 3000 TB capacity	2831	984, 985, 986	8155
- BF - 3000.1 TB to 6000 TB capacity	2831	984, 985, 986	8156
- BF - 6000.1 TB to 10000 TB	2831	984, 985, 986	8160
Copy Services (CS) license:			
- CS - Inactive	2831	984, 985, 986	8250
- CS - Up to 100 TB capacity	2831	984, 985, 986	8251
- CS - 100.1 TB to 250 TB capacity	2831	984, 985, 986	8252
- CS - 250.1 TB to 500 TB capacity	2831	984, 985, 986	8253
- CS - 500.1 TB to 1250 TB capacity	2831	984, 985, 986	8254
- CS - 1250.1 TB to 3000 TB capacity	2831	984, 985, 986	8255
- CS - 3000.1 TB to 6000 TB capacity	2831	984, 985, 986	8256
- CS - 6000.1 TB to 10000 TB	2831	984, 985, 986	8260
z-synergy Services (zsS) license:			
- zsS - Active	2831	984, 985, 986	8300
- zsS - Inactive	2831	984, 985, 986	8350
- zsS - Up to 100 TB capacity	2831	984, 985, 986	8351
- zsS - 100.1 TB to 250 TB capacity	2831	984, 985, 986	8352
- zsS - 250.1 TB to 500 TB capacity	2831	984, 985, 986	8353
- zsS - 500.1 TB to 1250 TB capacity	2831	984, 985, 986	8354
- zsS - 1250.1 TB to 3000 TB capacity	2831	984, 985, 986	8355
- zsS - 3000.1 TB to 6000 TB capacity	2831	984, 985, 986	8356

Description	Machine type	Models	Feature numbers
- zsS - 6000.1 TB to 10000 TB	2831	984, 985, 986	8360
Copy Services Manager (CSM on HMC) license:			
- CSM on HMC - Inactive	2831	984, 985, 986	8450
- CSM on HMC - Up to 100 TB capacity	2831	984, 985, 986	8451
- CSM on HMC - 100.1 TB to 250 TB capacity	2831	984, 985, 986	8452
- CSM on HMC - 250.1 TB to 500 TB capacity	2831	984, 985, 986	8453
- CSM on HMC - 500.1 TB to 1250 TB capacity	2831	984, 985, 986	8454
- CSM on HMC - 1250.1 TB to 3000 TB capacity	2831	984, 985, 986	8455
- CSM on HMC - 3000.1 TB to 6000 TB capacity	2831	984, 985, 986	8456
- CSM on HMC - 6000.1 TB to 100,000 TB	2831	984, 985, 986	8460
IGF transaction:			
- IGF transaction indicator	2831	984, 985, 986	8999
Shipping and Handling NC	2831	984, 985, 986, 84E, 85E, 86E	AG00
Shipping and handling 984	2831	984	AGAA
Shipping and handling 84E	2831	84E	AGAB
Shipping and handling 985	2831	985	AGAC
Shipping and handling 85E	2831	85E	AGAD
Shipping and handling 986	2831	986	AGAE
Shipping and handling 86E	2831	86E	AGAF

Feature conversions

Machine type 2831 Models 984, 985, and 986

From feature	To feature	Returned parts*	Description
Disk enclosures:			
1242	1244	No	HD STD enclosure indicator to 3.5-inch disk enclosure indicator
1242	1245	No	HD STD enclosure indicator to 400 GB SSD enclosure indicator
1242	1256	No	HD STD enclosure indicator to 800 GB SSD enclosure indicator
1242	1257	No	HD STD enclosure indicator to 1.6 TB SSD enclosure indicator
1245	1256	No	SSD enclosure indicator
1245	1257	No	SSD enclosure indicator
1256	1257	No	SSD enclosure indicator
Host adapters:			
3153	3157	Yes	Host adapter conversion
3153	3253	Yes	Host adapter conversion
3153	3257	Yes	Host adapter conversion
3157	3153	Yes	Host adapter conversion
3157	3253	Yes	Host adapter conversion
3157	3257	Yes	Host adapter conversion
3253	3153	Yes	Host adapter conversion
3253	3157	Yes	Host adapter conversion
3253	3257	Yes	Host adapter conversion
3257	3153	Yes	Host adapter conversion
3257	3157	Yes	Host adapter conversion
3257	3253	Yes	Host adapter conversion
3353	3453	Yes	Host adapter conversion
3453	3353	Yes	Host adapter conversion
Encryption disk drive sets:			
5308	5618	Yes	Encryption disk drive set conversion

From feature	To feature	Returned parts*	Description
5308	5708	Yes	Encryption disk drive set conversion
5308	5768	Yes	Encryption disk drive set conversion
5308	5778	Yes	Encryption disk drive set conversion
5308	5868	Yes	Encryption disk drive set conversion
5618	5708	Yes	Encryption disk drive set conversion
5618	5768	Yes	Encryption disk drive set conversion
5618	5778	Yes	Encryption disk drive set conversion
5618	5868	Yes	Encryption disk drive set conversion
5708	5618	Yes	Encryption disk drive set conversion
5708	5768	Yes	Encryption disk drive set conversion
5708	5778	Yes	Encryption disk drive set conversion
5708	5868	Yes	Encryption disk drive set conversion
5768	5778	Yes	Encryption disk drive set conversion
5868	5878	Yes	Encryption disk drive set conversion
Encryption SSD drive sets:			
6158	6258	Yes	Encryption SSD drive conversion
6158	6358	Yes	Encryption SSD drive conversion
6258	6358	Yes	Encryption SSD drive conversion
Encryption SAS to SSD drive sets:			
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	6158	Yes	Encryption SAS to SSD drive conversion

From feature	To feature	Returned parts*	Description
5618	6258	Yes	Encryption SAS to SSD drive conversion
5618	6358	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
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
5778	6158	Yes	Encryption SAS to SSD drive conversion
5778	6258	Yes	Encryption SAS to SSD drive conversion
5778	6358	Yes	Encryption SAS to SSD drive conversion
5868	6158	Yes	Encryption SAS to SSD drive conversion
5868	6258	Yes	Encryption SAS to SSD drive conversion
5868	6358	Yes	Encryption SAS to SSD drive conversion
5878	6158	Yes	Encryption SAS to SSD drive conversion
5878	6258	Yes	Encryption SAS to SSD drive conversion
5878	6358	Yes	Encryption SAS to SSD drive conversion

Machine type 2831 Model 984

From feature	To feature	Returned parts*	Description
Processor memory:			
4223	4224	No	Processor memory conversion
4223	4225	No	Processor memory conversion
4224	4225	No	Processor memory conversion

Machine type 2831 Models 985 and 986

From feature	To feature	Returned parts*	Description
I/O cables:			
1320	1321	Yes	I/O cable conversion
Processor memory:			
4324	4325	No	Processor memory conversion
4324	4326	No	Processor memory conversion
4325	4326	No	Processor memory conversion
4325	4327	No	Processor memory conversion
4326	4327	No	Processor memory conversion
4326	4328	No	Processor memory conversion
4327	4328	Yes	Processor memory conversion
Processor License feature indicators:			
4422	4423	No	Processor License feature conversion
4422	4424	No	Processor License feature conversion
4423	4424	No	Processor License feature conversion

Machine type 2831 Models 84E, 85E, and 86E

From feature	To feature	Returned parts*	Description
Disk enclosures:			
1242	1244	No	HD STD enclosure indicator to 3.5-inch disk enclosure indicator
1242	1245	No	HD STD enclosure indicator to 400 GB SSD enclosure indicator
1242	1256	No	HD STD enclosure indicator to 800 GB SSD enclosure indicator
1242	1257	No	HD STD enclosure indicator to 1.6 TB SSD enclosure indicator
1245	1256	No	SSD enclosure indicator
1245	1257	No	SSD enclosure indicator
1256	1257	No	SSD enclosure indicator
Host adapters:			
3153	3157	Yes	Host adapter conversion
3153	3253	Yes	Host adapter conversion
3153	3257	Yes	Host adapter conversion

From feature	To feature	Returned parts*	Description
3157	3153	Yes	Host adapter conversion
3157	3253	Yes	Host adapter conversion
3157	3257	Yes	Host adapter conversion
3253	3153	Yes	Host adapter conversion
3253	3157	Yes	Host adapter conversion
3253	3257	Yes	Host adapter conversion
3257	3153	Yes	Host adapter conversion
3257	3157	Yes	Host adapter conversion
3257	3253	Yes	Host adapter conversion
3353	3453	Yes	Host adapter conversion
3453	3353	Yes	Host adapter conversion
Encryption disk drive sets:			
5308	5618	Yes	Encryption disk drive set conversion
5308	5708	Yes	Encryption disk drive set conversion
5308	5768	Yes	Encryption disk drive set conversion
5308	5868	Yes	Encryption disk drive set conversion
5308	5778	Yes	Encryption disk drive set conversion
5618	5708	Yes	Encryption disk drive set conversion
5618	5768	Yes	Encryption disk drive set conversion
5618	5868	Yes	Encryption disk drive set conversion
5618	5778	Yes	Encryption disk drive set conversion
5708	5618	Yes	Encryption disk drive set conversion
5708	5768	Yes	Encryption disk drive set conversion
5708	5868	Yes	Encryption disk drive set conversion
5708	5778	Yes	Encryption disk drive set conversion

From feature	To feature	Returned parts*	Description
5778	5868	Yes	Encryption disk drive set conversion
5768	5778	Yes	Encryption disk drive set conversion
5868	5878	Yes	Encryption disk drive set conversion
Encryption SSD drive sets:			
6158	6258	Yes	Encryption SSD drive conversion
6158	6358	Yes	Encryption SSD drive conversion
6258	6358	Yes	Encryption SSD drive conversion
Encryption SAS to SSD drive sets:			
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	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	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
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
5778	6158	Yes	Encryption SAS to SSD drive conversion
5778	6258	Yes	Encryption SAS to SSD drive conversion
5778	6358	Yes	Encryption SAS to SSD drive conversion

From feature	To feature	Returned parts*	Description
5868	6158	Yes	Encryption SAS to SSD drive conversion
5868	6258	Yes	Encryption SAS to SSD drive conversion
5868	6358	Yes	Encryption SAS to SSD drive conversion
5878	6158	Yes	Encryption SAS to SSD drive conversion
5878	6258	Yes	Encryption SAS to SSD drive conversion
5878	6358	Yes	Encryption SAS to SSD drive conversion

Machine type 2831 Models 984, 985,986, 84E, 85E, and 86E

From feature	To feature	Returned parts*	Description
1610	1611	Yes	Flash cards conversion
1610	1612	Yes	Flash cards conversion
1610	1613	Yes	Flash cards conversion
1611	1612	Yes	Flash cards conversion
1611	1613	Yes	Flash cards conversion
1612	1613	Yes	Flash cards 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 ID and password are required (use IBMid).

[BP Attachment for Announcement Letter 116-097](#)

Publications

The following publication has been updated to reflect this announcement and will be available November 2, 2016.

Title	Order number
<i>IBM DS8880 Introduction and Planning Guide</i>	GC27-8525

The following publications are shipped with the DS8000 series:

Title	Order number
<i>IBM DS8000 Customer Series Publications CDROM</i>	01FT138
<i>IBM DS8000 Series License Documentation CDROM</i>	01FT139

The publications CD contains the following documents:

Title	Order number
<i>License Agreement for Machine Code</i>	SC28-6872
<i>IBM DS8880 Introduction and Planning Guide</i>	GC27-8525
<i>IBM DS8000 Host Systems Attachment Guide</i>	SC27-8527
<i>IBM DS Command-Line Interface User's Guide for DS8000 series</i>	SC27-8526
<i>IBM System Storage^(R) Multipath Subsystem Device Driver User's Guide</i>	GC52-1309
<i>IBM DS Open Application Programming Interface Installation and Reference</i>	GC27-4211
<i>IBM DS8000 series Non-IBM_Licenses_and_Notices-Rel 5.x-7.x, 8.0, 8.1 , 8.2</i>	GA32-2204
<i>IBM Warranty Information</i>	GC26-7919
<i>READ ME FIRST for IBM Products</i>	GA32-1061
<i>IBM System Storage Notice Regarding Storage Encryption</i>	45W6389

The license CD contains the following documentation:

Title	Order number
<i>IBM System Storage DS^(R) Storage Mgr R8.2 & CIM Agent for DS Open Application Programming Interface 5.8.2</i>	GC27-3907
<i>IBM International License Agreement for Non-Warranted Programs (ILAN)</i>	98Y2827
<i>Global Mirroring Utilities for ICKDSF Users and Open Systems Environments License Information</i>	GC26-7644

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

You can search, view, and collaborate with documentation using [IBM Knowledge Center](#). 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.

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

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 go to the [IBM Global Technology Services[®]](#) 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 authorized training](#) website.

Technical information

Specified operating environment

Physical specifications

- Width: 606 mm (23.86 in)
- Depth:
 - 1,200 mm (47.25 in) without doors
 - 1,380 mm (54.3 in) with doors
- Height: 40U: 1,924 mm (75.75 in)
- Weight: 40U: 975.7 kg (2,151 lb)

Operating environment

- Temperature: 16°C to 32°C (60°F to 90°F)
- Relative humidity: 20% - 80%
- Wet bulb (caloric value):
 - DS8886 Model 985/85E
 - 22757 BTU for A rack
 - 20912 BTU for B rack
 - 17869 BTU for C or D rack
 - 11913 BTU for E rack
 - DS8886 Model 986/86E
 - 20890 BTU for A rack
 - 19610 BTU for B rack
 - 16457 BTU for C or D or E rack
 - DS8884
 - 15806 BTU for A rack
 - 14676 BTU for B rack
 - 15947 BTU for C rack
- Electrical power:
 - DS8886 Model 985/85E
 - 6.4 KW for A rack
 - 6.0 KW for B rack
 - 5.1 KW for C or D rack
 - 3.4 KW for E rack
 - DS8886 Model 986/86E
 - 5.9 KW for A rack
 - 5.5 KW for B rack
 - 4.6 KW for C or D or E rack

- DS8884
 - 4.5 KW for A rack
 - 4.2 KW for B rack
 - 4.5 KW for C rack
- Capacity of exhaust:
 - 1300 cubic feet/minute for 985/986
 - 1500 cubic feet/minute for 85E/86E
 - 1200 cubic meter/minute for 984
 - 1100 cubic meter/minute for 84E
- Declared operating A-weighted sound power level: 7.9 bels
- Leakage current: 100 mA

Power consumption

- Model 984 (6-core) with 192 drives and 1 HPFE pair: 4.5 KW
- Model 84E with 240 drives and 1 HPFE pair: 4.2 KW
- Model 84E with 336 drives: 4.5 KW
- Model 985 (8, 16, and 24-core) with 144 drives and 2 HPFE pair: 6.4 KW
- Model 85E with 240 drives and 2 HPFE pair: 6.0 KW
- Model 85E with 432 drives: 5.1 KW
- Model 85E with 288 drives: 3.4 KW
- Model 986 (8, 16, and 24-core) with 96 drives and 2 HPFE pair: 5.9 KW
- Model 86E with 192 drives and 2 HPFE pair: 5.5 KW
- Model 86E with 384 drives: 4.6 KW

DASD Subsystems

- Product Category (2011 law): N
- Maximum physical storage capacity: 3,379,200 Gigabytes
- Power consumption: 26,000 watts
- DASD Energy Consumption Efficiency: 0.0077 watts/Gigabytes

Homologation

This product is not certified for connection to interfaces of public telecommunications networks in the following countries:

- 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 8.8.20.xx.xx (bundle version 88.20.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 the [IBM System Storage Interoperation Center](#).

Limitations

None.

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 DS8880 Introduction and Planning Guide (GC27-8525)*.

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 DS8880 Introduction and Planning Guide (GC27-8525)*.

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, and also the DS8000 GUI.

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 DS8880 Introduction and Planning Guide (GC27-8525)* 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.

- IBM Storage Appliance planning
- IBM Security Key Lifecycle Manager (SKLM) planning
- Encryption activation review planning

IBM Storage Appliance planning

IBM Storage Appliance planning is a customer responsibility. Introductory information, including required and optional features, can be found in the *IBM Storage Appliance Guide (SC27-8520)*.

According to encryption best practices, DS8880 requires at least two storage appliances and associated software for each site which has one or more encryption-enabled DS8000 system. One server must be isolated and the others can be of any supported appliance configuration. Any site that operates independently of other sites must have storage appliances for the encryption-enabled DS8000 systems at that site.

It is the customer's responsibility to replicate any key labels and their associated key material across all storage appliances attached to a given encryption-enabled DS8000 before configuring that key label on the DS8000.

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 customers desiring NIST 800-131a compliance, IBM SKLM, formerly known as IBM Tivoli[®] Key Lifecycle Manager, V2.5, or later, is required.

IBM SKLM planning

The DS8000 series supports IBM SKLM V2.5, or later.

Program number	VRM	Program name
5724-T60	2.5.0	IBM Security Key Lifecycle Manager for Distributed
5641-KL1/3	2.6.0	IBM Security Key Lifecycle Manager for Distributed
5698-B35	1.1.0	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 about the licensing requirements and pricing of the metric, refer to Software Announcement [213-470](#), dated October 29, 2013.

Isolated key server ordering options

- **Single/dual storage appliance server - Feature numbers 1761 and 1762 are available through Machine type Model 2421-AP1:** New storage appliance server options are available in addition to the existing SKLM isolated key manager (feature number #0204).
- **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 an 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 and a license for the encrypting drives.

IBM Security Key Lifecycle Manager, V2.6 English publications may be viewed online on the electronic availability date in [IBM Knowledge Center](#).

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

Encryption activation review planning

Encryption activation is a customer 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

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 8 Gbps or 16 Gbps FCP/FICON host adapter ports to server or fabric ports. Cables can be purchased using DS8000 series feature numbers. Additional cable options, along with product support services such as installation, 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 (singlemode) fiber optic cable terminated with a LC connector. Fibre Channel cables can be purchased using feature numbers 142x for 9 micron cables.

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 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 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, go to the [IBM Electronic Support](#) website.

Terms and conditions

Volume orders

Contact your IBM representative.

Yes

Products - terms and conditions

Warranty period

One year

This product includes 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.

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 DS8880 models offer enhanced worldwide client care support, including the availability of one year of 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

Warranty service

Customer Replaceable Unit (CRU) and On-site, twenty-four hours a day, seven days a week, same day.

Improved worldwide support processes, including additional response to severity 2 calls, twenty-four hours a day, seven days a week.

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 via 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 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.

CRU and On-site Service

At IBM's discretion, you will receive specified CRU service, or 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, 4 hour average, 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

Refer to the [Customer 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 customer 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 customer. 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 customers. The educational allowance may not be added to any other discount or allowance.

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

Prices

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

Description	Machine type	Models	Feature numbers
DS8884	2831	984	
DS8884 Expansion Unit	2831	84E	
DS8886	2831	985	
DS8886 Expansion Unit	2831	85E	
DS8886	2831	986	
DS8886 Expansion Unit	2831	86E	
Model 8xE merge indicators:			
- 8xE factory merge	2831	984, 985, 986, 84E, 85E, 86E	0003
- 8xE field merge	2831	84E, 85E, 86E	0004
- PPA Software Order Indicator	2831	984, 985, 986, 84E, 85E, 86E	0017
- DoD indicator	2831	984, 985, 986, 84E, 85E, 86E	0020
- JEMT indicator	2831	984, 985, 986, 84E, 85E, 86E	0021
- Cables indicator	2831	98E, 85E, 86E	0110
Custom features:			
- Top Expansion	2831	985, 986, 85E, 86E	0170
- Shipping weight reduction	2831	984, 985, 986, 84E, 85E, 86E	0200
Model 8xE position indicators:			
- 98x - 8xE position 1	2831	984, 985, 986, 84E, 85E, 86E	0241
- 98x - 8xE position 2	2831	984, 985, 986, 84E, 85E, 86E	0242
- 98x - 8xE position 3	2831	985, 986, 85E, 86E	0243
- 98x - 8xE position 4	2831	985, 986, 85E, 86E	0244

Description	Machine type	Models	Feature numbers
Encryption not capable	2831	984, 985, 986	0403
All-flash indicator	2831	984, 985, 986	0600
SAS-SSD mix indicators	2831	984, 985, 986, 84E, 85E, 86E	0603
SSD custom placement indicators	2831	984, 985, 986, 84E, 85E, 86E	0604
Initial system capacity:			
- Up to 5 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0795
- 5.1 TB to 10 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0796
- 10.1 TB to 25 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0797
- 25.1 TB to 50 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0798
- 50.1 TB to 75 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0799
- 75.1 TB to 100 TB capacity	2831	984, 985, 986, 84E, 85E, 86E	0801
- INIT SYS CAPACITY 100.1TB	2831	984, 985, 986, 84E, 85E, 86E	0803
- INIT SYS CAPACITY 250.1TB	2831	984, 985, 986, 84E, 85E, 86E	0804
- INIT SYS CAPACITY 500.1TB	2831	984, 985, 986, 84E, 85E, 86E	0806
- INIT SYS CAPACITY 1250.1TB	2831	984, 985, 986, 84E, 85E, 86E	0807
- INIT SYS CAPACITY 3000.1TB	2831	984, 985, 986, 84E, 85E, 86E	0808
- INIT SYS CAPACITY 6000.1TB	2831	984, 985, 986, 84E, 85E, 86E	0809
Attachment indicators:			
- ATTACHM INDIC OPENWAVE ALL	2831	984, 985, 986, 84E, 85E, 86E	0930
-IBM System i ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0931
-IBM System p indicator	2831	984, 985, 986, 84E, 85E, 86E	0932
-IBM System x indicator	2831	984, 985, 986, 84E, 85E, 86E	0933
-IBM System z ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0934
-IBM System z B/C indicator	2831	984, 985, 986, 84E, 85E, 86E	0935
- ATTACHM INDIC SYSTEM ZENTE	2831	984, 985, 986, 84E, 85E, 86E	0936
-Linux TM indicator	2831	984, 985, 986, 84E, 85E, 86E	0940
- Storage Appliance indicator	2831	984, 985, 986	0952
-IBM ProtecTIER ^(R) indicator	2831	984, 985, 986, 84E, 85E, 86E	0960
-IBM Storwize ^(R) V7000 indicator	2831	984, 985, 986, 84E, 85E, 86E	0961

Description	Machine type	Models	Feature numbers
-IBM N series indicator	2831	984, 985, 986, 84E, 85E, 86E	0962
- ATTACHM INDIC SAN VOLUME C	2831	984, 985, 986, 84E, 85E, 86E	0963
- EPIC ATTACHMENT INDICATOR	2831	984, 985, 986, 84E, 85E, 86E	0964
- VMware VAAI indicator	2831	984, 985, 986, 84E, 85E, 86E	0965
- OpenStack indicator	2831	984, 985, 986, 84E, 85E, 86E	0966
- ATTACHM INDIC US TAA COMPL	2831	984, 985, 986, 84E, 85E, 86E	0983
Power:			
- Single phase DC-UPS	2831	984, 985, 84E, 85E	1050
- Three phase DC-UPS	2831	986, 86E	1052
- Extended PLD	2831	984, 985, 986, 84E, 85E, 86E	1055
Single phase line cords:			
- SNG PHASE LINE CORDS SPP	2831	984, 985, 84E, 85E	1062
- SNG PHASE LINE CORDS SPP	2831	984, 985, 84E, 85E	1063
Three phase line cords:			
- 3PHS 380-415V 30A 5 PIN	2831	986, 86E	1086
- 3PHS 200-240V 30A 4 PIN	2831	986, 86E	1087
- 3PHS 380-415V 40A No CON	2831	986, 86E	1088
- 3PHS 200-240V 60A 4 PIN	2831	986, 86E	1089
Special tool:			
- Overhead ladder - 5ft	2831	984, 985, 986	1101
- Ladder - Top Expansion - 3ft	2831	985, 986	1102
Management Console:			
- Mgmt console - Primary	2831	984, 985, 986	1140
- Mgmt console - Secondary	2831	984, 985, 986	1150
Disk drive enclosures:			
- HD disk enclosure pair	2831	984, 985, 986, 84E, 85E, 86E	1241
- HD STD enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1242
- 3.5-inch disk enclosure indicator	2831	984, 985, 986, 84E, 85E, 86E	1244
- DISK DRIVE ENCLOSURES HD 4	2831	984, 985, 986, 84E, 85E, 86E	1245
- DISK DRIVE ENCLOSURES HD 8	2831	984, 985, 986, 84E, 85E, 86E	1256

Description	Machine type	Models	Feature numbers
- DISK DRIVE ENCLOSURES HD 1	2831	984, 985, 986, 84E, 85E, 86E	1257
Disk drive cables:			
- Disk drive cable group A	2831	985, 986	1246
- Disk drive cable group B	2831	85E, 86E	1247
- Disk drive cable group C	2831	85E, 86E	1248
- Disk drive cable group D	2831	85E, 86E	1249
- Disk drive cable group E	2831	85E, 86E	1251
- EXTENDED HD DISK DRIVE CAB	2831	85E, 86E	1252
- EXTENDED HD DISK DRIVE CAB	2831	85E, 86E	1253
- EXTENDED HD DISK DRIVE CAB	2831	85E, 86E	1254
- BC DISK DRIVE CABLE GROUP	2831	984	1261
- BC DISK DRIVE CABLE GROUP	2831	84E	1262
- BC DISK DRIVE CABLE GROUP	2831	84E	1263
- EXTEND BCDISK DRIVE CBL GR	2831	84E	1266
I O ENCLOSURE PAIR PCIE 3	2831	984, 985, 986, 84E, 85E, 86E	1303
I/O cables:			
- PCI-E cable group 1	2831	985, 986	1320
- PCI-E cable group 2	2831	985, 986	1321
Top exit bracket:			
- TOP EXIT BRACKET FOR FIBRE	2831	984, 985, 986, 84E, 85E, 86E	1400
Fibre Channel/ FICON cables:			
- 50 um Fibre cable (LC)	2831	984, 985, 986, 84E, 85E, 86E	1410
- 50 um Fibre cable (LC/SC)	2831	984, 985, 986, 84E, 85E, 86E	1411
- 50 um Fibre cable (Jumper)	2831	984, 985, 986, 84E, 85E, 86E	1412
- 9 um Fibre cable (LC)	2831	984, 985, 986, 84E, 85E, 86E	1420
- 9 um Fibre cable (LC/SC)	2831	984, 985, 986, 84E, 85E, 86E	1421
- 9 um Fibre cable (Jumper)	2831	984, 985, 986, 84E, 85E, 86E	1422
High Performance Flash Enclosure Gen2 family:			
- HPFE Gen2 pair	2831	984, 985, 986, 84E, 85E, 86E	1600
-400 GB 2.5-inch flash card	2831	984, 985, 986, 84E, 85E, 86E	1610
- 800 GB 2.5-inch flash card	2831	984, 985, 986, 84E, 85E, 86E	1611

Description	Machine type	Models	Feature numbers
- 1600 GB 2.5-inch flash card	2831	984, 985, 986, 84E, 85E, 86E	1612
- 3200 GB 2.5-inch flash card	2831	984, 985, 986, 84E, 85E, 86E	1613
- Flash enclosure filler set	2831	984, 985, 986, 84E, 85E, 86E	1699
DS8000 Licensed Machine Code:			
-DS8000 LMC R8.2	2831	980, 981, 982, 984, 985, 986	1882
-DS8000 LMC R8.2 indicator	2831	98B, 98E, 98F, 84E, 85E, 86E	1982
Earthquake kit	2831	984, 985, 986, 84E, 85E, 86E	1906
Hardware installation MES	2831	984, 985, 986, 84E, 85E, 86E	1999
Disk enclosure filler sets:			
- 3.5INCH DISK ENCLOSURE FIL	2831	984, 985, 986, 84E, 85E, 86E	2997
- 2.5INCH DISK ENCLOSURE FIL	2831	984, 985, 986, 84E, 85E, 86E	2999
Device adapters:			
- Device adapter pair I	2831	984, 985, 986, 84E, 85E, 86E	3053
Host adapters:			
- 8GB 4PORT SW FCP FICON ADA	2831	984, 985, 986, 84E, 85E, 86E	3153
- 8GB 8PORT SW FCP FICON ADA	2831	984, 985, 986, 84E, 85E, 86E	3157
- 8GB 4PORT LW FCP FICON ADA	2831	984, 985, 986, 84E, 85E, 86E	3253
- 8GB 8PORT LW FCP FICON ADA	2831	984, 985, 986, 84E, 85E, 86E	3257
- 16GB 4PORT SW FCP FICON AD	2831	984, 985, 986, 84E, 85E, 86E	3353
- 16GB 4PORT LW FCP FICON AD	2831	984, 985, 986, 84E, 85E, 86E	3453
Processor memory:			
- 64GB PROCESSOR MEMORY 6COR	2831	984	4223
- 128GB PROCESSOR MEMORY 6CO	2831	984	4224
- 256GB PROCESSOR MEMORY 6CO	2831	984	4225
- 128GB PROCESSOR MEMORY 8CO	2831	985, 986	4324
- 256GB PROCESSOR MEMORY 8CO	2831	985, 986	4325
- 512GB PROCESSOR MEMORY 16C	2831	985, 986	4326
- 1TB PROCESSOR MEMORY 24COR	2831	985, 986	4327

Description	Machine type	Models	Feature numbers
- 2TB PROCESSOR MEMORY 24COR	2831	985, 986	4328
Processor license indicators:			
- 6-core processor indicator	2831	984	4421
- 8-core processor indicator	2831	985, 986	4422
- 16-core processor indicator	2831	985, 986	4423
- 24-core processor indicator	2831	985, 986	4424
Encryption disk drive sets:			
- 300 GB 15K drive set	2831	984, 985, 986, 84E, 85E, 86E	5308
- 600 GB 15K drive set	2831	984, 985, 986, 84E, 85E, 86E	5618
- 600 GB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5708
- 1.2 TB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5768
- 1.8 TB 10K drive set	2831	984, 985, 986, 84E, 85E, 86E	5778
- 4 TB 7.2K half drive set	2831	984, 985, 986, 84E, 85E, 86E	5868
-6 TB 7.2K half drive set	2831	984, 985, 986, 84E, 85E, 86E	5878
Encryption SSD drive sets:			
-400 GB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6158
- 800 GB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6258
- 1.6 TB SSD drive set	2831	984, 985, 986, 84E, 85E, 86E	6358
Function Authorization indicators			
Base Function (BF):			
- BF - Up to 100 TB capacity	2831	984, 985, 986	8151
- BF 100.1TB TO 250TB CAPACI	2831	984, 985, 986	8152
- BF 250.1TB TO 500TB CAPACI	2831	984, 985, 986	8153
- BF 500.1TB TO 1250TB CAPAC	2831	984, 985, 986	8154
- BF 1250.1TB TO 3000TB CAPA	2831	984, 985, 986	8155
- BF 3000.1TB TO 6000TB CAPA	2831	984, 985, 986	8156
- BF - 6000.1 TB to 10000 TB	2831	984, 985, 986	8160
Copy Services (CS) license:			
- CS - Inactive	2831	984, 985, 986	8250
- CS - Up to 100 TB capacity	2831	984, 985, 986	8251
- CS 100.1TB TO 250TB CAPACI	2831	984, 985, 986	8252

Description	Machine type	Models	Feature numbers
- CS 250.1TB TO 500TB CAPACI	2831	984, 985, 986	8253
- CS 500.1TB TO 1250TB CAPAC	2831	984, 985, 986	8254
- CS 1250.1TB TO 3000TB CAPA	2831	984, 985, 986	8255
- CS 3000.1TB TO 6000TB CAPA	2831	984, 985, 986	8256
- CS - 6000.1 TB to 10000 TB	2831	984, 985, 986	8260
z-synergy Services (zsS) license:			
- zsS - Active	2831	984, 985, 986	8300
- zsS - Inactive	2831	984, 985, 986	8350
- zsS - Up to 100 TB capacity	2831	984, 985, 986	8351
- ZSS 100.1TB TO 250TB CAPAC	2831	984, 985, 986	8352
- ZSS 250.1TB TO 500TB CAPAC	2831	984, 985, 986	8353
- ZSS 500.1TB TO 1250TB CAPA	2831	984, 985, 986	8354
- ZSS 1250.1TB TO 3000TB CAP	2831	984, 985, 986	8355
- ZSS 3000.1TB TO 6000TB CAP	2831	984, 985, 986	8356
- ZSS 6000.1TB TO 10000TB	2831	984, 985, 986	8360
Copy Services Manager (CSM on HMC) license:			
- CSM on HMC - Inactive	2831	984, 985, 986	8450
- CSM UP TO 100 TB CAP	2831	984, 985, 986	8451
- CSM 100.1 TB TO 250 TB CAP	2831	984, 985, 986	8452
- CSM 250.1 TB TO 500 TB CAP	2831	984, 985, 986	8453
- CSM 500.1 TB TO 1250 TB CA	2831	984, 985, 986	8454
- CSM 1250.1 TB TO 3000 TB C	2831	984, 985, 986	8455
- CSM 3000.1 TB TO 6000 TB C	2831	984, 985, 986	8456
- CSM 6000.1 TB TO 100000 TB	2831	984, 985, 986	8460
IGF transaction:			
- IGF transaction indicator	2831	984, 985, 986	8999
Shipping and Handling NC	2831	984, 985, 986, 84E, 85E, 86E	AG00
Shipping and handling 984	2831	984	AGAA
Shipping and handling 84E	2831	84E	AGAB
Shipping and handling 985	2831	985	AGAC
Shipping and handling 85E	2831	85E	AGAD
Shipping and handling 986	2831	986	AGAE

Description	Machine type	Models	Feature numbers
Shipping and handling 86E	2831	86E	AGAF

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
Model 8xE merge indicators:						
- 8xE factory merge	0003	Plant only	No	No	No	N/A
- 8xE field merge	0004	Plant only	No	No	No	N/A
- PPA Software Order Indicator	0017	Both	No	No	No	N/A
- DoD indicator	0020	Plant only	No	No	No	N/A
- JEMT indicator	0021	Plant only	No	No	No	N/A
- Cables indicator	0110	Field only	No	No	No	N/A
Custom features:						
- Top Expansion	0170	Both	No	No	No	No
- Shipping weight reduction	0200	Plant only	No	No	No	N/A
Model 8xE position indicators:						
- 98x - 8xE position 1	0241	Both	No	No	Yes	N/A
- 98x - 8xE position 2	0242	Both	No	No	Yes	N/A
- 98x - 8xE position 3	0243	Both	No	No	Yes	N/A
- 98x - 8xE position 4	0244	Both	No	No	Yes	N/A
Encryption not capable	0403	Plant only	No	No	No	N/A
All-flash indicator	0600	Plant only	No	No	No	N/A
SAS-SSD mix indicators	0603	Field only	No	No	No	N/A
SSD custom placement indicators	0604	Both	No	No	No	N/A

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
Initial system capacity:						
- Up to 5 TB capacity	0795	Both	No	No	Yes	N/A
- 5.1 TB to 10 TB capacity	0796	Both	No	No	Yes	N/A
- 10.1 TB to 25 TB capacity	0797	Both	No	No	Yes	N/A
- 25.1 TB to 50 TB capacity	0798	Both	No	No	Yes	N/A
- 50.1 TB to 75 TB capacity	0799	Both	No	No	Yes	N/A
- 75.1 TB TO 100.0 TB CAPACI	0801	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 100.1TB	0803	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 250.1TB	0804	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 500.1TB	0806	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 1250.1TB	0807	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 3000.1TB	0808	Both	No	No	Yes	N/A
- INIT SYS CAPACITY 6000.1TB	0809	Both	No	No	Yes	N/A
Attachment indicators:						
- ATTACHM INDIC OPENWAVE ALL	0930	Both	No	No	No	N/A
-IBM System i indicator	0931	Both	No	No	No	N/A
-IBM System p indicator	0932	Both	No	No	No	N/A
-IBM System	0933	Both	No	No	No	N/A

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
x indicator						
-IBM System z indicator	0934	Both	No	No	No	N/A
-IBM System z B/C indicator	0935	Both	No	No	No	N/A
- ATTACHM INDIC SYSTEM ZENTE	0936	Both	No	No	No	N/A
-Linux indicator	0940	Both	No	No	No	N/A
- Storage Appliance indicator	0952	Both	No	No	No	N/A
-IBM ProtecTIER indicator	0960	Both	No	No	No	N/A
-IBM Storwize V7000 indicator	0961	Both	No	No	No	N/A
-IBM N series indicator	0962	Both	No	No	No	N/A
- ATTACHM INDIC SAN VOLUME C	0963	Both	No	No	No	N/A
- EPIC ATTACHMENT INDICATOR	0964	Both	No	No	No	N/A
- VMware VAAI indicator	0965	Both	No	No	No	N/A
- OpenStack indicator	0966	Both	No	No	No	N/A
- ATTACHM INDIC US TAA COMPL	0983	Plant only	No	No	No	N/A
Power:						
- Single phase DC-UPS	1050	Plant only	No	No	No	No
- Three phase DC-UPS	1052	Plant only	No	No	No	No
- Extended PLD	1055	Both	No	No	No	No
Single phase						

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
line cords:						
- SNG PHASE LINE CORDS SPP	1062	Both	No	No	No	No
- SNG PHASE LINE CORDS SPP	1063	Both	No	No	No	No
Three phase line cords:						
- 3PHS 380-415V 30A 5 PIN	1086	Both	No	No	No	No
- 3PHS 200-240V 30A 4 PIN	1087	Both	No	No	No	No
- 3PHS 380-415V 40A No CON	1088	Both	No	No	No	No
- 3PHS 200-240V 60A 4 PIN	1089	Both	No	No	No	No
Special tool:						
- Overhead ladder - 5ft	1101	Both	No	No	No	No
- Ladder - Top Expansion - 3ft	1102	Both	No	No	No	No
Management Console:						
- Mgmt console - Primary	1140	Plant only	No	No	No	No
- Mgmt console - Secondary	1150	Both	No	No	No	No
Disk drive enclosures:						
- HD disk enclosure pair	1241	Both	No	No	No	No
- HD STD enclosure indicator	1242	Both	No	No	No	No
- 3.5-inch disk	1244	Both	No	No	No	No

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
enclosure indicator						
- DISK DRIVE ENCLOSURES HD 4	1245	Both	Yes	No	Yes	No
- DISK DRIVE ENCLOSURES HD 8	1256	Both	Yes	No	Yes	No
- DISK DRIVE ENCLOSURES HD 1	1257	Both	Yes	No	Yes	No
Disk drive cables:						
- Disk drive cable group A	1246	Plant only	No	No	No	No
- Disk drive cable group B	1247	Both	No	No	Yes	No
- Disk drive cable group C	1248	Both	No	No	Yes	No
- Disk drive cable group D	1249	Both	No	No	Yes	No
- Disk drive cable group E	1251	Both	No	No	Yes	No
- EXTENDED HD DISK DRIVE CAB	1252	Both	No	No	Yes	No
- EXTENDED HD DISK DRIVE CAB	1253	Both	No	No	Yes	No
- EXTENDED HD DISK DRIVE CAB	1254	Both	No	No	Yes	No
- BC DISK DRIVE CABLE GROUP	1261	Plant only	No	No	No	No
- BC DISK DRIVE CABLE GROUP	1262	Both	No	No	Yes	No
- BC DISK DRIVE	1263	Both	No	No	Yes	No

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
CABLE GROUP						
- EXTEND BCDISK DRIVE CBL GR	1266	Both	No	No	No	No
I/O ENCLOSURE PAIR PCIE 3	1303	Both	No	No	No	No
I/O cables:						
- PCI-E cable group 1	1320	Both	No	No	No	No
- PCI-E cable group 2	1321	Both	No	No	No	No
Top exit bracket:						
- TOP EXIT BRACKET FOR FIBRE	1400	Both	No	No	No	No
Fibre Channel/FICON cables:						
- 50 um Fibre cable (LC)	1410	Both	No	No	No	No
- 50 um Fibre cable (LC/SC)	1411	Both	No	No	No	No
- 50 um Fibre cable (Jumper)	1412	Both	No	No	No	No
- 9 um Fibre cable (LC)	1420	Both	No	No	No	No
- 9 um Fibre cable (LC/SC)	1421	Both	No	No	No	No
- 9 um Fibre cable (Jumper)	1422	Both	No	No	No	No
High Performance Flash Enclosure Gen2 family:						
- HPFE Gen2 pair	1600	Both	No	No	No	No
-400 GB 2.5-inch	1610	Both	No	No	No	No

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
flash card						
- 800 GB 2.5-inch flash card	1611	Both	No	No	No	No
- 1600 GB 2.5-inch flash card	1612	Both	No	No	No	No
- 3200 GB 2.5-inch flash card	1613	Both	No	No	No	No
- Flash enclosure filler set	1699	Both	No	No	No	No
DS8000 Licensed Machine Code:						
-DS8000 LMC R8.2	1882	Both	No	No	Yes	No
-DS8000 LMC R8.2 indicator	1982	Both	No	No	Yes	N/A
Earthquake kit	1906	Both	No	No	Yes	No
Hardware installation MES	1999	Field only	No	No	No	No
Disk enclosure filler sets:						
- 3.5INCH DISK ENCLOSURE FIL	2997	Both	No	No	Yes	No
- 2.5INCH DISK ENCLOSURE FIL	2999	Both	No	No	Yes	No
Device adapters:						
- Device adapter pair 1	3053	Both	No	No	No	No
Host adapters:						
- 8GB 4PORT SW FCP FICON ADA	3153	Both	Yes	No	No	No
- 8GB 8PORT SW FCP	3157	Both	Yes	No	No	No

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
FICON ADA						
- 8GB 4PORT LW FCP FICON ADA	3253	Both	Yes	No	No	No
- 8GB 8PORT LW FCP FICON ADA	3257	Both	Yes	No	No	No
- 16GB 4PORT SW FCP FICON AD	3353	Both	Yes	No	Yes	No
- 16GB 4PORT LW FCP FICON AD	3453	Both	Yes	No	Yes	No
Processor memory:						
- 64GB PROCESSOR MEMORY 6COR	4223	Both	Yes	No	No	No
- 128GB PROCESSOR MEMORY 6CO	4224	Both	Yes	No	No	No
- 256GB PROCESSOR MEMORY 6CO	4225	Both	Yes	No	No	No
- 128GB PROCESSOR MEMORY 8CO	4324	Both	Yes	No	No	No
- 256GB PROCESSOR MEMORY 8CO	4325	Both	Yes	No	No	No
- 512GB PROCESSOR MEMORY 16C	4326	Both	Yes	No	No	No
- 1TB PROCESSOR MEMORY 24COR	4327	Both	Yes	No	No	No
- 2TB PROCESSOR MEMORY 24COR	4328	Both	Yes	No	No	No
Processor license indicators:						
- 6-core processor indicator	4421	Both	No	No	No	No
- 8-core processor indicator	4422	Both	No	No	Yes	No

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
- 16-core processor indicator	4423	Both	No	No	Yes	No
- 24-core processor indicator	4424	Both	No	No	Yes	No
Encryption disk drive sets:						
- 300 GB 15K drive set	5308	Both	Yes	Yes	No	No
- 600 GB 15K drive set	5618	Both	Yes	Yes	No	No
- 600 GB 10K drive set	5708	Both	Yes	Yes	No	No
- 1.2 TB 10K drive set	5768	Both	Yes	Yes	No	No
- 1.8 TB 10K drive set	5778	Both	Yes	Yes	No	No
- 4 TB 7.2K half drive set	5868	Both	Yes	Yes	No	No
-6 TB 7.2K half drive set	5878	Both	Yes	Yes	No	No
Encryption SSD drive sets:						
-400 GB SSD drive set	6158	Both	Yes	Yes	No	No
- 800 GB SSD drive set	6258	Both	Yes	Yes	No	No
- 1.6 TB SSD drive set	6358	Both	Yes	Yes	No	No
Function Authorization indicators						
Base Function (BF):						
- BF - Up to 100 TB capacity	8151	Both	No	No	Yes	N/A
- BF 100.1TB TO 250TB CAPACI	8152	Both	No	No	Yes	N/A
- BF 250.1TB	8153	Both	No	No	Yes	N/A

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
TO 500TB CAPACI						
- BF 500.1TB TO 1250TB CAPAC	8154	Both	No	No	Yes	N/A
- BF 1250.1TB TO 3000TB CAPA	8155	Both	No	No	Yes	N/A
- BF 3000.1TB TO 6000TB CAPA	8156	Both	No	No	Yes	N/A
- BF - 6000.1 TB to 10000 TB	8160	Both	No	No	Yes	N/A
Copy Services (CS) license:						
- CS - Inactive	8250	Both	No	No	Yes	N/A
- CS - Up to 100 TB capacity	8251	Both	No	No	Yes	N/A
- CS 100.1TB TO 250TB CAPACI	8252	Both	No	No	Yes	N/A
- CS 250.1TB TO 500TB CAPACI	8253	Both	No	No	Yes	N/A
- CS 500.1TB TO 1250TB CAPAC	8254	Both	No	No	Yes	N/A
- CS 1250.1TB TO 3000TB CAPA	8255	Both	No	No	Yes	N/A
- CS 3000.1TB TO 6000TB CAPA	8256	Both	No	No	Yes	N/A
- CS - 6000.1 TB to 10000 TB	8260	Both	No	No	Yes	N/A
z- synergy Services						

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
(zsS) license:						
- zsS - Active	8300	Both	No	No	Yes	N/A
- zsS - Inactive	8350	Both	No	No	Yes	N/A
- zsS - Up to 100 TB capacity	8351	Both	No	No	Yes	N/A
- ZSS 100.1TB TO 250TB CAPAC	8352	Both	No	No	Yes	N/A
- ZSS 250.1TB TO 500TB CAPAC	8353	Both	No	No	Yes	N/A
- ZSS 500.1TB TO 1250TB CAPA	8354	Both	No	No	Yes	N/A
- ZSS 1250.1TB TO 3000TB CAP	8355	Both	No	No	Yes	N/A
- ZSS 3000.1TB TO 6000TB CAP	8356	Both	No	No	Yes	N/A
- ZSS 6000.1TB TO 10000TB	8360	Both	No	No	Yes	N/A
Copy Services Manager (CSM on HMC) license:						
- CSM on HMC - Inactive	8450	Both	No	No	Yes	N/A
- CSM UP TO 100 TB CAP	8451	Both	No	No	Yes	N/A
- CSM 100.1 TB TO 250 TB CAP	8452	Both	No	No	Yes	N/A
- CSM 250.1 TB TO 500 TB CAP	8453	Both	No	No	Yes	N/A
- CSM 500.1 TB TO	8454	Both	No	No	Yes	N/A

Description	Feature numbers	Install type	Feature conversion	Feature exchange	Feature remove	CSU
1250 TB CA						
- CSM 1250.1 TB TO 3000 TB C	8455	Both	No	No	Yes	N/A
- CSM 3000.1 TB TO 6000 TB C	8456	Both	No	No	Yes	N/A
- CSM 6000.1 TB TO 100000 TB	8460	Both	No	No	Yes	N/A
IGF transaction:						
- IGF transaction indicator	8999	Field only	No	No	Yes	N/A
Shipping and Handling NC	AG00	Plant only	No	No	No	N/A
Shipping and handling 984	AGAA	Plant only	No	No	No	N/A
Shipping and handling 84E	AGAB	Plant only	No	No	No	N/A
Shipping and handling 985	AGAC	Plant only	No	No	No	N/A
Shipping and handling 85E	AGAD	Plant only	No	No	No	N/A
Shipping and handling 986	AGAE	Plant only	No	No	No	N/A
Shipping and handling 86E	AGAF	Plant only	No	No	No	N/A

CSU = Customer setup

N/A = Not applicable

* 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.

ServiceElect (ESA) charges

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

Feature conversion purchase price

Machine type 2831 Models 984, 985, and 986

From feature	To feature	Returned parts*	Description	Continuous maintenance
Disk enclosures:				
1242	1244	No	HD STD enclosure indicator to 3.5-inch disk enclosure indicator	NA
1242	1245	No	HD STD enclosure indicator to 400 GB SSD enclosure indicator	NA
1242	1256	No	HD STD enclosure indicator to 800 GB SSD enclosure indicator	NA
1242	1257	No	HD STD enclosure indicator to 1.6 TB SSD enclosure indicator	NA
1245	1256	No	SSD enclosure indicator	NA
1245	1257	No	SSD enclosure indicator	NA
1256	1257	No	SSD enclosure indicator	NA
Host adapters:				
3153	3157	Yes	Host adapter conversion	Yes
3153	3253	Yes	Host adapter conversion	Yes
3153	3257	Yes	Host adapter conversion	Yes
3157	3153	Yes	Host adapter conversion	Yes
3157	3253	Yes	Host adapter conversion	Yes
3157	3257	Yes	Host adapter conversion	Yes
3253	3153	Yes	Host adapter conversion	Yes
3253	3157	Yes	Host adapter conversion	Yes
3253	3257	Yes	Host adapter conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
3257	3153	Yes	Host adapter conversion	Yes
3257	3157	Yes	Host adapter conversion	Yes
3257	3253	Yes	Host adapter conversion	Yes
3353	3453	Yes	Host adapter conversion	Yes
3453	3353	Yes	Host adapter conversion	Yes
Encryption disk drive sets:				
5308	5618	Yes	Encryption disk drive set conversion	Yes
5308	5708	Yes	Encryption disk drive set conversion	Yes
5308	5768	Yes	Encryption disk drive set conversion	Yes
5308	5778	Yes	Encryption disk drive set conversion	Yes
5308	5868	Yes	Encryption disk drive set conversion	Yes
5618	5708	Yes	Encryption disk drive set conversion	Yes
5618	5768	Yes	Encryption disk drive set conversion	Yes
5618	5778	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
5708	5768	Yes	Encryption disk drive set conversion	Yes
5708	5778	Yes	Encryption disk drive set conversion	Yes
5708	5868	Yes	Encryption disk drive set conversion	Yes
5768	5778	Yes	Encryption disk drive set conversion	Yes
5868	5878	Yes	Encryption disk drive set conversion	Yes
Encryption SSD drive sets:				
6158	6258	Yes	Encryption SSD drive conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
6158	6358	Yes	Encryption SSD drive conversion	Yes
6258	6358	Yes	Encryption SSD drive conversion	Yes
Encryption SAS to SSD drive sets:				
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	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	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
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
5778	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5778	6258	Yes	Encryption SAS to SSD drive conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
5778	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6358	Yes	Encryption SAS to SSD drive conversion	Yes

Machine type 2831 Model 984

From feature	To feature	Returned parts*	Description	Continuous maintenance
4223	4224	No	Processor memory conversion	Yes
4223	4225	No	Processor memory conversion	Yes
4224	4225	No	Processor memory conversion	Yes

Machine type 2831 Models 985 and 986

From feature	To feature	Returned parts*	Description	Continuous maintenance
I/O cables:				
1320	1321	No	I/O cables	No
Processor memory:				
4324	4325	No	Processor memory conversion	Yes
4324	4326	No	Processor memory conversion	Yes
4325	4326	No	Processor memory conversion	Yes
4325	4327	No	Processor memory conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
4326	4327	No	Processor memory conversion	Yes
4326	4328	No	Processor memory conversion	Yes
4327	4328	No	Processor memory conversion	Yes
Processor License feature indicators:				
4422	4423	No	Processor License feature conversion	Yes
4422	4424	No	Processor License feature conversion	Yes
4423	4424	No	Processor License feature conversion	Yes

Machine type 2831 Models 84E, 85E, and 86E

From feature	To feature	Returned parts*	Description	Continuous maintenance
Disk enclosures:				
1242	1244	No	HD STD enclosure indicator to 3.5-inch disk enclosure indicator	NA
1242	1245	No	HD STD enclosure indicator to 400 GB SSD enclosure indicator	NA
1242	1256	No	HD STD enclosure indicator to 800 GB SSD enclosure indicator	NA
1242	1257	No	HD STD enclosure indicator to 1.6 TB SSD enclosure indicator	NA
1245	1256	No	SSD enclosure indicator	NA
1245	1257	No	SSD enclosure indicator	NA
1256	1257	No	SSD enclosure indicator	NA

From feature	To feature	Returned parts*	Description	Continuous maintenance
Host adapters:				
3153	3157	Yes	Host adapter conversion	Yes
3153	3253	Yes	Host adapter conversion	Yes
3153	3257	Yes	Host adapter conversion	Yes
3157	3153	Yes	Host adapter conversion	Yes
3157	3253	Yes	Host adapter conversion	Yes
3157	3257	Yes	Host adapter conversion	Yes
3253	3153	Yes	Host adapter conversion	Yes
3253	3157	Yes	Host adapter conversion	Yes
3253	3257	Yes	Host adapter conversion	Yes
3257	3153	Yes	Host adapter conversion	Yes
3257	3157	Yes	Host adapter conversion	Yes
3257	3253	Yes	Host adapter conversion	Yes
3353	3453	Yes	Host adapter conversion	Yes
3453	3353	Yes	Host adapter conversion	Yes
Encryption disk drive sets:				
5308	5618	Yes	Encryption disk drive set conversion	Yes
5308	5708	Yes	Encryption disk drive set conversion	Yes
5308	5768	Yes	Encryption disk drive set conversion	Yes
5308	5868	Yes	Encryption disk drive set conversion	Yes
5308	5778	Yes	Encryption disk drive set conversion	Yes
5618	5708	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
5618	5778	Yes	Encryption disk drive set conversion	Yes
5708	5618	Yes	Encryption disk drive set conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
5708	5768	Yes	Encryption disk drive set conversion	Yes
5708	5868	Yes	Encryption disk drive set conversion	Yes
5708	5778	Yes	Encryption disk drive set conversion	Yes
5778	5868	Yes	Encryption disk drive set conversion	Yes
5768	5778	Yes	Encryption disk drive set conversion	Yes
5868	5878	Yes	Encryption disk drive set conversion	Yes
Encryption SSD drive sets:				
6158	6258	Yes	Encryption SSD drive conversion	Yes
6158	6358	Yes	Encryption SSD drive conversion	Yes
6258	6358	Yes	Encryption SSD drive conversion	Yes
Encryption SAS to SSD drive sets:				
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	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	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5708	6258	Yes	Encryption SAS to SSD drive conversion	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
5708	6358	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
5778	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5778	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5778	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5868	6358	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6158	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6258	Yes	Encryption SAS to SSD drive conversion	Yes
5878	6358	Yes	Encryption SAS to SSD drive conversion	Yes

Machine types 2831 Models 984, 985, 986, 84E, 85E, and 86E

From feature	To feature	Returned parts*	Description	Continuous maintenance
1610	1611	Flash cards conversion	Yes	Yes
1610	1612	Flash cards conversion	Yes	Yes
1610	1613	Flash cards conversion	Yes	Yes
1611	1612	Flash cards conversion	Yes	Yes

From feature	To feature	Returned parts*	Description	Continuous maintenance
1611	1613	Flash cards conversion	Yes	Yes
1612	1613	Flash cards conversion	Yes	Yes

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