IBM Storwize V5000 delivers simplicity, efficiency, and flexibility for midsize organizations

At a glance

IBM® Storwize® V5000 delivers flexible midrange storage in a compact 2U rack mount design:

- Dual-active intelligent array node canisters with 16 GB cache
- 6 Gb SAS and 1 Gb iSCSI host ports, along with either 8 Gb Fibre Channel (FC) or 10 Gb iSCSI/Fibre Channel over Ethernet (FCoE) host ports
- Support for twelve (3.5-inch) or twenty-four (2.5-inch) dual-port, hot-swappable 6 Gb SAS drives
- Scalable to 168 drives per system and 336 drives per clustered system with the attachment of Storwize V5000 expansion enclosures
- One year or three year warranty with customer replaceable unit (CRU) and on-site service, along with optional warranty service upgrades

Storwize V5000 functional capabilities are provided through IBM Storwize Family Software for Storwize V5000, including:

- Rich set of standard functions, including virtualized internal storage, thin provisioning, data migration, two-way system clustering, and an intuitive, web-based GUI
- Optional functions including FlashCopy®, Easy Tier®, remote mirroring, and external storage virtualization

Overview

IBM Storwize V5000 is the newest addition to the Storwize family of disk systems. Leveraging demonstrated IBM Storwize V7000 and IBM SAN Volume Controller functions, management tools, and interoperability, Storwize V5000 delivers simplicity, efficiency, and flexibility to meet the needs of midsize organizations.

Storwize V5000 features dual node canisters and 16 GB cache in a compact, 2U, 19-inch rack mount enclosure. 6 Gb SAS and 1 Gb iSCSI host attachment support is standard on all machines, along with either 8 Gb FC or 10 Gb iSCSI/FCoE host attachment. A Storwize V5000 system scales up to 168 drives with the attachment of six Storwize V5000 expansion enclosures, and up to 336 drives in a two-way system cluster configuration.

Storwize V5000 is available in the following models:

- Control enclosures:
  - Storwize V5000 large form factor (LFF) Control Enclosure
- Storwize V5000 small form factor (SFF) Control Enclosure
- Expansion enclosures:
  - Storwize V5000 LFF Expansion Enclosure
  - Storwize V5000 SFF Expansion Enclosure

The LFF enclosure models support up to twelve 3.5-inch drives, while the SFF enclosure models support up to twenty-four 2.5-inch drives. High-performance disk drives, high-capacity nearline disk drives, and solid state drives (SSDs) are supported. Drives of the same form factor can be intermixed within an enclosure, providing the flexibility to address performance and capacity needs within a single enclosure. You can also intermix LFF and SFF expansion enclosures behind either a LFF or SFF control enclosure.

All Storwize V5000 models are available with either a one year or three year warranty. This flexibility allows you to select the warranty period that best addresses your business and financial needs. The warranty period is specified during the order process:

- Models ordered using machine type 2077 have a one year warranty
- Models ordered using machine type 2078 have a three year warranty

All Storwize V5000 functional capabilities are provided through IBM Storwize Family Software for Storwize V5000 and include:

- RAID levels 0, 1, 5, 6, and 10 for data protection
- Virtualization of internal storage to enable rapid, flexible provisioning and simple configuration changes
- Thin provisioning for improved storage utilization
- One-way data migration to easily move data onto the Storwize V5000 system
- Two-way system clustering for greater capacity and performance growth potential
- Innovative and easy-to-use management capabilities with an embedded GUI
- Extensive interoperability with support for most major server platforms and operating systems

Storwize V5000 software also offers a rich set of optional features:

- FlashCopy for creating instant copies of data for backup or application testing
- IBM System Storage® Easy Tier for automatic migration of frequently accessed data from disk drives to high performing SSDs
- Remote mirroring for data replication between systems at different locations through Metro Mirror and Global Mirror functions
- Virtualization of external storage for improvements in administrator productivity and storage utilization of an existing storage asset

For additional information on the Storwize V5000 software, refer to the announcements listed in the Reference information section.

### Key prerequisites

Storwize V5000 requires Storwize Family Software for Storwize V5000 version 7.1, or later, for operation.

Storwize V5000 software version 7.1.0.5, or later, is required for 10 Gb iSCSI/FCoE host attachment support.

Use of the software is entitled through the acquisition of Storwize V5000 software licenses.
Storwize V5000 is supported for attachment to select:

- IBM System x® and IBM Power Systems™ servers
- IBM Flex System™, IBM BladeCenter®, and IBM Power Systems blades
- Intel™ and AMD processor-based servers
- HP Itanium™ and PA-RISC servers
- Oracle and Sun SPARC servers

Refer to the IBM System Storage Interoperation Center (SSIC) for additional details

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

**Planned availability date**

October 11, 2013: Storwize V5000 models and features except as noted below

November 15, 2013: Storwize V5000 models and features in Korea

December 6, 2013: The following Storwize V5000 features in all countries

- 10 Gb iSCSI/FCoE host ports
- 800 GB SSD
- TAA compliance
- US Department of Defense UID label
- RFID tags
- Generic bezel
- Generic packaging

Refer to the Limitations section for additional information regarding Korea.

**Description**

Storwize V5000 control enclosures are available in two models:

- Storwize V5000 LFF Control Enclosure
  - Dual node canisters with 16 GB cache (8 GB per canister)
  - Four 6 Gb SAS and four 1 Gb iSCSI host interface ports, along with either eight 8 Gb FC or four 10 Gb iSCSI/FCoE host interface ports
  - Four 6 Gb SAS ports for expansion enclosure attachment
  - Twelve slots for 3.5-inch SAS drives
  - 2U, 19-inch rack mount enclosure with ac power supplies

- Storwize V5000 SFF Control Enclosure
  - Dual node canisters with 16 GB cache (8 GB per canister)
  - Four 6 Gb SAS and four 1 Gb iSCSI host interface ports, along with either eight 8 Gb FC or four 10 Gb iSCSI/FCoE host interface ports
  - Four 6 Gb SAS ports for expansion enclosure attachment
  - Twenty-four slots for 2.5-inch SAS drives
  - 2U, 19-inch rack mount enclosure with ac power supplies

Storwize V5000 expansion enclosures are available in two models:

- Storwize V5000 LFF Expansion Enclosure
  - Dual expansion canisters
  - Four 6 Gb SAS ports for control enclosure and expansion enclosure attachment
- Twelve slots for 3.5-inch SAS drives
- 2U, 19-inch rack mount enclosure with ac power supplies

**Storwize V5000 SFF Expansion Enclosure**
- Dual expansion canisters
- Four 6 Gb SAS ports for control enclosure and expansion enclosure attachment
- Twenty-four slots for 2.5-inch SAS drives
- 2U, 19-inch rack mount enclosure with ac power supplies

All models are available with a either one year or three year warranty. This flexibility enables you to select the warranty period that best addresses your business and financial needs.

The warranty period is specified during the order process:
- Models ordered using machine type 2077 have a one year warranty
- Models ordered using machine type 2078 have a three year warranty

The models offered under both machine types are functionally identical.

**SAS, iSCSI, FC, and FCoE connectivity with intermix flexibility**

With 6 Gb SAS and 1 Gb iSCSI host interface support standard, along with either 8 Gb FC or 10 Gb iSCSI/FCoE support, Storwize V5000 is designed to accommodate the most common storage networks.

The following configurations are available:

<table>
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<tr>
<td>6 GB SAS</td>
<td>1 GB iSCSI</td>
</tr>
<tr>
<td>4 ports</td>
<td>4 ports</td>
</tr>
<tr>
<td>4 ports</td>
<td>4 ports</td>
</tr>
</tbody>
</table>

Field-installed features are available to replace the plant-installed 8 Gb FC ports with 10 Gb iSCSI/FCoE ports or the plant-installed 10 Gb iSCSI/FCoE ports with 8 Gb FC ports.

This broad networking support, along with field-upgrade capability enables deployment of Storwize V5000 in the existing storage network infrastructure with confidence that the system will support additional network technologies should needs change in future.

**Drive options and intermix flexibility to meet a complete range of needs**

Storwize V5000 is designed to support the complete range of data storage requirements, from highly utilized applications to high-capacity, low usage applications.

The following 3.5-inch (LFF) 6 Gb SAS drives are supported:
- High-performance, enterprise class disk drives
  - 300 GB 15,000 rpm
  - 900 GB and 1.2 TB 10,000 rpm
- High-capacity, archival-class nearline disk drives
  - 2 TB, 3 TB, and 4 TB 7,200 rpm

The following 2.5-inch (SFF) 6 Gb SAS drives are supported:
- Solid state drives
  - 200 GB, 400 GB, and 800 GB
- High-performance, enterprise class disk drives
- 146 GB and 300 GB 15,000 rpm
- 600 GB, 900 GB, and 1.2 TB 10,000 rpm
- High-capacity, archival-class nearline disk drives
  - 1 TB 7,200 rpm

All drives are dual-port and hot-swappable. Drives of the same form factor can be intermixed within the appropriate enclosure. The ability to intermix solid state drives, high-performance disk drives, and high-capacity nearline disk drives provides the flexibility to address both performance and capacity needs within a single enclosure.

**Scalable configurations to respond to growing capacity needs**

Up to six Storwize V5000 expansion enclosures are supported by a single Storwize V5000 control enclosure (maximum of 168 drives per system). Expansion enclosures are designed to be dynamically added with virtually no downtime, helping to quickly and seamlessly respond to ever-growing capacity demands.

With two-way system clustering, the size of the system can be doubled to a maximum of 336 drives.

Further scalability can be achieved with virtualization of external storage. When Storwize V5000 virtualizes an external disk system, capacity in the external system inherits the functional richness and ease of use of Storwize V5000.

**Designed for high availability**

Storwize V5000 is designed to offer high system and data availability with:

- Dual-active, intelligent node canisters with mirrored cache
- Dual port disk drives with automatic disk drive failure detection and RAID rebuild with global hot spares
- Redundant hardware, including power supplies and fans
- Hot-swappable and customer replaceable components
- Automated path failover support for the data path between the server and the drives

**Rich set of functional capabilities**

As a member of the Storwize family, Storwize V5000 leverages Storwize V7000 and SAN Volume Controller functions and management tools. All Storwize V5000 functional capabilities for are provided through the IBM Storwize Family Software for Storwize V5000.

The following functions are delivered with the Storwize V5000 base software license:

- **RAID levels 0, 1, 5, 6, and 10** provides the flexibility to choose the level of data protection required.
- **Virtualization of internal storage** enables rapid, flexible provisioning and simple configuration changes.
- **Thin provisioning** optimizes efficiency by allocating disk storage space in a flexible manner among multiple users, based on the minimum space required by each user at any given time. With thin provisioning, applications use only the space they are actually using, not the total space that has been allocated to them.
- **Data migration** enables easy and nondisruptive moves of volumes from another storage system onto the Storwize V5000 system using FC or SAS connectivity.
- **Two-way system clustering** allows two systems to be joined together (where a system is a Storwize V5000 control enclosure and all attached expansion enclosures) so they can be operated and managed as a single system.
- **Simple and easy to use GUI** allows storage to be quickly deployed and efficiently managed. The GUI runs on the Storwize V5000 system, so there is no
need for a separate console. All you need to do is point your web browser to the system. It is based on the Storwize V7000 management GUI and has a similar look and feel.

The following optional features are offered with the Storwize V5000 software:

- **FlashCopy** allows you to create copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately.
- **Easy Tier** storage tiering helps optimize storage use with data location to improve system performance, reduce costs, and simplify management. Easy Tier automatically and dynamically moves frequently accessed data to SSDs in the system, resulting in SSD performance without manually creating and managing storage tier policies. Easy Tier makes it easy and economical to deploy SSDs in the environment.
- **Remote mirroring** provides storage system-based data replication using either synchronous or asynchronous data transfers over IP, FC, or FCoE communication links:
  - Metro Mirror to maintain a fully synchronized copy at metropolitan distances (up to 300 km)
  - Global Mirror to operate asynchronously and maintain a copy at much greater distances (up to 8000 km)

Both functions are designed to support VMware Site Recovery Manager to help speed disaster recovery.

For ultimate flexibility, Storwize V5000 remote mirroring is designed to interoperate with any other IBM Storwize family system, including Storwize V7000, IBM Storwize V3700, IBM FlexSystem V7000, and IBM SAN Volume Controller.

- **External storage virtualization** enables Storwize V5000 to manage capacity in other disk systems. When Storwize V5000 virtualizes a disk system, its capacity becomes part of the Storwize V5000 system and is managed in the same way as capacity on internal drives within Storwize V5000. Capacity in external disk systems inherits all the functional richness and ease of use of the Storwize V5000.

### Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at


### Reference information

For additional information on the Storwize V5000 software, refer to:

- Software Announcement **ZP13-0519**, dated October 08, 2013, IBM Storwize V5000 Software version 7 delivers a rich set of functional capabilities and optional features for Storwize V5000 hardware
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Storwize V5000 Control Enclosures

Base model configurations consist of the following:

- **Storwize V5000 LFF Control Enclosure (Model 12C):**
  - 2U, 19-inch rack mount enclosure
  - Two node canisters with 16 GB cache (8 GB per node canister)
  - One of the following:
    - Eight 8 Gb FC host interface ports with shortwave SFP transceivers (four ports per node canister)
    - Four 10 Gb iSCSI/FCoE host interface ports (two ports per node canister)
  - Four 6 Gb SAS host interface ports (two ports per node canister)
  - Four 6 Gb SAS ports for attachment of a Storwize V5000 expansion enclosure (two ports per node canister)
  - Four Ethernet ports for use as 1 Gb iSCSI host interface ports and for system management (two ports per node canister)
  - Twelve slots for 3.5-inch SAS drives
  - Two ac power supplies and cooling units

- **Storwize V5000 SFF Control Enclosure (Model 24C):**
  - 2U, 19-inch rack mount enclosure
  - Two node canisters with 16 GB cache (8 GB per node canister)
  - One of the following:
    - Eight 8 Gb FC host interface ports with shortwave SFP transceivers (four ports per node canister)
    - Four 10 Gb iSCSI/FCoE host interface ports (two ports per node canister)
  - Four 6 Gb SAS host interface ports (two ports per node canister)
  - Four 6 Gb SAS ports for attachment of a Storwize V5000 expansion enclosure (two ports per node canister)
  - Four Ethernet ports for use as 1 Gb iSCSI host interface ports and for system management (two ports per node canister)
  - Twenty-four slots for 2.5-inch SAS drives
  - Two ac power supplies and cooling units
The following are available as optional features on Storwize V5000 control enclosures. Refer to the Product number section for feature numbers.

- 3.5-inch 6 Gb SAS disk drives:
  - 300 GB 15,000 rpm
  - 900 GB and 1.2 TB 10,000 rpm
  - 2 TB, 3 TB, and 4TB 7,200 rpm
- 2.5-inch 6 Gb SAS disk drives:
  - 146 GB and 300 GB 15,000 rpm
  - 600 GB, 900 GB, and 1.2 TB 10,000 rpm
  - 1 TB 7,200 rpm
- 2.5-inch 6 Gb SAS SSDs:
  - 200 GB, 400 GB, and 800 GB
- 8 Gb FC longwave SFP transceivers
- SAS and fiber optic host interface cables
- Rack PDU and wall outlet line cords
- RFID tag
- US Department of Defense UID label
- Rack shipment bracket

**Storwize V5000 Expansion Enclosures**

Base model configurations consist of the following:

- Storwize V5000 LFF Expansion Enclosure (Model 12E):
  - 2U, 19-inch rack mount enclosure
  - Two expansion canisters
  - Four 6 Gb SAS ports for attachment to a Storwize V5000 control enclosure or to another Storwize V5000 expansion enclosure (two ports per canister)
  - Twelve slots for 3.5-inch SAS drives
  - Two ac power supplies and cooling units
- Storwize V5000 SFF Expansion Enclosure (Model 24E):
  - 2U, 19-inch rack mount enclosure
  - Two expansion canisters
  - Four 6 Gb SAS ports for attachment to a Storwize V5000 control enclosure or to another Storwize V5000 expansion enclosure (two ports per canister)
  - Twenty-four slots for 2.5-inch SAS drives
  - Two ac power supplies and cooling units

The following are available as optional features. Refer to the Product number section for feature numbers.

- 3.5-inch 6 Gb SAS disk drives:
  - 300 GB 15,000 rpm
  - 900 GB and 1.2 TB 10,000 rpm
  - 2 TB, 3 TB, and 4TB 7,200 rpm
- 2.5-inch 6 Gb SAS disk drives:
  - 146 GB and 300 GB 15,000 rpm
  - 600 GB, 900 GB, and 1.2 TB 10,000 rpm
  - 1 TB 7,200 rpm
- 2.5-inch 6 Gb SAS SSDs:
- 200 GB, 400 GB, and 800 GB
- SAS expansion enclosure attachment cables
- Rack power distribution unit (PDU) and wall outlet line cords
- RFID tag
- US Department of Defense UID label
- Rack shipment bracket

Publications

The following publications are available:

- IBM Storwize V5000 Installation Poster
- IBM Storwize V5000 Quick Installation Guide
- IBM Storwize V5000 Read First Flyer

The most up-to-date product documentation, including the Storwize V5000 information center, is available and downloadable at

http://www.ibm.com/support

IBM Publications Center Portal

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

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

When available, translated product documentation is downloadable from the following IBM support site

http://www.ibm.com/support

Services

Global Technology Services®

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

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For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

Select your country, and then select the product as the category.

Technical information

Specified operating environment

**Physical specifications**
- Height: 8.7 cm (3.4 in)
- Width: 48.3 cm (19.0 in)
- Depth: 55.6 cm (21.9 in)
- Approximate weight:
  - LFF control enclosure:
    - Empty: 18.0 kg (39.6 lb)
    - Fully configured: 28.3 kg (62.2 lb)
  - LFF expansion enclosure:
    - Empty: 16.4 kg (36.1 lb)
    - Fully configured: 26.7 kg (58.8 lb)
  - SFF control enclosure:
    - Empty: 19.0 kg (41.8 lb)
    - Fully configured: 27.3 kg (60.0 lb)
  - SFF expansion enclosure:
    - Empty: 16.7 kg (36.7 lb)
    - Fully configured: 25.0 kg (55.2 lb)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

**Operating environment**

**Air temperature:**
- Operating: 10°C to 35°C (50°F to 95°F) at 30.5 below to 3,000 m above sea level (100 below to 9,840 ft above)
- Non-operating: -10°C to 50°C (14°F to 125°F)

**Relative humidity:**
- Operating: 20% - 80%
- Non-operating: 10% - 90%

**Electrical power:**
- Voltage range: 100-240 V ac
- Frequency: 50-60 Hz
- Power:
  - LFF control enclosure: 378 watts
  - LFF expansion enclosure: 300 watts
  - SFF control enclosure: 425 watts
  - SFF expansion enclosure: 338 watts

**Heat dissipation (BTU per hour):**
- LFF control enclosure: 1,290
• LFF expansion enclosure: 1,024
• SFF control enclosure: 1,451
• SFF expansion enclosure: 1,154

Acoustical noise emission:

• LFF control enclosure:
  – 5.8 bels (idling)
  – 5.8 bels (operating)
• LFF expansion enclosure:
  – 6.0 bels (idling)
  – 6.0 bels (operating)
• SFF control enclosure:
  – 5.9 bels (idling)
  – 5.9 bels (operating)
• SFF expansion enclosure:
  – 6.1 bels (idling)
  – 6.1 bels (operating)

Software requirements
Storwize V5000 requires IBM Storwize Family Software for Storwize V5000, version 7.1, or later, for operation.

Version 7.1.0.5, or later, is required for 10 Gb iSCSI/FCoE host attachment support

Version 7.2, or later, is required for:

• Data migration using SAS connectivity
• Remote mirroring over IP communication links

The Storwize V5000 software is preloaded by IBM on the Storwize V5000 control enclosure. Use of the software is entitled through the acquisition of a Storwize V5000 Base Software license. This license is required for the Storwize V5000 control enclosure and for each Storwize V5000 expansion enclosure.

Use of optional features offered with the Storwize V5000 software is entitled through the acquisition of their respective licenses.

For additional information on the Storwize V5000 software, refer to the announcements listed in the Reference information section.

Compatibility
Refer to the IBM System Storage Interoperation Center (SSIC) for a comprehensive list of supported environments, devices, and configurations

http://www.ibm.com/systems/support/storage/ssic

Limitations
Storwize V5000 systems shipped prior to the published planned availability date for Korea and Russia are not compliant with certification and product labeling requirements for these countries.

If you did not acquire your system from IBM as a direct shipment to these countries, you are responsible for validating the system has the appropriate certification and product labeling for use that country. Contact your IBM sales representative or business partner for assistance with this validation.
Planning information

Customer responsibilities

Physical configuration and installation planning, along with machine installation and configuration, are customer responsibilities.

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

As a convenience, a limited selection of cables can be ordered with the Storwize V5000 machine. Refer to the Product number section for feature numbers.

Cables, along with installation services, are also available from IBM Network Integration and Deployment Services, an IBM Global Services offering.

Host interface cables

Host interface cables are required to connect Storwize V5000 host ports to server or fabric ports.

FC: Storwize V5000 requires a 50.0/125 micrometer fiber optic cable terminated with an LC Duplex connector. The following fiber optic cables can be ordered with Storwize V5000 control enclosure models:

- 1 m fiber cable (LC)
- 5 m fiber cable (LC)
- 25 m fiber cable (LC)
- 10 m OM3 fibre cable (LC)

10 Gb iSCSI/FCoE: Storwize V5000 requires a 10GBASE-SR cable terminated with an SFP+ connector. The following cable can be ordered with Storwize V5000 control enclosure models:

- 10 m OM3 Fibre cable (LC)

SAS: Storwize V5000 requires a mini-SAS HD 4x cable terminated with an SFF-8644 connector. The following SAS cables can be ordered with Storwize V5000 control enclosure models:

- Cables terminated with a SFF-8088 connector for host attachment:
  - 0.6 m SAS cable (mSAS HD to mSAS)
  - 1.5 m SAS cable (mSAS HD to mSAS)
  - 3 m SAS cable (mSAS HD to mSAS)
- Cables terminated with a SFF-8644 connector for host attachment:
  - 0.6 m SAS cable (mSAS HD to mSAS HD)
  - 1.5 m SAS cable (mSAS HD to mSAS HD)
  - 3 m SAS cable (mSAS HD to mSAS HD)

1 Gb iSCSI: Storwize V5000 requires a Category 5 or Category 5E Ethernet cable terminated with an 8P8C modular connector (RJ45 compatible connector). This cable is not available for ordering with the machine and must be supplied by the customer.
**Expansion enclosure attachment cables**

Expansion enclosure attachment cables are required to connect a Storwize V5000 expansion enclosure to the Storwize V5000 control enclosure and to another Storwize V5000 expansion enclosure. This requires a mini-SAS HD 4x cable terminated with an SFF-8644 connector.

The following SAS cables can be ordered with Storwize V5000 expansion enclosure models:

- 0.6 m SAS cable (mSAS HD to mSAS HD)
- 1.5 m SAS cable (mSAS HD to mSAS HD)
- 3 m SAS cable (mSAS HD to mSAS HD)

**Management cables:**

Storwize V5000 management requires a Category 5 or Category 5E Ethernet cable terminated with an 8P8C modular connector (RJ45 compatible connector). One cable is required per controller (node canister). This cable is not available for ordering with the machine and must be supplied by the customer.

**Security, auditability, and control**

This product uses the security and auditability features of the pre-loaded application software.

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

**Global Technology Services**

Contact your IBM representative for the list of selected services available in your country, either as standard or customized offerings, for the efficient installation, implementation, or integration of this product.

**IBM Electronic Services**

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

Now integrated into the base operating system of AIX® 5.3, AIX 6.1, and AIX 7.1, Electronic Service Agent is designed to automatically and electronically report system failures and utilization issues to IBM, which can result in faster problem resolution and increased availability. System configuration and inventory information collected by the Electronic Service Agent tool also can be viewed on the secure Electronic Support web portal, and used to improve problem determination and resolution by you and the IBM support team. To access the tool main menu, simply type "smitty esa_main", and select "Configure Electronic Service Agent." In addition, ESA now includes a powerful Web user interface, giving the administrator easy access to status, tool settings, problem information, and filters. For more information and documentation on how to configure and use Electronic Service Agent, refer to [http://www.ibm.com/support/electronic](http://www.ibm.com/support/electronic)
The IBM Electronic Support portal is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. This portal enables you to gain easier access to IBM resources for assistance in resolving technical problems. The My Systems and Premium Search functions make it even easier for Electronic Service Agent tool-enabled customers to track system inventory and find pertinent fixes.

**Benefits**

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

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

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

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

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

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

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

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

**Terms and conditions**

**Products - terms and conditions**

**Warranty period**

Machine type 2077: One year (including the battery)

Machine type 2078: Three years (including the battery)
Machine type 2077 is provided with one year of standard warranty. Machine type 2078 is provided with one year of standard warranty and two years of extended warranty service. Please consult with your advisors about the appropriate financial treatment for these products.

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. 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 effective on its date of installation. 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.

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 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 Customer 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.

CRU Service

IBM provides replacement CRUs to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request. CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 (mandatory) CRU

Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

Tier 2 (optional) CRU

You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

Based upon availability, CRUs will be shipped for next business day (NBD) delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU. You may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

The following parts have been designated as Tier 1 CRUs:

- Battery
- Bezel
- Cache
- Canister
- Drive
• Filler panel
• I/O adapter
• I/O cable
• I/O transceiver
• Power cord
• Power supply unit
• Rack kit

**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:

• 9 hours per day, Monday through Friday, excluding holidays, next business day response. Calls must be received by 3:00 p.m. local time in order to qualify for next business day response.

**Non-IBM parts service**

**Warranty service**
IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

**Warranty service upgrades**
During the warranty period, warranty service upgrades provide an enhanced level of On-site Service for an additional charge. Service levels are response-time objectives and are not guaranteed. See the Warranty services section for additional details.

IBM will attempt to resolve your problem over the telephone or electronically by access to 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.

**CRU and On-site Service**
At IBM's discretion you will receive 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. The following on-site response-time objectives are available as warranty service upgrades for your machine. Available offerings are:

• 9 hours per day, Monday through Friday, excluding holidays, 4 hour average, same business day response
• 24 hours per day, 7 days a week, 4 hour average response, same day
• 24 hours per day, 7 days a week, 2 hour average response, same day

Customer Replaceable Units (CRUs) may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under the CRU and On-site Service
level specified above. For additional information on the CRU Service, see the warranty information.

**Maintenance service options**

**Maintenance services**

If required, IBM provides repair or exchange service depending on the types of maintenance 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. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance 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. The following service selections are available as maintenance options for your machine type.

**On-site Service**

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 levels are:

- 9 hours per day, Monday through Friday, excluding holidays, next business day response
- 9 hours per day, Monday through Friday, excluding holidays, 4 hour average response, same business day
- 24 hours per day, 7 days a week, 4 hour average response, same day
- 24 hours per day, 7 days a week, 2 hour average response, same day

**Customer Replaceable Unit (CRU) Service**

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the replacement CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next business day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, 1) return instructions and a container are shipped with the replacement CRU, and 2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

CRUs are designated as being either a Tier 1 (mandatory) or a Tier 2 (optional) CRU.

Tier 1 (mandatory) CRUs: Installation of Tier 1 CRUs, as specified in this announcement, is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.

For machines with On-site Same-day Response Service, IBM will replace a Tier 1 CRU part at your request, at no additional charge.

Tier 2 (optional) CRUs: You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge.

The following parts and features have been designated as Tier 1 CRUs:
- Battery
- Bezel
- Cache
- Canister
- Drive
- Filler panel
- I/O adapter
- I/O cable
- I/O transceiver
- Power cord
- Power supply unit
- Rack kit

Feature codes or models for which there is a maintenance charge:

<table>
<thead>
<tr>
<th>Description</th>
<th>Machine type</th>
<th>Model</th>
<th>Feature number</th>
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</thead>
<tbody>
<tr>
<td>One Year Warranty Machines:</td>
<td></td>
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<tr>
<td>V5000 LFF Control</td>
<td>2077</td>
<td>12C</td>
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<td>V5000 LFF Expansion</td>
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<td>V5000 SFF Expansion</td>
<td>2077</td>
<td>24E</td>
<td></td>
</tr>
<tr>
<td>200GB 2.5 Inch SSD</td>
<td>2077</td>
<td>24C,24E</td>
<td>AC80</td>
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<td>2077</td>
<td>24C,24E</td>
<td>AC81</td>
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<td>800GB 2.5 Inch SSD</td>
<td>2077</td>
<td>24C,24E</td>
<td>AC82</td>
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<td>Three Year Warranty Machines:</td>
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<td>V5000 LFF Control</td>
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<td>AC92</td>
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</table>

Non-IBM parts service

Under certain conditions, IBM provides services for selected non-IBM parts at no additional charge for machines that are covered under warranty service upgrades or maintenance services.

This service includes hardware problem determination (PD) on the non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines and provides the labor to replace the failing parts at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Usage plan machine

No

IBM hourly service rate classification

Two
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.

**Maintenance service offerings**
These machines are eligible under terms and conditions of IBM ServiceElite, the IBM Enterprise Service Agreement (ESA), or the IBM Maintenance Agreement. Consult your IBM representative for details.

**General terms and conditions**

**Field-installable features**
Yes

**Model conversions**
No

**Machine installation**
Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

**Graduated program license charges apply**
No

**Licensed internal code and licensed machine code**
These products do not contain Licensed Internal Code or Licensed Machine Code.

**Prices**
For all local charges, contact your IBM representative.

**IBM Global Financing**
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http://www.ibm.com/financing

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Financing solutions from IBM Global Financing can help you stretch your budget and affordably acquire the new product. But beyond the initial acquisition, our end-to-end approach to IT management can also help keep your technologies current, reduce costs, minimize risk, and preserve your ability to make flexible equipment decisions throughout the entire technology life cycle.
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For the most current information regarding IBM products, consult your IBM representative or reseller, or visit the IBM worldwide contacts page

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

Corrections

(Corrected on March 3, 2014)
The Service level under the CRU and On-site Service section in the Products - terms and conditions section has been updated.