Lenovo Storage S2200

Lenovo Press Product Guide

The Lenovo® Storage S2200 (as shown in the following figure) provides simplicity, speed, scalability, security, and high availability for small to large businesses. The S2200 SAN array delivers enterprise-class storage management technology in an affordable solution with a wide choice of host connectivity options, flexible drive configurations, and enhanced data management features.

The S2200 is a perfect fit for small offices and remote and branch offices of large enterprises that need a primary storage solution that supports general purpose workloads, such as file and print serving, web serving, email and collaboration, and small databases. The S2200 is also well-suited for secure archive storage or a low-cost backup solution.

Figure 1. Lenovo Storage S2200

The S2200 offers the flexible choice of 6/12 Gb SAS, 1/10 Gb iSCSI, and 4/8 Gb Fibre Channel (FC) host connectivity protocols. The Converged Network Controller (CNC) design of the S2200 makes the selection of iSCSI or FC host connectivity as simple as attaching corresponding transceivers or Direct-Attach Copper (DAC) cables to the SFP/SFP+ ports on the RAID controller.

The S2200 supports up to 96 drives with up to three external expansion enclosures. It also offers flexible drive configurations with the choice of 2.5-inch and 3.5-inch drive form factors, 10 K or 15 K rpm SAS and 7.2 K rpm NL SAS hard disk drives (HDDs) and self-encrypting drives (SEDs), and SAS solid-state drives (SSDs). The S2200 can be scaled up to 288 TB of raw storage capacity.

Did you know?

The S2200 supports Intelligent Real-time Tiering capabilities that help optimize system performance, reduce costs, and simplify management. The base software includes the ability to move data dynamically between SAS HDDs that are optimized for cost per IOPS and NL SAS HDDs that are optimized for cost per GB. With the optional software license, the S2200 supports hybrid tiering across HDDs and SSDs.

The S2200 can be upgraded to the Lenovo Storage S3200 by replacing the RAID controllers in the controller enclosure during a planned offline maintenance window without the need to migrate or move data and re-configure the attached hosts. The new S3200 RAID controller recognizes the array configuration and preserves the controller's host port parameters (for example, FC WWN).

The S2200 supports battery-free cache protection, which reduces maintenance costs and provides permanent backup of unwritten cache data if there is a power failure.

Key features

The S2200 storage system includes the following key features and benefits:

- Low-cost, entry-level storage with a single controller or dual active/active controller configurations for high availability and performance.

- Flexible host connectivity to match diverse client needs with support for 6/12 Gb SAS (SAS controller) or 1/10 Gb iSCSI or 4/8 Gb FC connectivity (FC and iSCSI controller).

- Support for 6 Gb SAS drive-side connectivity with support for 12x 3.5-inch large form factor (LFF) or 24x 2.5-inch small form factor (SFF) drives in the controller enclosure; scalable up to 48 LFF drives per system with the attachment of Lenovo Storage E1012 expansion enclosure (12x LFF drives each) or up to 96 SFF drives per system with the attachment of Lenovo Storage E1024 expansion enclosure (24x SFF drives each) to satisfy growing needs for storage capacity and performance.

- Flexibility in storing data on high-performance SAS SSDs, performance-optimized enterprise SAS HDDs, or capacity-optimized enterprise NL SAS HDDs; mixing and matching drive types and form factors within a single system to perfectly meet performance and capacity requirements for various workloads.

- Support for SEDs to allow clients to secure their sensitive data and to comply with various security regulations, when required.

- Rich set of standard functions available at no extra cost, including virtualized storage pools, snapshots, thin provisioning, rapid rebuild, real-time HDD tiering, and SSD read cache.

- Optional licensed functions, including higher number of snapshots for more scalability and real-time SSD tiering for boosting IOPS performance.

- In-chassis upgrade to the S3200 storage system without the need to migrate data or to re-configure attached hosts.

- Intuitive, web-based GUI for easy system set up and management.

- Designed to comply with NEBS and MIL-STD requirements.

- Designed for 99.999% availability.

The S2200 supports the complete range of data storage requirements, from highly used applications to high-capacity, low usage applications.

The following 3.5-inch drives are supported:

- High-performance SSDs: 400 GB

- Performance-optimized, enterprise class disk drives: 600 GB and 900 GB 10 K rpm

- High-capacity, archival-class nearline disk drives: 2 TB, 4 TB, and 6 TB 7.2 K rpm

The following 2.5-inch drives are supported:

- High performance SSDs: 400 GB, 800 GB, and 1.6 TB

- Performance-optimized, enterprise class disk drives:
    - o   300 GB and 600 GB 15 K rpm
    - o   600 GB, 900 GB, and 1.2 TB 10 K rpm

- High-capacity, archival-class nearline disk drives: 1 TB 7.2K rpm

Other drives and expansion units are designed to be dynamically added with virtually no downtime, which helps to quickly and seamlessly respond to ever-growing capacity demands.

The S2200 storage system offers high levels of system and data availability with the following technologies:

- Dual-active RAID controllers with low latency cache mirroring
- Dual-port drives (HDDs and SSDs) with automatic drive failure detection and rapid RAID rebuild with global hot spares
- Redundant hardware, including host ports, controller modules, and power supplies and fans
- Hot-swappable and customer replaceable components, including controllers, power supplies with fans, and drives
- Automated path failover support for the data path between the host and the drives with multipathing software
- Non-disruptive controller firmware upgrades for dual controller configurations with multipathing

The following functions are included with every S2200:

- Intelligent Real-time Tiering for HDDs

  Storage tiering helps optimize storage use with intelligent data placement to improve system performance, reduce costs, and simplify management. S2200 automatically and dynamically moves frequently accessed data to higher performing HDDs in the system without manually creating and managing storage tier policies.

- RAID levels 0, 1, 5, 6, and 10

  Provide the flexibility to choose the level of data protection that is required.

- Virtualized storage pools

  Enables rapid, flexible storage provisioning and simple configuration changes. Stored data is distributed across all drive groups in the pool (wide striping), which helps improve performance, lower latency, and achieve higher volume capacities. When a new drive group is added to the pool, the system performs automatic rebalancing to use all drives in the pool for better performance.

- Thin provisioning

  Optimizes efficiency by allocating drive storage space in a flexible manner among multiple applications that is based on the minimum required space by each application at any specific time. With thin provisioning, applications use only the space they are actually using and not the total space that was allocated to them, which allows clients to purchase storage they need today and add storage as application requirements grow.

- SSD Read Cache

  An extension of the controller's cache to improve performance of read-centric workloads.

- Rapid RAID Rebuild

  Helps significantly decrease the time to recover lost data by rebuilding only the stripe where the corruption occurred, not the empty space or other stripes.

- Snapshots

  Enables creation of copies of data for backup, parallel processing, testing, and development, and have the copies available almost immediately. Base software supports up to 64 snapshot targets per system.

The S2200 storage capabilities can be expanded with optional licensed functions. Each optional S2200 function is licensed on a per-system basis and covers controller enclosure and all attached expansion units.

The following optional licensed functions are available:

- Intelligent Real-time Tiering for SSDs

  The SSD tiering upgrade option makes it easy and economical to deploy hybrid storage by dynamically moving frequently accessed data to SSDs in the system, which results in flash drive performance without manually creating and managing storage tier policies.

- Snapshots upgrade

  The snapshot upgrade options increase the supported number of snapshot targets to 256 or 512 per system.

The S2200 supports the following management interfaces:

- Web-based graphical user interface (GUI) via HTTP that requires only a supported browser (Microsoft Internet Explorer, Google Chrome, or Mozilla Firefox); therefore, there is no need for a separate console or plug-in.
- Command line interface (CLI) via Telnet or SSH or through Direct Connect USB.
- HTTP scripting interface with XML encoding.
- SNMP and email notifications.

Components

The following figure shows the front of the S2200 SFF chassis and E1024 drive expansion enclosure.
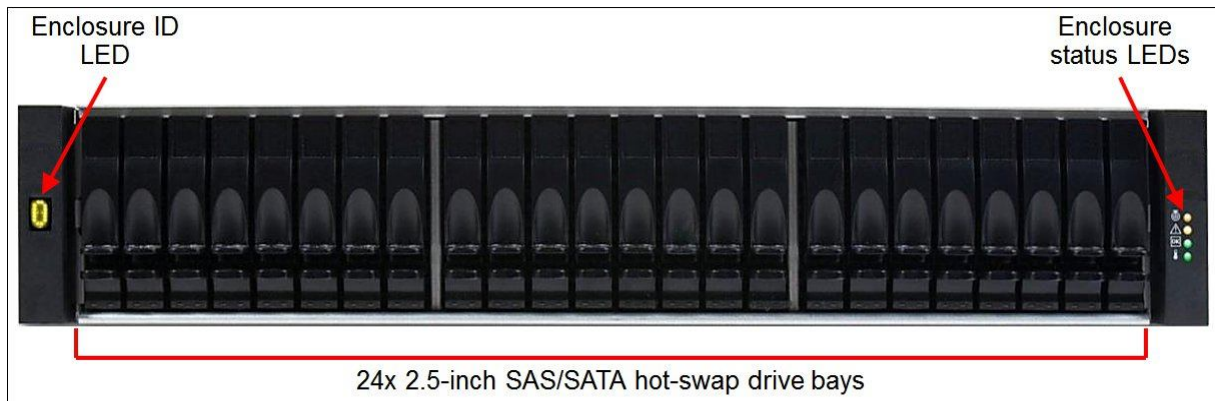

Figure 2. Front view of the S2200 SFF chassis and E1024 drive enclosure

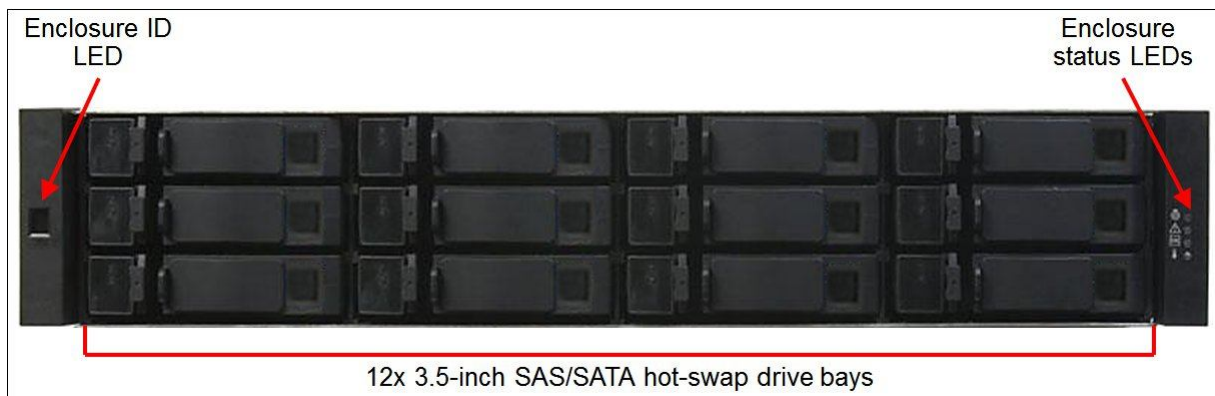The following figure shows the front of the S2200 LFF chassis and E1012 drive expansion enclosure.

Figure 3. Front view of the S2200 LFF chassis and E1012 drive enclosure

The following figure shows the rear of the S2200 with FC or iSCSI host interfaces with dual RAID controllers. Single RAID controller configurations also are supported.
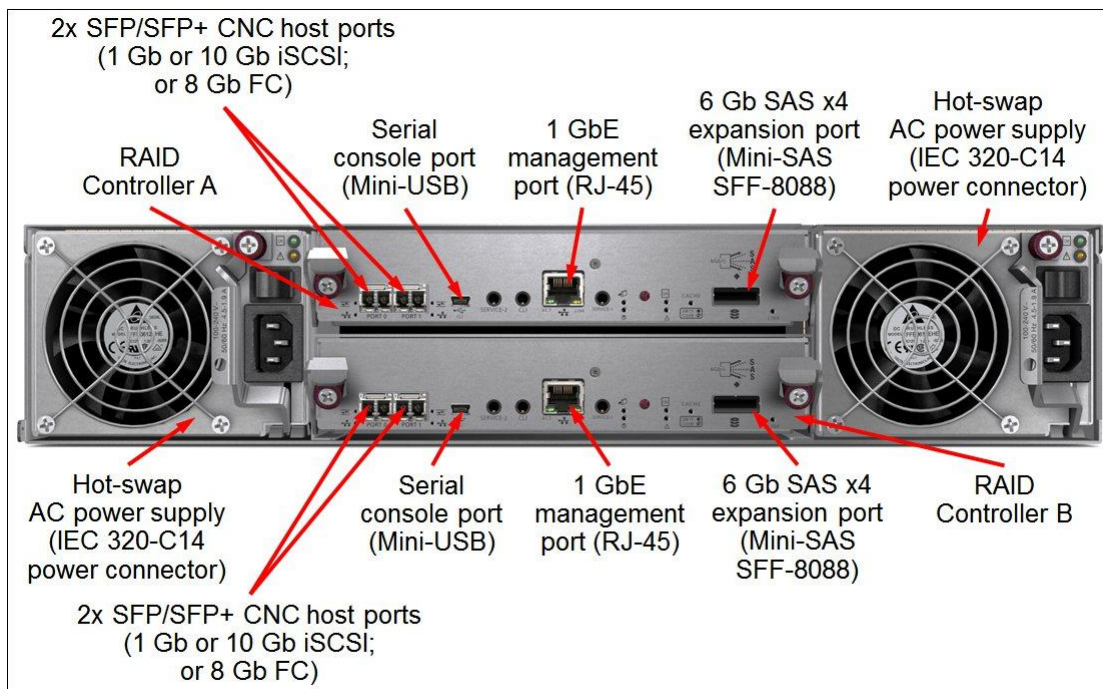

Figure 4. Rear view of the S2200 with FC or iSCSI host interfaces

The following figure shows the rear of the S2200 with SAS host interfaces with dual RAID controllers. Single RAID controller configurations also are supported.
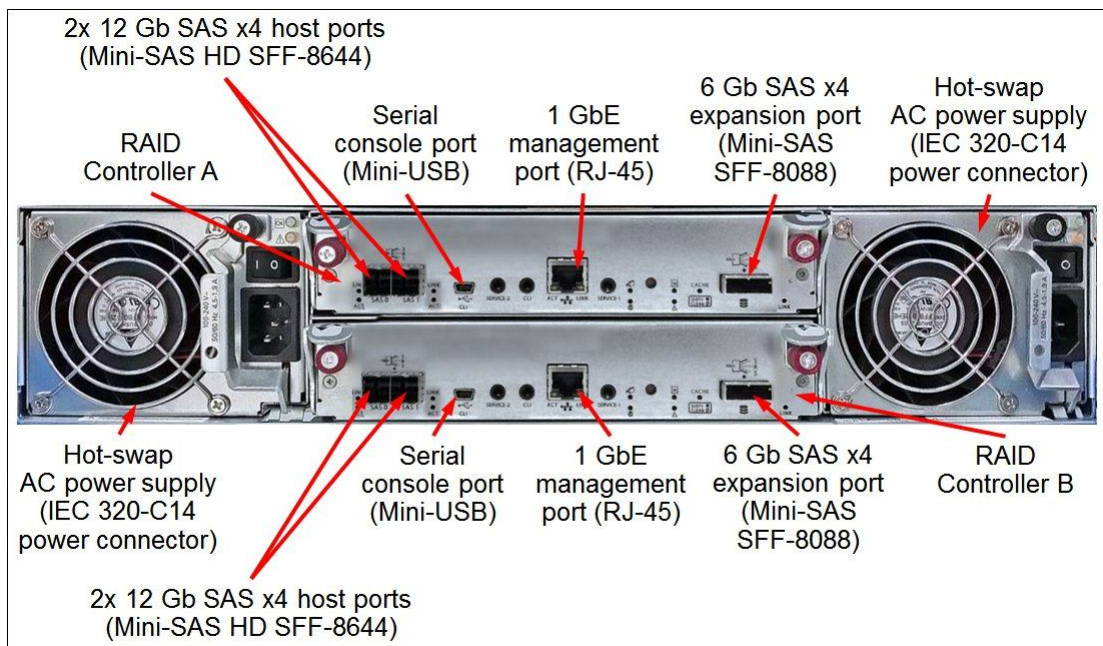

Figure 5. Rear view of the S2200 with SAS host interfaces

The following figure shows the rear of the E1012 and E1024 drive enclosures with dual I/O expansion modules. Single I/O module configurations also are supported with the single-controller S2200.
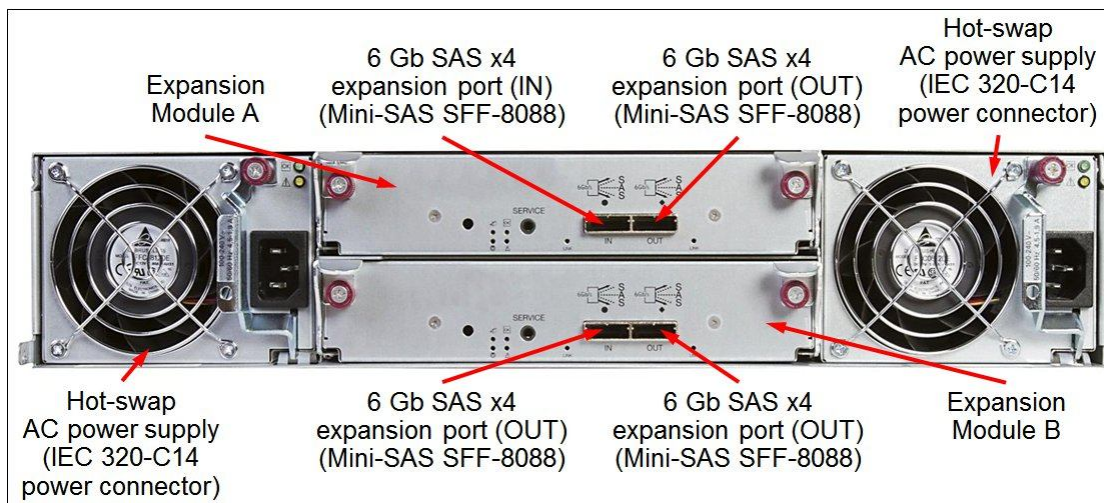

Figure 6. Rear view of the E1012 and E1024 drive enclosures

Note: The RAID controllers (as shown in Figure 4 and Figure 5) and expansion modules (as shown in Figure 6) include extra service ports with a specialized connector. These ports are reserved for use by a Lenovo service technician.

Technical specifications

The following table lists the S2200 storage system technical specifications.

Table 1. Technical specifications (Part 1)

Components	Specification
Form factor	S2200 controller enclosure: 2U rack mount E1012 or E1024 drive expansion enclosure: 2U rack mount
RAID controller configuration	Two types of controllers: ● S2200 SAS controller ● S2200 FC and iSCSI controller Single or dual RAID controller configurations supported. Single controller systems can be upgraded to dual controller non-disruptively. Both controllers in the system must be the same.
RAID levels	RAID 0, 1, 5, 6, and 10
RAID controller cache	6 GB per controller. Battery-free cache protection with flash memory and supercapacitors. Low latency cache mirroring protection for dual controller configurations.
Drive bays	Up to 96 SFF drive bays per system: ● 24 SFF drive bays in the S2200 controller enclosure ● 24 SFF drive bays in the E1024 drive expansion enclosure; up to 3x E1024 enclosures Up to 48 LFF drive bays per system: ● 12 LFF drive bays in the S2200 controller enclosure ● 12 LFF drive bays in the E1012 drive expansion enclosure; up to 3x E1012 enclosures Intermix of SFF and LFF enclosures is supported.
Drive technologies	SAS and NL SAS HDDs and SEDs; eMLC SAS SSDs. Intermix of HDDs and SSDs is supported. Intermix of SEDs with HDDs or SSDs is not supported.

Table 1. Technical specifications (Part 2)

Components	Specification
Drive connectivity	Dual-ported 6 Gb SAS drive attachment infrastructure. Controller enclosure with one or two RAID controllers (ports per one controller): ● 24x 6 Gb SAS internal drive ports (SFF chassis) ● 12x 6 Gb SAS internal drive ports (LFF chassis) ● 1x 6 Gb SAS x4 (Mini-SAS SFF-8088) expansion port for the attachment of the external drive enclosures Drive expansion enclosure with one or two expansion modules (ports per one module): ● 24x 6 Gb SAS internal drive ports (SFF chassis) ● 12x 6 Gb SAS internal drive ports (LFF chassis) ● 2x 6 Gb SAS x4 (Mini-SAS SFF-8088) expansion ports (IN and OUT) for the daisy chained attachment of the external drive enclosures
Drives	SFF drives: ● 400 GB, 800 GB, and 1.6 TB SAS SSDs ● 300 GB and 600 GB 15K rpm SAS HDDs ● 600 GB, 900 GB, and 1.2 TB 10K rpm SAS HDDs ● 1 TB 7.2K rpm NL SAS HDDs LFF drives: ● 400 GB SAS SSDs ● 600 GB and 900 GB 10K rpm SAS HDDs ● 2 TB, 4 TB, and 6 TB 7.2K rpm NL SAS HDDs
Storage capacity	Up to 288 TB (48x 6 TB NL SAS HDDs)
Host connectivity	S2200 SAS controller: 2x 6/12 Gb SAS host ports (Mini-SAS HD, SFF-8644) S2200 FC and iSCSI controller: 2x SFP/SFP+ CNC host ports CNC host port options (per RAID controller): ● 2x 1 Gb iSCSI SFP (1 Gb speed, UTP, RJ-45) ● 2x 10 Gb iSCSI SFP+ (1/10 Gb speeds, SW fiber optics, LC) ● 2x 8 Gb FC SFP+ (4/8 Gb speeds, SW fiber optics, LC) ● 2x 10 Gb iSCSI SFP+ DAC cables
Host operating systems	Microsoft Windows Server 2012 and 2012 R2; Red Hat Enterprise Linux (RHEL) 6 and 7; SUSE Linux Enterprise Server (SLES) 10, 11, and 12; VMware vSphere 5.5 and 6.0.
Standard software features	Intelligent Real-time Tiering for HDDs, Virtualized Storage Pools, Thin Provisioning, SSD Read Cache, Rapid RAID Rebuild, Snapshots (up to 64 targets).
Optional features	Intelligent Real-time Tiering for SSDs, Snapshots (up to 512 targets).
Performance	Dual controller configuration: ● Up to 80,000 random read IOPS (4 KB blocks) ● Up to 3.3 GBps sequential read throughput (512 KB blocks) ● Up to 2.4 GBps sequential write throughput (512 KB blocks)
Configuration maximums	Per system: ● Maximum number of virtual storage pools: 2 (1 per controller) ● Maximum number of logical volumes (total/mapped): 2,048/1,024 ● Maximum logical volume size: 128 TB ● Maximum number of drives in a drive group: 16 ● Maximum number of drive groups: 32 ● Maximum global spares: 16 ● Maximum number of initiators: 8,192 (1,024 per port) ● Maximum number of hosts in a host group: 256 ● Maximum number of host groups: 32 ● Maximum number of initiators per host: 128 ● Maximum number of snapshots: 512 (requires an optional license)

Table 1. Technical specifications (Part 3)

Components	Specification
Cooling	Redundant cooling with two fans that are built into power supplies.
Power supply	Two redundant hot-swap 595 W AC power supplies.
Hot-swap parts	RAID controllers, expansion modules, SFP/SFP+ transceivers, drives, power supplies, and fans.
Management interfaces	Web-based GUI; Telnet, SSH, or Direct Connect USB CLI; HTTP scripting with XML encoding; SNMP and email notifications
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), and SEDs
Warranty	Three-year customer-replaceable unit, parts-only limited warranty with 9x5 next business day.
Service and support	Optional warranty service upgrades are available through Lenovo: on-site support, 24x7 coverage, 4-hour response time, 1-year or 2-year warranty extensions, Hard Drive Retention.
Dimensions	- S2200 LFF and E1012: Height: 87 mm (3.4 in), width: 447 mm (17.6 in), depth: 523 mm (20.6 in) - S2200 SFF and E1024: Height: 89 mm (3.5 in), width: 447 mm (17.6 in), depth: 519 mm (20.5 in)
Weight	- S2200 LFF: Minimum: 17.7 kg (39.0 lb); Maximum: 27.5 kg (60.6 lb) - S2200 SFF: Minimum: 17.8 kg (39.2 lb); Maximum: 24.3 kg (53.6 lb) - E1012: Minimum: 16.8 kg (37.0 lb); Maximum: 26.6 kg (58.6 lb) - E1024: Minimum: 16.9 kg (37.2 lb); Maximum: 23.4 kg (51.6 lb)

Controller enclosures

The following table lists the models of the S2200 chassis.

Table 2. Part numbers and feature codes for ordering S2200 models

Description	Part number	Feature code (MTM 6411-HC1)
Lenovo Storage S2200 LFF Chassis (without RAID controllers)	None*	AT14
Lenovo Storage S2200 SFF Chassis (without RAID controllers)	None*	AT15
Lenovo Storage S2200 LFF Chassis (with two SAS RAID controllers)	64112B2	None
Lenovo Storage S2200 SFF Chassis (with two SAS RAID controllers)	64112B4	None
Lenovo Storage S2200 LFF Chassis (with two FC and iSCSI RAID controllers)	64114B2	None
Lenovo Storage S2200 SFF Chassis (with two FC and iSCSI RAID controllers)	64114B4	None

* CTO or custom models only.

The part number for the S2200 includes the following items:

- One S2200 chassis with two power supplies and fans:
    - o   With two SAS RAID controllers (64112B2, 64112B4) installed
    - o   With two FC and iSCSI RAID controllers (64114B2, 64114B4) installed
- Two 4.3 m, 10 A/100 - 250 V, C13 to IEC 320-C14 Rack Power Cables

- Lenovo Storage SAN Rack Mount Kit: Rails 25-inch to 36-inch

- Lenovo 1.5 m USB console cable (USB to Mini-USB)

- Getting Started Guide

- Warranty Flyer

- Important Notices Flyer

- Documentation CD-ROM

RAID controller modules

The S2200 supports single and dual controller configurations. Standard models of the S2200 ship with two RAID controller modules (for more information, see Table 2). Custom models of the S2200 can be configured with one or two RAID controllers. Single-controller models can be upgraded to dual-controller models non-disruptively.

The following types of RAID controller modules are available:

- S2200 SAS RAID Controllers
- S2200 FC and iSCSI RAID Controllers

S2200 SAS RAID Controllers provide direct SAS attachment for up to two hosts with a supported SAS HBA installed. Each S2200 SAS Controller has two 6/12 Gb SAS ports with Mini-SAS HD (SFF-8644) connectors.

S2200 FC and iSCSI RAID Controllers provide SAN based iSCSI or FC connectivity to the hosts with a supported software initiator or HBA installed. Each S2200 FC and iSCSI Controller has a built-in CNC, which has two SFP/SFP+ ports.

The CNC supports the following storage connectivity protocols, depending on the SFP/SFP+ transceiver installed or DAC cables attached:

- 1 Gb iSCSI with 1 GbE RJ-45 SFP optical modules
- 1/10 Gb iSCSI with 10 GbE SW SFP+ optical modules with LC connectors
- 10 Gb iSCSI with 10 GbE SFP+ DAC cables
- 4/8 Gb Fibre Channel with 8 Gb FC SW SFP+ optical modules with LC connectors

Notes:

- Both ports on the CNC on the S2200 FC and iSCSI RAID Controller must have the same connectivity type (the same type of SFP/SFP+ modules or DAC cables).

- For dual-controller configurations, both RAID controllers in the system must be of the same type and they must have matching port configurations (that is, the ports on both S2200 RAID controllers must have SFP/SFP+ modules of the same type).

Both SAS controllers and FC and iSCSI controllers have one 6 Gb SAS x4 expansion port (Mini-SAS SFF-8088 connector) for the attachment of the E1012 and E1024 expansion enclosures.

The following table lists ordering information for the RAID controllers and related connectivity options.

Table 3. RAID controllers and connectivity options

Description	Part number	Feature code (MTM 6411-HC1)	Maximum qty per one S2200
RAID controller modules			
Lenovo Storage S2200 FC and iSCSI Controller	00WC081	AT25	2
Lenovo Storage S2200 SAS Controller	00WC082	AT26	2
FC and iSCSI controller host connectivity options			
Lenovo Storage S2200/S3200 1G RJ45 iSCSI SFP+ Module 1 pack	00WC086	AT2C	4*
Lenovo Storage S2200/S3200 10G SW Optical iSCSI SFP+ Module 1 pack	00WC087	AT2A	4*
Lenovo Storage S2200/S3200 8G Fibre Channel SFP+ Module 1 pack	00WC088	AT28	4*
Cable options for FC and optical iSCSI host connectivity			
Lenovo 1m LC-LC OM3 MMF Cable	00MN502	ASR6	4**
Lenovo 3m LC-LC OM3 MMF Cable	00MN505	ASR7	4**
Lenovo 5m LC-LC OM3 MMF Cable	00MN508	ASR8	4**
Lenovo 10m LC-LC OM3 MMF Cable	00MN511	ASR9	4**
Lenovo 25m LC-LC OM3 MMF Cable	00MN517	ASRB	4**
DAC cable options for 10 Gb iSCSI host connectivity			
Lenovo 1m Passive SFP+ DAC Cable	90Y9427	A1PH	4**
Lenovo 2m Passive SFP+ DAC Cable	00AY765	A51P	4**
Lenovo 3m Passive SFP+ DAC Cable	90Y9430	A1PJ	4**
SAS host connectivity cables - Mini-SAS HD (controller) to Mini-SAS (host)			
1.5m HD-miniSAS to miniSAS SAS Cable	00D5224	A3HX	4**
3m HD-miniSAS to miniSAS SAS Cable	00D5226	A3HY	4**
SAS host connectivity cables - Mini-SAS HD (controller) to Mini-SAS HD (host)			
External MiniSAS HD 8644/MiniSAS HD 8644 1m cable	00WE748	AT1D	4**
External MiniSAS HD 8644/MiniSAS HD 8644 2m cable	00WE749	AT1E	4**
Cable options for 1 Gb iSCSI and Ethernet management ports			
Lenovo Ethernet CAT5E shielded 6m cable	00WE747	AT1G	6***
Spare cables for serial management ports			
Lenovo USB A Male-to-Mini-B 1.5m cable	00WE746	AT1F	1

* Up to two SFP/SFP+ modules per controller; the modules must be of the same type.
** Up to two cables per controller.
*** Up to three cables per controller: one cable for 1 GbE management port connection; up to two cables for CNC port connections with 1G RJ45 modules attached.

The S2200 can be upgraded to Lenovo Storage S3200 functionality by replacing the S2200 controllers with the S3200 controllers during a planned offline maintenance window without the need to migrate or move data and re-configure the attached hosts. The new S3200 controller recognizes the array configuration and preserves the controller's host port parameters, such as FC World Wide Names (WWNs) or iSCSI Qualified Names (IQNs).

For more information about the S3200 storage, including features, capabilities, and ordering information for the S3200 controllers and other S3200 options, see the following Lenovo Storage S3200 Product Guide:
http://lenovopress.com/tips1299

Expansion enclosures

The S2200 supports attachment of up to three Lenovo Storage E1012 or E1024 expansion enclosures. Intermix of E1012 and E1024 is supported. The enclosures can be added to the system non-disruptively.

The following table lists the models of the E1012 and E1024 expansion enclosure models.

Table 4. Part numbers and feature codes for ordering E1012 and E1024 models

Description	Part number	Feature code (MTM 6411-HC3)
Lenovo Storage E1012 LFF Disk Expansion (without expansion modules)	None*	AT18
Lenovo Storage E1024 SFF Disk Expansion (without expansion modules)	None*	AT19
Lenovo Storage E1012 LFF Disk Expansion (with two expansion modules)	64111B2	None
Lenovo Storage E1024 SFF Disk Expansion (with two expansion modules)	64111B4	None

* CTO or custom models only

The part number for the E1012 or E1024 includes the following items:

● One E1012 or E1024 chassis with two power supplies and fans and with two expansion modules installed
● Two 4. 3m, 1 0A/100 - 250 V, C13 to IEC 320-C14 Rack Power Cables
● Lenovo Storage SAN Rack Mount Kit: Rails 25-inch to 36-inch
● Getting Started Guide
● Warranty Flyer
● Important Notices Flyer
● Documentation CD-ROM

The E1012 and E1024 support single and dual expansion module configurations. Standard models of the E1012 and E1024 ship with two expansion modules (for more information, see Table 4). Custom models of the E1012 and E1024 can be configured with one or two expansion modules. Single module configurations can be upgraded to dual module configurations non-disruptively. The number of expansion modules in the E1012 or E1024 must match the number of RAID controllers in the S2200.

Each expansion module has two 6 Gb SAS x4 ports (Mini-SAS SFF-8088 connectors) that are labelled IN and OUT. These ports are used for connections to the S2000 and for daisy chaining the E1012 and E1024 enclosures between each other. The expansion port on the S2200 controller is connected to the IN port on the expansion module. The OUT port on the expansion module is connected to the IN port on the expansion module in the adjacent enclosure, and so on.

The expansion connectivity topology for dual controller configurations is shown in the following figure. For single controller configurations, only Controller A path is present.
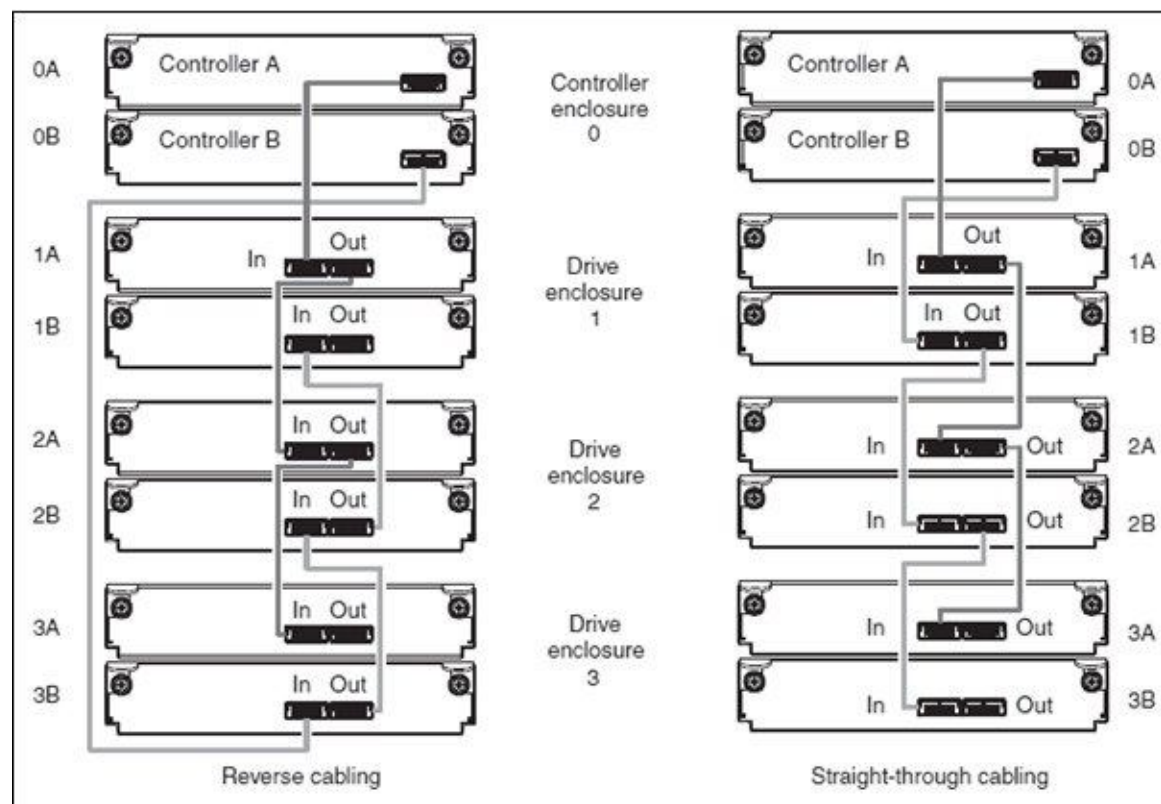

Figure 7. Expansion connectivity topology

The following table lists the ordering information for the expansion modules and related connectivity options.

Table 5. Expansion modules and connectivity options

Description	Part number	Feature code (MTM 6411-HC3)	Maximum qty per one E1012 or E1024
Expansion modules			
Lenovo Storage Expansion SAS IO Module	00WC085	AT27	2
SAS expansion connectivity cables			
External MiniSAS 8088/MiniSAS 8088 1m cable	00WE755	AT1B	2*
External MiniSAS 8088/MiniSAS 8088 0.6m cable	00WE754	AT1A	2*
External MiniSAS 8088/MiniSAS 8088 2m cable	00WE756	AT1C	2*

* One cable per SAS expansion module

Drive options

The S2200 LFF chassis and the E1012 expansion enclosure support up to 12 LFF hot-swap drives. The S2200 SFF chassis and the E1024 expansion enclosure support up to 24 SFF hot-swap drives.

The following table lists drive options for the S2200 LFF chassis and the E1012 expansion enclosure.

Table 6. LFF drive options

Description	Part number	Feature code (MTM 6411-HC1, 6411-HC3)	Maximum qty per one S2200 LFF or E1012
3.5-inch SAS hot-swap HDDs			
Lenovo Storage 3.5" 600GB 10K SAS HDD (2.5" in 3.5")	00WC040	AT21	12
Lenovo Storage 3.5" 900GB 10K SAS HDD (2.5" in 3.5")	00WC035	AT1Z	12
3.5-inch NL SAS hot-swap HDDs			
Lenovo Storage 3.5" 2TB 7.2k NL-SAS HDD	00MM735	AT1V	12
Lenovo Storage 3.5" 4TB 7.2k NL-SAS HDD	00MM730	AT1W	12
Lenovo Storage 3.5" 6TB 7.2k NL-SAS HDD	00MM725	AT1Y	12
3.5-inch NL SAS hot-swap SEDs			
Lenovo Storage 3.5" 4TB 7.2k NL-SAS HDD (SED)	00WC025	AT1X	12
3.5-inch SAS hot-swap SSDs			
Lenovo Storage 3.5" 400GB SSD SAS (2.5" in 3.5")	00WC030	AT20	12

The following table lists drive options for the S2200 SFF chassis and the E1024 expansion enclosure.

Table 7. LFF drive options

Description	Part number	Feature code (MTM 6411-HC1, 6411-HC3)	Maximum qty per one S2200 SFF or E1024
2.5-inch SAS hot-swap HDDs			
Lenovo Storage 2.5" 300GB 15k SAS HDD	00MM685	AT1H	24
Lenovo Storage 2.5" 600GB 10k SAS HDD	00MM700	AT1K	24
Lenovo Storage 2.5" 600GB 15k SAS HDD	00MM680	AT1J	24
Lenovo Storage 2.5" 900GB 10k SAS HDD	00MM695	AT1M	24
Lenovo Storage 2.5" 1.2TB 10k SAS HDD	00MM690	AT1P	24
2.5-inch SAS hot-swap SEDs			
Lenovo Storage 2.5" 600GB 10k SAS HDD (SED)	00WC020	AT1L	24
Lenovo Storage 2.5" 900GB 10k SAS HDD (SED)	00MM745	AT1N	24
Lenovo Storage 2.5" 1.2TB 10k SAS HDD (SED)	00MM740	AT1Q	24
2.5-inch NL SAS hot-swap HDDs			
Lenovo Storage 2.5" 1TB 7.2k NL- SAS HDD	00MM705	AT1R	24
2.5-inch SAS hot-swap SSDs			
Lenovo Storage 2.5" 400GB SSD (SAS)	00MM720	AT1S	24
Lenovo Storage 2.5" 800GB SSD (SAS)	00MM715	AT1T	24
Lenovo Storage 2.5" 1.6TB SSD (SAS)	00MM710	AT1U	24

Software options

The S2200 comes standard with the following software features:

- Intelligent Real-time Tiering for HDDs
- Virtualized Storage Pools
- Thin Provisioning
- SSD Read Cache
- Rapid RAID Rebuild
- Snapshots: up to 64 targets.

The functionality of the S2200 can be expanded with the following optional software features:

- Intelligent Real-time Tiering for SSDs
- Snapshots: up to 256 targets.
- Snapshots: up to 512 targets

The following table lists ordering information for optional software features.

Table 8. Optional software features

Description	Part number	Feature code (MTM 6411-HC1)	Maximum qty per one S2200
Lenovo Storage S2200 256 Snapshot Upgrade	00WE760	AT2D	1
Lenovo Storage S2200/S3200 512 Snapshot Upgrade	00WE761	AT2E	1
Lenovo Storage SSD Data Tiering Upgrade	00WE764	AT2J	1

Power cables

The S2200, E1012, and E1024 ship standard with two 4.3 m, 10 A/100 - 250 V, C13 to IEC 320-C14 Rack Power Cables. Other power cable options are also available. The part numbers and feature codes to order them (two power cables are required per each S2200, E1012, and E1024) are listed in the following table.

Table 9. Part numbers and feature codes for ordering power cables (Part 1)

Description	Part number	Feature code (MTM 6411-HC1, 6411-HC3)
Rack power cables		
1.2m, 10A/100-250V, 2 Short C13s to Short C14 Rack Power Cable	47C2487	A3SS
1.2m, 16A/100-250V, 2 Short C13s to Short C20 Rack Power Cable	47C2491	A3SW
1.5m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7937	6201
2.5m, 10A/100-250V, 2 Long C13s to Short C14 Rack Power Cable	47C2488	A3ST
2.5m, 16A/100-250V, 2 Long C13s to Short C20 Rack Power Cable	47C2492	A3SX
2.8m, 10A/100-250V, 2 Short C13s to Long C14 Rack Power Cable	47C2489	A3SU
2.8m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	None*	6311
2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable	39Y7938	6204
2.8m, 16A/100-250V, 2 Short C13s to Long C20 Rack Power Cable	47C2493	A3SY
4.1m, 10A/100-250V, 2 Long C13s to Long C14 Rack Power Cable	47C2490	A3SV
4.1m, 16A/100-250V, 2 Long C13s to Long C20 Rack Power Cable	47C2494	A3SZ
4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable	39Y7932	6263

Table 9. Part numbers and feature codes for ordering power cables (Part 2)

Description	Part number	Feature code (MTM 6411-HC1, 6411-HC3)
Country-specific power cords		
10A/125V C13 to NEMA 5-15P 4.3m line cord	39Y7931	6207
10A/250V C13 to NEMA 6-15P 2.8m line cord	46M2592	A1RF
Argentina 10A/250V C13 to IRAM 2073 2.8m line cord	39Y7930	6222
Australia/NZ 10A/250V C13 to AS/NZ 3112 2.8m line cord	39Y7924	6211
Brazil 10A/250V C13 to NBR 14136 2.8m line cord	69Y1988	6532
China 10A/250V C13 to GB 2099.1 2.8m line cord	39Y7928	6210
Denmark 10A/250V C13 to DK2-5a 2.8m line cord	39Y7918	6213
European 10A/230V C13 to CEE7-VII 2.8m line cord	39Y7917	6212
India 10A/250V C13 to IS 6538 2.8m line cord	39Y7927	6269
Israel 10A/250V C13 to SI 32 2.8m line cord	39Y7920	6218
Italy 10A/250V C13 to CEI 23-16 2.8m line cord	39Y7921	6217
Japan 10A/100V C13 to JIS C-8303 2.8m line cord	46M2593	A1RE
Korea 12A/250V C13 to KETI 2.8m line cord	39Y7925	6219
South Africa 10A/250V C13 to SABS 164 2.8m line cord	39Y7922	6214
Switzerland 10A/250V C13 to SEV 1011-S24507 2.8m line cord	39Y7919	6216
Taiwan 15A/125V C13/CNS 10917 2.8m line cord	00CG267	6402
United Kingdom 10A/250V C13 to BS 1363/A 2.8m line cord	39Y7923	6215

Operating environment

The S2200, E1012, and E1024 are supported in the following environment:

- Air temperature:
  - Operating: 5 °C - 40 °C (41 °F - 104 °F); decrease the maximum ambient temperature by 3.3 °C for every 1,000 m (3,280 ft)
  - Storage: -10 °C - +60 °C (14 °F - 140 °F)
  - Maximum altitude: 3,000 m (9,842 ft)
- Humidity:
  - Operating: 8% - 85% (non-condensing)
  - Storage: 5% - 90% (non-condensing)
- Electrical: 100 to 240 (nominal) V AC; 50 Hz - 60 Hz
- BTU output: 1488 Btu/hr (436 W)
- Noise level: 6.8 bels

Warranty options

The S2200 includes a three-year parts-only warranty with 9x5/next business day (NBD) terms. Lenovo offers the service upgrades through warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

Lenovo warranty service upgrade offerings are country-specific; that is, each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of warranty service upgrades might be available in a particular country or area. For more information about Lenovo warranty service upgrade offerings that are available in your country, see the Lenovo Services Product Selector that is available at this website:

https://www-304.ibm.com/sales/gss/download/spst/servicepac

Warranty service definitions for the S2200 system are listed in the following table.

Table 10. Warranty service definitions

Term	Description
On-site service	A service technician will arrive at the client's location for equipment service.
24x7x4 hour	A service technician is scheduled to arrive at the client's location within four hours after remote problem determination is completed. Lenovo provides service around the clock, every day, including Lenovo holidays.
9x5x4 hour	A service technician is scheduled to arrive at the client's location within four business hours after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday-Friday, excluding Lenovo holidays. For example, if a customer reports an incident at 3:00 pm on Friday, the technician arrives by 10:00 am the following Monday.
9x5 next business day	A service technician is scheduled to arrive at the client's location on the business day after remote problem determination is completed. Lenovo provides service 8:00 am - 5:00 pm in the client's local time zone, Monday - Friday, excluding Lenovo holidays. Calls received after 4:00 pm local time require an extra business day for service dispatch. Next business day service is not guaranteed.

In general, the following types of Lenovo warranty service upgrades for the S2200 are available:

● Warranty and maintenance service upgrades:

  o Onsite support for 9x5 NBD coverage
  o 4-hour target response time with onsite, 9x5 or 24x7 service coverage
  o Up to five years of warranty extension for all service levels in one or two year increments

● Hard Drive Retention

  Lenovo's Hard Drive Retention service is a multi-drive hard drive retention offering that ensures your data is always under your control, regardless of the number of hard drives that are installed in your Lenovo system. In the unlikely event of a hard drive failure, you retain possession of your hard drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The Hard Drive Retention service can be purchased in convenient bundles with our warranty upgrades and extensions.

Regulatory compliance

The S2200 conforms to the following regulations:

- UL 60950-1, 2nd Edition, 2007-03-27 (USA)
- CAN/CSA-C22.2 No 60950-1-07, 2nd Edition, 2007-03 (Canada)
- IEC 60950-1:2005 (2nd Edition); Am 1:2009
- EN 60950-1:2005, 2nd Edition, AM1 2009 (EU)
- CFR 47 Part 15 Subpart B Class A (USA FCC)
- ICES-003:2012, Class A (Canada)
- EN 55022: 2010 Class A (EU)
- EN 55024: 2010 (EU)
- ASNZS CISPR 22 -2009 Class A
- CNS 14338 (2006)
- KN22 Class A
- VCCI Technical Requirements 2012 Class A
- RoHS Directive 2011/65/EU
- EAC
- NOM
- UL, BMSI, CCC

Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The S2200 supports attachment to Lenovo System x®, ThinkServer®, and Flex System™ hosts by using SAS, iSCSI, Fibre Channel, or Fibre Channel over Ethernet (FCoE) (via the FCoE gateway) storage connectivity protocols.

SAS interoperability

The System x and ThinkServer SAS adapters that are listed in the following table are compatible with the S2200 SAS storage (direct attach).

Table 11. S2200 SAS adapter interoperability

Description	Part number
System x servers	
N2125 SAS/SATA HBA	46C9010
N2225 SAS/SATA HBA	00AE912
N2226 SAS/SATA HBA	00AE916
ThinkServer servers	
Lenovo ThinkServer 9300-8e PCIe 12Gb 8 Port External SAS Adapter by LSI	4XB0F28703

iSCSI interoperability

The S2200 supports iSCSI attachments via standard 1 Gb or 10 Gb Ethernet network. Any compatible Ethernet switch, including Lenovo RackSwitch™ top of rack (TOR) switches and integrated Flex System Ethernet I/O modules, can be used to provide iSCSI connectivity with the S2200 iSCSI storage.

With software iSCSI initiators, any supported 1 Gb Ethernet or 10 Gb Ethernet adapter for System x, ThinkServer, and Flex System is compatible with the S2200 iSCSI storage. For more information about hardware iSCSI initiators (iSCSI HBAs), see the S2200 support page on the Lenovo support web site (http://support.lenovo.com) or ask a Lenovo representative.

Fibre Channel interoperability

The S2200 supports FC direct attachments and FC switch based attachments. Brocade and QLogic SAN switches can be used to provide FC connectivity with the S2200 FC storage.

The System x, ThinkServer, and Flex System FC adapters that are listed in the following table are compatible with the S2200 FC storage.

Table 12. S2200 FC adapter interoperability (Part 1)

Description	Part number
System x - 16 Gb FC	
Brocade 16Gb FC Dual-port HBA	81Y1675
Brocade 16Gb FC Single-port HBA	81Y1668
Emulex 16Gb FC Dual-port HBA	81Y1662
Emulex 16Gb FC Single-port HBA	81Y1655
QLogic 16Gb FC Single-port HBA	00Y3337
QLogic 16Gb FC Dual-port HBA	00Y3341

Table 12. S2200 FC adapter interoperability (Part 2)

Description	Part number
System x - 8 Gb FC	
Brocade 8Gb FC Dual-port HBA	46M6050
Brocade 8Gb FC Single-port HBA	46M6049
Emulex 8Gb FC Dual-port HBA	42D0494
Emulex 8Gb FC Single-port HBA	42D0485
QLogic 8Gb FC Dual-port HBA	42D0510
QLogic 8Gb FC Single-port HBA	42D0501
ThinkServer - 16 Gb FC	
ThinkServer QLE2672 PCIe 16Gb 2 Port FC Adapter by Qlogic	4XC0F28745
ThinkServer LPe16000B Single Port 16Gb FC HBA by Emulex	4XB0F28653
ThinkServer LPe16002B Dual Port 16Gb Fiber Channel HBA by Emulex	4XB0F28650
ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port FC HBA by Emulex	4XB0F28705
ThinkServer LPe16004B-M6-L PCIe 16Gb 4 Port FC HBA by Emulex	4XB0F28681
ThinkServer LPm16002-M6-L AnyFabric 16Gb 2 Port FC HBA by Emulex	4XB0F28706
ThinkServer - 8 Gb FC	
ThinkServer QLE2562 Dual Port 8Gb Fibre Channel HBA by Qlogic	0C19482
ThinkServer LPe16002B-M8-L PCIe 8Gb 2 Port FC HBA by Emulex	4XB0F28704
ThinkServer LPe15004B-M8-L PCIe 8Gb 4 Port FC HBA by Emulex	4XB0F28682
ThinkServer LPm15004-M8-L AnyFabric 8Gb 4 Port FC HBA by Emulex	4XB0F28707
Flex System - 16 Gb FC	
Flex System FC5052 2-port 16Gb FC Adapter	95Y2386
Flex System FC5172 2-port 16Gb FC Adapter	69Y1942
Flex System - 8 Gb FC	
Flex System FC3052 2-port 8Gb FC Adapter	95Y2375
Flex System FC3172 2-port 8Gb FC Adapter	69Y1938

Operating systems

The S2200 supports host attachments with the following host operating systems:

- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2012 R2 (Hyper-V + NPV)
- Microsoft Windows Server 2012
- Red Hat Enterprise Linux 7
- Red Hat Enterprise Linux 6 (Update 6)
- SUSE Linux Enterprise Server 12
- SUSE Linux Enterprise Server 11 (SP3)
- SUSE Linux Enterprise Server 10 (SP4)
- VMware vSphere 6.0
- VMware vSphere 5.5

Other configurations might be supported; for more information, see the S2200 support page on the Lenovo support web site (http://support.lenovo.com) or ask a Lenovo representative.

Networking switches

The following table lists the Ethernet and Fibre Channel rack mount switches that are offered by Lenovo that can be used in S2200 storage solutions.

Table 13. Ethernet and Fibre Channel rack mount switches

Description	Part number
1 Gb Ethernet	
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet	
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6
Converged 10 GbE and 8 Gb FC (FCoE gateways)	
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
8 Gb Fibre Channel	
Brocade 300 FC SAN Switch	3873AR1
16 Gb Fibre Channel	
Brocade 6505 FC SAN Switch	3873AR2
Brocade 6510 FC SAN Switch	3873BR1

The following table lists the Ethernet and Fibre Channel integrated switches for Flex System that can be used in S2200 storage solutions.

Table 14. Ethernet and Fibre Channel integrated switches for Flex System

Description	Part number
10 Gb Ethernet	
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch	00FM514
Cisco Nexus B22 Fabric Extender for Flex System*	94Y5350
Cisco Nexus B22 Fabric Extender with FET bundle for Flex System*	94Y5355
Converged 10 GbE and 8 Gb FC (FCoE gateways)	
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510
Converged 10 GbE and 16 Gb FC (FCoE gateways)	
Flex System EN4023 10Gb Scalable Switch	94Y5212
16 Gb Fibre Channel	
Flex System FC5022 16 Gb SAN Scalable Switch	88Y6374
Flex System FC5022 24-port 16 Gb SAN Scalable Switch (includes two 16 Gb SFPs)	00Y3324
Flex System FC5022 24-port 16 Gb ESB SAN Scalable Switch	90Y9356

* Requires a supported Cisco Nexus top of rack switch

Rack cabinets

The following table lists the rack cabinets that are offered by Lenovo that can be used in S2200 storage solutions.

Table 15. Rack cabinets

Description	Part number
11U Office Enablement Kit	201886X
25U Standard Rack	93072RX
25U Static S2 Standard Rack	93072PX
42U 1100mm Dynamic Expansion Rack	93634EX
42U 1100mm Dynamic Rack	93634PX
42U 1200mm Deep Dynamic Expansion Rack	93604EX
42U 1200mm Deep Dynamic Rack	93604PX
42U 1200mm Deep Static Expansion Rack	93614EX
42U 1200mm Deep Static Rack	93614PX
42U Enterprise Expansion Rack	93084EX
42U Enterprise Rack	93084PX
42U Standard Rack	93074RX
42U Standard Rack Extension	93074XX
47U 1200mm Deep Static Expansion Rack	93624EX
47U 1200mm Deep Static Rack	93624PX
PureFlex System 42U Expansion Rack	93634BX
PureFlex System 42U Expansion Rack	93634DX
PureFlex System 42U Rack	93634AX
PureFlex System 42U Rack	93634CX

For more information, see the list of Product Guides in the Rack cabinets and options category at this website:
http://lenovopress.com/systemx/rack

Power distribution units

The following table lists the the power distribution units (PDUs) that are offered by Lenovo that can be used in S2200 storage solutions.

Table 16. Power distribution units (Part 1)

Description	Part number
Switched and Monitored PDUs	
1U 9 C19/3 C13 Active Energy Manager DPI PDU	46M4002
1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU	46M4003
1U 12 C13 Active Energy Manager DPI PDU	46M4004
1U 12 C13 Active Energy Manager 60A 3 Phase PDU	46M4005
1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU	46M4167
0U 24 C13 Switched and Monitored 30A PDU	46M4116
0U 24 C13 Switched and Monitored 32A PDU	46M4119
0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU	46M4134
0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU	46M4137
Enterprise PDUs	
Ultra Density Enterprise PDU C19 PDU+ (WW)	71762MX
Ultra Density Enterprise PDU C19 PDU (WW)	71762NX
Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)	71763MU
Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)	71763NU
DPI C13 Enterprise PDU without linecord	39M2816
DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed line cord	39Y8923
DPI Single Phase C13 Enterprise PDU without line cord	39Y8941
DPI Single Phase C19 Enterprise PDU without line cord	39Y8948
Front-end PDUs	
DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector	39Y8934
DPI 63amp/250 V Front-end PDU with IEC 309 2P+Gnd connector	39Y8935
30 amp/125 V Front-end PDU with NEMA L5-30P connector	39Y8938
30 amp/250 V Front-end PDU with NEMA L6-30P connector	39Y8939
60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector	39Y8940

Table 16. Power distribution units (Part 2)

Description	Part number
Universal PDUs	
DPI Universal Rack PDU with US LV and HV line cords	39Y8951
DPI Universal Rack PDU with CEE7-VII Europe LC	39Y8952
DPI Universal Rack PDU with Denmark LC	39Y8953
DPI Universal Rack PDU with Israel LC	39Y8954
DPI Universal Rack PDU with Italy LC	39Y8955
DPI Universal Rack PDU with South Africa LC	39Y8956
DPI Universal Rack PDU with UK LC	39Y8957
DPI Universal Rack PDU with AS/NZ LC	39Y8958
DPI Universal Rack PDU with China LC	39Y8959
DPI Universal Rack PDU (Argentina)	39Y8962
DPI Universal Rack PDU (Brazil)	39Y8960
DPI Universal Rack PDU (India)	39Y8961
0U Basic PDUs	
0U 24 C13 16A 3 Phase PDU	46M4122
0U 24 C13 30A 3 Phase PDU	46M4125
0U 24 C13 30A PDU	46M4128
0U 24 C13 32A PDU	46M4131
0U 12 C19/12 C13 60A 3 Phase PDU	46M4140
0U 12 C19/12 C13 32A 3 Phase PDU	46M4143

For more information, see the list of Product Guides in the Power infrastructure category at this website:
http://lenovopress.com/systemx/power

Uninterruptible power supply units

The following table list the uninterruptible power supply (UPS) units that are offered by Lenovo that can be used in S2200 storage solutions.

Table 17. Uninterruptible power supply units

Description	Part number
RT1.5kVA 2U Rack or Tower UPS (100-125VAC)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)	55949PX

For more information, see the list of Product Guides in the Power infrastructure category at this website:
http://lenovopress.com/systemx/power

Lenovo Financial Services

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For your region specific offers, ask your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:
http://www.lenovo.com/services_warranty/us/en/financial_services.html

Related publications and links

For more information, see the following resources:

- Lenovo Storage S2200 product page:
  http://www.lenovo.com/systems/storage

- Standalone Solutions Configuration Tool:
  http://ibm.com/support/entry/portal/docdisplay?lndocid=MIGR-62168

- Lenovo Storage S2200 support:
  http://support.lenovo.com

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