

Lenovo Storage V5030 Product Guide (withdrawn product)

Lenovo Storage V5030 (Machine Type 6536) is a highly flexible, easy to use virtualized storage system that enables midsize organizations to meet the challenges of rapid data growth and limited IT budgets. By using IBM Spectrum Virtualize software functions, interoperability, and management tools, Lenovo Storage V5030 enables organizations to consolidate and provide new capabilities to their infrastructures.

Lenovo Storage V5030 control enclosure models include two node canisters, each with 16 GB cache upgradeable to 32 GB per canister for a system total of 64 GB cache. 1/10 Gb iSCSI connectivity is standard, with an option for additional 1 Gb iSCSI, 12 Gb SAS, 16 Gb Fibre Channel (FC), 10 Gb iSCSI or Fibre Channel over Ethernet (FCoE), or 25 Gb iSCSI connectivity.

A Lenovo Storage V5030 system scales up to 504 drives with the attachment of up to 20 Lenovo Storage V5030 expansion enclosures. It also offers flexible drive configurations with the choice of 2.5-inch and 3.5-inch form factors, 10 K or 15 K rpm SAS and 7.2 K rpm NL SAS hard disk drives (HDDs), and SAS flash drives (solid-state drives [SSDs]).

The Lenovo Storage V5030 SFF and LFF enclosure are shown in the following figure.



Figure 1. Lenovo Storage V5030 SFF (top) and LFF (bottom) enclosures

Did you know?

A single Lenovo Storage V5030 system can be scaled up to 7.74 PB of raw storage capacity. With external virtualization, the system can manage up to 32 PB in total.

Lenovo Storage V5030 offers hybrid block storage connectivity with support for 10 Gb iSCSI and 12 Gb SAS, 1 Gb iSCSI, 10 Gb iSCSI or FCoE, 25 GbE iSCSI, or 16 Gb FC at the same time.

Two Lenovo Storage V5030 systems can be clustered to help deliver greater performance, bandwidth, and scalability with up to 1,008 drives.

Lenovo Storage V5030 includes 3-year or 5-year software subscription and support (model dependent).

Key features

The Lenovo Storage V5030 storage system provides the following features:

- Scalable enterprise storage with a dual active/active intelligent array node canisters with up to 32 GB cache each for high availability and performance.
- Flexible host connectivity to match diverse client needs with support for a mix of 10 Gb iSCSI and 12 Gb SAS, 1 Gb iSCSI, 10 Gb iSCSI or FCoE, 25 Gb iSCSI, or 16 Gb FC connectivity at the same time.
- A 12 Gb SAS drive-side connectivity with support for 12x 3.5-inch LFF or 24x 2.5-inch SFF drives in the control enclosure, scalable up to 252 LFF drives per system with the attachment of Lenovo Storage V5030 LFF Expansion Enclosure (12x LFF drives each) or up to 504 SFF drives per system with the attachment of Lenovo Storage V5030 SFF Expansion Enclosure (24x SFF drives each) to satisfy growing needs for storage capacity and performance.
- With two-way clustering, the size of the system can be doubled to a maximum of 1,008 drives.
- Further scalability can be achieved with virtualization of external storage. When Lenovo Storage V5030 virtualizes an external disk system, capacity in the external system inherits the functional richness and ease of use of Lenovo Storage V5030.
- Flexibility in storing data on high-performance SAS SSDs, performance-optimized enterprise SAS hard disk drives (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.
- Lenovo Storage V5030 combines various Spectrum Virtualize technologies, including thin provisioning, data reduction pools, deduplication, automated tiering, external and internal storage virtualization, clustering, encryption, compression, replication, and multiprotocol support.
- VMware vSphere Virtual Volumes (VVol) integration brings advanced storage management functions to the virtual machine level for finer VM storage service level control and policy-driven automation.

Note: VVol integration feature requires Spectrum Connect that can be downloaded from <http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/v5030/6536/downloads>

- Intuitive, web-based next-generation GUI for easy system set up and management.
- Extensive interoperability with support for most major server platforms and operating systems.
- Lenovo Storage V Series systems that are based on Spectrum Virtualize software provide five 9's (99.999%) availability which means an average annual downtime of less than five minutes.

The Lenovo Storage V5030 supports the complete range of data storage requirements, from highly used applications to high-capacity, low usage applications.

The following 2.5-inch drives are supported:

- High-performance SSDs: 400 GB, 800 GB, 1.6 TB, and 3.2 TB SAS
- Read-optimized SSDs: 1.92 TB, 3.84 TB, 7.68 TB, and 15.36 TB SAS
- Performance-optimized, enterprise class disk drives:
 - 300 GB, 600 GB, and 900 GB 15K rpm SAS
 - 900 GB, 1.2 TB, 1.8 TB, and 2.4 TB 10K rpm SAS
- High-capacity, archival-class nearline disk drives: 2 TB 7.2K rpm NL SAS

The following 3.5-inch drives are supported:

- Performance-optimized, enterprise class disk drives:
 - 300 GB, 600 GB, and 900 GB 15K rpm SAS
 - 900 GB, 1.2 TB, 1.8 TB, and 2.4 TB 10K rpm SAS
- High-capacity, archival-class nearline disk drives: 4 TB, 6 TB, 8 TB, 10 TB, and 12 TB 7.2K rpm NL SAS

All drives are dual-port and hot-swappable. Drives of the same form factor can be intermixed within the appropriate enclosure, which provides the flexibility to address performance and capacity needs within a single enclosure.

Up to 20 Lenovo Storage V5030 expansion enclosures are supported by a single Lenovo Storage V5030 control enclosure. Customers can intermix 3.5-inch and 2.5-inch expansion enclosures behind a 3.5-inch or 2.5-inch control enclosure. This configuration delivers the added flexibility to mix 3.5-inch and 2.5-inch drives within a single system (but not within the enclosure).

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

The Lenovo Storage V5030 storage system offers high levels of system and data availability with the following technologies:

- Dual-active, intelligent node canisters with mirrored cache
- Dual port drives with automatic 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

Components and connectors

The following figures show the front of the Lenovo Storage V5030 SFF and LFF enclosures.

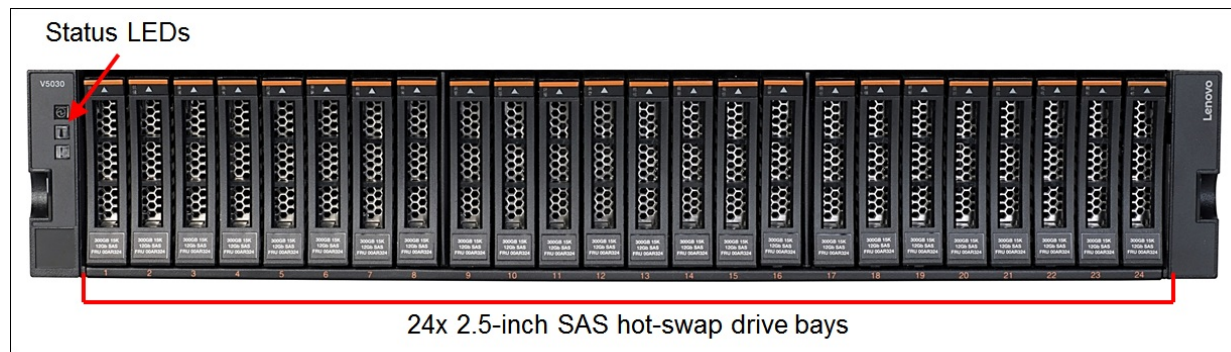


Figure 2. Front view of the Lenovo Storage V5030 SFF enclosure

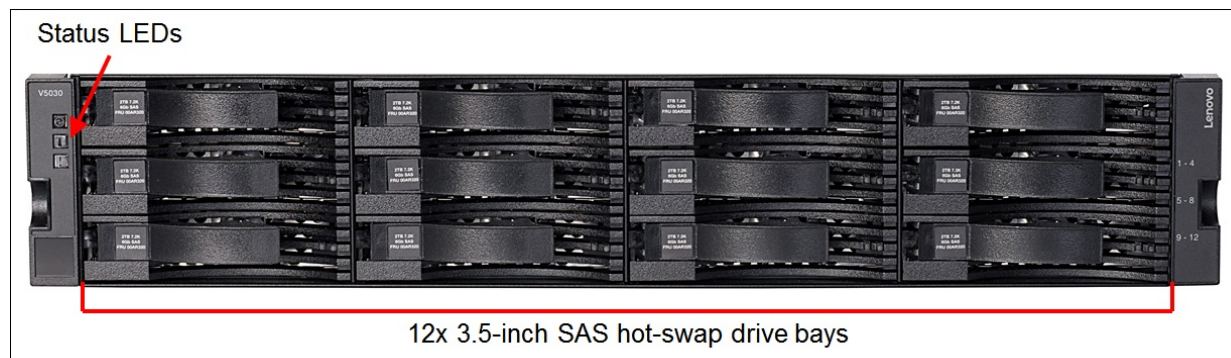


Figure 3. Front view of the Lenovo Storage V5030 LFF enclosure

The following figure shows the rear of the Lenovo Storage V5030 control enclosure.

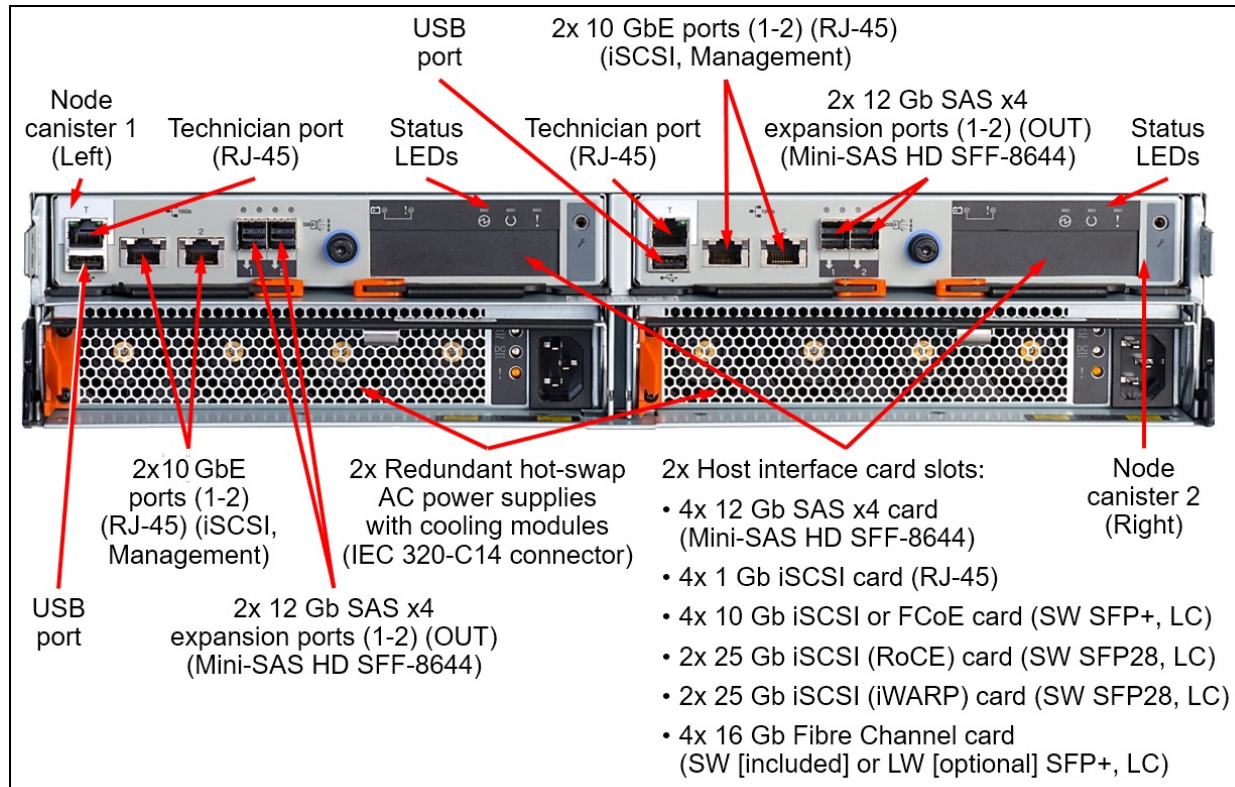


Figure 4. Rear view of the Lenovo Storage V5030 control enclosure

The following figure shows the rear of the Lenovo Storage V5030 expansion enclosure.

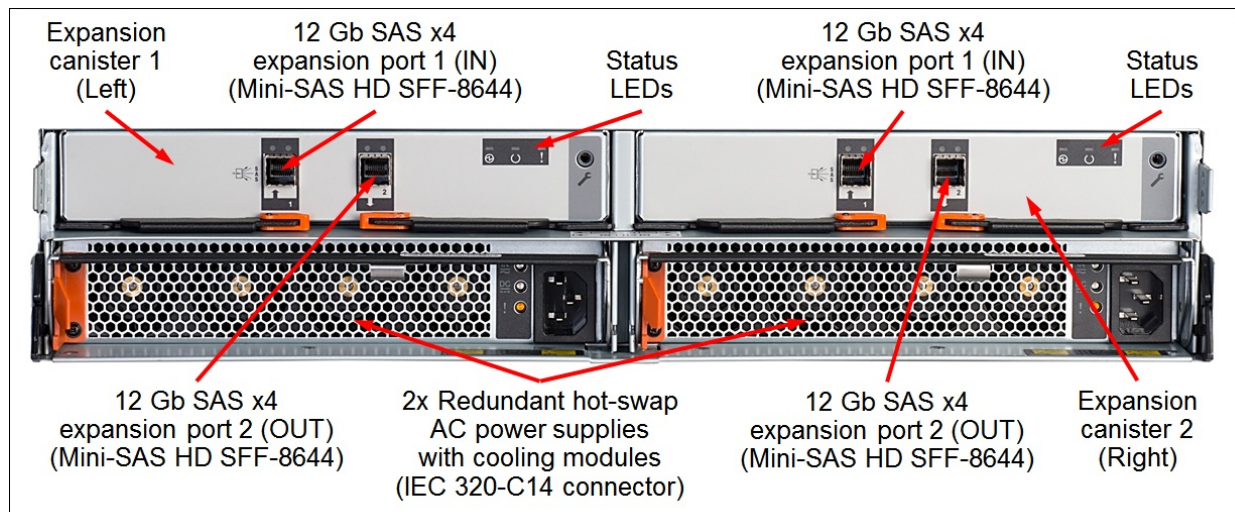


Figure 5. Rear view of the Lenovo Storage V5030 expansion enclosure

System specifications

The following table lists the Lenovo Storage V5030 storage system specifications.

Note: The supported hardware options and software features listed in this product guide are based on the Spectrum Virtualize software version 8.1.3. For details about specific Spectrum Virtualize software releases that introduced support for certain hardware options and software features, refer to the Release notes of the particular software release that can be found at:

<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/v5030/6536/downloads>

Table 1. System specifications

Components	Specification
Form factor	<ul style="list-style-type: none"> Lenovo Storage V5030 control enclosure: 2U rack mount Lenovo Storage V5030 expansion enclosure: 2U rack mount
Controller configuration	Dual controller (known as <i>node canister</i>) configuration per control enclosure. Two control enclosures can be combined into a single clustered system (or cluster).
RAID levels	RAID 0, 1, 5, 6, and 10; Distributed RAID 5 and 6 (internal storage only).
Controller cache	32 GB per system (16 GB per node canister) upgradeable to 64 GB (32 GB per node canister). Cache mirroring between the node canisters. Flash-backed cache protection (includes battery).
Drive bays	<p>Up to 504 SFF drive bays per single system (up to 1,008 SFF drive bays per cluster):</p> <ul style="list-style-type: none"> 24 SFF drive bays in the control enclosure 24 SFF drive bays in the expansion enclosure; up to 20 expansion enclosures <p>Up to 252 LFF drive bays per single system (up to 504 LFF drive bays per cluster):</p> <ul style="list-style-type: none"> 12 LFF drive bays in the control enclosure 12 LFF drive bays in the expansion enclosure; up to 20 expansion enclosures <p>Intermix of SFF and LFF enclosures is supported.</p>
Drive technology	SAS and NL SAS HDDs and SAS SSDs. Intermix of HDDs and SSDs is supported.
Drive connectivity	<p>Dual-ported 12 Gb SAS drive attachment infrastructure.</p> <p>Control enclosure with two node canisters (ports per one node canister):</p> <ul style="list-style-type: none"> 24x 12 Gb SAS internal drive ports (SFF chassis) 12x 12 Gb SAS internal drive ports (LFF chassis) 2x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports for the attachment of the expansion enclosures <p>Expansion enclosure with two expansion canisters (ports per one expansion canister):</p> <ul style="list-style-type: none"> 24x 12 Gb SAS internal drive ports (SFF chassis) 12x 12 Gb SAS internal drive ports (LFF chassis) 2x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) expansion ports (IN and OUT) for the daisy chained attachment of the expansion enclosures
Drives	<p>SFF drives:</p> <ul style="list-style-type: none"> 300 GB, 600 GB, and 900 GB 15K rpm SAS HDDs 900 GB, 1.2 TB, 1.8 TB, and 2.4 TB 10K rpm SAS HDDs 2 TB 7.2K rpm NL SAS HDDs 400 GB, 800 GB, 1.6 TB, and 3.2 TB SAS SSDs 1.92 TB, 3.84 TB, 7.68 TB, and 15.36 TB read-optimized SAS SSDs <p>LFF drives:</p> <ul style="list-style-type: none"> 300 GB, 600 GB, and 900 GB 15K rpm SAS HDDs 900 GB, 1.2 TB, 1.8 GB, and 2.4 TB 10K rpm SAS HDDs 4 TB, 6 TB, 8 TB, 10 TB, and 12 TB 7.2K rpm NL SAS HDDs
Storage capacity	<ul style="list-style-type: none"> Up to 7.74 PB (504x 15.36 TB SAS SSDs) per single system Up to 15.48 PB (1008x 15.36 TB SAS SSDs) per cluster

Components	Specification
Host connectivity	<p>Standard ports (per control enclosure with two node canisters):</p> <ul style="list-style-type: none"> • 4x 10 Gb iSCSI host ports (UTP, RJ-45) (2 ports per node canister) <p>Optional additional ports on host interface cards (per control enclosure with two node canisters):</p> <ul style="list-style-type: none"> • 8x 12 Gb SAS host ports (Mini-SAS HD, SFF-8644) (4 ports per node canister) • 8x 1Gb iSCSI host ports (UTP, RJ-45) (4 ports per node canister) • 8x 10 Gb iSCSI or FCoE SFP+ host ports (SW fiber, LC) (4 ports per node canister) • 8x 16 Gb FC SFP+ host ports (SW or LW fiber, LC) (4 ports per node canister) • 4x 25 Gb iSCSI (RoCE) SFP28 host ports (SW fiber, LC) (2 ports per node canister) • 4x 25 Gb iSCSI (iWARP) SFP28 host ports (SW fiber, LC) (2 ports per node canister)
Host operating systems^	Microsoft Windows Server 2012, 2012 R2, and 2016; Red Hat Enterprise Linux (RHEL) 6 and 7; SUSE Linux Enterprise Server (SLES) 11 and 12; VMware vSphere 5.1, 5.5, 6.0, and 6.5.
Standard software features	Virtualization of internal storage, Thin Provisioning, Data reduction pools, Deduplication (requires 32 GB cache per node), One-way Data Migration, Dual-system Clustering, HyperSwap (requires a Remote Mirroring license), and Embedded GUI.
Optional software features	Easy Tier, FlashCopy, Real-time Compression, Encryption, Remote Mirroring, and External Virtualization.
Performance (single system)*	<ul style="list-style-type: none"> • Up to 730 000 cache read IOPS • Up to 269 000 disk read IOPS • Up to 59 000 disk write IOPS • Up to 131 000 disk mixed (70% read/30% write) IOPS • Up to 8.1 GBps sequential disk read throughput • Up to 3.2 GBps sequential disk write throughput
Configuration maximums**	<p>Per one control enclosure / cluster (if different):</p> <ul style="list-style-type: none"> • Maximum storage capacity (including virtualized external storage): 32 PB • Maximum number of storage pools: 1024 • Maximum number of logical volumes: 2048 / 4096 • Maximum logical volume size: 256 TB • Maximum number of drives in a RAID array: 16 • Maximum number of RAID arrays: 128 • Maximum number of drives in a distributed RAID array: 128 (including up to 4 spares) • Maximum number of distributed RAID arrays: 10 / 20 • Maximum hot spare drives: No limit • Maximum number of host ports: 2048 / 4096 • Maximum number of hosts: 256 / 512 • Maximum number of host ports per one host: 32 • Maximum number of snapshots: 2048 / 4096 (requires an optional license) • Maximum number of remote mirroring relationships: 2048 / 4096 (requires an optional license)
Cooling	Redundant cooling with the fan modules that are built into power supplies.
Power supply	Two redundant hot-swap 800 W AC power supplies.
Hot-swap parts	Node canisters, expansion canisters, SFP+/SFP28 transceivers, drives, power supplies with fans.
Management interfaces	2x 10 GbE ports (UTP, RJ-45) for data/management. Web-based GUI; SSH CLI; SMI-S; SNMP and email notifications.
Security features	Secure Socket Layer (SSL), Secure Shell (SSH), user level security, LDAP authentication.
Hardware warranty	Three-year customer-replaceable unit and onsite warranty with 9x5 next business day terms. Optional warranty service upgrades are available through Lenovo: 24x7 coverage, 2-hour or 4-hour response time, 6-hour or 24-hour committed repair, 1-year or 2-year warranty extensions, YourDrive YourData.

Components	Specification
Software maintenance	Three-year or five-year (model dependent) base software maintenance is included. Models with five-year software maintenance require additional two years of hardware support be purchased for the model.
Dimensions	Height: 87 mm (3.4 in); width: 483 mm (19.0 in); depth: 556 mm (21.9 in)
Weight	<ul style="list-style-type: none"> Control enclosure (fully configured): 27.7 kg (61.1 lb) Expansion enclosure (fully configured): 26.7 kg (58.9 lb)

^ The operating systems shown are for Lenovo servers. The V5030 might support other operating systems. For a full list of supported operating systems, refer to the Lenovo Storage V5030 Interoperability Matrix that can be found on the Lenovo Storage V5030 Documentation page:

<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/v5030/6536/documentation>.

* Internal performance measurements with SSDs.

** For a detailed list of configuration limits and restrictions for a specific version of the Spectrum Virtualize for Lenovo Storage V5030 Software, refer to the Lenovo Support website: <http://support.lenovo.com>

Control enclosures

The following table lists the models of the Lenovo Storage V5030 control enclosures.

Table 2. Lenovo Storage V5030 control enclosures

Description	Part number	Machine Type-Model	Feature codes*
Lenovo Storage V5030 LFF Control Enclosure 3Yr S&S	6536C12	6536-HC3	AU45 / AU7K / AU7L
Lenovo Storage V5030 LFF Control Enclosure 5Yr S&S	6536C32	6536-HC3	AUC8 / AU7K / AU7M
Lenovo Storage V5030 SFF Control Enclosure 3Yr S&S	6536C22	6536-HC6	AU46 / AU7K / AU7L
Lenovo Storage V5030 SFF Control Enclosure 5Yr S&S	6536C42	6536-HC6	AUC9 / AU7K / AU7M

* Feature codes for System unit base hardware / Base software / Software support and subscription.

The Lenovo Storage V5030 control enclosures include the following items:

- One Lenovo Storage V5030 LFF or SFF control enclosure
 - Two power supplies with cooling modules
 - Two node canisters
- Rack mount hardware kit
- Publications package

Note: The control enclosures come standard without power cords; the power cord option must be purchased together with the enclosure (see [Power supplies and cables](#) for details).

The Lenovo Storage V5030 control enclosures ship with two node canisters. A *node canister* provides interfaces for host connectivity, management, and internal drives, and it runs storage management and virtualization software.

Each Lenovo Storage V5030 control enclosure ships with 32 GB of battery-backed cache (16 GB per node canister) which can be upgraded to 64 GB (32 GB per node canister). The following table lists cache upgrade option.

Table 3. Cache upgrade option

Description	Part number	Feature code	Maximum quantity per one control enclosure
Lenovo Storage V5030 Cache Upgrade	01DE237	AU7A	1

Configuration note: Deduplication requires 32 GB cache per node provided by the V5030 Cache Upgrade (01DE237).

The Lenovo Storage V5030 control enclosures ship with 4x 10 Gb Ethernet (RJ-45) ports (2 ports per node canister) for 1 Gb or 10 Gb iSCSI host connectivity and management. Each node canister also has one expansion slot for an optional host interface card (HIC). The following host interfaces can be added to the Lenovo Storage V5030 control enclosures with optional HICs:

- 8x 12 Gb SAS x4 (Mini-SAS HD SFF-8644) ports (4 ports per HIC) for SAS connectivity
- 8x 1 GbE (RJ-45) ports (4 ports per HIC) for extra iSCSI connectivity (for a total of 12x 1 GbE ports per control enclosure)
- 8x 10 GbE SFP+ ports (4 ports per HIC) with eight SW SFP+ optical transceivers (LC connectors) installed (4 transceivers per HIC) for 10 Gb iSCSI or FCoE connectivity
- 8x 16 Gb FC SFP+ ports (4 ports per HIC) with eight SW SFP+ optical transceivers (LC connectors) installed (4 transceivers per HIC) for FC connectivity (16 Gb FC LW SFP+ transceivers are available for ordering as an option)
- 4x 25 GbE (RoCE) SFP28 ports (2 ports per HIC) with four SW SFP28 optical transceivers (LC connectors) installed (2 transceivers per HIC) for 25 GbE iSCSI connectivity with support for RDMA with RoCE v2
- 4x 25 GbE (iWARP) SFP28 ports (2 ports per HIC) with four SW SFP28 optical transceivers (LC connectors) installed (2 transceivers per HIC) for 25 GbE iSCSI connectivity with support for RDMA with iWARP

Configuration notes:

- Both node canisters must have the same type of the host interface card installed, and both cards must have SFP+/SFP28 modules of the same type.
- Onboard 10 GbE RJ-45 ports and 25 GbE SFP28 host interface cards do not support FCoE.

The following table lists the host port configurations for the Lenovo Storage V5030 control enclosures.

Table 4. Lenovo Storage V5030 host port configurations

Port type and total number of ports					
12 Gb SAS	1 Gb iSCSI	1/10 Gb iSCSI (UTP)	10 Gb iSCSI or FCoE (SW SFP+)	25 Gb iSCSI (RoCE or iWARP)	16 Gb FC
Standard configuration					
-	-	4 (2 per node canister)	-	-	-
Optional configurations					
8 (4 per node canister)	-	4 (2 per node canister)	-	-	-
-	8 (4 per node canister)	4 (2 per node canister)	-	-	-
-	-	4 (2 per node canister)	8 (4 per node canister)	-	-
-	-	4 (2 per node canister)	-	4 (2 per node canister)	-
-	-	4 (2 per node canister)	-	-	8 (4 per node canister)

The following table lists the host connectivity options that are supported with the Lenovo Storage V5030 control enclosures.

Table 5. Lenovo Storage V5030 host connectivity options

Description	Part number	Feature code	Maximum quantity per one control enclosure
Host interface cards			
Lenovo Storage V5030 12Gb SAS Adapter Pair	01DE225	AU4A	1
Lenovo Storage V5030 16Gb FC Adapter Pair	01DE227	AU4C	1
Lenovo Storage V5030 1Gb Ethernet Adapter Pair	01DE229	AU4E	1
Lenovo Storage V5030 10Gb Ethernet Adapter Pair	01DE231	AU4G	1
Lenovo Storage V5030 25GbE (RoCE) Adapter Pair	00YK984	B2UQ	1
Lenovo Storage V5030 25GbE (iWARP) Adapter Pair	00YK986	B2UR	1
SFP+ options for 16 Gb FC host interface card (the card ships with four 16 Gb FC SW SFP+ transceivers)			
Lenovo Storage V5030 16Gb FC LW SFP+ Transceivers (Pair)	01DE233	AU78	4*
Cable options for FC, FCoE, 10 Gb iSCSI, and 25 GbE iSCSI SW SFP+/SFP28 host connectivity			
Lenovo Storage V5030 1m OM3 Fiber Cable (LC)	01PG235	B2YB	8
Lenovo Storage V5030 5m OM3 Fiber Cable (LC)	01PG237	B2YC	8
Lenovo Storage V5030 10m OM3 Fiber Cable (LC)	01DE261	AU52	8
Lenovo Storage V5030 25m OM3 Fiber Cable (LC)	01PG241	B2YD	8
Cable options for FC, FCoE, and 10 Gb iSCSI SW SFP+ host connectivity			
Lenovo Storage V5030 1m Fiber Cable (LC)	01DE255	AU4W	8
Lenovo Storage V5030 5m Fiber Cable (LC)	01DE257	AU4Y	8
Lenovo Storage V5030 25m Fiber Cable (LC)	01DE259	AU50	8
SAS host connectivity cables: Mini-SAS HD (controller) to Mini-SAS (host)			
Lenovo Storage V5030 0.6m SAS Cable (mSAS)	01DE243	AU4J	8
Lenovo Storage V5030 1.5m SAS Cable (mSAS)	01DE245	AU4L	8
Lenovo Storage V5030 3m SAS Cable (mSAS)	01DE247	AU4N	8
SAS host connectivity cables: Mini-SAS HD (controller) to Mini-SAS HD (host)			
Lenovo Storage V5030 0.6m 12Gb SAS Cable (mSAS HD)	01DE249	AU4Q	8
Lenovo Storage V5030 1.5m 12Gb SAS Cable (mSAS HD)	01DE251	AU4S	8
Lenovo Storage V5030 3m 12Gb SAS Cable (mSAS HD)	01DE253	AU4U	8

* Up to two LW SFP+ module pairs per 16 Gb FC host interface card in the node canister; both node canisters must have the same connectivity type. The LW SFP+ modules replace the SW SFP+ modules that ship standard with the 16 Gb FC HIC.

The Lenovo Storage V5030 control enclosures provide 12 Gb SAS internal dual-port drive connectivity, and each control enclosure also has four 12 Gb SAS x4 (Mini-SAS HD SFF-8644) ports (2 port per node canister) for 12 Gb SAS expansion enclosure connectivity.

Expansion enclosures

The Lenovo Storage V5030 control enclosure supports attachment of up to 20 Lenovo Storage V5030 LFF or SFF expansion enclosures. Intermix of LFF and SFF enclosures is supported. The expansion enclosures can be added to the system non-disruptively.

The following table lists the models of the Lenovo Storage V5030 LFF and SFF expansion enclosures.

Table 6. Lenovo Storage V5030 expansion enclosures

Description	Part number	Machine Type-Model	Feature codes*
Lenovo Storage V5030 LFF Expansion Enclosure 3Yr S&S	6536N13	6536-HC7	AU47 / AU7N / AU7P
Lenovo Storage V5030 LFF Expansion Enclosure 5Yr S&S	6536N33	6536-HC7	AU47 / AU7N / AU7Q
Lenovo Storage V5030 SFF Expansion Enclosure 3Yr S&S	6536N23	6536-HC8	AU48 / AU7N / AU7P
Lenovo Storage V5030 SFF Expansion Enclosure 5Yr S&S	6536N43	6536-HC8	AU48 / AU7N / AU7Q

* Feature codes for System unit base hardware / Base software / Software support and subscription.

The Lenovo Storage V5030 expansion enclosures include the following items:

- One Lenovo Storage V5030 LFF or SFF expansion enclosure
 - Two power supplies with cooling modules
 - Two expansion canisters
- Rack mount hardware kit
- Publications package

Note: The expansion enclosures come standard without power cords; the power cord option must be purchased together with the enclosure (see [Power supplies and cables](#) for details).

Each Lenovo Storage V5030 expansion enclosure ships with two expansion canisters. Each expansion canister provides 12 Gb SAS connectivity to the internal drives and two external 12 Gb SAS x4 ports (Mini-SAS HD SFF-8644 connectors labelled Port 1 and Port 2) that are used for connections to the Lenovo Storage V5030 node canisters and for connecting the expansion enclosures between each other. One of the expansion ports (Port 1 or Port 2) on the left and right node canisters is connected to the Port 1 on the left and right expansion canisters, respectively. The Port 2 on the left and right expansion canisters is connected to the Port 1 on the left and right expansion canisters in the adjacent enclosure, respectively, and so on.

Note: Up to 10 expansion enclosures can be connected to Port 1 in a daisy-chained manner, and up to 10 expansion enclosures can be connected to Port 2 in a daisy-chained manner, for a total of 20 expansion enclosures per one control enclosure.

The expansion enclosure connectivity topology is shown in the following figure.

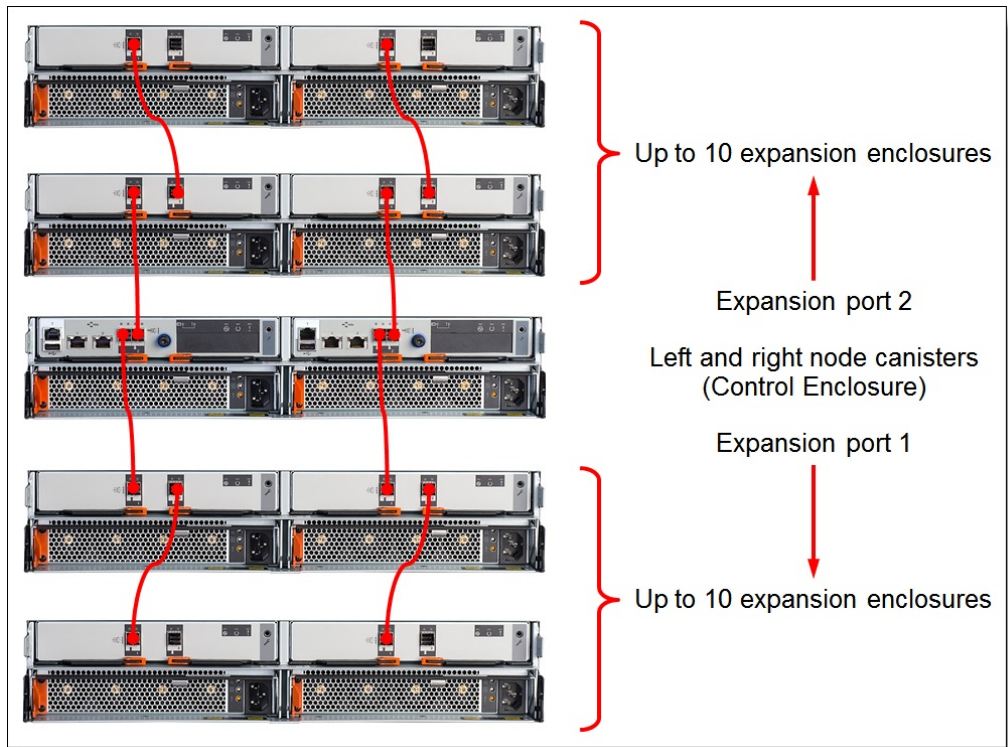


Figure 6. Expansion unit connectivity topology

The following table lists ordering information for the connectivity options that are supported with the expansion enclosures.

Table 7. Expansion enclosure connectivity options

Description	Part number	Feature code	Quantity per one expansion enclosure
Lenovo Storage V5030 0.6m 12Gb SAS Cable (mSAS HD)	01DE249	AU4Q	2*
Lenovo Storage V5030 1.5m 12Gb SAS Cable (mSAS HD)	01DE251	AU4S	2*
Lenovo Storage V5030 3m 12Gb SAS Cable (mSAS HD)	01DE253	AU4U	2*

* One cable per expansion canister; two cables are required per each expansion enclosure.

Drives

The Lenovo Storage V5030 LFF control and expansion enclosures support up to 12 LFF hot-swap drives, and the SFF enclosures support up to 24 SFF hot-swap drives.

The following table lists drive options that are supported with the Lenovo Storage V5030 LFF enclosures.

Table 8. LFF drive options

Description	Part number	Feature code	Maximum quantity per one LFF enclosure
3.5-inch 12 Gbps SAS hot-swap HDDs			
Lenovo Storage V5030 300GB 3.5" 15K HDD	01DE379	AU6P	12
Lenovo Storage V5030 600GB 3.5" 15K HDD	01DE381	AU6Q	12
Lenovo Storage V5030 900GB 3.5" 10K HDD	01DE383	AU6R	12
Lenovo Storage V5030 900GB 15K RPM 3.5" HDD	01KP913	B0RB	12
Lenovo Storage V5030 1.2TB 3.5" 10K HDD	01DE385	AU6S	12
Lenovo Storage V5030 1.8TB 3.5" 10K HDD	01DE387	AU6T	12
Lenovo Storage V5030 2.4TB 3.5" 10K HDD	01KP966	B1JS	12
3.5-inch 12 Gbps NL SAS hot-swap HDDs			
Lenovo Storage V5030 4TB 3.5" 7.2K HDD	01DE389	AU6U	12
Lenovo Storage V5030 6TB 3.5" 7.2K HDD	01DE391	AU6V	12
Lenovo Storage V5030 8TB 3.5" 7.2K HDD	01DE393	AU6W	12
Lenovo Storage V5030 10TB 7.2K 3.5" HDD	01KP826	AVW4	12
Lenovo Storage V5030 12TB 7.2K 3.5" HDD	01PG412	B3SD	12

The following table lists drive options that are supported with the Lenovo Storage V5030 SFF enclosures.

Table 9. SFF drive options

Description	Part number	Feature code	Maximum quantity per one SFF enclosure
2.5-inch 12 Gbps SAS hot-swap HDDs			
Lenovo Storage V5030 300GB 2.5" 15K HDD	01DE395	AU6X	24
Lenovo Storage V5030 600GB 2.5" 15K HDD	01DE397	AU6Y	24
Lenovo Storage V5030 900GB 2.5" 10K HDD	01DE399	AU6Z	24
Lenovo Storage V5030 900GB 15K RPM 2.5" HDD	01KP912	B0RA	24
Lenovo Storage V5030 1.2TB 2.5" 10K HDD	01CX551	AU70	24
Lenovo Storage V5030 1.8TB 2.5" 10K HDD	01CX553	AU71	24
Lenovo Storage V5030 2.4TB 2.5" 10K HDD	01KP965	B1JR	24
2.5-inch 12 Gbps NL SAS hot-swap HDDs			
Lenovo Storage V5030 2TB 2.5" 7.2K HDD	01CX555	AU72	24
2.5-inch 12 Gbps SAS hot-swap SSDs			
Lenovo Storage V5030 400GB 2.5" Flash Drive	01CX557	AU73	24

Description	Part number	Feature code	Maximum quantity per one SFF enclosure
Lenovo Storage V5030 800GB 2.5" Flash Drive	01CX559	AU74	24
Lenovo Storage V5030 1.6TB 2.5" Flash Drive	01CX561	AU75	24
Lenovo Storage V5030 3.2TB 2.5" Flash Drive	01CX563	AU76	24
2.5-inch 12 Gbps SAS hot-swap SSDs - Read-optimized			
Lenovo Storage V5030 1.92TB 1DWD 2.5" SAS SSD	01CX804	AUDR	24
Lenovo Storage V5030 3.84TB 1DWD 2.5" SAS SSD	01GT347	AUK4	24
Lenovo Storage V5030 7.68TB 2.5" RI Flash Drive	01KP492	AVVZ	24
Lenovo Storage V5030 15.36TB 2.5" RI Flash Drive	01KP493	AVW0	24

Software

The following functions are included with every Lenovo Storage V5030:

- RAID levels 0, 1, 5, 6, and 10
Provides the flexibility to choose the level of data protection that is required.
- Distributed RAID 5 and 6 for internal storage
Helps improve performance and availability with significantly faster rebuild time by allowing data to be distributed across more physical drives that are used simultaneously.
- Dual-system clustering
Lenovo Storage V5030 systems can be clustered to help deliver greater performance, bandwidth, and scalability. A Lenovo Storage V5030 clustered system can contain two Lenovo Storage V5030 systems and up to 1,008 drives, or one Lenovo Storage V5030 system and one Storwize V5000 for Lenovo (Machine Type 6194) system and up to 984 drives.
- HyperSwap
Provides dual-site, active-active access to a volume for high availability and disaster recovery configurations. With active-active relationships between the volume copies at each site, HyperSwap configurations can be used to maintain access to data on the system when site-wide failures or outages occur, using a flexible choice of host multipathing drivers.
Note: HyperSwap feature requires a Remote Mirroring license and a third site to host an FC- or IP-based quorum device for an automatic tie-break in the event of a potential link failure between the two main sites.
- Virtualization of internal storage
Enables rapid, flexible provisioning and simple configuration changes.
- Thin provisioning
Optimizes efficiency by allocating drive storage space in a flexible manner among multiple applications that is based on the minimum space that is required by each application at any time. With thin provisioning, applications use only the space they are actually using (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.
- Data Reduction Pools
Help deliver consistent performance from compressed volumes and increase existing capacity utilization by automatically de-allocating and reclaiming capacity of thin-provisioned volumes containing deleted data and enabling this reclaimed capacity to be reused by other volumes.

- **Deduplication**
Increases the efficiency of storage usage by utilizing pointers in duplicate blocks rather than keeping multiple copies of the blocks.
Note: Deduplication requires 32 GB cache per node canister.
- **One-way data migration**
Enables easy and nondisruptive moves of volumes from another storage system onto the Lenovo Storage V5030 storage system by using FC or SAS connectivity.
- **Embedded GUI**
Intuitive, web-based next-generation GUI for easy system set up and management.

The Lenovo Storage V5030 storage capabilities can be expanded with optional licensed functions. Each optional Lenovo Storage V5030 software license is required for each control enclosure, expansion enclosure, and externally virtualized enclosures.

The following optional licensed functions are available:

- **Easy Tier**
Easy Tier provides a mechanism to seamlessly migrate frequently accessed data between three tiers of storage (Flash drives, SAS, NL SAS). This migration can be to different tiers of internal drives or to external storage systems that are virtualized by Lenovo Storage V5030.
- **FlashCopy**
Enables creation of copies of data for backup, parallel processing, testing, and development and have the copies available almost immediately. Lenovo Storage V5030 supports up to 2,048 FlashCopy targets per single system and up to 4,096 FlashCopy targets per cluster.
- **Real-time Compression**
Real-time Compression enables storing up to five times as much data in the same physical disk space by compressing data as much as 80% (based on lab measurements). It is designed to be used with active primary data, such as production databases and email systems, which dramatically expands the range of candidate data that can benefit from compression. Real-time Compression operates immediately as data is written to disk, meaning that no space is wasted storing uncompressed data awaiting post-processing.
- **Encryption**
This feature provides encryption for data at rest for enhanced data security. Encryption is performed by the Lenovo Storage V5030 control enclosure for data that is stored within the Lenovo Storage V5030 system (the control enclosure and all attached expansion enclosures) and externally virtualized storage capacities. Encryption feature works with traditional drives, and it is enabled on the entire Lenovo Storage V5030 system (the control enclosure and all attached expansion enclosures) and externally virtualized storage under its control.
- **Remote mirroring**
The remote mirroring feature provides storage system-based data replication by using synchronous or asynchronous data transfers over IP, FC, or FCoE communication links. The remote mirroring option must be acquired (or licensed) for the primary (local) and secondary (remote) systems. If the Lenovo Storage V5030 is mirrored to another system, the other system must have the appropriate and applicable license for remote mirroring.

For ultimate flexibility, Lenovo Storage V5030 remote mirroring interoperates with any Lenovo Storage V Series, Storwize for Lenovo, or IBM Storwize family system, including Storwize V3700, Storwize V7000, Storwize V5000, and SAN Volume Controller.

- Metro Mirror maintains a fully synchronized copy at metropolitan distances (up to 300 km).
- Global Mirror operates asynchronously and helps maintain a copy at much greater distances (up to 8000 km).

Both functions support VMware Site Recovery Manager for disaster recovery.

- External Virtualization
This feature helps consolidate storage systems from various vendors that are connected into single FC networking. Storage administrator can manage and provision storage to applications from a single user interface and use a common set of advanced functions across all the storage systems under the control of the Lenovo Storage V5030.

The Lenovo Storage V5030 supports the following management interfaces:

- Web-based graphical user interface (GUI) via HTTPS that requires only a supported browser (Microsoft Internet Explorer, Google Chrome, or Mozilla Firefox), so there is no need for a separate console or plug-in
- Command line interface (CLI) via SSH
- Storage Management Initiative Specification (SMI-S)
- SNMP and email notifications

The following table lists ordering information for optional software features for the Lenovo Storage V5030 enclosures. Each Lenovo Storage V5030 enclosure (either control or expansion) requires a separate entitlement license; the total quantity of optional software feature licenses being acquired should be the same as the total number of the Lenovo Storage V5030 enclosures in the system or cluster.

Table 10. Software licenses for Lenovo Storage V5030 enclosures

Description	Part number	Feature code	Maximum quantity per one enclosure
Software licenses for systems with 3-year software maintenance			
Lenovo Storage V5030 Software V7 - Bundle w/3Yr S&S*	00YH887	AXTL	1**
Lenovo Storage V5030 Software V7 - Easy Tier w/3Yr S&S	00YH888	AXTM	1
Lenovo Storage V5030 Software V7 - FlashCopy w/3Yr S&S	00YH889	AXTN	1
Lenovo Storage V5030 Software V7 - Remote Mirror w/3Yr S&S	00YH890	AXTP	1
Lenovo Storage V5030 Software V7 - Compression w/3Yr S&S	00YH891	AXTQ	1**
Software licenses for systems with 5-year software maintenance			
Lenovo Storage V5030 Software V7 - Bundle w/5Yr S&S*	00YH892	AXTR	1**
Lenovo Storage V5030 Software V7 - Easy Tier w/5Yr S&S	00YH893	AXTS	1
Lenovo Storage V5030 Software V7 - FlashCopy w/5Yr S&S	00YH894	AXTT	1
Lenovo Storage V5030 Software V7 - Remote Mirror w/5Yr S&S	00YH895	AXTU	1
Lenovo Storage V5030 Software V7 - Compression w/5Yr S&S	00YH896	AXTV	1**

* The bundle option includes Easy Tier, FlashCopy, Remote Mirror, and Compression licenses.

** Compression feature (standalone or a part of the bundle) requires the Lenovo Storage V5030 Cache Upgrade (part number 01DE237) be installed in the control enclosure (See Table 3 for details).

The following tables list ordering information for optional external virtualization software features for the Lenovo Storage V5030. One license is required for each storage enclosure that is attached to, and externally managed by, the Lenovo Storage V5030.

Note: A storage enclosure that is externally managed by the Lenovo Storage V5030 is defined as an independently powered, channel-attached device that stores data on magnetic disks or SSDs, such as disk controllers and their respective expansion units, each of which constitutes separate enclosures. Therefore, an enclosure can be the main controller housing disk or SSDs, or the expansion chassis that houses extra disk or SSDs for the purpose of expanding the total capacity of the storage system.

Table 11. External virtualization licenses for Lenovo Storage V5030 (North America, Asia Pacific)

Description	Part number	Feature code	Maximum quantity per one external storage enclosure
Software licenses for systems with 3-year base software maintenance included			
Storage V5000/V5030 External Virtualization V7-Base w/3Yr S&S	00KH164	AZL0	1
Storage V5000/V5030 External Virtualization V7-Bundle w/3Yr S&S*	00KE143	AZXT	1
Storage V5000/V5030 External Virtualization V7-Easy Tier w/3Yr S&S	00KE144	AZXU	1
Storage V5000/V5030 External Virtualization V7-FlashCopy w/3Yr S&S	00KE146	AZXW	1
Storage V5000/V5030 External Virtualization V7-Rmt Mirror w/3Yr S&S	00KE145	AZXV	1
Storage V5000/V5030 External Virtualization V7-Compression w/3Yr S&S	00YH897	AXTW	1
Software licenses for systems with 5-year base software maintenance included			
Storage V5000/V5030 External Virtualization V7-Base w/5Yr S&S	01DA191	AXJF	1
Storage V5000/V5030 External Virtualization V7-Bundle w/5Yr S&S*	01DA192	AXJG	1
Storage V5000/V5030 External Virtualization V7-Easy Tier w/5Yr S&S	01DA193	AXJH	1
Storage V5000/V5030 External Virtualization V7-FlashCopy w/5Yr S&S	01DA195	AXJK	1
Storage V5000/V5030 External Virtualization V7-Rmt Mirror w/5Yr S&S	01DA194	AXJJ	1
Storage V5000/V5030 External Virtualization V7-Compression w/5Yr S&S	00YH898	AXTX	1

* The bundle option includes Easy Tier, FlashCopy, Remote Mirror, and Compression licenses.

Table 12. External virtualization licenses for Lenovo Storage V5030 (Latin America, EMEA)

Description	Part number	Feature code	Maximum quantity per one external storage enclosure
Software licenses for models with 3-year base software maintenance included			
Storage V5000/V5030 External Virtualization V7-Base w/3Yr S&S	00KH166	AZL2	1
Storage V5000/V5030 External Virtualization V7-Bundle w/3Yr S&S	00KE298	AZZF	1
Storage V5000/V5030 External Virtualization V7-Easy Tier w/3Yr S&S	00KE299	AZZG	1
Storage V5000/V5030 External Virtualization V7-FlashCopy w/3Yr S&S	00KE301	AZZJ	1
Storage V5000/V5030 External Virtualization V7-Rmt Mirror w/3Yr S&S	00KE300	AZZH	1
Storage V5000/V5030 External Virtualization V7-Compression w/3Yr S&S	00YH897	AXTW	1
Software licenses for models with 5-year base software maintenance included			
Storage V5000/V5030 External Virtualization V7-Base w/5Yr S&S	01DA220	AXKA	1
Storage V5000/V5030 External Virtualization V7-Bundle w/5Yr S&S	01DA221	AXKB	1
Storage V5000/V5030 External Virtualization V7-Easy Tier w/5Yr S&S	01DA222	AXKC	1
Storage V5000/V5030 External Virtualization V7-FlashCopy w/5Yr S&S	01DA224	AXKE	1
Storage V5000/V5030 External Virtualization V7-Rmt Mirror w/5Yr S&S	01DA223	AXKD	1
Storage V5000/V5030 External Virtualization V7-Compression w/5Yr S&S	00YH898	AXTX	1

* The bundle option includes Easy Tier, FlashCopy, Remote Mirror, and Compression licenses.

Encryption

The Lenovo Storage V5030 supports encryption for data at rest. Encryption is performed by the Lenovo Storage V5030 control enclosure for data stored within the Lenovo Storage V5030 system (the control enclosure and all attached expansion enclosures) and externally virtualized storage capacities. Encryption is enabled on Lenovo Storage V5030 through the acquisition of the Encryption Enablement feature. This feature enables encryption on the entire Lenovo Storage V5030 system (control enclosure and all attached expansion enclosures) and externally virtualized storage under its control.

The Encryption USB Flash Drives (Four Pack) feature is required when the Encryption Enablement feature is acquired. This feature provides four USB flash drives for storing the encryption master access key. This feature can also be ordered if more USB flash drives are needed.

The following table lists ordering information for the encryption options.

Table 13. Lenovo Storage V5030 encryption options

Description	Part number	Feature code	Maximum quantity per one control enclosure
Lenovo Storage V5030 Encryption Enablement	01DE239	AU7B	1
Lenovo Storage V5030 Encryption USB Drive Pack	01DE241	AU7C	1

Note: The Lenovo Storage V5030 Encryption Enablement feature and the Encryption USB Drive Pack feature are not available in the following countries:

- Belarus
- Kazakhstan
- People's Republic of China
- Russia

Power supplies and cables

The Lenovo Storage V5030 enclosures have two redundant hot-swap 800 W AC power supplies, each with an IEC 320-C14 connector.

The Lenovo Storage V5030 enclosures ship standard without power cables. Rack power cords or line cords should be ordered with the enclosures (see the following table; each part number or feature code contains two power cords that are needed per one enclosure).

Table 14. Power cords

Description	Part number	Feature code
Rack power cables		
Lenovo Storage V5030 2.0m, 10A/100-250V, C13/IEC 320-C14 2x Rack Power Cables	01DE283	AU5Q
Line cords		
Lenovo Storage V5030 1.8m, 10A/120V, C13/NEMA 5-15P(US/CHI) 2x Line Cords	01DE297	AU64
Lenovo Storage V5030 2.8m, 10A/110V, C13 to CNS 10917-3 (TW) 2x Line Cords	01DE287	AU5U
Lenovo Storage V5030 2.8m, 10A/120V, C13 to NEMA 5-15P (US) 2x Line Cords	01DE285	AU5S
Lenovo Storage V5030 2.8m, 10A/220V, C13 to GB 2099.1 (CN) 2x Line Cords	01DE281	AU5N
Lenovo Storage V5030 2.8m, 10A/220V, C13 to IRAM 2073 (AR) 2x Line Cords	01DE279	AU5L
Lenovo Storage V5030 2.8m, 10A/220V, C13 to NBR 6147 (Brazil) 2x Line Cords	01DE289	AU5W

Description	Part number	Feature code
Lenovo Storage V5030 2.8m, 10A/230V, C13 to AS/NZS 3112 (ANZ) 2x Line Cords	01DE265	AU56
Lenovo Storage V5030 2.8m, 10A/230V, C13 to BS 1363/A (UK) 2x Line Cords	01DE263	AU54
Lenovo Storage V5030 2.8m, 10A/230V, C13 to CEE7-VII (EUR) 2x Line Cords	01DE267	AU58
Lenovo Storage V5030 2.8m, 10A/230V, C13 to CEI 23-16 (IT) 2x Line Cords	01DE275	AU5G
Lenovo Storage V5030 2.8m, 10A/230V, C13 to DK2-5a (DK) 2x Line Cords	01DE269	AU5A
Lenovo Storage V5030 2.8m, 10A/230V, C13 to SABS 164 (SA) 2x Line Cords	01DE271	AU5C
Lenovo Storage V5030 2.8m, 10A/230V, C13 to SI 32 (Israel) 2x Line Cords	01DE277	AU5J
Lenovo Storage V5030 2.8m, 10A/230V, C13/SEV 1011-S24507 (SW) 2x Line Cords	01DE273	AU5E
Lenovo Storage V5030 2.8m, 10A/240V, C13 to IS 6538 (India) 2x Line Cords	01DE291	AU5Y
Lenovo Storage V5030 2.8m, 12A/220V, C13 to KSC 8305 (KR) 2x Line Cords	01DE295	AU62
Lenovo Storage V5030 4.3m, 12A/100V, C13 to JIS C-8303 (JPN) 2x Line Cords	01DE293	AU60

Physical specifications

The Lenovo Storage V5030 enclosures have the following dimensions and weight (approximate):

- Height: 87 mm (3.4 in)
- Width: 483 mm (19.0 in)
- Depth: 556 mm (21.9 in)
- Weight (fully configured):
 - Control Enclosure: 27.7 kg (61.1 lb)
 - Expansion Enclosure: 26.7 kg (58.9 lb)

Operating environment

The Lenovo Storage V5030 enclosures are supported in the following environment:

- Air temperature:
 - Operating: 10 °C - 35 °C (50 °F - 95 °F)
 - Non-operating: -10 °C - +50 °C (14 °F - 125 °F)
 - Maximum altitude: 3,050 m (10,006 ft)
- Relative humidity:
 - Operating: 20% - 80% (non-condensing)
 - Non-operating: 8% - 80% (non-condensing)
- Electrical power:
 - Voltage range: 100 V AC - 240 V AC
 - Frequency: 50 Hz - 60 Hz
 - Power consumption:
 - LFF Control Enclosure: 401 watts
 - SFF Control Enclosure: 403 watts
 - LFF Expansion Enclosure: 231 watts
 - SFF Expansion Enclosure: 233 watts
- Heat dissipation (BTU per hour):
 - LFF Control Enclosure: 1,368
 - SFF Control Enclosure: 1,375
 - LFF Expansion Enclosure: 788
 - SFF Expansion Enclosure: 795

- Acoustical noise emission:
 - LFF enclosure:
 - 6.1 bels (idling)
 - 6.1 bels (operating)
 - SFF enclosure:
 - 6.2 bels (idling)
 - 6.2 bels (operating)

Warranty services and upgrades

The Lenovo Storage V5030 has a three-year Customer Replaceable Unit (CRU) and onsite warranty with 9x5/next business day (NBD) terms.

Note: When purchasing the system that includes 5-year software maintenance, additional two years of hardware support are required.

Some countries might have different warranty terms and conditions than the standard warranty. This is due to local business practices or laws in the specific country. Local service teams can assist in explaining country-specific terms when needed. Examples of country-specific warranty terms are second or longer business day parts delivery or parts-only base warranty.

If warranty terms and conditions include onsite labor for repair or replacement of parts, Lenovo will dispatch a service technician to the customer site to perform the replacement. Onsite labor under base warranty is limited to labor for replacement of parts that have been determined to be field-replaceable units (FRUs). Parts that are determined to be customer-replaceable units (CRUs) do not include onsite labor under base warranty.

If warranty terms include parts-only base warranty, Lenovo is responsible for delivering only replacement parts that are under base warranty (including FRUs) that will be sent to a requested location for self-service. Parts-only service does not include a service technician being dispatched onsite. Parts must be changed at customer's own cost and labor and defective parts must be returned following the instructions supplied with the spares parts.

Also available are Lenovo Services warranty 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. Not all warranty service upgrades are available in every country. For information about Lenovo warranty service upgrade offerings that are available in your country or area, refer to the following resources:

- Service part numbers in Lenovo Data Center Solution Configurator (DCSC):
<http://dcsc.lenovo.com/#/services>
- Lenovo Services Availability Locator
<http://lenovolocator.com/>

In general, the following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
 - 3, 4, or 5 years of warranty service coverage
 - 1-year or 2-year post-warranty extensions
 - Foundation Service: 9x5 service coverage with next business day onsite response
 - Essential Service: 24x7 service coverage with 4-hour onsite response or 24-hour committed repair (available only in select countries)
 - Advanced Service: 24x7 service coverage with 2-hour onsite response or 6-hour committed repair (available only in select countries)

- **YourDrive YourData**
Lenovo's YourDrive YourData service (where applicable) is a multi-drive retention offering that ensures your data is always under your control, regardless of the number of drives that are installed in your Lenovo system. In the unlikely event of a drive failure, you retain possession of your drive while Lenovo replaces the failed drive part. Your data stays safely on your premises, in your hands. The YourDrive YourData service can be purchased in convenient bundles with Foundation, Essential, or Advanced Service upgrades and extensions.
- **Remote Technical Support**
Remote Technical Support (RTS) provides comprehensive technical call center support for 1 or 3 years. RTS can reduce problem resolution time, which helps decrease the cost to address technical problems and increase uptime.
- **Hardware Installation Services**
Lenovo experts can seamlessly manage the physical installation of your server, storage, or networking hardware. Working at a time convenient for you (business hours or off shift), the technician will unpack and inspect the systems on your site, install options, mount in a rack cabinet, connect to power and network, check and update firmware to the latest levels, verify operation, and dispose of the packaging, allowing your team to focus on other priorities.

For service definitions, country-specific details, and service limitations, please refer to the following documents:

- **Lenovo Statement of Limited Warranty for Infrastructure Solutions Group (ISG) Servers and System Storage**
<http://pcsupport.lenovo.com/us/en/solutions/ht503310>
- **Lenovo Data Center Services Agreement**
<http://support.lenovo.com/us/en/solutions/ht116628>

Regulatory compliance

The Lenovo Storage V5030 conforms to the following regulations:

- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, Class A
- Australia and New Zealand Class A statement
- European Union Council Directive 2004/108/EC
- EN 55022, Class A
- Japan VCCI Class A statement
- People's Republic of China Class A statement
- Taiwan Class A compliance statement
- Korea KCC Class A statement
- Russia EMI Class A statement
- Mexico NOM

Interoperability

Lenovo provides end-to-end storage compatibility testing to deliver interoperability throughout the network. The Lenovo Storage V5030 supports attachment to Lenovo servers by using SAS, iSCSI, FC, or FC over Ethernet (FCoE) storage connectivity protocols. Hybrid storage connectivity also is supported.

Note: Tables that are provided in this section are for ordering reference purposes only.

For end-to-end storage configuration support, refer to the Lenovo Storage Interoperation Center (LSIC): <https://datacentersupport.lenovo.com/us/en/lxic>

Use the LSIC to select the known components of your configuration and then get a list all other supported combinations, with details about supported hardware, firmware, operating systems, and drivers, plus any additional configuration notes. View results on screen or export them to Excel.

SAS connectivity

The following table lists currently available SAS adapters for Lenovo servers that are compatible with the Lenovo Storage V5030 SAS storage (direct attach).

Table 15. SAS adapters

Description	Part number
ThinkSystem SAS HBAs	
ThinkSystem 430-8e SAS/SATA 12Gb HBA	7Y37A01090
ThinkSystem 430-16e SAS/SATA 12Gb HBA	7Y37A01091
System x SAS HBAs	
6Gb SAS HBA	46M0907
N2125 SAS/SATA HBA (6Gb)	46C9010
N2225 SAS/SATA HBA (12Gb)	00AE912
N2226 SAS/SATA HBA (12Gb)	00AE916
ThinkServer SAS HBAs	
Lenovo ThinkServer 9300-8e PCIe 12Gb 8 Port External SAS Adapter by LSI	4XB0F28703

FCoE or iSCSI connectivity

The Lenovo Storage V5030 supports end-to-end 10 Gb FCoE connectivity with native FCoE ports or FCoE connectivity via FCoE/FC gateways with native FC ports. Lenovo RackSwitch™, Brocade, and Cisco converged switches can be used to provide FCoE connectivity for the Lenovo Storage V5030 FC storage.

The Lenovo Storage V5030 also supports iSCSI attachments via standard 1 Gb, 10 Gb, or 25 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 for the Lenovo Storage V5030 iSCSI storage.

With software iSCSI initiators, any supported 1 Gb, 10 Gb, or 25 Gb Ethernet adapter for Lenovo servers is compatible with the Lenovo Storage V5030 iSCSI storage.

Currently available converged FCoE/iSCSI adapters for Lenovo servers that are compatible with the Lenovo Storage V5030 are listed in the following table. Other HBAs also might be supported (see the Interoperability Matrix for details).

Table 16. Converged FCoE/iSCSI adapters

Description	Part number
System x converged adapters	
QLogic 8200 Dual Port 10GbE SFP+ VFA (Requires 00Y5624)	90Y4600
System x FoD upgrades required for FCoE/iSCSI support	
QLogic 8200 VFA FCoE/iSCSI License (FoD) (For 90Y4600)	00Y5624
Flex System converged adapters	
Flex System CN4022 2-port 10Gb Converged Adapter	88Y5920
Flex System CN4058S 8-port 10Gb Virtual Fabric Adapter (Requires 94Y5164)	94Y5160
Flex System FoD upgrades required for FCoE/iSCSI support	
Flex System CN4058S Virtual Fabric Adapter SW Upgrade (FoD) (For 94Y5160)	94Y5164

Fibre Channel connectivity

The Lenovo Storage V5030 supports direct FC attachments and FC switch-based attachments. Brocade and Cisco SAN switches can be used to provide FC connectivity for the Lenovo Storage V5030 FC storage.

Currently available FC adapters for Lenovo servers that are compatible with the Lenovo Storage V5030 FC storage are listed in the following table. Other HBAs also might be supported (see the Interoperability Matrix for details).

Table 17. Fibre Channel adapters

Description	Part number
ThinkSystem HBAs: 32 Gb FC	
ThinkSystem Emulex LPe32000-M2-L PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00517
ThinkSystem Emulex LPe32002-M2-L PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00519
ThinkSystem QLogic QLE2740 PCIe 32Gb 1-Port SFP+ Fibre Channel Adapter	7ZT7A00516
ThinkSystem QLogic QLE2742 PCIe 32Gb 2-Port SFP+ Fibre Channel Adapter	7ZT7A00518
System x HBAs: 16 Gb FC	
Emulex 16Gb Gen6 FC Single-port HBA (LPe31000)	01CV830
Emulex 16Gb Gen6 FC Dual-port HBA (LPe31002)	01CV840
Emulex 16Gb FC Single-port HBA (LPe16000)	81Y1655
Emulex 16Gb FC Dual-port HBA (LPe16002)	81Y1662
QLogic 16Gb Enhanced Gen5 FC Single-port HBA (QLE2690)	01CV750
QLogic 16Gb Enhanced Gen5 FC Dual-port HBA (QLE2692)	01CV760
QLogic 16Gb FC Single-port HBA (QLE2660)	00Y3337
QLogic 16Gb FC Dual-port HBA (QLE2662)	00Y3341
System x HBAs: 8 Gb FC	
Emulex 8Gb FC Single-port HBA (LPe12000)	42D0485
Emulex 8Gb FC Dual-port HBA (LPe12002)	42D0494
QLogic 8Gb FC Single-port HBA (QLE2560)	42D0501
QLogic 8Gb FC Dual-port HBA (QLE2562)	42D0510

Description	Part number
ThinkServer HBAs: 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 LPm16002-M6-L AnyFabric 16Gb 2 Port FC HBA by Emulex	4XB0F28706
ThinkServer HBAs: 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
Flex System HBAs: 16 Gb FC	
Flex System FC5052 2-port 16Gb FC Adapter	95Y2386
Flex System FC5054 4-port 16Gb FC Adapter	95Y2391
Flex System FC5172 2-port 16Gb FC Adapter	69Y1942
Flex System HBAs: 8 Gb FC	
Flex System FC3052 2-port 8Gb FC Adapter	95Y2375
Flex System FC3172 2-port 8Gb FC Adapter	69Y1938

Networking switches

The following table lists currently available Ethernet and FC rack-mount switches that are currently offered by Lenovo that can be used with the Lenovo Storage V5030 in storage solutions.

Table 18. Ethernet and FC rack-mount switches

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet (iSCSI connectivity)	
Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)	7159A1X
Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)	7159B1X
Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)	7159C1X
10 Gb Ethernet (iSCSI connectivity, FCoE transit switch)	
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
25 Gb Ethernet (iSCSI connectivity)	
Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)	7159E1X
100 Gb Ethernet (4x 25 Gb Ethernet breakout connectivity out of a 100 Gb port; iSCSI connectivity)	
Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)	7159D1X
Converged 10 GbE and 8 Gb FC (iSCSI connectivity, FCoE/FC gateway, end-to-end FCoE)	

Description	Part number
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
8 Gb FC	
Lenovo B300, 8 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B300, E_Port License included, 8 ports activated, 8x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR6
16 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 8x 16Gb SWL SFPs, 1 PS, Rail Kit	6559D2Y
Lenovo ThinkSystem DB610S, 24 ports activated, 24x 16Gb SWL SFP, Enterprise SW, 1 PS, Rail Kit	6559D1Y
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3
32 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 1 PS, Rail Kit	6559D3Y
Lenovo ThinkSystem DB620S, 24 ports activated, No SFPs, 2 PS, Rail Kit	6415G3A
Lenovo ThinkSystem DB620S, 24 Ports Activated, 24x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G11
Lenovo ThinkSystem DB620S, 48 Ports Activated, 48x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G2A
Lenovo ThinkSystem DB400D 32Gb FC Director, Up to 192 ports, 8U, Enterprise SW	6684B2A
Lenovo ThinkSystem DB800D 32Gb FC Director, Up to 384 ports, 14U, Enterprise SW	6682B1A

For more information, see the list of Product Guides in the following categories:

- Top-of-rack Switches: <http://lenovopress.com/servers/options/switches#rt=product-guide>
- Rack SAN Switches: <http://lenovopress.com/storage/switches/rack#rt=product-guide>

The following table lists currently available Ethernet and FC embedded switches and pass-thru modules for Flex System that can be used with the Lenovo Storage V5030 in storage solutions.

Table 19. Ethernet and FC embedded switches for Flex System

Description	Part number
1 Gb Ethernet (iSCSI connectivity)	
Lenovo Flex System EN2092 1Gb Ethernet Scalable Switch	49Y4294
10 Gb Ethernet (iSCSI connectivity, FCoE transit switch)	
Lenovo Flex System Fabric EN4093R 10Gb Scalable Switch	00FM514
Lenovo Flex System SI4091 10Gb System Interconnect Module	00FE327
Lenovo Flex System Fabric SI4093 System Interconnect Module	00FM518
Cisco Nexus B22 Fabric Extender for Flex System*	94Y5350
Cisco Nexus B22 Fabric Extender with FET bundle for Flex System*	94Y5355
25 Gb Ethernet (iSCSI connectivity)	
Lenovo ThinkSystem NE2552E Flex Switch	4SG7A08868
Converged 10 GbE and 8 Gb FC (iSCSI connectivity, FCoE/FC gateway, end-to-end FCoE)	
Lenovo Flex System Fabric CN4093 10Gb Converged Scalable Switch	00FM510
8 Gb FC	
Lenovo Flex System FC3171 8Gb SAN Switch	69Y1930
16 Gb FC	
Lenovo Flex System FC5022 16Gb SAN Scalable Switch	88Y6374
Lenovo Flex System FC5022 24-port 16Gb SAN Scalable Switch (includes two 16 Gb SFPs)	00Y3324
Lenovo Flex System FC5022 24-port 16Gb ESB SAN Scalable Switch	90Y9356
Pass-thru modules (require a compatible external switch)	
Lenovo Flex System EN4091 10Gb Ethernet Pass-thru	88Y6043
Lenovo Flex System FC3171 8Gb SAN Pass-thru	69Y1934

* Requires a supported Cisco Nexus top of rack switch.

For more information, see the list of Product Guides in the following categories:

- Blade Network Modules: <http://lenovopress.com/servers/blades/networkmodule#rt=product-guide>
- Blade Storage Modules: <http://lenovopress.com/servers/blades/storagemodule#rt=product-guide>

Rack cabinets

The following table lists the rack cabinets that are currently offered by Lenovo that can be used with the Lenovo Storage V5030 in storage solutions.

Table 20. Rack cabinets

Description	Part number
25U S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072RX
25U Static S2 Standard Rack (1000 mm deep; 2 sidewall compartments)	93072PX
42U S2 Standard Rack (1000 mm deep; 6 sidewall compartments)	93074RX
42U 1100mm Enterprise V2 Dynamic Rack (6 sidewall compartments)	93634PX
42U 1100mm Enterprise V2 Dynamic Expansion Rack (6 sidewall compartments)	93634EX
42U 1200mm Deep Dynamic Rack (6 sidewall compartments)	93604PX
42U 1200mm Deep Static Rack (6 sidewall compartments)	93614PX
42U Enterprise Rack (1105 mm deep; 4 sidewall compartments)	93084PX
42U Enterprise Expansion Rack (1105 mm deep; 4 sidewall compartments)	93084EX

For more information, see the list of Product Guides in the Rack cabinets category:
<http://lenovopress.com/servers/options/racks>

Power distribution units

The following table lists the power distribution units (PDUs) that are currently offered by Lenovo that can be used with the Lenovo Storage V5030 in storage solutions.

Table 21. Power distribution units

Description	Part number
0U Basic PDUs	
0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord	00YJ776
0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord	00YJ777
0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 cord	00YJ778
0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord	00YJ779
Switched and Monitored PDUs	
0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord	00YJ781
0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord	00YJ780
0U 18 C13/6 C19 Switched and Monitored 32A/200-240/346-415V/3Ph PDU w/ IEC60309 532P6 cord	00YJ782
0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord	00YJ783
1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)	46M4002
1U 9 C19/3 C13 Switched and Monitored 60A 3Ph PDU with IEC 309 3P+Gnd line cord	46M4003
1U 12 C13 Switched and Monitored DPI PDU (without line cord)	46M4004
1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4005
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
Ultra Density Enterprise C19/C13 PDU Module (without line cord)	71762NX
Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord	71763NU
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
DPI C13 Enterprise PDU+ (without line cord)	39M2816
DPI Single Phase C13 Enterprise PDU (without line cord)	39Y8941
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
DPI Single Phase C19 Enterprise PDU (without line cord)	39Y8948
DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord	39Y8923
Front-end PDUs (3x IEC 320 C19 outlets)	
DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord	39Y8938
DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord	39Y8939
DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8934
DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8940
DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8935
Universal PDUs (7x IEC 320 C13 outlets)	
DPI Universal 7 C13 PDU (with 2 m IEC 320-C19 to C20 rack power cord)	00YE443
NEMA PDUs (6x NEMA 5-15R outlets)	
DPI 100-127V PDU with fixed NEMA L5-15P line cord	39Y8905
Line cords for PDUs that ship without a line cord	
DPI 30a Line Cord (NEMA L6-30P)	40K9614
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612

Description	Part number
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI Australian/NZ 3112 Line Cord (32A)	40K9617
DPI Korean 8305 Line Cord (30A)	40K9618

For more information, see the list of Product Guides in the Power Distribution Units category:
<http://lenovopress.com/servers/options/pdu>

Uninterruptible power supply units

The following table list the uninterruptible power supply (UPS) units that are currently offered by Lenovo that can be used with the Lenovo Storage V5030 in storage solutions.

Table 22. Uninterruptible power supply units

Description	Part number
Worldwide models	
RT1.5kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-15R 12A outlets)	55941AX
RT1.5kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A outlets)	55941KX
RT2.2kVA 2U Rack or Tower UPS (100-125VAC) (8x NEMA 5-20R 16A outlets)	55942AX
RT2.2kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55942KX
RT3kVA 2U Rack or Tower UPS (100-125VAC) (6x NEMA 5-20R 16A, 1x NEMA L5-30R 24A outlets)	55943AX
RT3kVA 2U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 1x IEC 320 C19 16A outlets)	55943KX
RT5kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55945KX
RT6kVA 3U Rack or Tower UPS (200-240VAC) (8x IEC 320 C13 10A, 2x IEC 320 C19 16A outlets)	55946KX
RT8kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55948KX
RT11kVA 6U Rack or Tower UPS (200-240VAC) (4x IEC 320-C19 16A outlets)	55949KX
RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55948PX
RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC) (4x IEC 320-C19 16A outlets)	55949PX
ASEAN, HTK, INDIA, and PRC models	
ThinkSystem RT3kVA 2U Standard UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)	55943KT
ThinkSystem RT3kVA 2U Long Backup UPS (200-230VAC) (2x C13 10A, 2x GB 10A, 1x C19 16A outlets)	55943LT
ThinkSystem RT6kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	55946KT
ThinkSystem RT10kVA 5U UPS (200-230VAC) (2x C13 10A outlets, 1x Terminal Block output)	5594XKT

For more information, see the list of Product Guides in the Uninterruptible Power Supply Units category:
<http://lenovopress.com/servers/options/ups#rt=product-guide>

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For more information about your region-specific offers, contact your Lenovo sales representative or your technology provider about the use of Lenovo Financial Services. For more information, see the following Lenovo website:

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Related publications and links

For more information, see the following resources:

- Lenovo Storage product page:
<http://www.lenovo.com/systems/storage>
- Lenovo Data Center Solution Configurator:
<http://dcsc.lenovo.com>
- Lenovo Storage V5030 Documentation
<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/v5030/6536/documentation>
- Lenovo Storage V5030 Support:
<http://datacentersupport.lenovo.com/us/en/products/storage/lenovo-storage/v5030/6536>

Related product families

Product families related to this document are the following:

- [External Storage](#)
- [Lenovo SAN Storage](#)

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This document, LP0498, was created or updated on September 11, 2018.

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