



## Lenovo ThinkServer RD450 (E5-2600 v4) Product Guide

The Lenovo ThinkServer RD450, with up to two Intel Xeon E5-2600 v4 processors, is a versatile, 2U two-socket server that blends outstanding flexibility and expandability.

With as much as 1TB of memory, it supports double the capacity of the previous generation. Because the RD450 uses DDR4 memory, you get up to a 50 percent boost in performance and up to a 45 percent increase in power savings over previous generation memory, enabling your applications to run faster and more efficiently.

These gains, coupled with the RD450's highly flexible design, make it perfect for your infrastructure, collaboration and line-of-business applications, as well as web serving or hosting.

The following figure shows the ThinkServer RD450.



Figure 1. Lenovo ThinkServer RD450

### Did you know?

The ThinkServer RD450 provides a variety of drive configurations, including support for 2.5-inch or 3.5-inch hot-swap drives. Some configurations also support an internal tape drive and optical drive.

The RD450 is now also better managed with new support for Lenovo XClarity Administrator. Improved systems management means greater remote management capabilities for increased reliability and uptime.

The ThinkServer RD450 delivers impressive compute power per watt and incorporates energy-smart features for minimized costs and efficient performance. The 80 PLUS Titanium power supply units (PSUs) can deliver 96% efficiency at 50% load.

## Key features

The RD450 is a versatile 2U two-socket business-critical server that offers improved performance and pay-as-you-grow flexibility, along with new features that improve server management capability. This powerful system is designed for your most important business applications and cloud deployments.

Combining balanced performance and flexibility, the RD450 is a great choice for small and medium businesses. It can provide outstanding uptime to keep business-critical applications and cloud deployments running safely. Ease of use and comprehensive systems management tools help make deployment easier. Outstanding reliability, availability, and serviceability (RAS) and high-efficiency design improve your business environment and help save operational costs.

## Scalability and performance

The RD450 offers numerous features to boost performance, improve scalability, and reduce costs:

- Improves productivity by offering superior system performances with up to 14-core processors, up to 35 MB of L3 cache, and up to 9.6 GT/s QPI interconnect links.
- Supports up to two processors, 28 cores, and 56 threads maximize the concurrent execution of multi-threaded applications.
- Intelligent and adaptive system performance with energy efficient Intel Turbo Boost Technology allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor thermal design power (TDP).
- Intel Hyper-Threading Technology boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better utilize the hardware for virtualization workloads.
- Intel Advanced Vector Extensions 2.0 (AVX 2.0) enable acceleration of enterprise-class workloads such as databases, enterprise resource planning, and others.
- Up to 2400 MHz memory speeds with two DIMMs per channel running at 2400 MHz, to help maximize system performance.
- Up to 1 TB of memory capacity with 64 GB LRDIMMs.
- The 12 Gbps SAS internal storage connectivity doubles the data transfer rate compared to 6 Gb SAS solutions to maximize performance of storage I/O-intensive applications.
- Flexible and scalable internal storage configurations provide for up to 80 TB of storage capacity (eight 10 TB drives) in a 2U rack form factor.
- The use of solid-state drives (SSDs) instead of or along with spinning drives (HDDs) can significantly improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- The server offers up to six PCI Express (PCIe) 3.0 I/O expansion slots.
- The RD450 provides Lenovo AnyRAID technology, a midplane RAID adapter that connects directly to the drive backplane without consuming a PCIe slot.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family. This helps to dramatically reduce I/O latency and increase overall system performance.

## Availability and serviceability

The RD450 provides many features to simplify serviceability and increase system uptime:

- Toolless cover removal provides easy access to upgrades and serviceable parts, such as processors, DIMMs, and adapters.
- The server offers hot-swap drives and support RAID redundancy for data protection and greater

system uptime.

- The server offers redundant hot-swap power supplies and redundant fans to provide availability for business-critical applications.
- Solid-state drives (SSDs) offer significantly better reliability than mechanical HDDs for greater uptime.
- Built-in ThinkServer System Manager TSM continuously monitors system parameters and triggers alerts to minimize downtime.
- One- or three-year customer replaceable unit and onsite limited warranty (depending on model), next business day 9x5. Optional service upgrades are available.

### **Manageability and security**

Powerful systems management features simplify local and remote management of the RD450:

- Support for Lenovo XClarity Administrator, providing autodiscovery, inventory tracking, monitoring, and call home capabilities.
- Includes ThinkServer System Manager (TSM) to monitor server availability and perform remote management. Optional TSM Premium added remote control and remote media.
- Support for Lenovo XClarity Energy Manager which captures real-time power and temperature data from the server and provides automated controls to lower energy costs.
- Embedded ThinkServer Deployment Manager (TDM) provides a complete set of provisioning capabilities from a single interface, automating many of the tasks associated with server provisioning.
- An optional Trusted Platform Modules (TPM) enables advanced cryptographic functionality such as digital signatures and Windows BitLocker encryption, a Windows data protection feature.
- Intel Execute Disable Bit functionality can help prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system.

### **Energy efficiency**

The RD450 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to the green environment:

- Energy-efficient planar components help lower operational costs.
- High-efficiency power supplies with 80 PLUS Platinum and Titanium certifications.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed, to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy the demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.2 V DDR4 memory DIMMs consume up to 20% less energy compared to 1.35 V DDR3 DIMMs (even less than 1.5 V DDR3).
- Solid-state drives (SSDs) consume less power than traditional spinning HDDs.
- Lenovo XClarity Energy Manager provides advanced data center power notification and management to help achieve lower heat output and reduced cooling needs.

## Locations of key components and connectors

The RD450 is available either with 3.5-inch hot-swap drive bays, 3.5-inch easy-swap drive bays or 2.5-inch hot-swap drive bays. The following figure shows the front of the server.

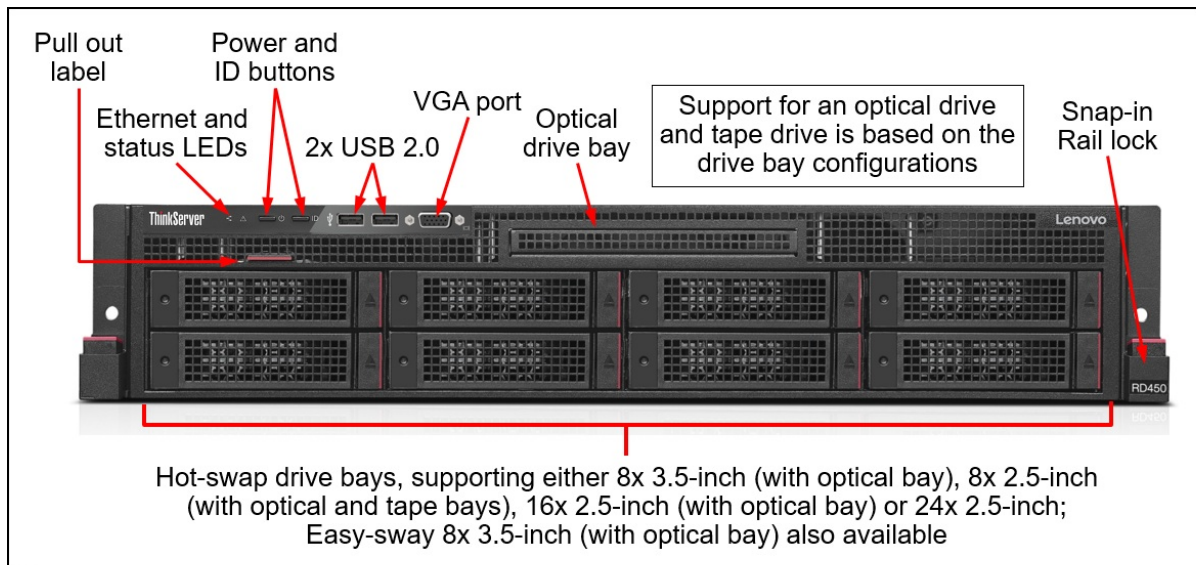


Figure 2. Front view of the ThinkServer RD450 (3.5-inch drive-bay model)

The following figure shows the rear of the RD450 server.

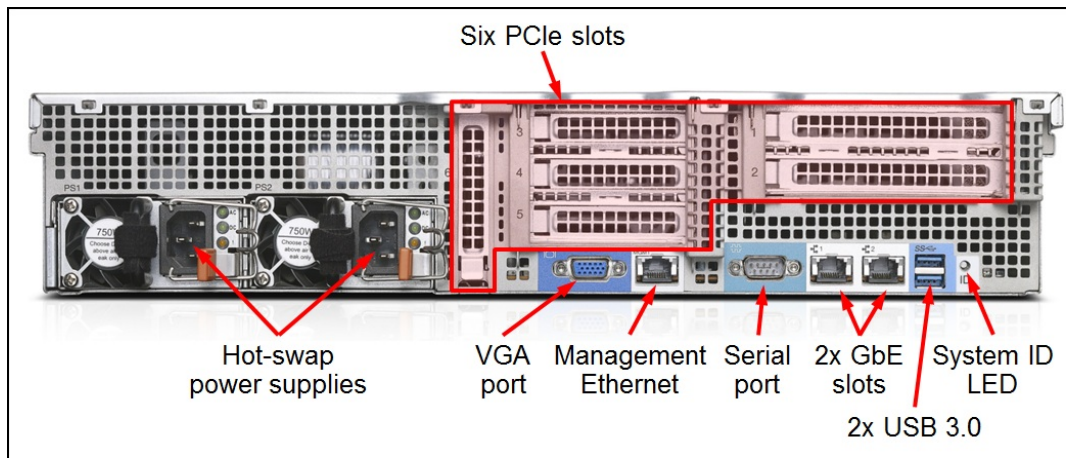


Figure 3. Rear view of the ThinkServer RD450

The following figure shows the locations of key components inside the server.

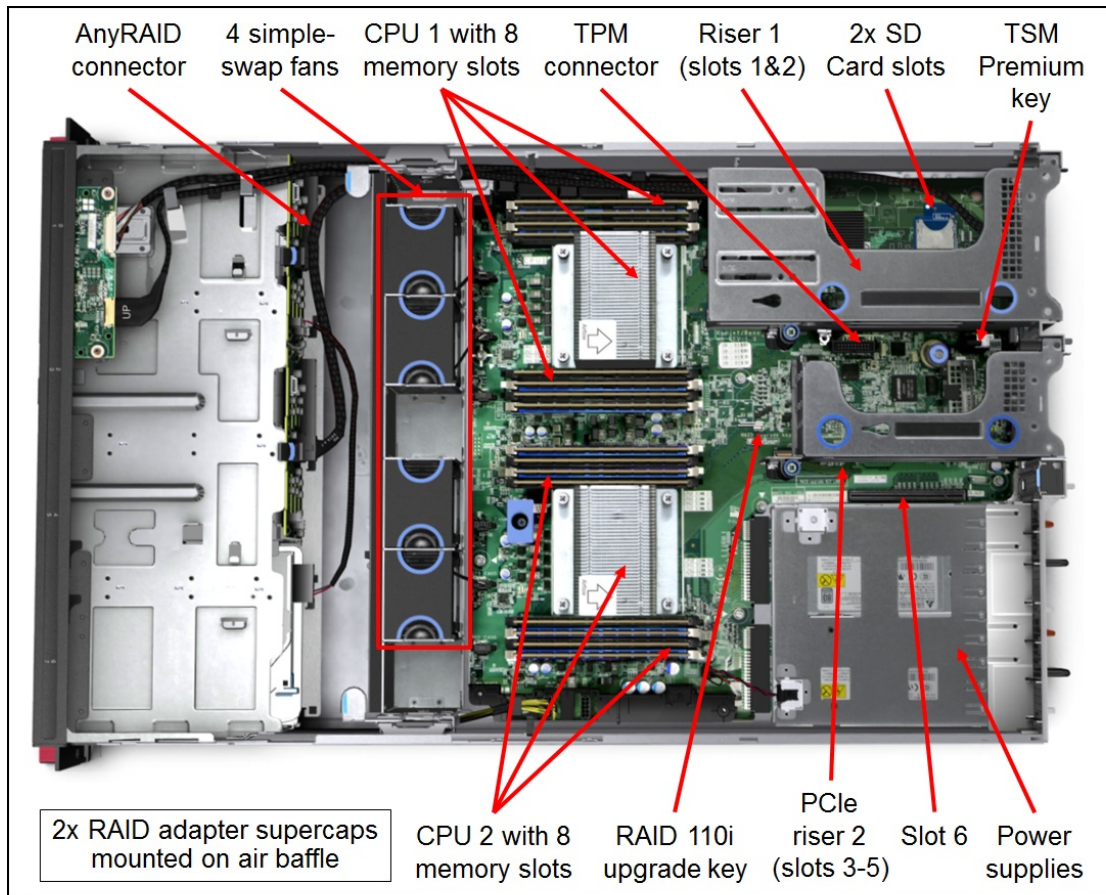


Figure 4. Inside view of the ThinkServer RD450

### Standard specifications

The following table lists the standard specifications.

Table 1. Standard specifications

Components	Specification
Machine type	70QQ, 70QR: 8x 3.5-inch drive bays 70Q9, 70QA: 8x 2.5-inch drive bays 70QS, 70QT: 24x 2.5-inch drive bays 70QW, 70QV: 16x 2.5-inch drive bays
Form factor	2U rack.
Processor	Up to two Intel Xeon E5-2600 v4 Series CPUs, with up to 105 W SKUs and up to 14 cores per CPU
Chipset	Intel C610
Memory	Up to 16 DDR4 DIMM sockets (8 DIMMs per processor). RDIMMs and Load Reduced DIMMs (LRDIMMs) are supported. Memory types cannot be intermixed. Memory speed up to 2400 MHz
Memory maximums	With RDIMMs: Up to 512 GB with 16x 32 GB RDIMMs and two processors With LRDIMMs: Up to 1024 GB with 16x 64 GB LRDIMMs and two processors

<b>Components</b>	<b>Specification</b>
Memory protection	ECC, Patrol Scrubbing, Demand Scrubbing, Sparing, Mirroring, and Lockstep Mode
Disk drive bays	Up to 24x 2.5" hot-swap SAS/SATA HDDs/SSDs, or Up to 8x 3.5" hot-swap SAS/SATA HDDs/SSDs, or Up to 8x 2.5" easy-swap SAS/SATA HDDs
Maximum internal storage	With 3.5-inch hot-swap drives, up to 80 TB with 8x 10 TB NL SATA drives or 12.8 TB with 8x 1.6 TB SSDs. With 3.5-inch easy-swap drives, up to 48 TB with 8x 6 TB NL SAS drives. With 2.5-inch drives, up to 48 TB with 24x 2 TB SATA drives or 43.2 TB with 24x 1.8 TB SSDs. Intermix of SAS/SATA is supported.
Storage controllers for 2.5-inch drive bay models	<p>Models with 2.5-inch drives support an AnyRAID adapter installed on a dedicated slot on the drive backplane. Supported controllers are as follows:</p> <ul style="list-style-type: none"> <li>AnyRAID 110i 6 Gb SATA RAID 0/1/10 with optional RAID 5. This is a pass-through card that routes the embedded controller in the Intel C610 PCH to the backplane. Maximum 6 SATA drives.</li> <li>AnyRAID 510i 6 Gb SAS &amp; SATA RAID 0/1/10 with optional RAID 5/50. Maximum 8 drives.</li> <li>AnyRAID 720i 12Gb RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2 GB or 4 GB cache each with CacheVault (flash), CacheCade, and FastPath support. Maximum 8 drives.</li> <li>AnyRAID 720ix 12 Gb RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2GB or 4GB cache each with CacheVault (flash), CacheCade, and FastPath support. Includes SAS Expander to support up to 24 drives.</li> </ul> <p>Models with 2.5-inch drives also support PCIe RAID adapter installed in slot 1:</p> <ul style="list-style-type: none"> <li>RAID 520i PCIe 12 Gb SAS &amp; SATA RAID 0/1/10 with optional RAID 5/50.</li> <li>RAID 720i PCIe 12Gb RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2 GB or 4 GB cache each with CacheVault (flash), CacheCade, and FastPath support.</li> </ul>
Storage controllers for 3.5-inch drive bay models	<p>Models with 3.5-inch drives support either an embedded controller or a PCIe RAID adapter. Supported controllers are as follows:</p> <ul style="list-style-type: none"> <li>Embedded RAID 110i 6 Gb controller in the Intel C610 PCH routed via cable to the backplane. SATA drives only. RAID arrays can include at most six drives.</li> <li>RAID 520i PCIe 12 Gb SAS &amp; SATA RAID 0/1/10 with optional RAID 5/50.</li> <li>RAID 720i PCIe 12Gb RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2 GB or 4 GB cache each with CacheVault (flash), CacheCade, and FastPath support.</li> </ul>
Optical drive bays	<p>One optional slimline drive, either a DVD-ROM or Multiburner, is supported with these configurations:</p> <ul style="list-style-type: none"> <li>8x 3.5-inch drive bays</li> <li>8x 2.5-inch drive bays</li> <li>16x 2.5-inch drive bays</li> </ul>
Tape drive bays	Support for an LTO6 internal tape drive in configurations with 8x 2.5-inch drive bays.
Network interfaces	Two integrated RJ-45 Gigabit Ethernet 1000BASE-T ports (Intel i210) for the operating system, Port 1 can be configured as shared with systems management. Dedicated Gigabit Ethernet port for systems management



Components	Specification
PCI Expansion slots	<p>Up to six slots, depending on the riser cards installed. The slots are numbered as follows (see the rear view in <a href="#">Locations of key components and connectors</a> for slot locations). With one CPU, three slots are available with two riser cards (slots 1, 2, and 5).</p> <ol style="list-style-type: none"> <li>1. PCIe 3.0 x8 (x16 mechanical) FHHL slot (riser 1)</li> <li>2. PCIe 3.0 x8 (x16 mechanical) FHHL slot (riser 1)</li> <li>3. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2, requires CPU 2)</li> <li>4. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2, requires CPU 2)</li> <li>5. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2)</li> <li>6. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (requires CPU 2)</li> </ol>
Ports	<ul style="list-style-type: none"> <li>• Front: 2x USB 2.0 and 1x VGA port.</li> <li>• Rear: 2x USB 3.0, 1x DB-15 VGA video, 1x RJ-45 systems management, 2x RJ-45 GbE network ports, 1x DB-9 serial port</li> <li>• Internal: 2x SD Card slots (supporting SDHC cards; for embedded hypervisor)</li> </ul>
Cooling	<p>Up to 4 simple-swap (non-hot-swap) redundant fans:</p> <ul style="list-style-type: none"> <li>• With 1 processor: 3 fans (2 + 1 redundant)</li> <li>• With 2 processors: 4 fans (3 + 1 redundant)</li> </ul>
Power supply	<p>Up to two redundant hot-swap AC power supplies, Energy Start 2.0 compliant:</p> <ul style="list-style-type: none"> <li>• 450W 80 PLUS Gold (110-240V AC) (machine types 70DA, 70DC only)</li> <li>• 550 W 80 PLUS Platinum (110-240V AC)</li> <li>• 750 W 80 PLUS Platinum AC (110-240V AC)</li> <li>• 750 W 80 PLUS Titanium AC (220-240V AC)</li> <li>• 1100 W 80 PLUS Platinum AC (110-240V AC)</li> </ul>
Hot-swap parts	Hard drives and power supplies
Systems management	UEFI, ThinkServer System Management (TSM) based on ASPEED AST2400, IPMI 2.0-compliant baseboard management controller (BMC), Support for Lenovo XClarity Administrator. Optional TSM Premium Upgrade software feature for remote presence. ThinkServer Deployment Manager. Lenovo XClarity Energy Manager (activated with TSM Premium or separate license).
Security features	Power-on and administrator password. Optional Trusted Platform Module (TCG 1.2-compliant). Chassis intrusion switch standard on some models, not available on others.
Video	Onboard Aspeed AST2400 with 16MB memory, one DisplayPort on front, one VGA on rear. Maximum resolution: 1920x1200@60Hz
Operating systems supported	Microsoft Windows Server 2016, 2012 R2 & 2012, Red Hat Enterprise Linux 6 and 7, SUSE Linux Enterprise Server 11 & 12, VMware vSphere (ESXi) 5.5 and 6.0 (ESXi does not support the RAID 110i or AnyRAID 110i controllers)
Limited warranty	One- or three-year limited onsite service with 9x5/Next Business Day
Service and support	Optional service upgrades are available through Lenovo Services
Dimensions	Height: 87 mm (3.4 in), width: 482 mm (19 in), depth: 783 mm (30.8 in)
Weight	Minimum configuration: 16 kg (35.3 lb), maximum: 27 kg (59.5 lb)

## Models

ThinkServer RD450 models are country-specific; that is, each country may define their own server models, and not all server models are available in every country.

Machine types for the RD450 with Xeon E5-2600 v4 processors are as follows:

- 70QQ, 70QR: 8x 3.5-inch drive bays
- 70Q9, 70QA: 8x 2.5-inch drive bays
- 70QS, 70QT: 24x 2.5-inch drive bays
- 70QW, 70QV: 16x 2.5-inch drive bays

For a list of the RD450 models available in the US or EMEA, see PSREF:  
[http://psref.lenovo.com/Product/ThinkServer\\_RD450](http://psref.lenovo.com/Product/ThinkServer_RD450)

For models in other countries, contact a local Lenovo or Lenovo Business Partner representative.

The RD450 server models are shipped with the following items:

- Read Me First printed publication
- Documentation DVD containing the ThinkServer RD450 User Guide and Hardware Maintenance Manual
- ThinkServer EasyStartup software DVD
- Country-specific power cords



## Processor options

The RD450 supports up to two Intel Xeon E5-2600 v4 series of processors. The following table lists the supported processor options. When two processors are installed, they must be identical.

**Note:** This product guide covers the RD450 with E5 v4 processors. For information about models with v3 processor support, see [Lenovo ThinkServer RD450 \(E5-2600 v3\)](#).

Table 2. Processor options (TB = Turbo Boost, VT = Virtualization Technology, HT = Hyper-Threading Technology)

Part number	Description	Memory speed	L3 cache	TB	VT	HT
4XG0G89090	Lenovo ThinkServer RD450 Intel Xeon E5-2603 v4 (6C, 85W, 1.7GHz) Processor	1866 MHz	15 MB	N	Y	N
4XG0G89085	Lenovo ThinkServer RD450 Intel Xeon E5-2609 v4 (8C, 85W, 1.7GHz) Processor	1866 MHz	20 MB	N	Y	N
4XG0G89080	Lenovo ThinkServer RD450 Intel Xeon E5-2620 v4 (8C, 85W, 2.1GHz) Processor	2133 MHz	20 MB	Y	Y	Y
4XG0G89095	Lenovo ThinkServer RD450 Intel Xeon E5-2623 v4 (4C, 85W, 2.6GHz) Processor	2133 MHz	10 MB	Y	Y	Y
4XG0G89075	Lenovo ThinkServer RD450 Intel Xeon E5-2630 v4 (10C, 85W, 2.2GHz) Processor	2133 MHz	25 MB	Y	Y	Y
4XG0G89105	Lenovo ThinkServer RD450 Intel Xeon E5-2630L v4 (10C, 55W, 1.8GHz) Processor	2133 MHz	25 MB	Y	Y	Y
4XG0G89070	Lenovo ThinkServer RD450 Intel Xeon E5-2640 v4 (10C, 90W, 2.4GHz) Processor	2133 MHz	25 MB	Y	Y	Y
4XG0G89065	Lenovo ThinkServer RD450 Intel Xeon E5-2650 v4 (12C, 105W, 2.2GHz) Processor	2400 MHz	30 MB	Y	Y	Y
4XG0G89100	Lenovo ThinkServer RD450 Intel Xeon E5-2650L v4 (14C, 65W, 1.7GHz) Processor	2400 MHz	35 MB	Y	Y	Y
4XG0G89060	Lenovo ThinkServer RD450 Intel Xeon E5-2660 v4 (14C, 105W, 2.0GHz) Processor	2400 MHz	35 MB	Y	Y	Y

Xeon E5-2600 v4 processors improves on the v3 generation in the following ways:

- Manufacturing process technology has transitioned from 22 nm to 14 nm
- Maximum RD450 core count is increased from 12 to 14 cores per processor
- Single thread count for RD450 is increased from 24 to 28
- Maximum last level per-processor cache for RD450 is increased from 30 MB to 35 MB
- Supports DDR4 memory at up to 2400 MT/s.
- New and increased Resource Monitoring and Allocation capabilities
- Enhanced hardware assisted Security features

## Memory options

The ThinkServer RD450 supports DDR4 memory. DDR4 memory offers many benefits over older generation DDR3 memory. DDR4 operates at a lower voltage than DDR3 (1.2V vs. 1.35V or 1.5V) and as a result, offers significant power savings. In addition, the DDR4 DIMMs used with Xeon E5 v4 processors have higher memory transfer speeds of up to 2400 MT/s, depending on the memory configuration.

Lenovo offers Registered DIMMs (RDIMM) and Load Reduced DIMMs (LRDIMM) that use a buffer to reduce memory bus loading, which enables greater memory capacities to be achieved.

The following table lists the DDR4 memory options and ordering information.

Table 3. Memory Options

Part number	Description	Maximum supported*
4X70G88318	Lenovo ThinkServer 8GB DDR4-2400MHz (1Rx4) RDIMM	8 / 16
4X70G88319	Lenovo ThinkServer 16GB DDR4-2400MHz (2Rx4) RDIMM	8 / 16
4X70G88320	Lenovo ThinkServer 32GB DDR4-2400MHz (2Rx4) RDIMM	8 / 16
4X70G88321	Lenovo ThinkServer 64GB DDR4-2400MHz (4Rx4) LRDIMM	8 / 16

\* Maximum supported with 1 processor installed / 2 processors installed

The server supports up to 8 DIMMs when one processor is installed and up to 16 DIMMs when two processors are installed. Each processor has four memory channels, and there are two DIMMs supported per channel.

The following table shows the characteristics of the supported DIMMs. All configurations allows the DIMMs to operate at rated speed, provided the CPU selected also supports that speed. Tables cells highlighted with a gray background indicate that the server supports higher memory frequencies than the Intel processor specification.

Table 4. Maximum memory speeds

DIMM specification	RDIMM		LRDIMM
Rank	Single rank	Dual rank	Quad rank
Part numbers	4X70G88318 (8 GB)	4X70G88319 (16 GB) 4X70G88320 (32 GB)	4X70G88321 (64 GB)
Rated speed	2400 MHz	2400 MHz	2400 MHz
Rated voltage	1.2 V	1.2 V	1.2 V
Maximum quantity supported*	16	16	16
Maximum DIMM capacity	8 GB	32 GB	64 GB
Maximum memory capacity	128 GB	512 GB	1024 GB
Maximum memory at rated speed	64 GB	64 GB	1 TB
<b>Maximum operating speed</b>			
1 DIMM per channel	2400 MHz	2400 MHz	2400 MHz
2 DIMMs per channel	2400 MHz	2400 MHz	2400 MHz

\* The maximum quantity that is supported is shown for two processors installed.

Protection against data loss is provided through the following memory RAS features:

- ECC
- Patrol and Demand Scrubbing
- Sparing

- Mirroring
- Lockstep Mode

### **Configuration Guidelines**

Memory can be configured to meet various needs and workloads subject to the following general rules:

- Mixing memory type (RDIMM, LRDIMM) is not supported.
- DIMM capacities and rank can be mixed.

When you are populating for the various RAS modes the following rules apply:

- If memory mirroring or lockstep is used, DIMMs must be installed in pairs (minimum of one pair per each CPU), and both DIMMs in a pair must be identical in type, size, and rank.
- If memory sparing is used, one rank of a DIMM in each populated channel is reserved as spare memory; therefore, Single Rank DIMMs cannot be used. DIMMs in a pair must be identical in type, size, and rank.

### **Memory Optimization**

The memory subsystem can be optimized for various factors, including performance, capacity, or power consumption. Refer to the following guidelines when you are selecting memory options:

- Guidelines for maximum memory performance:
  - Use all available memory channels (four per processor, eight total per system).
  - Use identical DIMM populations in size and speed across channels.
  - Populate both processors with equal amounts of memory.
  - Use the same number of ranks that are populated per channel.
  - Have at least two ranks available on each channel.
- Guidelines for lowest memory energy consumption
  - Use fewer, higher capacity DIMMs. For example, a configuration of 8x 16 GB DIMMs often has lower power requirements than a configuration of 16x 8 GB DIMMs, despite the same capacity.
  - Populating more DIMMs per channel—but using fewer channels (the opposite of the preceding bullet)—further reduces overall system energy use, but at the cost of significant performance reduction.

## Internal storage

The RD450 supports chassis configurations with either 2.5-inch drive bays or 3.5-inch drive bays. Some configurations also support an optical drive or both an optical drive and an internal LTO6 tape drive. The seven available drive configurations are shown in the following figure (the 4th diagram indicates two of the seven configurations).

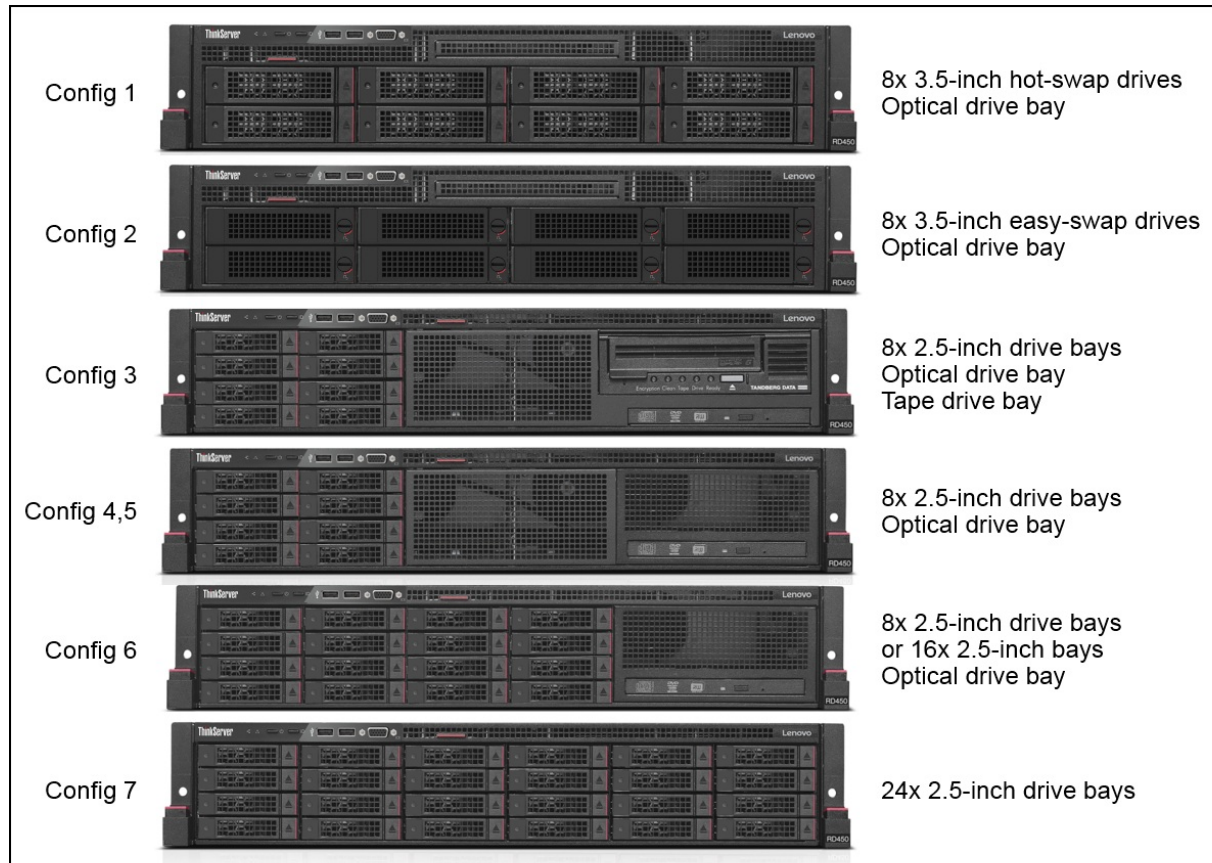


Figure 5. Available drive bay configurations

There are four backplanes available for the RD450:

- 8x 3.5-inch drive backplane with SAS connectors
- 8x 2.5-inch drive backplane with SAS connectors
- 8x 2.5-inch drive backplane with AnyRAID connectors
- 16x 2.5-inch drive backplane with AnyRAID connectors

All configurations support 12Gb SAS/SATA speeds when 12 Gb drives and RAID controller are used.

The following table shows the specifics of each of the drive bay configurations.

Table 5. Backplanes and drive support

Config (Figure 5)	Number of available drive bays	Backplanes required	RAID adapter support	Bay upgrades	Optical drive support	Tape drive support
Config 1	8x 3.5-inch hot-swap drives	One 8x3.5 backplane	PCIe or Onboard	No	Yes	No
Config 2	8x 3.5-inch easy-swap drives	None	PCIe or Onboard	No	Yes	No
Config 3	8x 2.5-inch hot-swap drives + tape	One 8x2.5 backplane with AnyRAID connectors	AnyRAID	No	Yes	Yes*
Config 4	8x 2.5-inch hot-swap drives	One 8x2.5 backplane with SAS connectors	PCIe	No	Yes	No
Config 5	8x 2.5-inch hot-swap drives	One 8x2.5 backplane with AnyRAID connectors	AnyRAID	Yes (16, 24)	Yes	No
Config 6	16x 2.5-inch hot-swap drives	Two 8x2.5 backplane with AnyRAID connectors	AnyRAID	Yes (24)	Yes	No
Config 7	24x 2.5-inch hot-swap drives	One 8x2.5 backplane + One 16x2.5 backplane (AnyRAID connectors)	AnyRAID	No	No	No

\* The use of a tape drive also requires the AnyRAID 720ix controller be installed

The 8x2.5-bay configuration with AnyRAID (Config 5) and 16x2.5-bay configuration (Config 6) can be upgraded to 16 bays or 24 bays using the options listed in the following table. The 8x2.5-bay configuration with SAS connectors (Config 4) cannot be upgraded to additional bays.

**Note:** These upgrades are complex and we recommend that Lenovo business partners perform the upgrade.

Table 6. Backplane options

Part Number	Description
4XF0G45894	Front 2.5-inch backplane kit (8 drive)
4XF0G45895	Front 2.5-inch backplane kit (16-drive)

The server also supports an optional SD Card module which installs into a dedicated slot on the system board and supports two SDHC cards. See the [SD Card storage options](#) section for information.

SD cards can be configured redundantly by using the operating system. The SD cards are enabled via a USB port from the system board Platform Controller Hub (PCH) and do not require a RAID controller.

## Controllers for internal storage

The RD450 supports one RAID controller for all internal drives. Controller options are listed in the following table. The maximum supported column indicates which slots each adapter is supported in. For slot locations see the [I/O expansion options](#) section.

Table 7. Supported RAID controllers

Part number	Description	Maximum supported
Configurations with 2.5-inch drive bays and backplanes with AnyRAID connectors		
None	Lenovo ThinkServer RAID 110i AnyRAID Adapter	1
4XC0G88837	Lenovo ThinkServer RAID 510i AnyRAID Adapter	1
4XC0G88838	Lenovo ThinkServer RAID 720i AnyRAID Adapter	1
4XC0G88839	Lenovo ThinkServer RAID 720ix AnyRAID Adapter with Expander	1
Configurations with 2.5-inch drive bays and backplanes with SAS connectors or Configurations with 3.5-inch drive bays		
None	Lenovo ThinkServer RAID 110i (embedded controller)	1
4XC0G88850	ThinkServer RAID 520i PCIe Adapter	1 (slot 1)
4XC0G88849	ThinkServer RAID 720i PCIe Adapter	1 (slot 1)

Models with 2.5-inch drives and AnyRAID backplanes (Configs 3, 5, 6 & 7 in the [Backplane table](#)) support the following AnyRAID controllers. The AnyRAID controller is installed in a dedicated slot on the drive backplane.

- AnyRAID 110i offers a low-cost solution for light workloads with limited users. It supports 6 GB SATA drives with RAID 0/1/10 with optional RAID 5. The AnyRAID 110i is a pass-through card that routes the embedded controller in the Intel C610 PCH to the backplane. Supports SATA drives only. RAID support only with 6 drives; remaining 2 drives (if installed) must be configured as single drives (AHCI mode).
- AnyRAID 510i is an IOC-based RAID card that offers an affordable hardware controller that delivers performance and reliability. It supports 6 GB SAS & SATA drives and RAID 0/1/10 with optional RAID 5/50. Maximum 8 drives.
- AnyRAID 720i is a RoC-based 12Gb SAS/SATA controller that offers advanced RAID configurations, protection, and software. It supports RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2 GB or 4 GB cache each with CacheVault (flash), CacheCade, and FastPath support. Maximum 8 drives.
- AnyRAID 720ix is similar to the 720i but also includes a SAS Expander to support up to 24 drives. It is a 12 GB SAS/SATA controller with support for RAID 0/1/5/6/10/50/60. Cache is required, either 1 GB cache (without flash), or 1 GB, 2GB or 4GB cache each with CacheVault (flash), CacheCade, and FastPath support.

**Note:** If the server configuration includes an internal LTO6 tape drive, the AnyRAID 720ix is required.

Models with 3.5-inch drives (Configs 1 & 2 in the [Backplane table](#)) as well as models with 2.5-inch drives and a SAS backplane (Config 4) support either an embedded controller or a PCIe RAID adapter. Supported controllers are as follows:

- Embedded RAID 110i controller in the Intel C610 PCH routed via cable to the backplane. Supports SATA drives only. RAID support only with 6 drives; remaining 2 drives (if installed) must be configured as single drives (AHCI mode).
- RAID 520i PCIe is an IOC-based RAID card that delivers 12 Gb performance and reliability. It supports 12 GB SAS & SATA drives and RAID 0/1/10 with optional RAID 5/50.

- RAID 720i PCIe is a 12 Gb adapter similar to the AnyRAID 720i but in a regular PCIe form factor. It supports RAID 0/1/5/6/10/50/60 with optional 1 GB cache (without flash), or 1 GB, 2 GB or 4 GB cache each with CacheVault (flash), CacheCade, and FastPath support.

The following table summarizes the features and specifications of RAID controllers for use with 2.5-inch drive bay configurations.

Table 8. RAID controller features and specifications summary - AnyRAID adapters

	<b>AnyRAID 110i</b>	<b>AnyRAID 510i</b>	<b>AnyRAID 720i</b>	<b>AnyRAID 720ix</b>
Part number	None	4XC0G88837	4XC0G88838	4XC0G88839
Form factor	AnyRAID (passthru)	AnyRAID	AnyRAID	AnyRAID
Controller chip	Intel PCH	LSI SAS2008	LSI SAS3108	LSI SAS3108
Host interface	Not applicable	PCIe 2.0 x8	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	6 Gbps SATA	6 Gbps SAS	12 Gbps SAS	12 Gbps SAS
Drive interface	SATA	SAS, SATA	SAS, SATA	SAS, SATA
Includes SAS expander	No	No	No	Yes
Drive type	HDD, SSD	HDD, SSD	HDD, SSD	HDD, SSD
Number of drives	8*	8	8	24
RAID levels	0/1/10; optional 5 (4XB0F28690)	0/1/10; optional 5/50 (4XB0F28692)	0/1/10/5/50; optional 6/60 with cache upgrade	0/1/10/5/50/6/60
JBOD mode	Yes	Yes	Yes (without cache)	Yes (with 1GB no-backup cache)
Cache (some with CacheVault flash-backed cache)	None	None	Optional: 1 GB flash-backed (4XB0F28696) 2 GB flash-backed (4XB0F28697) 4 GB flash-backed (4XB0F28698) 1 GB (no backup) (4XB0F28695)	Required: 1 GB flash-backed (4XB0F28696) 2 GB flash-backed (4XB0F28697) 4 GB flash-backed (4XB0F28698) 4 GB flash-backed (4XB0F28698) 1 GB (no backup) (4XB0F28695)
FastPath	No	No	Yes (with flash backup)	Yes (with flash backup)
CacheCade 2.0	No	No	Yes (with flash backup)	Yes (with flash backup)
RD450 internal tape drive support	No	No	No	Yes

\* Up to 6 drives can be configured in a RAID array, and the remaining two drives operate in JBOD mode.

The following table summarizes the features and specifications of supported PCIe RAID controllers for use with 3.5-inch drive bay configurations and the 8x 2.5-inch drive bay configuration that uses a backplane with SAS connectors.



Table 9. Features of the supported RAID controllers - PCIe RAID adapters

	<b>RAID 110i controller</b>	<b>RAID 520i PCIe adapter</b>	<b>RAID 720i PCIe adapter</b>
Part number	None	4XC0G88850	4XC0G88849
Form factor	Onboard controller	PCIe Low profile	PCIe Low profile
Controller chip	Intel PCH	LSI SAS3008	LSI SAS3108
Host interface	Not applicable	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	6 Gbps SATA	12 Gbps SAS	12 Gbps SAS
Drive interface	SATA	SAS, SATA	SAS, SATA
Includes SAS expander	No	No	No
Drive type	HDD, SSD	HDD, SSD	HDD, SSD
Number of drives	8*	8	8
RAID levels	0/1/10; optional 5 (4XB0F28690)	0/1/10; optional 5/50 (4XC0G88841)	0/1/10/5/50; optional 6/60 with cache upgrade
JBOD mode	Yes	Yes	Yes (without cache)
Cache with flash-backed cache (CacheVault)	None	None	1 GB non-backed (4XB0F28695) 1 GB flash-backed (4XB0F28696) 2 GB flash-backed (4XB0F28697) 4 GB flash-backed (4XB0F28698)
FastPath	No	No	Yes (with flash-backed cache)
CacheCade 2.0	No	No	Yes (with flash-backed cache)

\* Up to 6 drives can be configured in a RAID array, and the remaining two drives operate in JBOD mode.

The following table summarizes the available RAID controller upgrades for the controllers supported in the RD450.

Table 10. RAID controller upgrades

<b>Part number</b>	<b>Description</b>
<b>AnyRAID 110i and RAID 110i upgrade</b>	
4XB0F28690	Lenovo ThinkServer RAID 110i RAID 5 Upgrade
<b>AnyRAID 510i upgrade</b>	
4XB0F28692	Lenovo ThinkServer RAID 510i RAID 5 Upgrade
<b>AnyRAID 720i and 720ix upgrades</b>	
4XB0F28695	Lenovo ThinkServer RAID 720i 1GB Modular DRAM Upgrade
4XB0F28696	Lenovo ThinkServer RAID 720i 1GB Modular Flash and Supercapacitor Upgrade
4XB0F28697	Lenovo ThinkServer RAID 720i 2GB Modular Flash and Supercapacitor Upgrade
4XB0F28698	Lenovo ThinkServer RAID 720i 4GB Modular Flash and Supercapacitor Upgrade
<b>Upgrades for the RAID 520i adapter</b>	
4XC0G88841	ThinkServer RAID 520i RAID 5 Upgrade
<b>Upgrades for the RAID 720i adapter</b>	
4XB0F28695	ThinkServer RAID 720i 1GB Modular DRAM Upgrade
4XB0F28696	ThinkServer RAID 720i 1GB Modular Flash and Supercapacitor Upgrade
4XB0F28697	ThinkServer RAID 720i 2GB Modular Flash and Supercapacitor Upgrade
4XB0F28698	ThinkServer RAID 720i 4GB Modular Flash and Supercapacitor Upgrade

## Internal drive options

The following tables list the drives supported in the RD450:

- Table 11: [2.5-inch hot-swap 12 Gb SAS/SATA HDDs](#)
- Table 12: [2.5-inch hot-swap 6 Gb SAS/SATA HDDs](#)
- Table 13: [2.5-inch hot-swap 12 Gb SAS/SATA SSDs](#)
- Table 14: [2.5-inch hot-swap 6 Gb SAS/SATA SSDs](#)
- Table 15: [3.5-inch hot-swap 12 Gb SAS/SATA HDDs](#)
- Table 16: [3.5-inch hot-swap 6 Gb SAS/SATA HDDs](#)
- Table 17: [3.5-inch hot-swap 12 Gb SAS/SATA SSDs](#)
- Table 18: [3.5-inch hot-swap 6 Gb SAS/SATA SSDs](#)
- Table 19: [3.5-inch easy-swap 12 Gb SAS/SATA HDDs](#)
- Table 20: [3.5-inch easy-swap 6 Gb SAS/SATA HDDs](#)

Table 11. 2.5-inch hot-swap 12 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
2.5-inch hot-swap HDDs - 12 Gb SAS 10K		
4XB0G88732	Lenovo ThinkServer Gen 5 2.5" 300GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88734	Lenovo ThinkServer Gen 5 2.5" 600GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88735	Lenovo ThinkServer Gen 5 2.5" 900GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88736	Lenovo ThinkServer Gen 5 2.5" 1.2TB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88737	Lenovo ThinkServer Gen 5 2.5" 1.8TB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
2.5-inch hot-swap HDDs - 12 Gb SAS 15K		
4XB0G88739	Lenovo ThinkServer Gen 5 2.5" 300GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88743	Lenovo ThinkServer Gen 5 2.5" 450GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	24
4XB0G88765	Lenovo ThinkServer Gen 5 2.5" 600GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	24

Table 12. 2.5-inch hot-swap 6 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
2.5-inch hot-swap HDDs - 6 Gb SAS 10K		
4XB0G45722	Lenovo ThinkServer Gen 5 2.5" 300GB 10K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
4XB0G45723	Lenovo ThinkServer Gen 5 2.5" 600GB 10K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
4XB0G45724	Lenovo ThinkServer Gen 5 2.5" 900GB 10K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
4XB0G45725	Lenovo ThinkServer Gen 5 2.5" 1.2TB 10K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
2.5-inch hot-swap HDDs - 6 Gb SAS 15K		
4XB0G45727	Lenovo ThinkServer Gen 5 2.5" 300GB 15K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
4XB0G45728	Lenovo ThinkServer Gen 5 2.5" 450GB 15K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
4XB0G45729	Lenovo ThinkServer Gen 5 2.5" 600GB 15K Enterprise SAS 6Gbps Hot Swap Hard Drive	24
2.5-inch hot-swap HDDs - 6 Gb NL SATA		
4XB0G45720	Lenovo ThinkServer Gen 5 2.5" 500GB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	24
4XB0G45721	Lenovo ThinkServer Gen 5 2.5" 1TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	24
4XB0G88774	LTS Gen 5 2.5" 2TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	24

Table 13. 2.5-inch hot-swap 12 Gb SAS/SATA SSDs

Part number	Description	Maximum supported
2.5-inch hot-swap SSDs - 12 Gb SAS - Enterprise Performance (10+ DWPD)		
4XB0G45730	Lenovo ThinkServer Gen 5 2.5" 200GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	24
4XB0G45731	Lenovo ThinkServer Gen 5 2.5" 400GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	24
4XB0G45732	Lenovo ThinkServer Gen 5 2.5" 800GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	24
2.5-inch hot-swap SSDs - 12 Gb SATA - Enterprise Mainstream (3-5 DWPD)		
4XB0K12258	Lenovo ThinkServer 2.5" 400GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	24
4XB0K12259	Lenovo ThinkServer 2.5" 800GB PM1635 Enterprise Mainstream 12Gb SAS Hot Swap SSD	24
4XB0K12260	Lenovo ThinkServer 2.5" 1.6TB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	24

Table 14. 2.5-inch hot-swap 6 Gb SAS/SATA SSDs

Part number	Description	Maximum supported
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)		
4XB0G88766	LTS Gen 5 2.5" 480GB Mainstream SATA 6Gbps Hot Swap SSD	24
4XB0G88768	LTS Gen 5 2.5" 800GB Mainstream SATA 6Gbps Hot Swap SSD	24
4XB0G88770	LTS Gen 5 2.5" 1.2TB Mainstream SATA 6Gbps Hot Swap SSD	24
4XB0G88772	LTS Gen 5 2.5" 1.6TB Mainstream SATA 6Gbps Hot Swap SSD	24
2.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)		
4XB0K12264	Lenovo ThinkServer 2.5" 120GB PM863 Enterprise Entry SATA 6Gbps HS SSD	24
4XB0K12265	Lenovo ThinkServer 2.5" 240GB PM863 Enterprise Entry SATA 6Gbps HS SSD	24
4XB0K12266	Lenovo ThinkServer 2.5" 480GB PM863 Enterprise Entry SATA 6Gbps HS SSD	24
4XB0K12257	Lenovo ThinkServer 2.5" 960GB PM863 Enterprise Entry SATA 6Gbps HS SSD	24
4XB0G88776	LTS Gen 5 2.5" 120GB Entry SATA 6Gbps Hot Swap SSD	24
4XB0G88778	LTS Gen 5 2.5" 240GB Entry SATA 6Gbps Hot Swap SSD	24
4XB0G88780	LTS Gen 5 2.5" 480GB Entry SATA 6Gbps Hot Swap SSD	24
4XB0G88782	LTS Gen 5 2.5" 800GB Entry SATA 6Gbps Hot Swap SSD	24

Table 15. 3.5-inch hot-swap 12 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
<b>3.5-inch hot-swap HDDs - 12 Gb SAS 15K</b>		
4XB0G88740	Lenovo ThinkServer Gen 5 3.5" 300GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88744	Lenovo ThinkServer Gen 5 3.5" 450GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88746	Lenovo ThinkServer Gen 5 3.5" 600GB 15K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
<b>3.5-inch hot-swap HDDs - 12 Gb SAS 10K</b>		
4XB0G88733	LTS Gen 5 3.5" 300GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88761	LTS Gen 5 3.5" 600GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88762	LTS Gen 5 3.5" 900GB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88763	LTS Gen 5 3.5" 1.2TB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88738	LTS Gen 5 3.5" 1.8TB 10K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
<b>3.5-inch hot-swap HDDs - 12 Gb NL SAS</b>		
4XB0G88730	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88731	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 12Gbps Hot Swap Hard Drive	8
4XB0G88715	Lenovo ThinkServer Gen 5 3.5" 6TB 7.2K Enterprise SAS 12Gbps HS HDD	8
4XB0K12254	Lenovo ThinkServer Gen5 3.5" 8TB 7.2K Enterprise SAS 12Gbps HS HDD	8
4XB0K12312	Lenovo ThinkServer Gen 5 3.5" 10TB 7.2K Enterprise SAS 12Gbps HS 512e HDD	8
4XB0K12270	Lenovo ThinkServer Gen5 3.5" 1TB 7.2K Enterprise SAS 12Gbps HS HDD	8
4XB0K12278	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 12Gbps HS HDD	8
4XB0K12279	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 12Gbps HS HDD	8

Table 16. 3.5-inch hot-swap 6 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
<b>3.5-inch hot-swap HDDs - 6 Gb SAS 10K</b>		
4XB0G88728	LTS Gen5 2.5" 300GB 10K Enterprise SAS 6Gbps HS HDD in 3.5" tray	8
4XB0G88729	LTS Gen5 2.5" 600GB 10K Enterprise SAS 6Gbps HS HDD in 3.5" tray	8
4XB0G88742	LTS Gen5 2.5" 900GB 10K Enterprise SAS 6Gbps HS HDD in 3.5" tray	8
<b>3.5-inch hot-swap HDDs - 6 Gb NL SAS</b>		
4XB0G45716	Lenovo ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SAS 6Gbps Hot Swap Hard Drive	8
4XB0G45717	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 6Gbps Hot Swap Hard Drive	8
4XB0G45718	Lenovo ThinkServer Gen 5 3.5" 3TB 7.2K Enterprise SAS 6Gbps Hot Swap Hard Drive	8
4XB0G45719	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 6Gbps Hot Swap Hard Drive	8
<b>3.5-inch hot-swap HDDs - 6 Gb NL SATA</b>		
4XB0F28712	Lenovo ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	8
4XB0F28713	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	8
4XB0F28714	Lenovo ThinkServer Gen 5 3.5" 3TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	8
4XB0G45715	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SATA 6Gbps Hot Swap Hard Drive	8
4XB0G88712	Lenovo ThinkServer Gen 5 3.5" 5TB 7.2K Enterprise SATA 6Gbps HS HDD	8
4XB0G88713	Lenovo ThinkServer Gen 5 3.5" 6TB 7.2K Enterprise SATA 6Gbps HS HDD	8
4XB0K12255	Lenovo ThinkServer Gen 5 3.5" 8TB 7.2K Enterprise SATA 6Gbps HS HDD	8
4XB0K12313	Lenovo ThinkServer Gen 5 3.5" 10TB 7.2K Enterprise SATA 6Gbps HS 512e HDD	8

Table 17. 3.5-inch hot-swap 12 Gb SAS/SATA SSDs

Part number	Description	Maximum supported
3.5-inch hot-swap SSDs - 12 Gb SAS - Enterprise (10+ DWPD)		
4XB0G45733	Lenovo ThinkServer Gen 5 3.5" 200GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	8
4XB0G45734	Lenovo ThinkServer Gen 5 3.5" 400GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	8
4XB0G45735	Lenovo ThinkServer Gen 5 3.5" 800GB Enterprise Performance SAS 12Gbps Hot Swap Solid State Drive	8
3.5-inch hot-swap SSDs - 12 Gb SATA - Enterprise Mainstream (3-5 DWPD)		
4XB0K12261	Lenovo ThinkServer 3.5" 400GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	8
4XB0K12262	Lenovo ThinkServer 3.5" 800GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	8
4XB0K12263	Lenovo ThinkServer 3.5" 1.6TB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	8

Table 18. 3.5-inch hot-swap 6 Gb SAS/SATA SSDs

Part number	Description	Maximum supported
3.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Mainstream (3-5 DWPD)		
4XB0G88767	LTS Gen 5 3.5" 480GB Mainstream SATA 6Gbps Hot Swap SSD	8
4XB0G88769	LTS Gen 5 3.5" 800GB Mainstream SATA 6Gbps Hot Swap SSD	8
4XB0G88771	LTS Gen 5 3.5" 1.2TB Mainstream SATA 6Gbps Hot Swap SSD	8
4XB0G88773	LTS Gen 5 3.5" 1.6TB Mainstream SATA 6Gbps Hot Swap SSD	8
3.5-inch hot-swap SSDs - 6 Gb SATA - Enterprise Entry (<3 DWPD)		
4XB0K12267	Lenovo ThinkServer 3.5" 120GB PM863 Enterprise Entry SATA 6Gbps HS SSD	8
4XB0K12268	Lenovo ThinkServer 3.5" 240GB PM863 Enterprise Entry SATA 6Gbps HS SSD	8
4XB0K12269	Lenovo ThinkServer 3.5" 480GB PM863 Enterprise Entry SATA 6Gbps HS SSD	8
4XB0K12256	Lenovo ThinkServer 3.5" 960GB PM863 Enterprise Entry SATA 6Gbps HS SSD	8
4XB0G88777	LTS Gen 5 3.5" 120GB Entry SATA 6Gbps Hot Swap SSD	8
4XB0G88779	LTS Gen 5 3.5" 240GB Entry SATA 6Gbps Hot Swap SSD	8
4XB0G88781	LTS Gen 5 3.5" 480GB Entry SATA 6Gbps Hot Swap SSD	8
4XB0G88783	LTS Gen 5 3.5" 800GB Entry SATA 6Gbps Hot Swap SSD	8

Table 19. 3.5-inch easy-swap 12 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
3.5-inch easy-swap HDDs - 12 Gb NL SAS		
4XB0K12290	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 12Gbps EasySwap Hard Drive	8
4XB0K12291	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 12Gbps EasySwap Hard Drive	8
4XB0K12292	Lenovo ThinkServer Gen 5 3.5" 6TB 7.2K Enterprise SAS 12Gbps EasySwap Hard Drive	8

Table 20. 3.5-inch easy-swap 6 Gb SAS/SATA HDDs

Part number	Description	Maximum supported
3.5-inch easy-swap HDDs - 6 Gb NL SAS		
4XB0K12286	Lenovo ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SAS 6Gbps EasySwap Hard Drive	8
4XB0K12287	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 6Gbps EasySwap Hard Drive	8
4XB0K12288	Lenovo ThinkServer Gen 5 3.5" 3TB 7.2K Enterprise SAS 6Gbps EasySwap Hard Drive	8
4XB0K12289	Lenovo ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 6Gbps EasySwap Hard Drive	8
3.5-inch easy-swap HDDs - 6 Gb NL SATA		
4XB0F28708	Lenovo ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SATA 6Gbps Easy Swap Hard Drive	8
4XB0F28709	Lenovo ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SATA 6Gbps Easy Swap Hard Drive	8
4XB0F28710	Lenovo ThinkServer Gen 5 3.5" 3TB 7.2K Enterprise SATA 6Gbps Easy Swap Hard Drive	8
4XB0K12314	Lenovo ThinkServer Gen 5 3.5" 10TB 7.2K Enterprise SATA 6Gbps EasySwap 512e HDD	8

## SD Card storage options

The RD450 also supports SD memory cards, which can be used to boot the operating system. The RD450 supports two SD memory cards via an optional module that is connected to USB ports on the system board. SD cards can be configured redundantly by using the operating system. The SD cards are enabled via a USB port from the system board Platform Controller Hub (PCH), and do not require a RAID controller.

Table 21. SD Card options

Part Number	Description	Maximum supported
4XF0G88933	ThinkServer SDHC Flash Assembly Module (supports 2 SDHC cards)	1
4X70F28592	ThinkServer 8GB SD Card	2
4X70F28593	ThinkServer 32GB SD Card	2

## Internal backup units

The RD450 supports an internal LTO6 tape drive in configurations that support a maximum of eight 2.5-inch drive bays. See Config 3 in Figure 5 in the [Internal storage](#) section.

To support a tape drive, the AnyRAID 720ix RAID controller must be used. The SAS connection for the tape drive is routed from the RAID controller.

The following table lists the part numbers for tape support.

Table 22. Internal LTO6 tape drive options

Part number	Description
4XF0G45866	Lenovo ThinkServer LTO-6 Linear Tape Drive Kit by Tandberg
4XB0F28689	2.5 TB LTO6 Tape Cartridge

The tape drive kit includes the necessary cables and mounting hardware to install the tape drive in the server.

## Optical drives

The RD450 server supports the optical drive options listed in the following table.

Table 23. Optical drives

Part number	Description	Maximum supported
4XA0G88616	9.5mm Ultra-Slim SATA DVD RW	1
4XA0G88617	9.5mm Ultra-Slim SATA DVD-ROM	1
4XA0F28609	ThinkServer RD350,RD450 Slim SATA DVD-RW Optical Disk Drive	1
4XA0F28610	ThinkServer RD350,RD450 Slim SATA DVD-ROM Optical Disk Drive	1

## I/O expansion options

The RD450 supports up to six slots, depending on the riser cards installed and the number of processors installed. With one CPU, three slots are available with two riser cards (slots 1, 2, and 5). The slots are numbered as follows:

1. PCIe 3.0 x8 (x16 mechanical) full-height half-length slot (riser 1)
2. PCIe 3.0 x8 (x16 mechanical) full-height half-length slot (riser 1)
3. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2, requires CPU 2)
4. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2, requires CPU 2)
5. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (riser 2)
6. PCIe 3.0 x8 (x16 mechanical) Low Profile slot (requires CPU 2)

The following figure shows the location of the slots, as seen from the rear of the server.

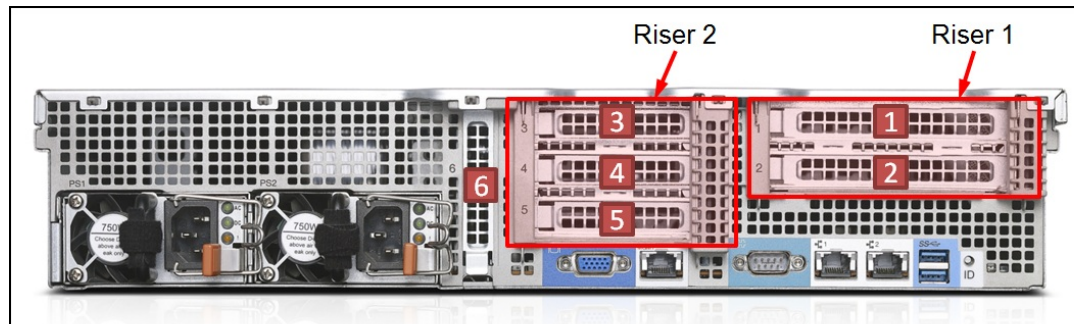


Figure 6. Slot numbering

To use three slots (slots 1, 2 and 5) with only one CPU, you will need to install two riser cards. Note that riser 2 will only have slot 5 active; slots 3 and 4 cannot be used.

Slot 6 is not part of a riser and is connected directly to the system board.

The ordering information for the riser card is shown in the following table. Riser 1 and riser 2 are the same part number.

Table 24. Riser card option

Part number	Description	Maximum supported
4XF0G45897	Lenovo ThinkServer RD450 x8/x8/x8 PCIe Riser Kit Can be used in either riser slot 1 or riser slot 2	2



## Network adapters

The RD450 supports two integrated Gigabit Ethernet ports controlled by a single integrated network interface controller (NIC):

- Based on the Intel i210 controller
- Two Gigabit Ethernet ports
- NIC Teaming (load balancing and failover)
- Port 1 supports NCSI to enable shared access to the management controller
- Supports Wake-on-LAN (WOL)
- Ethernet features:
  - Compliant with 1 Gb Ethernet IEEE 802.3, 802.3u, and 802.3ab PHY specifications
  - Integrated PHY for 10/100/1000 Mbps for multispeed, full, and half-duplex auto-negotiation
  - Automatic MDI crossover
  - IEEE 802.3x-compliant flow control support
  - IEEE 1588 protocol and 802.1AS time synchronization implementation
  - IEEE802.3az - Energy Efficient Ethernet (EEE)
  - IEEE 802.1q Virtual Local Area Network (VLAN) tagging support
- Stateless offload and performance features:
  - TCP, IP, and User Datagram Protocol (UDP) checksum offload
  - TCP segmentation offload (TCO)
  - Large Send Offload (LSO)
  - Receive Side Scaling (RSS) and Transmit Side Scaling (TSS)
  - Message Signal Interrupt (MSI) and Message Signal Interrupt Extension (MSI-X) support
  - Support for jumbo frames up to 9600 bytes

Note: iSCSI offload and iSCSI boot are not supported

The following table lists additional supported network adapters. The maximum supported column indicates which slots each adapter is supported in. For slot locations see the [I/O expansion options](#) section.

Table 25. Supported Ethernet adapters

Part number	Description	Maximum supported*
1 Gb Ethernet		
4XC0F28724	ThinkServer OCe14102-NX 10Gbps Dual Port Ethernet Adapter by Emulex	3 / 6 (All slots)
4XC0F28730	ThinkServer I350-T2 PCIe 1Gb 2 Port Base-T Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0F28731	ThinkServer I350-T4 PCIe 1Gb 4 Port Base-T Ethernet Adapter by Intel	3 / 6 (All slots)
10 Gb Ethernet		
4XC0F28732	ThinkServer X540-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0F28733	ThinkServer X520-SR2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0F28734	ThinkServer X520-DA2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0G88855	ThinkServer X550-T1 PCIe 10Gb 1 Port Base-T Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0G88856	ThinkServer X550-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0G88852	ThinkServer X710-DA2 PCIe 10Gb 2 port Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0G88854	ThinkServer X710-DA4 PCIe 10Gb 4 port Ethernet Adapter by Intel	3 / 6 (All slots)
4XC0F28735	ThinkServer 10Gb Optical Module by Intel (for use with Intel SFP+ adapters)	2 per card
4XC0F28736	ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ Converged Network Adapter by Emulex	3 / 6 (All slots)
4XC0F28737	ThinkServer 10Gb Optical Module by Emulex (for use with 4XC0F28736)	2 per card
40 Gb Ethernet		
4XC0F28738	ThinkServer OCe14401-UX-L PCIe 40Gb 1 Port QSFP+ Converged Network Adapter by Emulex	3 / 6 (All slots)
4XC0F28739	ThinkServer 40Gb Optical Module by Emulex (for use with 4XC0F28738)	1 per card

\* Maximum supported for 1 CPU / 2 CPU installed.

For more information, see the list of Product Guides in the Ethernet category:  
<https://lenovopress.com/servers/options/ethernet>

## SAS adapters for external storage

The following table lists the supported SAS HBAs and RAID adapters. The maximum supported column indicates which slots each adapter is supported in. For slot locations see the [I/O expansion options](#) section.

Table 26. Supported SAS HBAs and RAID adapters

Part number	Description	Maximum supported (1 CPU / 2 CPU)
SAS HBAs for external storage		
4XB0F28703	ThinkServer 9300-8e PCIe 12Gb 8 Port External SAS Adapter by LSI	2 / 5 (All except slot 2)
4XB0G88714	ThinkServer 8885e PCIe 12Gb SAS Adapter by PMC	3 / 6 (All slots)
RAID controllers for external storage		
4XB0F28699	ThinkServer 9286CV-8e PCIe 6Gb 8 Port External SAS RAID Adapter by LSI	3 / 6 (All slots)
Options for the 9286CV-8e controller		
4XB0F28702	Lenovo ThinkServer RAID CacheCade Pro 2.0 Key	1 per card
4XB0G45761	Lenovo ThinkServer CacheVault Data Protection Upgrade II	1 per card

The following table compares the features of the RAID controllers and HBAs.

Table 25. Features of RAID controllers and SAS HBAs

Feature	9286CV-8e	9300-8e	8885e
Adapter type	RAID controller	SAS HBA	SAS HBA
Part number	4XB0F28699	4XB0F28703	4XB0G88727
Form factor	Low profile	Low profile	Low profile
Controller chip	LSI SAS2208	LSI SAS3008	PMC PM8063
Host interface	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	6 Gbps SAS	12 Gbps SAS	12 Gbps SAS
Number of external ports	8	8	8*
External port connectors	2x Mini-SAS (SFF-8088)	2x Mini-SAS HD (SFF-8644)	2x Mini-SAS HD (SFF-8644)
Drive interface	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SSD	HDD, SSD	HDD, SSD
Maximum number of devices	240	1024	256
Maximum number of expansion units	8	8	8
RAID levels	0/1/10/5/50/6/60	None	None
JBOD mode	No	Yes	Yes
Cache	1 GB	None	1 GB
CacheVault cache protection	Optional (4XB0G45761)	None	None
FastPath	Included	None	None
CacheCade Pro 2.0	Optional (4XB0F28702)	None	None

\* In addition to eight external ports, the ThinkServer 8885e adapter has eight internal ports.

## Fibre Channel host bus adapters

The following table lists the supported Fibre Channel HBAs.

Table 27. Supported Fibre Channel host bus adapters

Part number	Description	Max Supported (1 CPU / 2 CPU)
<b>16 Gb Fibre Channel HBAs</b>		
4XB0F28704	ThinkServer LPe16002B-M8-L PCIe 8Gb 2 Port Fibre Channel Adapter by Emulex	3 / 6 (All slots)
4XB0F28705	ThinkServer LPe16002B-M6-L PCIe 16Gb 2 Port Fibre Channel Adapter by Emulex	3 / 6 (All slots)
4XC0F28745	ThinkServer QLE2672 PCIe 16Gb 2 Port Fibre Channel Adapter by QLogic	3 / 6 (All slots)
4XB0F28654	ThinkServer QLE2670 Single Port 16Gb Fibre Channel HBA by QLogic	3 / 6 (All slots)
4XB0F28653	ThinkServer LPe16000B Single Port 16Gb Fibre Channel HBA by Emulex	3 / 6 (All slots)
<b>8 Gb Fibre Channel HBAs</b>		
0C19476	ThinkServer LPe1250 Single Port 8Gb fibre Channel HBA by Emulex	3 / 6 (All slots)
0C19478	ThinkServer LPe12002 Dual Port 8Gb fibre Channel HBA by Emulex	3 / 6 (All slots)
0C19482	ThinkServer QLE2562 Dual Port 8Gb fibre Channel HBA by QLogic	3 / 6 (All slots)
4XB0F28649	ThinkServer QLE2560 Single Port 8Gb fibre Channel HBA by QLogic	3 / 6 (All slots)
4XB0F28652	ThinkServer LPe16000B Single Port 8Gb Fibre Channel HBA by Emulex	3 / 6 (All slots)

## PCIe Flash Storage adapters

The RD450 supports the following PCIe Flash Storage adapters. For slot locations see the [I/O expansion options](#) section.

Table 28. PCIe Flash Storage adapters

Part number	Description	Max supported (1 CPU / 2 CPU)
4XB0G88747	LTS 1.6TB ioMemory SX350 Performance PCIe 2.0 SSD by Sandisk	0 / 2 (slot 1, 2)
4XB0G88748	LTS 3.2TB ioMemory SX350 Performance PCIe 2.0 SSD by Sandisk	0 / 2 (slot 1, 2)
4XB0F28661	Lenovo ThinkServer 1.6TB ioMemory SX300 Performance PCIe 2.0 Solid State Drive by FusionIO	0 / 2 (slot 1, 2)
4XB0F28662	Lenovo ThinkServer 3.2TB ioMemory SX300 Performance PCIe 2.0 Solid State Drive by FusionIO	0 / 2 (slot 1, 2)

## GPU adapters

The RD450 does not support any GPU adapters.

## Power supplies

The RD450 supports up to two redundant hot-swap AC power supplies. Power supplies are Energy Start 2.0 compliant and 80 PLUS certified. The server ships with country-specific power cords.

Power supplies available for the RD450 are highly efficient, with Energy Star / 80 Plus Platinum and Titanium supplies. Several power supply options are available and they can be selected to match the workload and configuration of the server for even greater efficiencies. All power supplies used in the RD450 are common across the ThinkServer next-generation server portfolio, which simplifies management across large installations.

Power supplies are auto-sensing and support both 110V and 220V AC power. In China only, the power supplies also support 240V DC. The power supplies feature a line-cord retention mechanism to prevent unintended disconnects.

The available power supply options for RD450, including their operating characteristics, efficiency ratings, and ordering information are listed in the following table

Table 29. Power supply options

Part number	Power rating	80 PLUS rating	Voltage range	Efficiency at rated load - 110V			Efficiency at rated load - 220V		
				20%	50%	100%	20%	50%	100%
4X20G87845	450 W	Platinum	100 - 240 AC	90%	92%	89%	90%	94%	91%
4X20F28579	550 W	Platinum	100-240 AC	90%	92%	89%	89%	94%	91%
4X20F28575	750 W	Platinum	100 - 240 AC	90%	92%	89%	90%	94%	91%
4X20F28576	750 W	Titanium	200 - 240 AC	No support			94%	96%	91%
4X20F28577	1100 W	Platinum	100 - 240 AC	90 %	92 %	89 %	90 %	94 %	91 %

Use the ThinkServer Power Planner to estimate power usage for a specific configuration:  
<http://support.lenovo.com/us/en/downloads/ds101155>

Configuration rules:

- 1 or 2 powers supplies are supported.
- If two power supplies are installed, they must be identical
- If two power supplies are installed, they form a redundant pair
- Both active-active and active-passive forms of redundancy are supported and they are configurable through IPMI (command-line interface)

Power supply options do not ship with a power cable. Country-specific and rack cables can be ordered if needed, as listed in the following table.

Table 30. Power cables

Part number	Description
4X90F92964	ThinkServer C13-C14 WW 250V 10A 1.8m Jumper Cord
4X90F92965	ThinkServer C13-NEMA_5-15P US 125V 10A 1.8m Power Cord
4X90F92966	ThinkServer C13-JIS_C8303 Japan 125V 7A 1.8m Power Cord
4X90F92970	ThinkServer C13-BS_1363A UK 250V 10A 1.8m Power Cord
4X90F92971	ThinkServer C13-DK_2.5A Denmark 250V 10A 1.8m Power Cord
4X90F92974	ThinkServer C13-CEE_7.7 Europe 250V 10A 1.8m Power Cord
4X90F92975	ThinkServer C13-CE123_50 Italy 250V 10A 1.8m Power Cord
4X90F92976	ThinkServer C13-NRB_14136 Brazil 250V 10A 1.8m Power Cord
4X90F92977	ThinkServer C13-IRAM_2073 LA 250V 10A 1.8m Power Cord
4X90F92981	ThinkServer C13-GB1002 PRC 250V 10A 1.8m Power Cord
4X90F92973	ThinkServer C13-SI_32 Israel 250V 10A 1.8m Power Cord
4X90F92978	ThinkServer C13-SABS_164 South Africa 250V 6A 1.8m Power Cord
39Y7938	IEC C13 to C20 jumper power cable 2.8m
46M2593	10A/100V C13 to JIS C-8302 power cable 2.8m

## Integrated virtualization

The RD450 offers an optional SD Card solution for operating systems. See the [SD Card storage options](#) section for information.

## Systems management

A significant factor in the total cost of a server's ownership is the processes that are used for administering the system hardware, software, and support over the life of the server. ThinkServer systems management offerings are based on industry standards, which enable integration into existing IT environments. Lenovo's tools emphasize provisioning and operational management, which is a large portion of the system's ongoing cost. Optional upgrades provide more management capabilities to optimize performance and usage of the servers.

### Lenovo XClarity Administrator

Lenovo XClarity Administrator is a centralized resource management solution designed to reduce complexity, speed response, and enhance the availability of Lenovo systems and solutions.

Lenovo XClarity Administrator provides agent-free hardware management for ThinkServer, System x, and Flex System servers. The administration dashboard, shown in the following figure, based on HTML 5, allows fast location of resources so tasks can be run quickly.

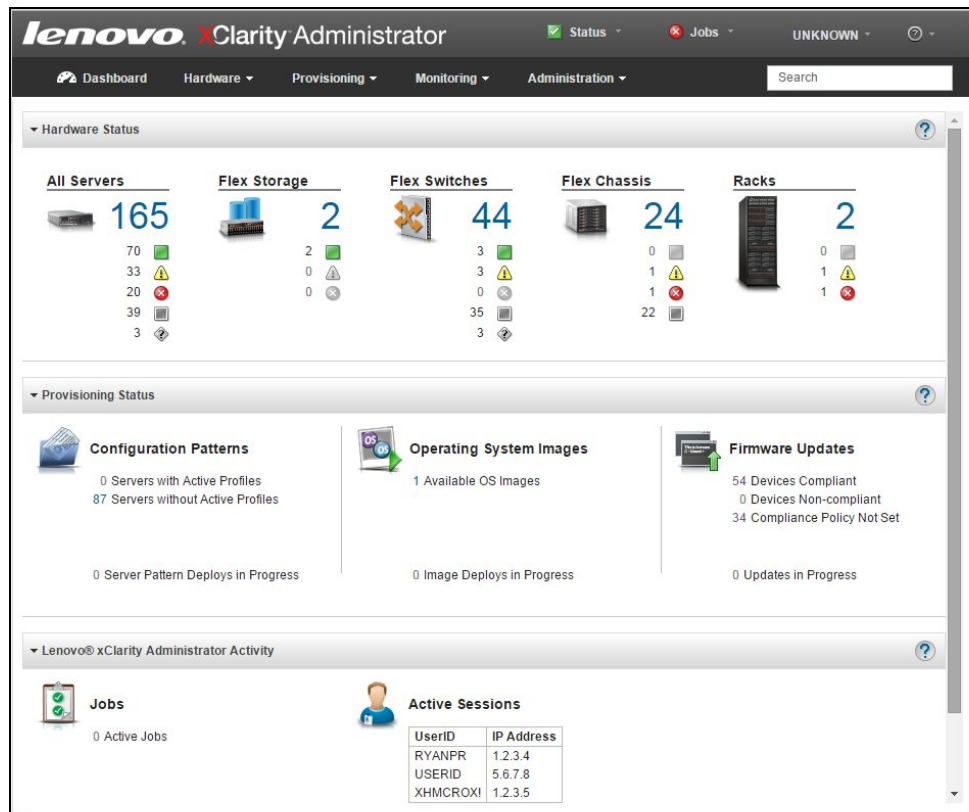


Figure 7. Lenovo XClarity Administrator dashboard

Because Lenovo XClarity Administrator does not include any agent software that is installed on the managed endpoints, there are no CPU cycles spent on agent execution and no memory is used, which means that up to 1GB of RAM and 1 - 2% CPU usage is saved, compared to a typical managed system where an agent is required.

Lenovo XClarity Administrator currently supports only a subset of function with ThinkServer systems:

- Discovery
- Inventory
- Monitoring & alerting
- Call home

Functions that are not currently supported are:

- Centralized user management
- Cryptography modes, server certificates, and encapsulation
- Configuration patterns
- Operating system deployment
- Firmware updates
- Rack view for tower-based servers

For more information about Lenovo XClarity Administrator, including ordering part numbers, see the Lenovo XClarity Administrator Product Guide:

<https://lenovopress.com/tips1200-lenovo-xclarity-administrator>

## ThinkServer System Manager



ThinkServer System Manager (TSM) is Lenovo’s integrated systems management technology is standard on all next-generation ThinkServer systems. TSM operates independently of the server. It provides hardware-based, out-of-band remote access and management to ThinkServer systems, regardless of the server’s power state or the condition of the operating system.

TSM is a fully featured management solution that is built on open industry standards that can help reduce related IT expenses by increasing a server administrator’s productivity. TSM provides important health and status information to systems administrators. It also enables administrators to remotely perform most functions that otherwise require a visit to the server.

TSM can be used as part of any server systems management infrastructure and is well-suited for customers who are deploying servers in remote branches, limited-access data centers, and where one-on-one remote-control capability is required. Lenovo’s design advancements address key system management concerns. In particular, TSM is a low-cost solution that supports heterogeneous environments, provides full remote management capability, and supports remote deployment.

Remote access to TSM is via a dedicated systems management Ethernet port on the rear of the server. Alternatively, you can go to UEFI and configure the first of the two system Gigabit Ethernet ports to be shared between TSM and the installed operating system.

TSM provides the following key features:

- Remote server management through the following industry standard interfaces:
  - Secure HTML5 browser-based UI that is suitable for today’s mobile devices and tablets
  - IPMI 2.0
  - DCMI 1.0
  - WS-MAN
  - SMASH-CLP
  - SNMP v3 (Gets only)
- A PowerShell CLI provides increased flexibility and scripting capabilities
- Automatic out-of-band notification and alerts from:
  - SNMP Traps
  - SMTP (email) CIM indications
- Configurable via web and PowerShell CLI, IPMI, WS-Man, and SMASH-CLI interfaces

ThinkServer System Manager Premium, which is available as an optional hardware upgrade key, enables the following advanced features:

- A remote console that provides complete remote control of the server. A video viewer enables graphical console, keyboard, and mouse redirection of the server.
- Remote media capability that enables the attachment of local CD-ROMs, DVD-ROMs, USB mass storage devices, ISO images, and IMG images (which are created from local folders) to the remote server.
- License for Lenovo XClarity Energy Manager.

The following table lists ThinkServer System Manager Premium ordering information.

Table 31. ThinkServer System Manager Premium

Description	Part number	Maximum supported
Lenovo ThinkServer System Manager Premium Module	4XF0G45867	1

### Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager (formerly ThinkServer Energy Manager) is an agent-less, web-based console that provides power management for ThinkServer and System x servers. It enables server density and data center capacity to be increased through the use of power capping.

Lenovo XClarity Energy Manager is a licensed product. A single-node XClarity Energy Manager license is included with ThinkServer System Manager Premium. If your server does not have a TSM Premium module, Energy Manager licenses can be ordered as shown in the following table.

Table 32. Lenovo XClarity Energy Manager

Description	Part number	Maximum supported
4L40E51621	Lenovo XClarity Energy Manager Node License	1 node
4L40E51622	Lenovo XClarity Energy Manager Node License Pack	5 nodes
4L40E51623	Lenovo XClarity Energy Manager Node License Pack	50 nodes

### ThinkServer Deployment Manager

Embedded within every Lenovo next-generation ThinkServer system, ThinkServer Deployment Manager is a tools suite that provides a complete set of provisioning capabilities from a single interface. ThinkServer Deployment Manager automates many of the tasks that are associated with server provisioning, including hardware configuration, operating system deployment, device drivers (for operating system installation), firmware updates, and server cloning. Because ThinkServer Deployment Manager is integrated into the UEFI preboot environment, the tools operate independently of the server and are available regardless of system's operational state. Formatting a system drive or reinstalling the operating system does not remove the tools, and there are no CDs or DVDs to retrieve or store, which affects user experience or productivity.

### Operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 for x64
- SUSE LINUX Enterprise Server 12
- Red Hat Enterprise Linux 6 x86
- Red Hat Enterprise Linux 6 x64
- Red Hat Enterprise Linux 7
- VMware ESXi 5.5
- VMware ESXi 6.0
- Citrix XenServer 6.5.1

**Note:** VMware ESXi does not support the RAID 110i or AnyRAID 110i controllers.

For the latest compatibility information, see the Operating System Interoperability Guide, <http://lenovopress.com/osig>

## Security

The RD450 supports the following security features.

### Trusted Platform Module (TPM)

The RD450 provides an optional Trusted Platform Module (TPM) to securely store the passwords, certificates, and encryption keys that might be used to authenticate the platform. TPM is a hardware-based system security feature that supports Trusted Computing Group (TCG) 1.2. TPM supports Windows BitLocker Drive encryption, which is a Windows data protection feature. BitLocker uses the TPM to protect user data and to ensure that a Windows server was not tampered with.

The Trusted Platform Module ordering information is listed in the following table.

The table also lists the Trusted Cryptographic Module (TCM) which is the equivalent component for use in China.

Table 33. Trusted Platform Module ordering information

Part number	Description	Maximum supported
4XF0G45908	ThinkServer Trusted Platform Module II (not for use in China)	1
4XF0G45869	ThinkServer Gen 5 Trusted Cryptographic Module (China only)	1

### Chassis intrusion switch

The intrusion switch informs you if the server cover is not properly installed or closed by creating an event in the system event log (SEL). The following figure shows where the switch is located.

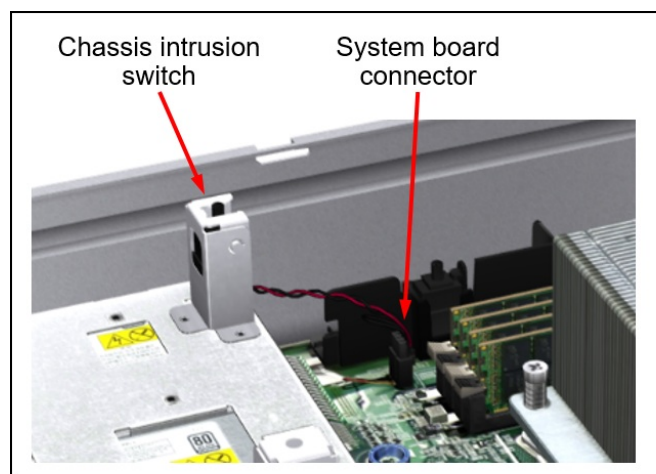


Figure 8. Chassis intrusion switch

Some models include the chassis switch and cable. For custom configurations, the SBB part number can be selected.

Table 34. Chassis intrusion switch ordering information

Part number	Description	Maximum supported
SBB 0G16686	Chassis Intrusion Cable for RD450	1

## Rack installation

The RD450 supports sliding and static rails as listed in the following table. The rail systems are designed for toolless support, which enables ease of installation.

Static Rail specifications:

- Support for EIA-310-E rack cabinet
- Cable Management Bar (CMB) is available for the static rail option
- Toolless CMB installation
- Supports maximum server weight of 32 kg (71 lbs)
- Uses M5 Mounting screw

Sliding Rail specifications:

- Support for EIA-310-E rack cabinets
- Available with or without optional Cable Management Arm (CMA)
- CMA can be mounted on either side of the rack
- Toolless Slide and CMA installation
- Support for four post racks
- Supports drop lock feature
- Extends 832 mm (32.75 in)
- Supports maximum server weight of 32 kg (71 lbs)
- Uses M5 Mounting screws

The server supports the rack options listed in the following table.

Table 35. Rack installation options

Part number	Description
4XF0G45872	Lenovo ThinkServer Gen 5 2U 4-Post Slide Rail Kit
4XF0G45873	Lenovo ThinkServer Gen 5 4-Post Static Rail Kit
4XF0G45875	Lenovo ThinkServer Gen 5 2U Cable Management Arm
4XF0G45876	Lenovo ThinkServer Gen 5 Cable Management Bar

For keyboards and KVM console options, see the [KVM console options](#) section.

## Physical, thermal and acoustic specifications

Dimensions and weight (approximate):

- Height: 87 mm (3.4 in)
- Width: 482 mm (19 in)
- Depth: 783 mm (30.8 in)
- Weight:
  - Minimum configuration: 16 kg (35.3 lb)
  - Maximum configuration: 27 kg (59.5 lb)

Thermal specifications are as follows:

- Operating ambient temperature: 10°C - 35°C (50°F - 95°F)
- Transit ambient temperature: -40°C - +70°C (-40°F - 158°F)
- Operating Humidity: 20 % - 80 % RH, non-condensing
- Transit humidity: 8 % - 90 % RH, non-condensing
- Operating altitude: 0 - 3048 m (0 - 10,000 ft)
- Transit altitude: 7620 m (25,000 ft)

Noise levels:

- Minimum configuration:
  - LWAd: 3.6 bels (Idle), 3.7 bels (Operating)
  - m : 24.8 dB (Idle), 25.2 dB (Operating)
- Maximum configuration:
  - LWAd: 5.6 bels (Idle), 5.6 bels (Operating)
  - m : 39.4 dB (Idle), 42.3 dB (Operating)

## Warranty

The server has a three-year or one-year warranty (model dependent) with 24x7 standard call center support and 9x5 next business day onsite coverage. Lenovo offers services warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, and length of service coverage.

The Lenovo QuickPick tool helps locate compatible accessories and services and warranty information. Services offered may vary by geographic location. Access the tool via the following URL:  
<http://lenovoquickpick.com>

The following table explains warranty service definitions in more detail.

Table 36. Warranty service definitions

Term	Description
On-site service	A service technician will go to 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.
24x7x8 hour	A service technician is scheduled to arrive at the client's location within eight 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 will arrive 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.

The following Lenovo warranty service upgrades are available:

- Warranty and maintenance service upgrades:
  - Three, four, or five years of 9x5 or 24x7 service coverage
  - Onsite response time from next business day to 4 hour same-day
  - Warranty extension of up to 5 years
  - Post warranty extensions offered in 1-year increments
- Priority Technical Support  
 Lenovo's Priority Support Offering enhances our award-winning call center support to provide top priority queue assignment to specialized Lenovo technicians. Priority support accelerates call center troubleshooting to get your problems resolved quickly, and includes other value-added support for Lenovo provided software tools. Priority support can be purchased stand alone to match the base warranty of your system or in convenient bundles with our same-day response services.
- Keep Your Drive Multi-Drive  
 Lenovo's Keep Your Drive Multi-Drive 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 server. 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. Keep Your Drive Multi-Drive covers multiple drives and multiple failures with one service offering at one value price. This service can be purchased stand-alone to match the base warranty of your system or in convenient bundles with our same-day response services.

## Regulatory compliance

The server conforms to the following regulations:

- Energy Star 2.0 (excluding the 450W power supply unit)
- FCC class A: USA FCC 47 CFR Part 15-Subpart B; ANSI C63.4
- ICES class A: Canada ICES-003 Issue 5
- CB
- UL/cTUVus
- Germany GS
- Russia EAC
- Argentina AR-S
- Mexico NOM
- EU CE: EN55022; EN55024; EN61000-3-2;EN61000-3-3;
- International: CISPR22; CISPR 24
- Brazil (voluntary)
- China CCC: GB 9254
- CECP
- CELP
- Green Guard

## External drive enclosures

The server supports attachment to external drive enclosures using a RAID controller with external ports or a SAS host bus adapter. Adapters supported by the server are listed in the [SAS adapters for external storage](#) section.

The following table lists the external drive enclosures that can be used for direct-attach SAS storage. Lenovo Storage expansion units can also be used to expand the Lenovo Storage Systems listed in the [External storage systems](#) section.

Table 37. External expansion enclosures

Part number	Description
64111B1*	Lenovo Storage E1012 LFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD
64111B2	Lenovo Storage E1012 LFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD
64111B3*	Lenovo Storage E1024 SFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD
64111B4	Lenovo Storage E1024 SFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD
70F0 / 70F1**	Lenovo ThinkServer SA120

\* Not available for ordering in North America (United States and Canada).

\*\* Machine Type; see the Lenovo ThinkServer SA120 Product Guide (<http://lenovopress.com/tips1234>) for available models.

For details about supported adapters, drives and cables for the Lenovo Storage E1012 and E1024, see the Lenovo Press Product Guide:  
<http://lenovopress.com/lp0043>

For details about supported adapters, drives and cables for the Lenovo ThinkServer SA120, see the Lenovo Press Product Guide:  
<http://lenovopress.com/tips1234>



## External disk storage systems

The following table lists the NAS and SAN external storage systems that are offered by Lenovo.

Table 38. External disk storage systems

Part number	Description
Lenovo Network-Attached Storage (NAS connectivity)	
70FX / 70FY*	Lenovo Storage N3310
70G0 / 70G1*	Lenovo Storage N4610
Lenovo Storage S2200 (SAS, iSCSI, or FC host connectivity)	
64112B1	Lenovo Storage S2200 LFF Chassis SAS Single Controller, Rack Kit, 9x5NBD
64112B2	Lenovo Storage S2200 LFF Chassis SAS Dual Controller, Rack Kit, 9x5NBD
64114B1	Lenovo Storage S2200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64114B2	Lenovo Storage S2200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
64112B3	Lenovo Storage S2200 SFF Chassis SAS Single Controller, Rack Kit, 9x5NBD
64112B4	Lenovo Storage S2200 SFF Chassis SAS Dual Controller, Rack Kit, 9x5NBD
64114B3	Lenovo Storage S2200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64114B4	Lenovo Storage S2200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
Lenovo Storage S3200 (SAS, iSCSI, or FC host connectivity)	
64113B1	Lenovo Storage S3200 LFF Chassis SAS Single Controller, Rack Kit, 9x5NBD
64113B2	Lenovo Storage S3200 LFF Chassis SAS Dual Controller, Rack Kit, 9x5NBD
64116B1	Lenovo Storage S3200 LFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64116B2	Lenovo Storage S3200 LFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
64113B3	Lenovo Storage S3200 SFF Chassis SAS Single Controller, Rack Kit, 9x5NBD
64113B4	Lenovo Storage S3200 SFF Chassis SAS Dual Controller, Rack Kit, 9x5NBD
64116B3	Lenovo Storage S3200 SFF Chassis FC/iSCSI Single Controller, Rack Kit, 9x5NBD
64116B4	Lenovo Storage S3200 SFF Chassis FC/iSCSI Dual Controller, Rack Kit, 9x5NBD
Lenovo Storage V Series (SAS, iSCSI, FC, or FCoE host connectivity)	
6535C1D	Lenovo Storage V3700 V2 LFF Control Enclosure
6535EC1	Lenovo Storage V3700 V2 LFF Control Enclosure (Top Seller)
6535C2D	Lenovo Storage V3700 V2 SFF Control Enclosure
6535EC2	Lenovo Storage V3700 V2 SFF Control Enclosure (Top Seller)
6535C3D	Lenovo Storage V3700 V2 XP LFF Control Enclosure
6535EC3	Lenovo Storage V3700 V2 XP LFF Control Enclosure (Top Seller)
6535C4D	Lenovo Storage V3700 V2 XP SFF Control Enclosure
6535EC4	Lenovo Storage V3700 V2 XP SFF Control Enclosure (Top Seller)
6536C12	Lenovo Storage V5030 LFF Control Enclosure 3Yr S&S
6536C32	Lenovo Storage V5030 LFF Control Enclosure 5Yr S&S
6536C22	Lenovo Storage V5030 SFF Control Enclosure 3Yr S&S
6536C42	Lenovo Storage V5030 SFF Control Enclosure 5Yr S&S
IBM Storwize for Lenovo (SAS [except V7000], iSCSI, FC, or FCoE host connectivity)	
6096CU2**	IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit
6096CU3**	IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit

Part number	Description
6099L2C	IBM Storwize V3700 3.5-inch Storage Controller Unit
6099S2C	IBM Storwize V3700 2.5-inch Storage Controller Unit
6099T2C	IBM Storwize V3700 2.5-inch DC Storage Controller Unit
6194L2C†	IBM Storwize V5000 LFF Control Enclosure, w/3 Yr S&S
6194L2L‡	IBM Storwize V5000 LFF Control Enclosure, w/3 Yr S&S (LA)
61941A1†	IBM Storwize V5000 LFF Control Enclosure, w/5 Yr S&S
61941AL‡	IBM Storwize V5000 LFF Control Enclosure, w/5 Yr S&S (LA)
6194S2C†	IBM Storwize V5000 SFF Control Enclosure, w/3 Yr S&S
6194S2L‡	IBM Storwize V5000 SFF Control Enclosure, w/3 Yr S&S (LA)
61941C1†	IBM Storwize V5000 SFF Control Enclosure, w/5 Yr S&S
61941CL‡	IBM Storwize V5000 SFF Control Enclosure, w/5 Yr S&S (LA)
6195SC5†	IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S
6195SCL‡	IBM Storwize V7000 2.5-inch Storage Controller Unit, w/3 Yr S&S (LA)
61951F1†	IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S
61951FL‡	IBM Storwize V7000 2.5-inch Storage Controller Unit, w/5 Yr S&S (LA)

\* Machine Type; see the respective Product Guide in the NAS Storage category for models:

<http://lenovopress.com/storage/nas>

\*\* Available only in China.

† Available worldwide except Latin America.

‡ Available only in Latin America.

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

- Lenovo Network-Attached Storage: <http://lenovopress.com/storage/nas>
- Lenovo SAN Storage: <https://lenovopress.com/storage/san/lenovo>
- IBM Storwize: <https://lenovopress.com/storage/san/ibm>

## External backup units

The following table lists the external backup options that are offered by Lenovo.

Table 39. External backup options

Part number	Description
External RDX USB drives (System x, Flex System, NeXtScale, BladeCenter)	
362532Y	RDX External USB 3.0 Dock with 320GB Cartridge
362550Y	RDX External USB 3.0 Dock with 500GB Cartridge
36251TY	RDX External USB 3.0 Dock with 1TB Cartridge
External RDX USB drives (ThinkServer)	
4XF0G88929	Lenovo ThinkServer External RDX Tape Drive
External SAS tape backup drives	
6160S5E	IBM TS2250 Tape Drive Model H5S
6160S6E	IBM TS2260 Tape Drive Model H6S
6160S7E	IBM TS2270 Tape Drive Model H7S
External SAS tape backup autoloaders	
6171S5R	IBM TS2900 Tape Autoloader w/LTO5 HH SAS
6171S6R	IBM TS2900 Tape Autoloader w/LTO6 HH SAS
6171S7R	IBM TS2900 Tape Autoloader w/LTO7 HH SAS
External tape backup libraries	
61732UL	IBM TS3100 Tape Library Model L2U
61734UL	IBM TS3200 Tape Library Model L4U
Fibre Channel backup drives for TS3100 and TS3200 Tape Libraries	
00NA107	6173 LTO Ultrium 5 Fibre Channel Drive
00NA113	6173 LTO Ultrium 5 Half High Fibre Drive Sled
00NA115	6173 LTO Ultrium 6 Fibre Channel Drive
00NA119	6173 LTO Ultrium 6 Half High Fibre Drive Sled
00WF765	6173 LTO Ultrium 7 Fibre Channel Drive
00WF769	6173 LTO Ultrium 7 Half High Fibre Drive Sled
SAS backup drives for TS3100 and TS3200 Tape Libraries	
00NA109	6173 LTO Ultrium 5 SAS Drive Sled
00NA111	6173 LTO Ultrium 5 Half High SAS Drive Sled
00NA117	6173 LTO Ultrium 6 Half High SAS Drive Sled
00WF767	6173 LTO Ultrium 7 Half High SAS Drive Sled

For more information, see the list of Product Guides in the Backup units category:

<https://lenovopress.com/servers/options/backup>

## Top-of-rack Ethernet switches

The following table lists the Ethernet LAN switches that are offered by Lenovo.

Table 40. Ethernet LAN switches

Part number	Description
1 Gb Ethernet switches	
7165H1X	Juniper EX2300-C PoE Switch
7165H2X	Juniper EX2300-24p PoE Switch
7159BAX	Lenovo RackSwitch G7028 (Rear to Front)
7159CAX	Lenovo RackSwitch G7052 (Rear to Front)
7159G52	Lenovo RackSwitch G8052 (Rear to Front)
10 Gb Ethernet switches	
7159BR6	Lenovo RackSwitch G8124E (Rear to Front)
7159G64	Lenovo RackSwitch G8264 (Rear to Front)
7159DRX	Lenovo RackSwitch G8264CS (Rear to Front)
7159CRW	Lenovo RackSwitch G8272 (Rear to Front)
7159GR6	Lenovo RackSwitch G8296 (Rear to Front)
40 Gb Ethernet switches	
7159BRX	Lenovo RackSwitch G8332 (Rear to Front)

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

- 1 Gb Ethernet switches: <http://lenovopress.com/networking/tor/1gb?rt=product-guide>
- 10 Gb Ethernet switches: <http://lenovopress.com/networking/tor/10gb?rt=product-guide>
- 40 Gb Ethernet switches: <http://lenovopress.com/networking/tor/40gb?rt=product-guide>

## Fibre Channel SAN switches

The following table lists the Fibre Channel SAN switches that are offered by Lenovo and can be used with this system.

Table 41. Fibre Channel SAN switches

Part number	Description
8 Gb Fibre Channel	
3873AR3	Lenovo B300, 8 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit
3873AR4	Lenovo B6505, 12 ports activated w/ 8Gb SWL SFPs, 1 PS, Rail Kit
3873BR2	Lenovo B6510, 24 ports activated w/ 8Gb SWL SFPs, 2 PS, Rail Kit
3873AR1*	Brocade 300 FC SAN Switch
16 Gb Fibre Channel	
3873AR5	Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit
3873BR3	Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit
3873AR2*	Brocade 6505 FC SAN Switch
3873BR1*	Brocade 6510 FC SAN Switch

\* Withdrawn from marketing

For more information, see the list of Product Guides in the Rack SAN Switches category:  
<http://lenovopress.com/storage/switches/rack>

## Uninterruptible power supply units

The following table lists the uninterruptible power supply (UPS) units that are offered by Lenovo.

Table 42. Uninterruptible power supply units

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

For more information, see the list of Product Guides in the UPS category:  
<https://lenovopress.com/servers/options/ups>

## Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo.

Table 43. Power distribution units

Part number	Description
<b>0U Basic PDUs</b>	
00YJ776	0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord
00YJ777	0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord
00YJ778	0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord
00YJ779	0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord
46M4143	0U 12 C19/12 C13 32A 3 Phase PDU with IEC 309 3P+N+Gnd line cord
<b>Switched and Monitored PDUs</b>	
00YJ781	0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord
00YJ780	0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord
00YJ782	0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord
00YJ783	0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord
46M4116	0U 24 C13 Switched and Monitored 30A PDU with NEMA L6-30P line cord
46M4137	0U 12 C19/12 C13 Switched and Monitored 32A 3 Phase PDU with IEC 309 3P+N+Gnd cord
46M4134	0U 12 C19/12 C13 Switched and Monitored 50A 3 Phase PDU with CS8365L 3P+Gnd cord
46M4002	1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)
46M4003	1U 9 C19/3 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
46M4004	1U 12 C13 Switched and Monitored DPI PDU (without line cord)
46M4005	1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord
<b>Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)</b>	
71762NX	Ultra Density Enterprise C19/C13 PDU Module (without line cord)
71763NU	Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord
<b>C13 Enterprise PDUs (12x IEC 320 C13 outlets)</b>	
39M2816	DPI C13 Enterprise PDU+ (without line cord)
39Y8941	DPI Single Phase C13 Enterprise PDU (without line cord)
<b>C19 Enterprise PDUs (6x IEC 320 C19 outlets)</b>	
39Y8948	DPI Single Phase C19 Enterprise PDU (without line cord)
39Y8923	DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord
<b>Front-end PDUs (3x IEC 320 C19 outlets)</b>	
39Y8938	DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord
39Y8939	DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord
39Y8934	DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8940	DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
39Y8935	DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord
<b>Universal PDUs (7x IEC 320 C13 outlets)</b>	
39Y8951	DPI Universal Rack PDU with US LV and HV line cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe line cord
39Y8953	DPI Universal Rack PDU with Denmark line cord
39Y8954	DPI Universal Rack PDU with Israel line cord
39Y8955	DPI Universal Rack PDU with Italy line cord

<b>Part number</b>	<b>Description</b>
39Y8956	DPI Universal Rack PDU with South Africa line cord
39Y8957	DPI Universal Rack PDU with UK line cord
39Y8958	DPI Universal Rack PDU with AS/NZ line cord
39Y8959	DPI Universal Rack PDU with China line cord
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
NEMA PDUs (6x NEMA 5-15R outlets)	
39Y8905	DPI 100-127V PDU with Fixed NEMA L5-15P line cord
Line cords for PDUs that ship without a line cord	
40K9611	DPI 32a Line Cord (IEC 309 3P+N+G)
40K9612	DPI 32a Line Cord (IEC 309 P+N+G)
40K9613	DPI 63a Cord (IEC 309 P+N+G)
40K9614	DPI 30a Line Cord (NEMA L6-30P)
40K9615	DPI 60a Cord (IEC 309 2P+G)
40K9617	DPI Australian/NZ 3112 Line Cord

For more information, see the Lenovo Press documents in the PDU category:  
<https://lenovopress.com/servers/options/pdu>

## Rack cabinets

The server supports the rack cabinets listed in the following table.

Table 44. Rack cabinets

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

For more information, see the list of Product Guides in the Rack cabinets category:

<https://lenovopress.com/servers/options/racks>

## KVM console options

The following table lists the supported KVM console, keyboards and KVM switches.

Table 45. Console keyboards

Part number	Description
Consoles	
17238BX	1U 18.5" Standard Console (without keyboard)
Console keyboards	
00MW310	Lenovo UltraNav Keyboard USB - US Eng
46W6713	Keyboard w/ Int. Pointing Device USB - Arabic 253 RoHS v2
46W6714	Keyboard w/ Int. Pointing Device USB - Belg/UK 120 RoHS v2
46W6715	Keyboard w/ Int. Pointing Device USB - Chinese/US 467 RoHS v2
46W6716	Keyboard w/ Int. Pointing Device USB - Czech 489 RoHS v2
46W6717	Keyboard w/ Int. Pointing Device USB - Danish 159 RoHS v2
46W6718	Keyboard w/ Int. Pointing Device USB - Dutch 143 RoHS v2



<b>Part number</b>	<b>Description</b>
46W6719	Keyboard w/ Int. Pointing Device USB - French 189 RoHS v2
46W6720	Keyboard w/ Int. Pointing Device USB - Fr/Canada 445 RoHS v2
46W6721	Keyboard w/ Int. Pointing Device USB - German 129 RoHS v2
46W6722	Keyboard w/ Int. Pointing Device USB - Greek 219 RoHS v2
46W6723	Keyboard w/ Int. Pointing Device USB - Hebrew 212 RoHS v2
46W6724	Keyboard w/ Int. Pointing Device USB - Hungarian 208 RoHS v2
46W6725	Keyboard w/ Int. Pointing Device USB - Italian 141 RoHS v2
46W6726	Keyboard w/ Int. Pointing Device USB - Japanese 194 RoHS v2
46W6727	Keyboard w/ Int. Pointing Device USB - Korean 413 RoHS v2
46W6728	Keyboard w/ Int. Pointing Device USB - LA Span 171 RoHS v2
46W6729	Keyboard w/ Int. Pointing Device USB - Norwegian 155 RoHS v2
46W6730	Keyboard w/ Int. Pointing Device USB - Polish 214 RoHS v2
46W6731	Keyboard w/ Int. Pointing Device USB - Portugese 163 RoHS v2
46W6732	Keyboard w/ Int. Pointing Device USB - Russian 441 RoHS v2
46W6733	Keyboard w/ Int. Pointing Device USB - Slovak 245 RoHS v2
46W6734	Keyboard w/ Int. Pointing Device USB - Spanish 172 RoHS v2
46W6735	Keyboard w/ Int. Pointing Device USB - Swed/Finn 153 RoHS v2
46W6736	Keyboard w/ Int. Pointing Device USB - Swiss F/G 150 RoHS v2
46W6737	Keyboard w/ Int. Pointing Device USB - Thai 191 RoHS v2
46W6738	Keyboard w/ Int. Pointing Device USB - Turkish 179 RoHS v2
46W6739	Keyboard w/ Int. Pointing Device USB - UK Eng 166 RoHS v2
46W6740	Keyboard w/ Int. Pointing Device USB - US Euro 103P RoHS v2
46W6741	Keyboard w/ Int. Pointing Device USB - Slovenian 234 RoHS v2
<b>Console switches</b>	
1754D2X	Global 4x2x32 Console Manager (GCM32)
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)
1754A1X	Local 1x8 Console Manager (LCM8)
<b>Console switch cables</b>	
43V6147	Single Cable USB Conversion Option (UCO)
39M2895	USB Conversion Option (4 Pack UCO)
46M5383	Virtual Media Conversion Option Gen2 (VCO2)
46M5382	Serial Conversion Option (SCO)

For more information, see the list of Product Guides in the KVM Switches and Consoles category:  
<http://lenovopress.com/servers/options/kvm>

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## Related publications and links

For more information, see these resources:

- ThinkServer RD450 product page  
<http://shop.lenovo.com/us/en/systems/servers/racks/thinkserver/rd450/>
- ThinkServer RD450 User Guide and Hardware Maintenance Manual  
[https://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd450\\_ug\\_hmm\\_en.pdf](https://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd450_ug_hmm_en.pdf)
- Lenovo Presale Advisor Tool (PSAT)  
<http://lenovo.presalesadvisor.com/Family/Family.aspx?id1=36>
- Lenovo Quick Pick  
<http://www.lenovoquickpick.com/usa/system/thinkserver/rd-series/rd450>
- Lenovo Think Option Compatibility Matrix (OCM):  
<http://www.lenovo.com/accessoriesguide>
- Lenovo Support for the RD450  
<http://support.lenovo.com/us/en/products/servers/thinkserver-rack-servers/thinkserver-rd450>
- ThinkServer Power Planner  
<http://support.lenovo.com/us/en/downloads/ds101155>
- Lenovo PSREF - Product Specifications Reference  
[http://psref.lenovo.com/Product/ThinkServer\\_RD450](http://psref.lenovo.com/Product/ThinkServer_RD450)

## Related product families

Product families related to this document are the following:

- [2-Socket Rack Servers](#)

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