Lenovo ThinkServer RD650 (E5-2600 v4)

Product Guide (withdrawn product)

The Lenovo® ThinkServer® RD650 is an enterprise class, 2U, two-socket server that features Intel® Xeon® processor E5-2600 v4 product family and supports up to 1.5 TB of DDR4 memory, 22 cores, and 44 threads per socket. With the capability to support mix and match internal hard disk drive (HDD) and solid-state drive (SSD) storage with up to 26x 2.5-inch drive bays, 40 Gbps integrated AnyFabric networking capability, up to six hot-swap dual rotor fans, hot-swap redundant power supplies, and a dedicated Gigabit Ethernet out-of-band management port, the ThinkServer RD650 provides leading features and capabilities.

Suggested uses: Server consolidation or virtualization, heavy web traffic workloads, data analytics, line-of-business applications.

The following figure shows the Lenovo ThinkServer RD650.

Figure 1. Lenovo ThinkServer RD650

Did you know?

Lenovo's distinctive AnyFabric design provides a wide choice of 1 Gb and 10 Gb Ethernet adapters, 10 Gb converged network adapters (CNAs), and 8 Gb and 16 Gb Fibre Channel host bus adapters (HBAs) to address growing network and storage connectivity bandwidth requirements without the use of a PCIe slot.

This storage-rich server provides up to 192 TB of storage capacity and features an industry-unique Lenovo AnyBay design that allows multiple storage types in the same drive bay. M.2 and SD card options are available, which enable flexible boot drive choices.

The RD650 provides Lenovo AnyRAID technology, a midplane RAID adapter design that connects directly to the drive backplane without using a PCIe slot. A comprehensive portfolio of AnyRAID controllers is available for various applications, which include software RAID and RAID on Chip-based controllers.

The RD650 delivers impressive compute power per watt, featuring 80 PLUS Titanium and Platinum redundant power supplies. This server is designed to meet ASHRAE A4 standards, which enable customers to lower energy costs.

The RD650 provides outstanding memory performance by supporting two DIMMs per channel at speeds up to 12% faster than the Intel specification, while still maintaining world-class reliability.

With an efficient cooling design, the RD650 can run continuously at 45 °C with no impact on reliability.

Key features

The ThinkServer RD650 is a versatile 2U two-socket business-critical server that offers improved performance and pay-as-you-grow flexibility along with improved systems management capabilities. This powerful system is designed for your most important business applications and cloud deployments.

Combining balanced performance and flexibility, the RD650 server is a great choice for small and medium businesses up to the large enterprise. 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.

Scalability and performance

The ThinkServer RD650 offers numerous features to boost performance, improve scalability, and reduce costs:

- Improves productivity by offering superior system performance with the Intel Xeon processor E5-2600 v4 product family with up to 22-core processors, up to 55 MB of L3 cache, and up to 9.6 GT/s QPI interconnect links.
    - Support for up to two processors, 44 cores, and 88 threads allows to maximize the concurrent execution of multithreaded 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.
- Up to 2400 MHz memory speeds with two DIMMs per channel running at 2400 MHz to help maximize system performance.
- Up to 1.5 TB of memory capacity with 64 GB Load Reduced DIMMs (LRDIMMs).
- 12 Gbps serial-attached SCSI (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 that feature an industry-unique Lenovo AnyBay™ design, which allows a choice of SAS, SATA or PCIe interface drives in the same bay, provide up to 192 TB of storage capacity in a 2U rack form factor.
- The use of SSDs instead of or along with traditional spinning HDDs can significantly improve I/O performance. An SSD can support a significantly higher number of I/O operations per second (IOPS) than a typical HDD.
- The RD650 server offers up to eight PCI Express (PCIe) 3.0 I/O expansion slots and an AnyFabric slot for a total of nine I/O slots in a 2U rack form factor.
- Leveraging the unique Lenovo AnyFabric design, the RD650 can house up to four 10 Gb Ethernet ports without taking up any of the available PCIe slots.
- The RD650 provides Lenovo AnyRAID® technology, which is a midplane RAID adapter that connects directly to the drive backplane without using a PCIe slot.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5-2600 v4 product family. This helps to dramatically reduce I/O latency and increase overall system performance.

Availability and serviceability

The ThinkServer RD650 provides many features to simplify serviceability and increase system uptime:

- Tool-less cover removal provides easy access to upgrades and serviceable parts, such as processors, memory DIMMs, and adapter cards.
- The RD650 server offers memory mirroring and memory rank sparing for redundancy in the event of a non-correctable memory failure.
- The RD650 server offers hot-swap drives supporting RAID redundancy for data protection and greater system uptime.
- The RD650 server offers redundant hot-swap power supplies and hot-swap redundant fans to provide availability for business-critical applications.
- SSDs offer significantly better reliability than traditional mechanical HDDs for greater uptime.
- Built-in ThinkServer System Manager (TSM) continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failure, to minimize downtime.
- Embedded Lenovo Diagnostics software speeds up troubleshooting to reduce service time.

Manageability and security

Powerful systems management features simplify local and remote management of the ThinkServer RD650 and deliver enterprise-class data protection:

- The server includes ThinkServer System Manager to monitor server availability and perform remote management.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Lenovo XClarity Administrator offers comprehensive hardware management tools that help to increase uptime, reduce costs and improve productivity through advanced server management capabilities.
- An optional Trusted Platform Module (TPM) supports the enablement of advanced cryptographic functionality, such as digital signatures and Windows BitLocker encryption.
- Embedded ThinkServer Deployment Manager (TDM) provides a complete set of provisioning capabilities from a single interface, which automates many of the tasks that are associated with server provisioning.

Energy efficiency

The ThinkServer RD650 offers the following energy-efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a 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 offer energy savings compared to 1.35 V and 1.5 V DDR3 DIMMs.
- System power profiles can be configured in UEFI to optimize usage for maximum performance or energy efficiency.
- Lenovo XClarity Energy Manager provide advanced data center power notification, analysis, and policy-based management to help achieve lower heat output and reduced cooling needs.

Components and connectors

The following figure shows the front of the RD650 3.5-inch drive bay models.

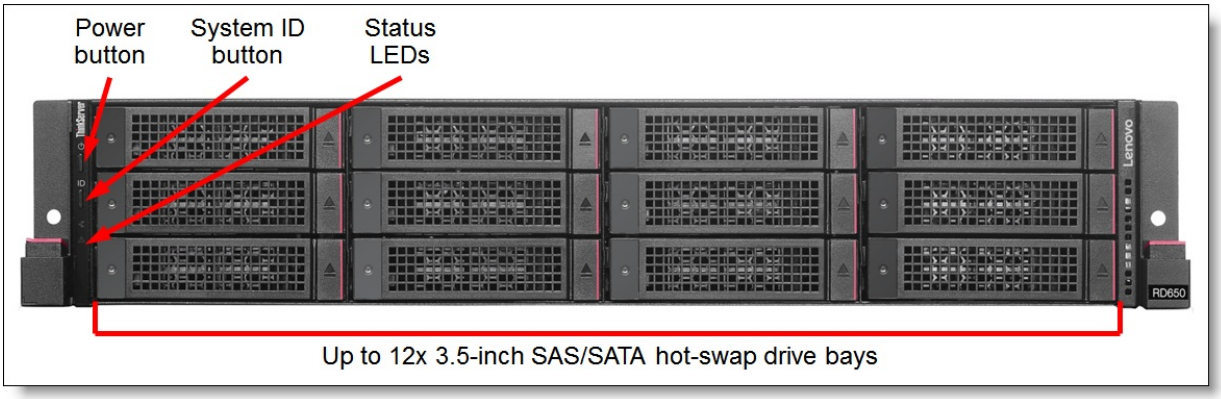

Figure 2. RD650 3.5-inch drive bay model front view

The following figure shows the front of the RD650 8x 2.5-inch drive bay models.

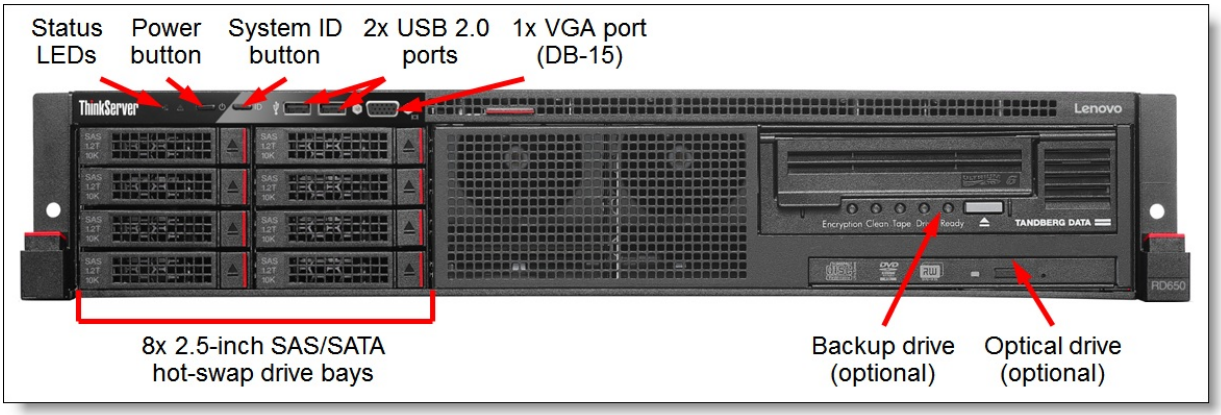

Figure 3. RD650 8x 2.5-inch drive bay model front view

The following figure shows the front of the RD650 16x 2.5-inch drive bay models.

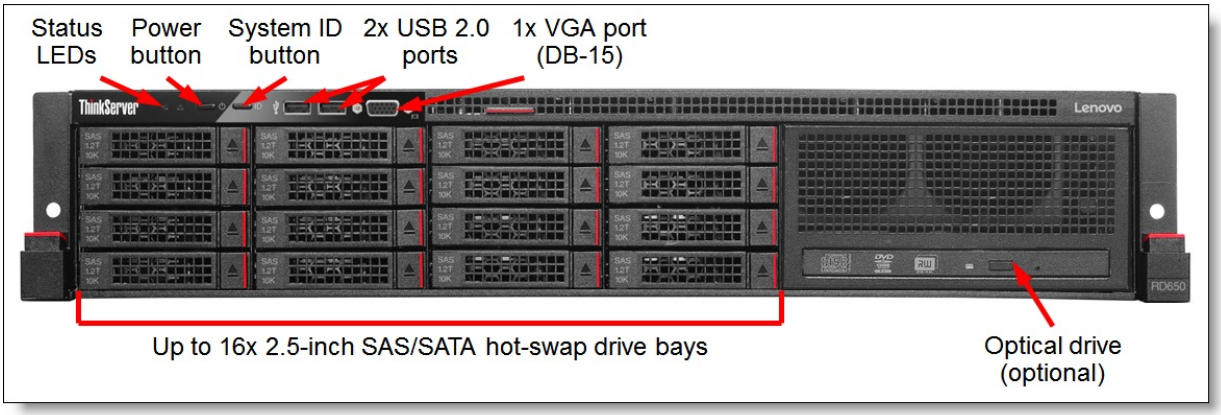

Figure 4. RD650 16x 2.5-inch drive bay model front view

The following figure shows the front of the RD650 24x 2.5-inch drive bay models.

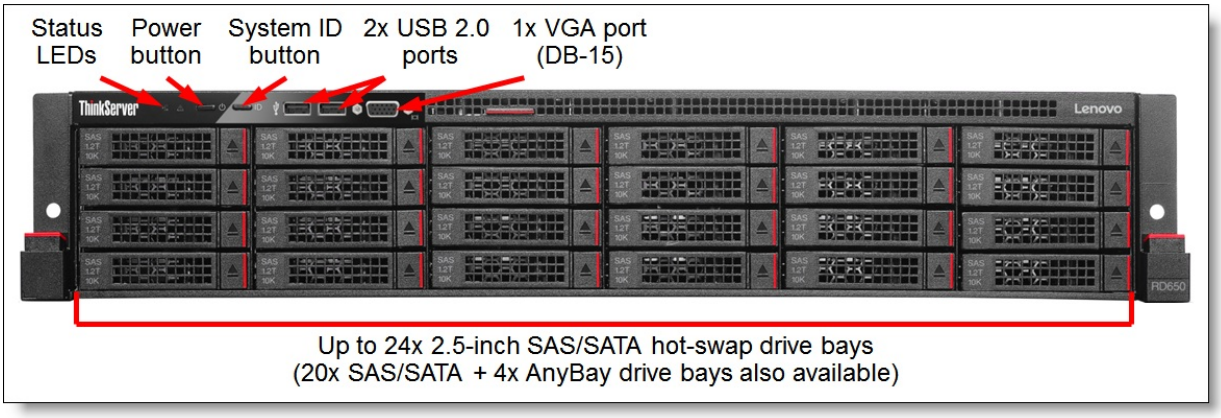

Figure 5. RD650 24x 2.5-inch drive bay model front view

The following figure shows the front of the RD650 hybrid 2.5-inch + 3.5-inch drive bay models.

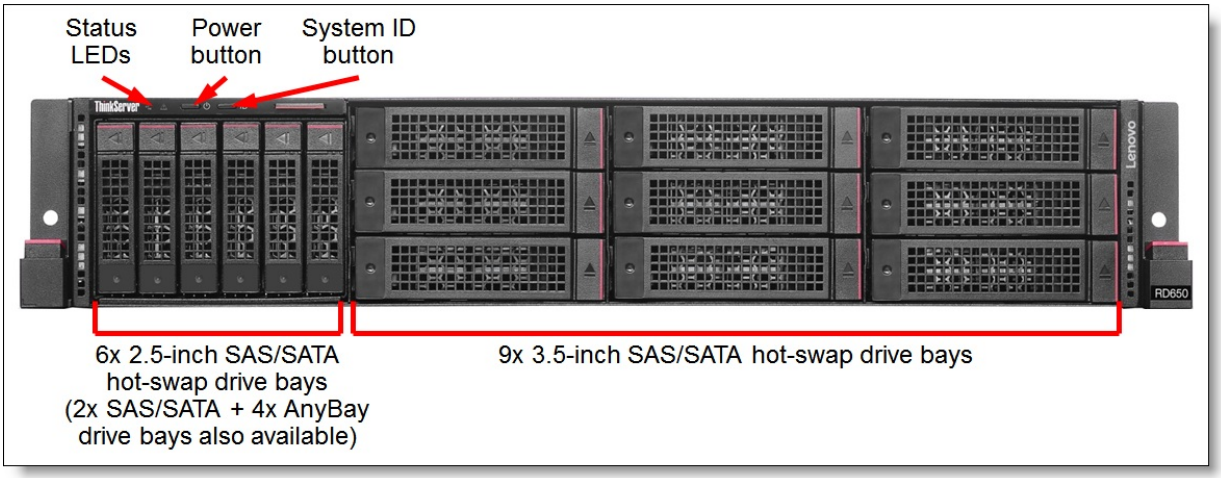

Figure 6. RD650 hybrid 2.5-inch + 3.5-inch drive bay model front view

The following figure shows the rear of the RD650 server.

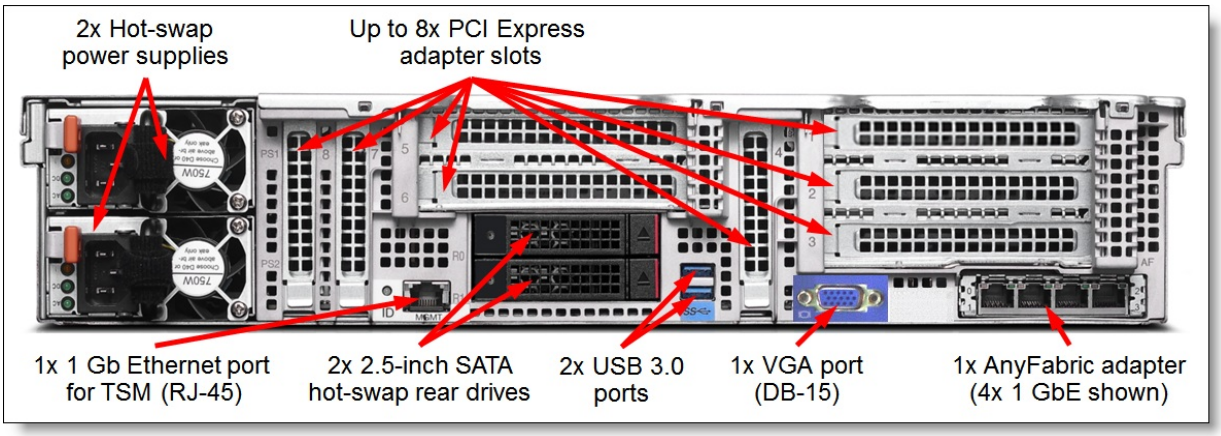

Figure 7. RD650 rear view

The following figure shows the internal components of the RD650 server.

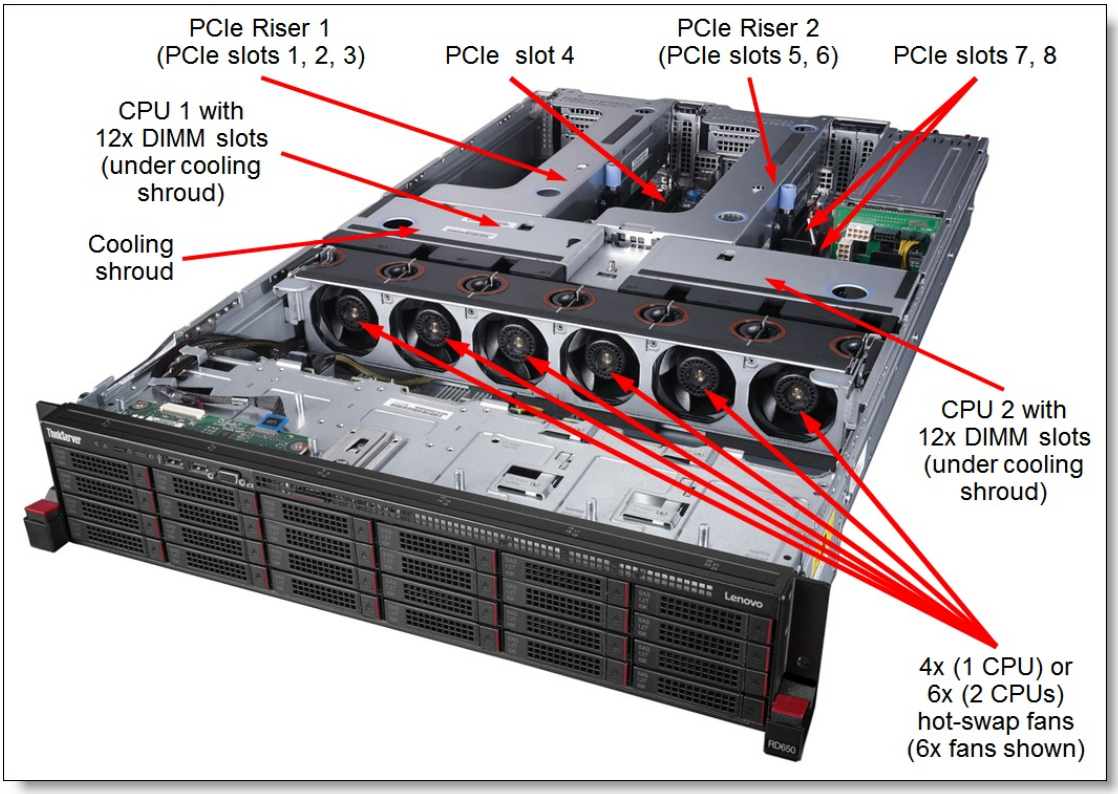

Figure 8. RD650 internal view

System specifications

The following table lists the ThinkServer RD650 system specifications.

Table 1. System specifications

Attribute	Specification
Form factor	2U rack-mount
Processor	Up to two processors of the Intel Xeon processor E5-2600 v4 product family: • Up to 22 cores (2.2 GHz core speeds) • Up to 3.5 GHz core speeds (4 cores) • Two QPI links up to 9.6 GT/s each • Up to 55 MB cache • Up to 2400 MHz memory speed
Chipset	Intel C610 Series.
Memory	Up to 24 DIMM sockets (12 DIMMs per processor; four memory channels per processor with three DIMMs per channel). Support for RDIMMs and LRDIMMs. Memory types cannot be intermixed. Memory speed up to 2400 MHz.
Maximum memory capacity	• With RDIMMs: Up to 768 GB with 24x 32 GB RDIMMs and two processors • With LRDIMMs: Up to 1.5 TB with 24x 64 GB LRDIMMs and two processors
Memory protection	Error-correcting code (ECC), Rank Sparing, Mirroring, and Lockstep Mode.

Attribute	Specification
Drive bays	Machine Types 70R7 and 70R8 (12x 3.5-inch chassis): ● 6x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 12x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) Machine Types 70RD and 70RE (8x 2.5-inch chassis): ● 8x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) Machine Types 70RF and 70RG (16x 2.5-inch chassis): ● 8x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 16x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) Machine Types 70R9 and 70RA (24x 2.5-inch chassis): ● 8x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 16x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 24x 2.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 20x 2.5-inch SAS/SATA hot-swap (front) + 4x 2.5-inch AnyBay (front)+ 2x 2.5-inch SATA hot-swap (rear) Machine Types 70RB and 70RC (Hybrid 6x 2.5-inch + 9x 3.5-inch chassis): ● 6x 2.5-inch SAS/SATA hot-swap (front) + 9x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5-inch SATA hot-swap (rear) ● 2x 2.5-inch SAS/SATA hot-swap (front) + 9x 3.5-inch SAS/SATA hot-swap (front) + 4x 2.5-inch AnyBay (front) + 2x 2.5-inch SATA hot-swap (rear)
Drive types	2.5-inch drives: ● SAS HDDs up to 1.8 TB ● Nearline (NL) SATA HDDs up to 2 TB ● SAS SSDs up to 7.68 TB ● SATA SSDs up to 3.84 TB ● PCIe 3.0 SSDs up to 3.84 TB 3.5-inch drives: ● SAS HDDs up to 1.8 TB ● NL SAS HDDs up to 10 TB ● NL SATA HDDs up to 12 TB ● SAS SSDs up to 3.84 TB ● SATA SSDs up to 3.84 TB M.2 Read-Optimized SSDs up to 120 GB. SD Cards up to 32 GB. Intermix of SAS and SATA HDDs and SSDs is supported within a system, but not within a RAID array.
Internal storage capacity	● 3.5-inch models: Up to 151.6 TB (12x 12 TB HDDs [front] + 2x 3.84 TB 2.5" SSDs [rear]). ● 2.5-inch models: Up to 192 TB (24x 7.68 TB SSDs + 2x 3.84 TB SSDs) ● Hybrid models: Up to 161.7 TB (9x 12 TB 3.5" HDDs + 6x 7.68 TB 2.5" SSDs + 2x 3.84 TB 2.5" SSDs)

Attribute	Specification

Storage controller	• 6 Gbps SATA: RAID 0, 1, 10 with RAID 110i. Optional RAID 5 upgrade is available.
	• 6 Gbps SAS/SATA: RAID 0, 1, and 10 with RAID 510i. Optional RAID 5 and 50 upgrade is available.
	• 12 Gbps SAS/6 Gbps SATA:
	  ◦ RAID 0, 1, and 10 with RAID 520i. Optional RAID 5 and 50 upgrade is available.
	  ◦ RAID 0, 1, 10, 5, and 50 with RAID 720i or 720ix. Optional (for 720i) or mandatory (for 720ix) cache memory upgrades are available: 1 GB non-backed; 1 GB, 2 GB, or 4 GB flash-backed. Cache upgrades include RAID 6 and 60 support. Flash backup upgrades include FastPath and CacheCade Pro 2.0 features.

Optical drive bays	• 8x 2.5-inch chassis: One (optional); support for DVD-ROM or DVD-RW. • 16x 2.5-inch chassis: One (optional); support for DVD-ROM or DVD-RW. • 3.5-inch, hybrid, and 24x 2.5-inch chassis: None; support for an external optical drive.
Tape drive bays	• 8x 2.5-inch chassis: One (optional); support for LTO 6 tape backup. • 3.5-inch, hybrid, and 16x and 24x 2.5-inch chassis: None; support for an external backup drive.
Network interfaces	One AnyFabric slot for optional AnyFabric adapters: • Dual-port 10 GbE RJ-45 • Dual-port 10 GbE SFP+ • Quad-port 10 GbE SFP+ • Quad-port GbE RJ-45
I/O expansion slots	Up to nine slots. Slots 4, 7, and 8 and AnyFabric slot are the fixed slots on the system planar, and the remaining slots depend on the riser cards installed. The slots are as follows: • AnyFabric slot (PCIe 3.0 x8) (horizontal slot on system planar) • Slot 1: PCIe 3.0 x8 full-height, half-length; or PCIe 3.0 x16 full-height, full-length (PCIe x16 slot is double-wide and available via CTO only) • Slot 2: PCIe 3.0 x8; full-height, half-length (not present if the slot 1 is PCIe x16) • Slot 3: PCIe 3.0 x8; full-height, half-length • Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar) • Slot 5: PCIe 3.0 x8 full-height, half-length; or PCIe 3.0 x16 full-height, full-length (PCIe x16 slot is double-wide and available via CTO only) • Slot 6: PCIe 3.0 x8; full-height, half-length (not present if the slot 5 is PCIe x16) • Slot 7: PCIe 3.0 x8; low profile (vertical slot on system planar) • Slot 8: PCIe 3.0 x8; low profile (vertical slot on system planar) Slots 4, 5, 6, 7, and 8 require the second processor to be installed.
Ports	• Front (2.5-inch chassis only): 2x USB 2.0 ports, 1x VGA port (DB-15). • Rear: 2x USB 3.0 ports, 1x VGA port (DB-9), 1x RJ-45 GbE management port for TSM. Optional serial port (DB-9).
Cooling	Four (with one processor) or six (with two processors) redundant hot-swap cooling fans.
Power supply	Up to two redundant hot-swap 550 W, 750 W, 1100 W, or 1600 W* 100-240 V AC Platinum power supplies or 750 W 200-240 V AC Titanium power supplies.
Hot-swap parts	Drives, power supplies, and fans.

Attribute	Specification
Systems management	UEFI, status and diagnostic LEDs, ThinkServer System Manager (TSM) (also known as Baseboard Management Controller [BMC]), ThinkServer Deployment Manager, ThinkServer Platform Update, and ThinkServer Diagnostics. Optional TSM Premium upgrade for remote presence (keyboard, video, mouse, and remote drive) and Lenovo XClarity Energy Manager support. Optional ThinkServer Partner Packs for VMware vCenter and Microsoft System Center. Optional Lenovo XClarity Administrator and Lenovo XClarity Energy Manager.
Security features	Administrator's password, optional Trusted Platform Module (TPM) version 1.2 or 2.0, optional intrusion switch.
Video	ASPEED AST2400 with 16 MB memory integrated into the ThinkServer System Manager. Maximum resolution is 1920x1200 at 60 Hz.
Operating systems	Microsoft Windows Server 2012, 2012 R2, and 2016; Red Hat Enterprise Linux (RHEL) Server 6 and 7; SUSE Linux Enterprise Server (SLES) 11 and 12; VMware vSphere (ESXi) 5.5 and 6.0; Citrix XenServer 6.5.
Limited warranty	One-year or three-year customer-replaceable unit (CRU) and on-site limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades (country-specific) are available through Lenovo Services offerings: 8-hour or 4-hour response time, warranty extension up to 5 years, Priority Technical Support, and Keep Your Drive Multi-Drive.
Dimensions	Height: 87 mm (3.4 in.), width: 447 mm (17.6 in.), depth: 764 mm (29.4 in.)
Weight	Minimum: 16 kg (35.3 lb), maximum: 32 kg (70.5 lb)

* If the 1600 W power supply is connected to a 100 - 127 V AC power source, the maximum output power will be limited to 1100 W. Rated output power of 1600 W can be achieved only when the power supply is connected to a 200 - 240 V AC power source

The RD650 server package includes the following items:

- Rail kit (select models)
- Cable management arm (select models)
- Rack installation instructions (select models)
- One or two rack power cords or line cords (select models)
- Documentation package

Relationship models

ThinkServer RD650 relationship models are region-specific; that is, each region may define their own server models, and not all server models are available in every region.

For a list of the RD650 relationship models (Machine Types 70R8, 70RA, 70RC, 70RE, and 70RG), contact a Lenovo or Lenovo Business Partner representative in your region.

Product availability: RD650 models are available in Asia Pacific (Australia, Hong Kong, and New Zealand), China, and EMEA (Europe, Middle East and Africa). EMEA models are available via Special Bid only.

TopSeller models

ThinkServer RD650 TopSeller models are region-specific; that is, each region may define their own server models, and not all server models are available in every region.

For a list of the RD650 TopSeller models (Machine Types 70R7, 70R9, 70RB, 70RD, and 70RF), contact a Lenovo or Lenovo Business Partner representative in your region.

Product availability: RD650 server models are available in Asia Pacific (Australia, Hong Kong, and New Zealand), China, and EMEA (Europe, Middle East and Africa). EMEA models are available via Special Bid only.

Processors

The ThinkServer RD650 supports up to two processors of the Intel Xeon processor E5-2600 v4 product family. The following table lists the specifications of the processors for the RD650 server.

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

Processor model	Core frequency (Base / TB Max)	Number of cores / threads	Cache	Max DDR4 frequency	QPI speed	TDP	HT	TB	VT-x	VT-d
E5-2603 v4	1.7 GHz	6 / 6	15 MB	1866 MHz	6.4 GT/s	85 W	No	No	Yes	Yes
E5-2609 v4	1.7 GHz	8 / 8	20 MB	1866 MHz	6.4 GT/s	85 W	No	No	Yes	Yes
E5-2620 v4	2.1 / 3 GHz	8 / 16	20 MB	2133 MHz	8.0 GT/s	85 W	Yes	Yes	Yes	Yes
E5-2623 v4	2.6 / 3.2 GHz	4 / 8	10 MB	2133 MHz	8.0 GT/s	85 W	Yes	Yes	Yes	Yes
E5-2630 v4	2.2 / 3.1 GHz	10 / 20	25 MB	2133 MHz	8.0 GT/s	85 W	Yes	Yes	Yes	Yes
E5-2630L v4	1.8 / 2.9 GHz	10 / 20	25 MB	2133 MHz	8.0 GT/s	55 W	Yes	Yes	Yes	Yes
E5-2637 v4	3.5 / 3.7 GHz	4 / 8	15 MB	2400 MHz	9.6 GT/s	135 W	Yes	Yes	Yes	Yes
E5-2640 v4	2.4 / 3.4 GHz	10 / 20	25 MB	2133 MHz	8.0 GT/s	90 W	Yes	Yes	Yes	Yes
E5-2643 v4	3.4 / 3.7 GHz	6 / 12	20 MB	2400 MHz	9.6 GT/s	135 W	Yes	Yes	Yes	Yes
E5-2650 v4	2.2 / 2.9 GHz	12 / 24	30 MB	2400 MHz	9.6 GT/s	105 W	Yes	Yes	Yes	Yes
E5-2650L v4	1.7 / 2.5 GHz	14 / 28	35 MB	2400 MHz	9.6 GT/s	65 W	Yes	Yes	Yes	Yes
E5-2660 v4	2 / 3.2 GHz	14 / 28	35 MB	2400 MHz	9.6 GT/s	105 W	Yes	Yes	Yes	Yes
E5-2667 v4	3.2 / 3.6 GHz	8 / 16	25 MB	2400 MHz	9.6 GT/s	135 W	Yes	Yes	Yes	Yes
E5-2680 v4	2.4 / 3.3 GHz	14 / 28	35 MB	2400 MHz	9.6 GT/s	120 W	Yes	Yes	Yes	Yes
E5-2683 v4	2.1 / 3 GHz	16 / 32	40 MB	2400 MHz	9.6 GT/s	120 W	Yes	Yes	Yes	Yes
E5-2690 v4	2.6 / 3.5 GHz	14 / 28	35 MB	2400 MHz	9.6 GT/s	135 W	Yes	Yes	Yes	Yes
E5-2695 v4	2.1 / 3.3 GHz	18 / 36	45 MB	2400 MHz	9.6 GT/s	120 W	Yes	Yes	Yes	Yes
E5-2697 v4	2.3 / 3.6 GHz	18 / 36	45 MB	2400 MHz	9.6 GT/s	145 W	Yes	Yes	Yes	Yes
E5-2697A v4	2.6 / 3.6 GHz	16 / 32	40 MB	2400 MHz	9.6 GT/s	145 W	Yes	Yes	Yes	Yes
E5-2698 v4	2.2 / 3.6 GHz	20 / 40	50 MB	2400 MHz	9.6 GT/s	135 W	Yes	Yes	Yes	Yes
E5-2699 v4	2.2 / 3.6 GHz	22 / 44	55 MB	2400 MHz	9.6 GT/s	145 W	Yes	Yes	Yes	Yes
E5-2699R v4	2.2 / 3.6 GHz	22 / 44	55 MB	2400 MHz	9.6 GT/s	145 W	Yes	Yes	Yes	Yes
E5-2699A v4	2.4 / 3.6 GHz	22 / 44	55 MB	2400 MHz	9.6 GT/s	145 W	Yes	Yes	Yes	Yes

For RD650 server models that come standard with one processor, the second processor can be ordered, if required (see the following table for ordering information). The second processor must be of the same model as the first processor. The second processor option includes two system fans.

Table 3. Processor options

Description	Part number
ThinkServer RD650 Intel Xeon E5-2603 v4 (6C, 85W, 1.7GHz) Processor	4XG0G89092
ThinkServer RD650 Intel Xeon E5-2609 v4 (8C, 85W, 1.7GHz) Processor	4XG0G89087
ThinkServer RD650 Intel Xeon E5-2620 v4 (8C, 85W, 2.1GHz) Processor	4XG0G89082
ThinkServer RD650 Intel Xeon E5-2623 v4 (4C, 85W, 2.6GHz) Processor	4XG0G89097
ThinkServer RD650 Intel Xeon E5-2630 v4 (10C, 85W, 2.2GHz) Processor	4XG0G89077

Description	Part number
ThinkServer RD650 Intel Xeon E5-2630L v4 (10C, 55W, 1.8GHz) Processor	4XG0G89107
ThinkServer RD650 Intel Xeon E5-2637 v4 (4C, 135W, 3.5GHz) Processor	4XG0G89048
ThinkServer RD650 Intel Xeon E5-2640 v4 (10C, 90W, 2.4GHz) Processor	4XG0G89072
ThinkServer RD650 Intel Xeon E5-2643 v4 (6C, 135W, 3.4GHz) Processor	4XG0G89045
ThinkServer RD650 Intel Xeon E5-2650 v4 (12C, 105W, 2.2GHz) Processor	4XG0G89067
ThinkServer RD650 Intel Xeon E5-2650L v4 (14C, 65W, 1.7GHz) Processor	4XG0G89102
ThinkServer RD650 Intel Xeon E5-2660 v4 (14C, 105W, 2.0GHz) Processor	4XG0G89062
ThinkServer RD650 Intel Xeon E5-2667 v4 (8C, 135W, 3.2GHz) Processor	4XG0G89042
ThinkServer RD650 Intel Xeon E5-2680 v4 (14C, 120W, 2.4GHz) Processor	4XG0G89057
ThinkServer RD650 Intel Xeon E5-2683 v4 (16C, 120W, 2.1GHz) Processor	4XG0G89054
ThinkServer RD650 Intel Xeon E5-2690 v4 (14C, 135W, 2.6GHz) Processor	4XG0G89039
ThinkServer RD650 Intel Xeon E5-2695 v4 (18C, 120W, 2.1GHz) Processor	4XG0G89051
ThinkServer RD650 Intel Xeon E5-2697 v4 (18C, 145W, 2.3GHz) Processor	4XG0G89111
ThinkServer RD650 Intel Xeon E5-2697A v4 (16C, 145W, 2.6GHz) Processor	4XG0G89113
ThinkServer RD650 Intel Xeon E5-2698 v4 (20C, 135W, 2.2GHz) Processor	4XG0G89036
ThinkServer RD650 Intel Xeon E5-2699 v4 (22C, 145W, 2.2GHz) Processor	4XG0G89109
ThinkServer RD650 Intel Xeon E5-2699R v4 (22C, 145W, 2.2GHz) Processor	4XG0G89118
ThinkServer RD650 Intel Xeon E5-2699A v4 (22C, 145W, 2.4GHz) Processor	4XG0G89116

Memory

The RD650 server supports up to 12 DIMMs when one processor is installed and up to 24 DIMMs when two processors are installed. Each processor has four memory channels and there are three DIMMs per channel. Lenovo DDR4 memory is compatibility tested and tuned for optimal ThinkServer performance and throughput. From a service and support standpoint, Lenovo memory automatically assumes the system warranty, and Lenovo provides service and support worldwide.

ThinkServer engineering tested and validated system designs that support memory speeds beyond Intel's original plan, which provides benefits for workloads that require memory speed and density. Lenovo ThinkServer memory is fully supported up to the rated speeds that are shown in the following table.

Table 4. RD650 maximum memory speeds and capacities

DIMMs per channel	RDIMM		LRDIMM	
	Memory bus speed	Maximum capacity	Memory bus speed	Maximum capacity
1 DPC	2400 MHz	256 GB (8x 32 GB)	2400 MHz	512 GB (8x 64 GB)
2 DPC	2400 MHz	512 GB (16x 32 GB)	2400 MHz	1 TB (16x 64 GB)
3 DPC	1866 MHz	768 GB (24x 32 GB)	2133 MHz	1.5 TB (24x 64 GB)

The following rules apply when the memory configuration is selected:

- The server supports RDIMMs and LRDIMMs.
- Mixing different types of memory (RDIMMs and LRDIMMs) is not supported.
- DIMM capacities and rank can be mixed.
- All DIMMs in the server operate at the same speed, which is determined as the lowest value of:
    - Memory speed that is supported by the specific processor.
    - Memory speed for selected quantity of DIMMs per channel.

The following memory protection technologies are supported:

- ECC
- Lockstep (SDDC x4/x8)
- Memory mirroring
- Memory sparing
- Patrol scrubbing
- Demand scrubbing

If lockstep or memory mirroring is used, RDIMMs must be installed in pairs (a minimum of one pair per each processor), and both RDIMMs 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.

Lockstep, memory mirroring, and memory sparing modes are mutually exclusive. Only one operational memory mode can be enabled on the server, and it is a system-wide setting.

The following table lists available memory options for the RD650 server.

Table 5. Memory options

Description	Part number	Maximum supported*
RDIMMs		
ThinkServer 8GB DDR4-2400MHz (1Rx4) RDIMM	4X70G88318	12 / 24
ThinkServer 16GB DDR4-2400MHz (2Rx4) RDIMM	4X70G88319	12 / 24
ThinkServer 16GB DDR4-2400MHz (2Rx8) RDIMM	4X70G88330	12 / 24
ThinkServer 32GB DDR4-2400MHz (2Rx4) RDIMM	4X70G88320	12 / 24
LRDIMMs		
ThinkServer 64GB DDR4-2400MHz (4Rx4) LRDIMM	4X70G88321	12 / 24

* The maximum quantity shown is with one processor / two processors.

Internal storage

The RD650 server supports the following internal storage configurations:

1. 8x 2.5-inch SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear) + optical drive bay + backup drive bay
2. Up to 18x 2.5-inch drive bays with the optical drive bay:
    a. 8x SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear) + optical drive bay
    b. 16x SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear) + optical drive bay
3. Up to 26x 2.5-inch drive bays:
    a. 8x SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear)
    b. 16x SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear)
    c. 24x SAS/SATA hot-swap (front) + 2x SATA hot-swap (rear)
    d. 20x SAS/SATA hot-swap (front) + 4x AnyBay (front) + 2x SATA hot-swap (rear)
4. Up to 14 drive bays:
    a. 6x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5 SATA hot-swap (rear)
    b. 12x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5 SATA hot-swap (rear)
5. Up to 15 drive bays:
    a. 6x 2.5-inch + 9x 3.5-inch SAS/SATA hot-swap (front) + 2x 2.5 SATA hot-swap (rear)
    b. 2x 2.5-inch + 9x 3.5-inch SAS/SATA hot-swap (front) + 4x AnyBay (front) + 2x SATA hot-swap (rear)

The following figure shows these internal drive configurations.

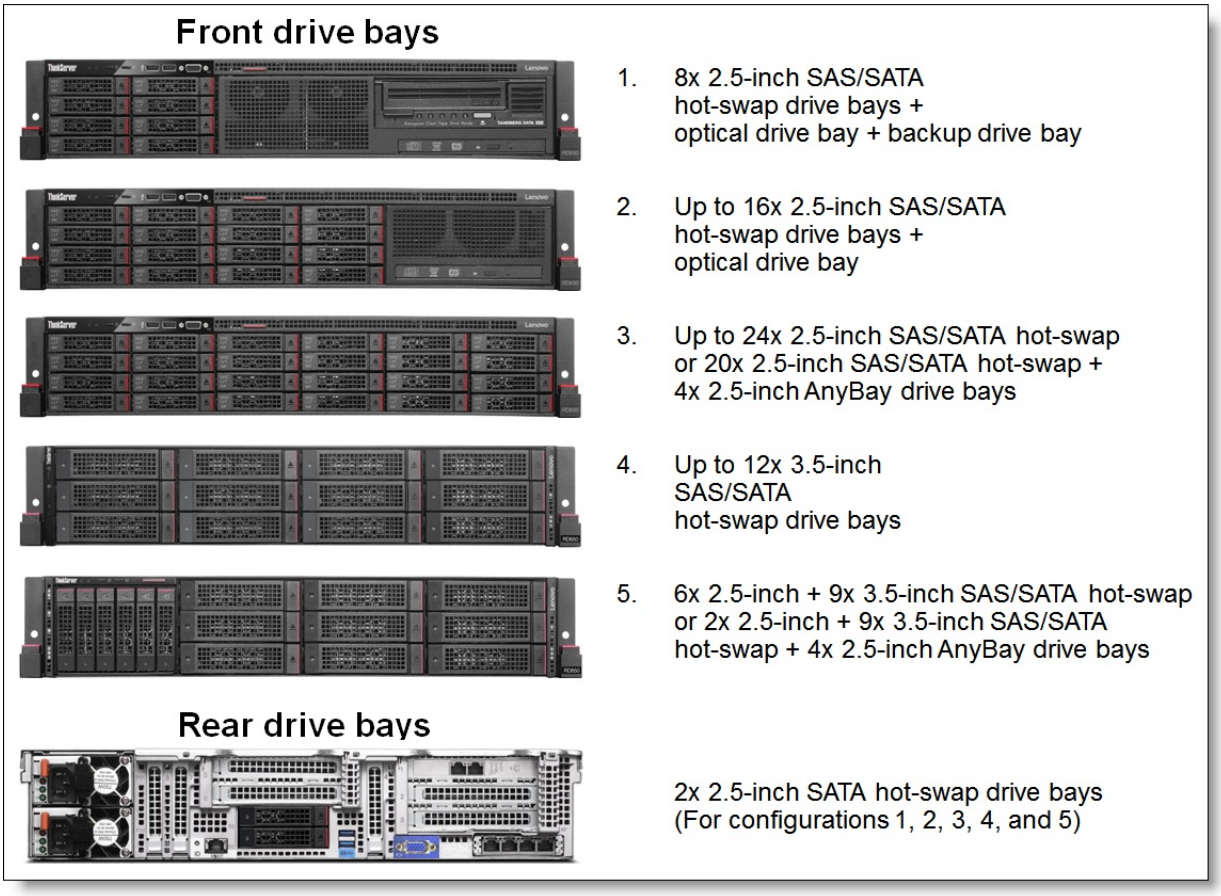

Figure 9. Internal drive configurations

In addition, the RD650 server models can be upgraded with 2x SD card internal slots, or 2x M.2 SSD internal slots, or both. The SD card slots are connected to the Intel Platform Controller Hub (PCH) via USB; therefore, they do not require a RAID controller. The M.2 SSD slots require a supported RAID controller (for details, see Controllers for internal storage).

Configuration notes:

- M.2 SSD slots and 2x 2.5-inch rear drive bays are mutually exclusive, that is, either M.2 SSD slots or 2x 2.5-inch rear drive bays can be selected in the configuration, but not both. The internal backup drive cannot be used if M.2 SDDs or rear drives are used in the configuration.
- If the internal backup drive is used in the configuration, neither M.2 SSD slots nor rear drive bays can be used.
- The RD650 server also supports configurations without front and rear drive bays; the SD card or M.2 SSD options can be used as bootable devices.

The following table shows the internal storage options available for the RD650 server.

Table 6. Internal storage options

Description	Part number	Maximum supported
ThinkServer Gen 5 2U 2.5" 8-Drive Backplane Kit	4XF0G45883	2
ThinkServer Gen 5 2U 2.5" 16-Drive Backplane Kit	4XF0G45884	1
ThinkServer Gen 5 2.5" 2-Drive Rear Backplane Kit	4XF0G45877	1
ThinkServer RD650 2.5x24 Chassis AnyBay Enablement Kit	4XF0G88925	1
ThinkServer RD650 Hybrid Chassis AnyBay Enablement Kit	4XF0G88926	1
ThinkServer SDHC Flash Assembly Module	4XF0G88933	1
ThinkServer RD650 M.2 Enablement Kit to Motherboard	4XF0G45891	1
ThinkServer M.2 Enablement Kit for RD650 with RAID720ix	4XF0G45890	1

Configuration notes:

- The 8-Drive Backplane Kit (4XF0G45883) is used to upgrade server models without any drive bays to 8x 2.5-in. SAS/SATA hot-swap drive bays, or models with 8x 2.5-in. SAS/SATA hot-swap drive bays and without optical and backup drive bays to 16x 2.5-in. SAS/SATA hot-swap drive bays.
- The 16-Drive Backplane Kit (4XF0G45884) is used to upgrade server models with 8x 2.5-in. SAS/SATA hot-swap drive bays and without optical and backup drive bays to 24x 2.5-in. SAS/SATA hot-swap drive bays.

For additional configuration guidelines, refer to Controllers for internal storage.

Controllers for internal storage

The following table lists the RAID controllers and the additional options used for the internal storage of the RD650 server. AnyRAID controllers are connected directly to the drive backplane, without the use of a PCIe slot. PCIe RAID controllers are supported in the PCIe slot 1. Two PCIe interposers that are included in the RD650 AnyBay Enablement Kit (4XF0G88925 or 4XF0G88926) require two processors and are supported in the PCIe slots 3 and 8.

Table 7. Controllers for internal storage

Description	Part number	Maximum supported
Onboard controllers		
Lenovo ThinkServer RAID 110i Controller	None*	1
AnyRAID controllers		
Lenovo ThinkServer RAID 510i AnyRAID Adapter	4XB0F28691	1
Lenovo ThinkServer RAID 720i AnyRAID Adapter	4XC0G88838	1
Lenovo ThinkServer RAID 720ix AnyRAID Adapter with Expander	4XC0G88839	1
PCIe RAID controllers		
Lenovo ThinkServer RAID 520i PCIe Adapter	4XC0G88850	1
Lenovo ThinkServer RAID 720i PCIe Adapter	4XC0G88849	1
Controller upgrades		
Lenovo ThinkServer RAID 110i RAID 5 Upgrade	4XB0F28690	1

Description	Part number	Maximum supported
Lenovo ThinkServer RAID 510i RAID 5/50 Upgrade	4XB0F28692	1
Lenovo ThinkServer RAID 520i RAID 5 Upgrade	4XC0G88841	1
Lenovo ThinkServer RAID 720i 1GB Modular DRAM Upgrade	4XB0F28695	1
Lenovo ThinkServer RAID 720i 1GB Modular Flash and Supercapacitor Upgrade	4XB0F28696	1
Lenovo ThinkServer RAID 720i 2GB Modular Flash and Supercapacitor Upgrade	4XB0F28697	1
Lenovo ThinkServer RAID 720i 4GB Modular Flash and Supercapacitor Upgrade	4XB0F28698	1
PCIe interposer		
PCIe interposer	None**	2

* Onboard hardware-assist, software RAID controller (Embedded MegaRAID).
** Two PCI interposers are included in the RD650 AnyBay Enablement Kit (4XF0G88925 or 4XF0G88926).

The following table summarizes features of supported storage controllers.

Table 8. Storage controller features and specifications summary

Feature	RAID 110i AnyRAID	RAID 510i AnyRAID	RAID 520i PCIe	RAID 720i PCIe	RAID 720i AnyRAID	RAID 720ix AnyRAID
Part number	None	4XB0F28691	4XC0G88850	4XC0G88849	4XC0G88838	4XC0G88839
Form factor	Onboard	AnyRAID	Low profile	Low profile	AnyRAID	AnyRAID
Controller chip	Not applicable	LSI SAS2008	LSI SAS3008	LSI SAS3108	LSI SAS3108	LSI SAS3108
Host interface	Not applicable	PCIe 2.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8	PCIe 3.0 x8
Port interface	6 Gbps SATA	6 Gbps SAS	12 Gbps SAS	12 Gbps SAS	12 Gbps SAS	12 Gbps SAS
Number of internal ports	8	8	8	8	8	8
Internal port connectors	Backplane connector	Backplane connector	2x Mini-SAS HD x4 (SFF-8643)	2x Mini-SAS HD x4 (SFF-8643)	Backplane connector	Backplane connector
Drive interface	SATA	SAS, SATA	SAS, SATA	SAS, SATA	SAS, SATA	SAS, SATA
Drive type	HDD, SSD	HDD, SSD	HDD, SSD	HDD, SSD	HDD, SSD	HDD, SSD
Drive form factor	SFF, LFF, M.2	SFF, LFF, M.2	SFF, LFF	SFF, LFF	SFF, LFF, M.2	SFF, M.2
Number of drives	8*	8	8	8	8	26**
RAID levels	0/1/10; Optional 5 (4XB0F28690)	0/1/10; Optional 5/50 (4XB0F28692)	0/1/10; Optional 5/50 (4XC0G88841)	0/1/10/5/50; Optional 6/60 with any cache upgrade		
JBOD mode	Yes	Yes	Yes	Yes (without cache)		Yes***
Cache	None	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	No	Yes (with flash-backed cache)		
CacheCade Pro 2.0	No	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.
** Includes SAS Expander.
*** JBOD mode is supported only with the non-backed cache.
**** A cache upgrade is required for the 720ix AnyRAID adapter operations, and it must be purchased together with the controller.

Important:

- A cache upgrade is required for the 720ix AnyRAID adapter operations, and it must be purchased together with the controller.
- RAID 110i is not supported by virtualization hypervisors, including VMware vSphere (ESXi), Linux KVM, Xen, and Microsoft Hyper-V.

The following table lists supported drive bay configurations, drive types, and RAID controllers.

Table 9. Drive bay configurations, drive types, and storage controllers

Drive bays	RAID 110i AnyRAID	RAID 510i AnyRAID	RAID 520i PCIe	RAID 720i PCIe	RAID 720i AnyRAID	RAID 720ix AnyRAID	PCIe Interposer
Front drives (HDDs and SSDs)							
8x 2.5-in. SAS/SATA	Yes*	Yes	Yes	Yes	Yes	Yes	No
16x 2.5-in. SAS/SATA	No	No	No	No	No	Yes	No
24x 2.5-in. SAS/SATA	No	No	No	No	No	Yes	No
20x 2.5-in. SAS/SATA + 4x 2.5-in. AnyBay	No	No	No	No	No	Yes	Yes†
6x 3.5-in. SAS/SATA	Yes*	Yes	Yes	Yes	Yes	Yes	No
12x 3.5-in. SAS/SATA	No	No	No	No	No	Yes	No
6x 2.5-in. SAS/SATA + 9x 3.5-in. SAS/SATA	No	No	No	No	No	Yes	No
2x 2.5-in. SAS/SATA + 9x 3.5-in. SAS/SATA + 4x 2.5-in. AnyBay	No	No	No	No	No	Yes	Yes‡
Rear drives (HDDs and SSDs)							
2x 2.5-in. SATA	No	No	No	No	No	Yes#	No
M.2 storage module							
2x M.2 SSDs	Yes§	No	No	No	No	Yes**	No
Backup unit							
LTO 6 tape drive	No	No	No	No	No	Yes***	No

* Supports SATA HDDs and SSDs only; up to 6 drives in a RAID array, and the remaining drives operate in JBOD mode.
† Requires the RD650 24x 2.5-inch Chassis AnyBay Enablement Kit (4XF0G88925).
‡ Requires the RD650 Hybrid Chassis AnyBay Enablement Kit (4XF0G88926).
# Requires the Rear Backplane Kit (4XF0G45877); not supported with the M.2 or tape drives.
§ Supported only in configurations without a drive backplane; requires the M.2 Enablement Kit to Motherboard (4XF0G45891).
** Requires the M.2 Enablement Kit for RD650 with RAID720ix (4XF0G45890); not supported with the rear drives or tape drive.
*** Supported only with 8x 2.5-in. bays and the ODD + Tape Cage (SBB0E69044); not supported with the M.2 or rear drives.

Drives for internal storage

The ThinkServer RD650 supports the drive options listed in the following table.

Table 10. Internal drive options: 3.5-inch drives

Description	Part number	Maximum supported
3.5-inch hot-swap HDDs (2.5-inch HDD in 3.5-inch drive tray) - 12 Gbps SAS		
ThinkServer Gen 5 2.5" 300GB 10K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88733	12
ThinkServer Gen 5 2.5" 300GB 15K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88740	12
ThinkServer Gen 5 2.5" 450GB 15K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88744	12
ThinkServer Gen 5 2.5" 600GB 10K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88761	12
ThinkServer Gen 5 2.5" 600GB 15K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88746	12
ThinkServer Gen 5 2.5" 900GB 10K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88762	12
ThinkServer Gen 5 2.5" 900GB 15K Enterprise SAS 12Gbps 512e HS HDD in 3.5" tray	4XB0K12396	12
ThinkServer Gen 5 2.5" 1.2TB 10K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88763	12
ThinkServer Gen 5 2.5" 1.8TB 10K Enterprise SAS 12Gbps HS HDD in 3.5" tray	4XB0G88738	12
3.5-inch hot-swap HDDs - 12 Gbps NL SAS		
ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512N)	4XB0K12270	12
ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512N)	4XB0K12278	12
ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512E)	4XB0G88730	12
ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512N)	4XB0K12279	12
ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512E)	4XB0G88731	12
ThinkServer Gen 5 3.5" 6TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512E)	4XB0G88715	12
ThinkServer Gen 5 3.5" 8TB 7.2K Enterprise SAS 12Gbps Hot Swap HDD (512E)	4XB0K12254	12
ThinkServer Gen 5 3.5" 10TB 7.2K Enterprise SAS 12Gbps HS 512e HDD	4XB0K12312	12
3.5-inch hot-swap HDDs - 6 Gbps NL SATA		
ThinkServer Gen 5 3.5" 1TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0F28712	12
ThinkServer Gen 5 3.5" 2TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0F28713	12
ThinkServer Gen 5 3.5" 3TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0F28714	12
ThinkServer Gen 5 3.5" 4TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0G45715	12
ThinkServer Gen 5 3.5" 5TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0G88712	12
ThinkServer Gen 5 3.5" 6TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0G88713	12
ThinkServer Gen 5 3.5" 8TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0K12255	12
ThinkServer Gen 5 3.5" 10TB 7.2K Enterprise SATA 6Gbps HS 512e HDD	4XB0K12313	12
ThinkServer Gen 5 3.5" 12TB 7.2K Enterprise SATA 6Gbps HS 512e HDD	4XB0N68532	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - Enterprise Performance (SS300) 12 Gbps SAS		
ThinkServer Gen 5 3.5" 400GB Enterprise Performance SAS 12Gb HS SSD	4XB0K12412	12
ThinkServer Gen 5 3.5" 800GB Enterprise Performance SAS 12Gb HS SSD	4XB0K12413	12
ThinkServer Gen 5 3.5" 1.6TB Enterprise Performance SAS 12Gb HS SSD	4XB0K12414	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - PM1635 Enterprise Mainstream 12 Gbps SAS		
ThinkServer 3.5" 400GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12261	12
ThinkServer 3.5" 800GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12262	12

Description	Part number	Maximum supported
ThinkServer 3.5" 1.6TB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12263	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - PM1635a Enterprise Mainstream 12 Gbps SAS		
ThinkServer 3.5" 400GB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12406	12
ThinkServer 3.5" 800GB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12407	12
ThinkServer 3.5" 1.6TB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12408	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - Enterprise Capacity 12 Gbps SAS		
ThinkServer 3.5" 3.84TB PM1633a Enterprise Capacity SAS 12Gbps HS SSD	4XB0K12388	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - 5100 Enterprise Mainstream 6 Gbps SATA		
ThinkServer Gen 5 3.5" 240GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12421	12
ThinkServer Gen 5 3.5" 480GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12423	12
ThinkServer Gen 5 3.5" 960GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12425	12
ThinkServer Gen 5 3.5" 1.92TB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12427	12
ThinkServer Gen 5 3.5" 3.84TB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12428	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - 5100 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 3.5" 480GB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0N68491	12
ThinkServer Gen 5 3.5" 960GB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0N68493	12
ThinkServer Gen 5 3.5" 1.92TB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0N68495	12
ThinkServer Gen 5 3.5" 3.84TB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0N68496	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - PM863a Enterprise Entry 6 Gbps SATA		
ThinkServer 3.5" 240GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12358	12
ThinkServer 3.5" 480GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12360	12
ThinkServer 3.5" 960GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12362	12
ThinkServer 3.5" 1.92TB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12325	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - S3520 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 3.5" 240GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12327	12
ThinkServer Gen 5 3.5" 480GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12330	12
ThinkServer Gen 5 3.5" 800GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12436	12
ThinkServer Gen 5 3.5" 960GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12333	12
ThinkServer Gen 5 3.5" 1.2TB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12438	12
ThinkServer Gen 5 3.5" 1.6TB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12440	12
3.5-inch hot-swap SSDs (2.5-inch SSD in 3.5-inch drive tray) - S4500 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 3.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68507	12
ThinkServer Gen 5 3.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68508	12
ThinkServer Gen 5 3.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68509	12

Table 11. Internal drive options: 2.5-inch drives

Description	Part number	Maximum supported
2.5-inch hot-swap HDDs - 12 Gbps SAS		
ThinkServer Gen 5 2.5" 300GB 10K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88732	24
ThinkServer Gen 5 2.5" 300GB 15K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88739	24
ThinkServer Gen 5 2.5" 450GB 15K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88743	24
ThinkServer Gen 5 2.5" 600GB 10K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88734	24
ThinkServer Gen 5 2.5" 600GB 15K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88765	24
ThinkServer Gen 5 2.5" 900GB 10K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88735	24
ThinkServer Gen 5 2.5" 900GB 15K Enterprise SAS 12Gbps 512e Hot Swap HDD	4XB0K12397	24
ThinkServer Gen 5 2.5" 1.2TB 10K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88736	24
ThinkServer Gen 5 2.5" 1.8TB 10K Enterprise SAS 12Gbps Hot Swap HDD	4XB0G88737	24
2.5-inch hot-swap HDDs - 6 Gbps NL SATA		
ThinkServer Gen 5 2.5" 1TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0G45721	26
ThinkServer Gen 5 2.5" 2TB 7.2K Enterprise SATA 6Gbps Hot Swap HDD	4XB0G88774	26
2.5-inch hot-swap SSDs - Enterprise Performance (SS300) 12 Gbps SAS		
ThinkServer Gen 5 2.5" 400GB Enterprise Performance SAS 12Gb HS SSD	4XB0K12409	24
ThinkServer Gen 5 2.5" 800GB Enterprise Performance SAS 12Gb HS SSD	4XB0K12410	24
ThinkServer Gen 5 2.5" 1.6TB Enterprise Performance SAS 12Gb HS SSD	4XB0K12411	24
2.5-inch hot-swap SSDs - PM1635 Enterprise Mainstream 12 Gbps SAS		
ThinkServer 2.5" 400GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12258	24
ThinkServer 2.5" 800GB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12259	24
ThinkServer 2.5" 1.6TB PM1635 Enterprise Mainstream 12Gb SAS HS SSD	4XB0K12260	24
2.5-inch hot-swap SSDs - PM1635a Enterprise Mainstream 12 Gbps SAS		
ThinkServer 2.5" 400GB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12403	24
ThinkServer 2.5" 800TB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12404	24
ThinkServer 2.5" 1.6TB PM1635a Enterprise Mainstream SAS 12Gb HS SSD	4XB0K12405	24
2.5-inch hot-swap SSDs - Enterprise Capacity 12 Gbps SAS		
ThinkServer 2.5" 3.84TB PM1633a Enterprise Capacity SAS 12Gbps HS SSD	4XB0K12387	24
ThinkServer 2.5" 7.68TB PM1633a Enterprise Capacity SAS 12Gb HS SSD	4XB0K12402	24
2.5-inch hot-swap SSDs - 5100 Enterprise Mainstream 6 Gbps SATA		
ThinkServer Gen 5 2.5" 240GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12416	26
ThinkServer Gen 5 2.5" 480GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12417	26
ThinkServer Gen 5 2.5" 960GB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12418	26
ThinkServer Gen 5 2.5" 1.92TB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12419	26
ThinkServer Gen 5 2.5" 3.84TB 5100 Enterprise Mainstream SATA 6Gbps HS SSD	4XB0K12420	26
2.5-inch hot-swap SSDs - 5100 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 2.5" 480GB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0K12441	26
ThinkServer Gen 5 2.5" 960GB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0K12442	26
ThinkServer Gen 5 2.5" 1.92TB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0K12443	26
ThinkServer Gen 5 2.5" 3.84TB 5100 Enterprise Entry SATA 6Gbps HS SSD	4XB0K12444	26

Description	Part number	Maximum supported
2.5-inch hot-swap SSDs - PM863a Enterprise Entry 6 Gbps SATA		
ThinkServer 2.5" 240GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12357	26
ThinkServer 2.5" 480GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12359	26
ThinkServer 2.5" 960GB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12361	26
ThinkServer 2.5" 1.92TB PM863a Enterprise Entry SATA 6Gbps HS SSD	4XB0K12324	26
2.5-inch hot-swap SSDs - S3520 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 2.5" 240GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12326	26
ThinkServer Gen 5 2.5" 480GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12329	26
ThinkServer Gen 5 2.5" 800GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12435	26
ThinkServer Gen 5 2.5" 960GB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12332	26
ThinkServer Gen 5 2.5" 1.2TB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12437	26
ThinkServer Gen 5 2.5" 1.6TB S3520 Entry SATA 6Gbps Hot Swap SSD	4XB0K12439	26
2.5-inch hot-swap SSDs - S4500 Enterprise Entry 6 Gbps SATA		
ThinkServer Gen 5 2.5" S4500 240GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68504	26
ThinkServer Gen 5 2.5" S4500 480GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68505	26
ThinkServer Gen 5 2.5" S4500 960GB Entry SATA 6Gbps Hot Swap SSD	4XB0N68506	26
2.5-inch EasySwap NVMe SSDs for AnyBay - Enterprise Performance PCIe 3.0		
ThinkServer G5 2.5" 400GB Enterprise Performance PCIe 3.0 Easy Swap SSD	4XB0G45748	4
ThinkServer G5 2.5" 800GB Enterprise Performance PCIe 3.0 Easy Swap SSD	4XB0G45749	4
ThinkServer G5 2.5" 1.6TB Enterprise Performance PCIe 3.0 Easy Swap SSD	4XB0G45750	4
2.5-inch EasySwap NVMe SSDs for AnyBay - Enterprise Mainstream PCIe 3.0		
ThinkServer 960GB NVMe 2.5" Enterprise Mainstream Easy Swap SSD	4XB0K12392	4
ThinkServer 1.92TB NVMe 2.5" Enterprise Mainstream Easy Swap SSD	4XB0K12393	4
2.5-inch EasySwap NVMe SSDs for AnyBay - Enterprise Entry PCIe 3.0		
ThinkServer 2.5" 1.92TB PM963 Enterprise Entry PCIe 3.0 Easy Swap SSD	4XB0K12389	4
ThinkServer 2.5" 3.84TB PM963 Enterprise Entry PCIe 3.0 Easy Swap SSD	4XB0K12390	4

Table 12. Internal drive options: M.2 SSD and SD card options

Description	Part number	Maximum supported
M.2 SSDs		
ThinkServer M.2 80GB Value Read-Optimized SATA 6Gbps SSD	4XB0G88741	2
ThinkServer M.2 120GB Value Read-Optimized SATA 6Gbps SSD	4XB0F28656	2
SD cards		
ThinkServer 8GB SD Card	4X70F28592	2
ThinkServer 32GB SD Card	4X70F28593	2

Internal backup units

RD650 server models with up to 8x 2.5-inch drive bays and the ODD + Tape Cage (SBB0E69044) support the internal LTO 6 tape drive option that is listed in the following table.

Table 13. Tape drives

Description	Part number	Maximum supported
Tape drive		
Lenovo ThinkServer LTO-6 Linear Tape Drive Kit by Tandberg	4XF0G45866	1
Tape media		
Lenovo ThinkServer 2.5TB SAS 6Gbps LTO-6 Tape	4XB0F28689	1

Optical drives

The RD650 server models with up to 16x 2.5-inch drives and the ODD cage (SBB0E68934) or 8x 2.5-inch drive bays and the ODD + Tape Cage (SBB0E69044) support the optical drive options listed in the following table.

Server models with 3.5-inch drive bays, or up to 24x 2.5-inch drive bays, or hybrid 6x 2.5-inch + 9x 3.5-inch drive bays do not support an internal optical drive; a supported external optical drive listed in the following table can be used instead.

Table 14. Optical drives

Description	Part number	Maximum supported
Internal optical drives		
Lenovo ThinkServer Slim SATA DVD-RW Optical Disk Drive	4XA0F28607	1
Lenovo ThinkServer Slim SATA DVD-ROM Optical Disk Drive	4XA0F28608	1
External USB optical drives		
ThinkPad UltraSlim USB DVD Burner	4XA0E97775	1

The Slim SATA DVD-RW Optical Disk Drive and the USB DVD Burner support the following types of media: CD-R, CD-ROM, CD-RW, DVD-R, DVD-R (dual-layer recording), DVD-RW, DVD+R, DVD+R (dual-layer recording), and DVD+RW.

The Slim SATA DVD-ROM Optical Disk Drive supports the following types of media: CD-R, CD-ROM, DVD-R, DVD-R (dual-layer recording), DVD+R, DVD+R (dual-layer recording).

I/O expansion

The RD650 server supports one AnyFabric slot and up to eight PCIe slots: three PCIe slots on the system planar and up to five PCIe slots with different riser cards installed into two riser sockets on the system planar (one riser socket supports installation of one riser card). The slot form factors are as follows:

- AnyFabric slot (PCIe 3.0 x8) (horizontal slot on system planar)
- Slot 1: PCIe 3.0 x8 full-height, half-length; or PCIe 3.0 x16 full-height, full-length (PCIe x16 slot is double-wide and available via CTO only)
- Slot 2: PCIe 3.0 x8; full-height, half-length (not present if the slot 1 is PCIe x16)
- Slot 3: PCIe 3.0 x8; full-height, half-length
- Slot 4: PCIe 3.0 x8; low profile (vertical slot on system planar)
- Slot 5: PCIe 3.0 x8 full-height, half-length; or PCIe 3.0 x16 full-height, full-length (PCIe x16 slot is double-wide and available via CTO only)
- Slot 6: PCIe 3.0 x8; full-height, half-length (not present if the slot 5 is PCIe x16)
- Slot 7: PCIe 3.0 x8; low profile (vertical slot on system planar)
- Slot 8: PCIe 3.0 x8; low profile (vertical slot on system planar)

Note: Slots 4, 5, 6, 7, and 8 require the second processor to be installed.

The locations of the PCIe slots are shown in the following figure.

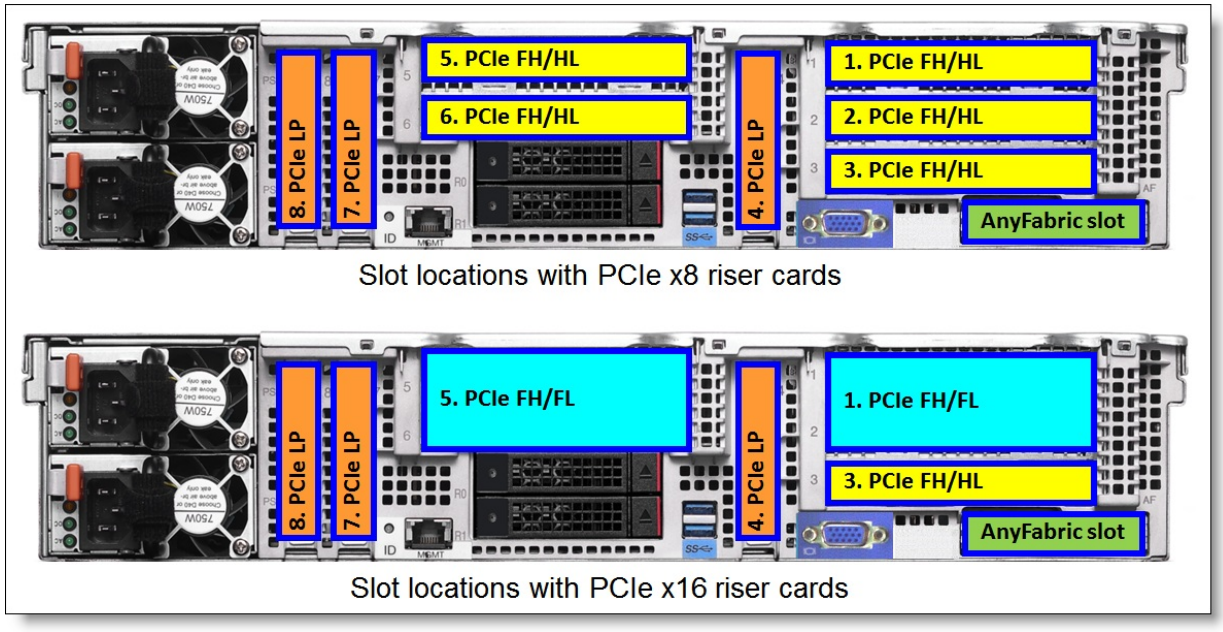

Figure 10. Slot locations

Riser 1 supplies slots 1, 2, and 3, and Riser 2 supplies slots 5 and 6. The slots that are available for use depend on the number of riser cards that are installed and whether the second processor is installed, as shown in the following table.

Table 15. Slots available for use and supported riser card combinations

Riser Card 1	Riser Card 2	Slots available for use
One processor		
None	None	AnyFabric
PCIe x8	None	AnyFabric, 1, 2, 3
PCIe x16	None	AnyFabric, 1, 3
Two processors		
None	None	AnyFabric, 4, 7, 8
PCIe x8	None	AnyFabric, 1, 2, 3, 4, 7, 8
PCIe x8	PCIe x8	AnyFabric, 1, 2, 3, 4, 5, 6, 7, 8
PCIe x16	None	AnyFabric, 1, 3, 4, 7, 8
PCIe x16	PCIe x16	AnyFabric, 1, 3, 4, 5, 7, 8

The following table lists available PCIe riser card options.

Table 16. Riser cards

Description	Part number	Maximum supported
Lenovo ThinkServer 2U PCIe x8/x8/x8 Riser Kit	4XF0G45881	2
Lenovo ThinkServer 2U PCIe x16 Double-wide + x8 Riser	None*	2

* Available via CTO only.

Serial port

The COM Cable option, SBB0J78877, is available via CTO for mounting the external serial port on the rear of the RD650 server, if needed. This option is mounted in place of the PCIe slot 8, and the PCIe slot 8 cannot be used.

Network adapters

The RD650 server supports integrated NIC options in the AnyFabric slot. The integrated NIC solution supports AnyFabric adapters with two or four 10 GbE ports or four Gigabit Ethernet ports and supports shared AnyFabric port for direct connectivity to the TSM service processor for systems management. The following table lists the supported network adapter options.

Table 17. Network adapters

Description	Part number	Maximum supported#
AnyFabric - 10 Gb Ethernet		
ThinkServer X520-DA2 AnyFabric 10Gb 2 Port SFP+ Ethernet Adapter by Intel	4XC0F28742	1*
ThinkServer X540-T2 AnyFabric 10Gb 2 Port Base-T Ethernet Adapter by Intel	4XC0F28741	1
Lenovo ThinkServer X710-DA2 AnyFabric 10Gb 2 port Ethernet Adapter by Intel	4XC0G88847	1*
Lenovo ThinkServer X710-DA4 AnyFabric 10Gb 4 port Ethernet Adapter by Intel	4XC0G88848	1*

Description	Part number	Maximum supported#
ThinkServer OCm14102-NX-L AnyFabric 10Gb 2 port SFP+ Enet Adapter by Emulex	4XC0G88830	1*
ThinkServer OCm14102-UX-L AnyFabric 10Gb 2 Port SFP+ CNA by Emulex	4XC0F28743	1*
ThinkServer OCm14104-UX-L AnyFabric 10Gb 4 Port SFP+ CNA by Emulex	4XC0F28744	1*
AnyFabric - 1 Gb Ethernet		
ThinkServer I350-T4 AnyFabric 1Gb 4 Port Base-T Ethernet Adapter by Intel	4XC0F28740	1
PCIe - 40 Gb Ethernet		
ThinkServer OCe14401-UX-L PCIe 40Gb 1 Port QSFP+ CNA by Emulex	4XC0F28738	3 / 8*
PCIe - 25 Gb Ethernet		
ThinkServer ConnectX-4 Lx PCIe 25Gb 2 Port SFP28 Ethernet Adapter by Mellanox	4XC0G88861	3 / 8^
PCIe - 10 Gb Ethernet		
ThinkServer X520-SR2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	4XC0F28733	3 / 8**
ThinkServer X520-DA2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	4XC0F28734	3 / 8*
ThinkServer X540-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	4XC0F28732	3 / 8
ThinkServer X550-T1 PCIe 10Gb 1 Port Base-T Ethernet Adapter by Intel	4XC0G88855	3 / 8
ThinkServer X550-T2 PCIe 10Gb 2 Port Base-T Ethernet Adapter by Intel	4XC0G88856	3 / 8
ThinkServer X710-DA2 PCIe 10Gb 2 Port SFP+ Ethernet Adapter by Intel	4XC0G88852	3 / 8*
ThinkServer X710-DA4 PCIe 10Gb 4 Port SFP+ Ethernet Adapter by Intel	4XC0G88854	3 / 5*^^
ThinkServer OCe14102-NX 10Gbps Dual Port SFP+ Ethernet Adapter by Emulex	4XC0F28724	3 / 8*
ThinkServer OCe14102-UX-L PCIe 10Gb 2 Port SFP+ CNA by Emulex	4XC0F28736	3 / 8*
PCIe - 1 Gb Ethernet		
ThinkServer I350-T2 PCIe 1Gb 2 Port Base-T Ethernet Adapter by Intel	4XC0F28730	3 / 8
ThinkServer I350-T4 PCIe 1Gb 4 Port Base-T Ethernet Adapter by Intel	4XC0F28731	3 / 8
Optical modules		
ThinkServer 40Gb Optical Module by Emulex (for 40 Gb QSFP+ adapters by Emulex)	4XC0F28739	Port qty***
ThinkServer 10Gb Optical Module by Emulex (for 10 Gb SFP+ adapters by Emulex)	4XC0F28737	Port qty***
ThinkServer 10Gb Optical Module by Intel (for 10 Gb SFP+ adapters by Intel)	4XC0F28735	Port qty***

The maximum quantity shown is with one processor / two processors.
* Requires a supported optical transceiver (see Optical modules at the end of this table).
^ Transceivers and cables are available only from Mellanox.
** Includes two 10Gb SR SFP+ transceivers.
^^ Supported only in slots 1, 2, 3, 5, and 6.
*** The maximum number of optical modules that are supported per adapter equals the quantity of the adapter ports.

SAS adapters for external storage

The following table lists SAS RAID controllers and HBAs for external storage attachments that are supported by the RD650 server.

Table 18. SAS RAID controllers and HBAs for external storage

Description	Part number	Maximum supported*
External RAID adapters		
Lenovo ThinkServer 9286CV-8e PCIe 6Gb 8 Port External SAS RAID Adapter by LSI	4XB0F28699	1
Lenovo ThinkServer RAID CacheCade Pro 2.0 Key (for 9286CV-8e)	4XB0F28702	1
External SAS HBAs		
Lenovo ThinkServer 9300-8e PCIe 12Gb 8 Port External SAS Adapter by LSI	4XB0F28703	3 / 8
Lenovo ThinkServer 8885e PCIe 12Gb 8 port external SAS Adapter by PMC	4XB0G88727	2 / 5**

* The maximum quantity shown is with one processor / two processors.
** Not supported in slots 3, 4, and 7.

The following table summarizes features of supported external storage controllers.

Table 19. External storage controller features and specifications summary

Feature	9286CV-8e	9300-8e	8885e*
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 SAS 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
Cache protection	CacheVault flash backup (included)	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 Fibre Channel host bus adapters (HBAs) supported by the RD650 server.

Table 20. Fibre Channel host bus adapter options

Description	Part number	Maximum supported*
AnyFabric - 16 Gb FC		
ThinkServer LPm16002-M6-L AnyFabric 2-Port 16Gb Fibre Channel HBA by Emulex	4XB0F28706	1
AnyFabric - Advanced 8 Gb FC		
ThinkServer LPm15004-M8-L AnyFabric 4-Port 8Gb Fibre Channel HBA by Emulex	4XB0F28707	1
PCIe - 16 Gb FC		
ThinkServer LPe16000B-M6-L PCIe 1-Port 16Gb Fibre Channel HBA by Emulex	4XB0F28653	3 / 8
ThinkServer LPe16002B-M6-L PCIe 2-Port 16Gb Fibre Channel HBA by Emulex	4XB0F28705	3 / 8
ThinkServer QLE2670 PCIe 1-Port 16Gb Fibre Channel HBA by QLogic	4XB0F28654	3 / 8
ThinkServer QLE2672 PCIe 2-Port 16Gb Fibre Channel HBA by QLogic	4XC0F28745	3 / 8
PCIe - Advanced 8 Gb FC		
ThinkServer LPe16000B-M8-L PCIe 1-Port 8Gb Fibre Channel HBA by Emulex	4XB0F28652	3 / 8
ThinkServer LPe16002B-M8-L PCIe 2-Port 8Gb Fibre Channel HBA by Emulex	4XB0F28704	3 / 8
PCIe - 8 Gb FC		
ThinkServer LPe1250 PCIe Single Port 8Gb Fibre Channel HBA by Emulex	0C19476	3 / 8
ThinkServer LPe12002 PCIe Dual Port 8Gb Fibre Channel HBA by Emulex	0C19478	3 / 8
ThinkServer QLE2560 PCIe Single Port 8Gb Fibre Channel HBA by QLogic	4XB0F28649	3 / 8
ThinkServer QLE2562 PCIe Dual Port 8Gb Fibre Channel HBA by QLogic	0C19482	3 / 8

* The maximum quantity shown is with one processor / two processors.

Flash storage adapters

The RD650 server supports the Flash storage adapters listed in the following table.

Note: The Flash storage adapters are supported in PCIe slots 5 and 6 only, which requires the PCIe x8 riser card in the riser slot 2 and the second processor to be installed.

Table 21. Flash storage adapters

Description	Part number	Maximum supported
Enterprise Performance		
ThinkServer Intel P3700 800GB NVMe Enterprise Performance Flash Adapter	4XB0K12391	1
ThinkServer 1.6TB ioMemory SX350 Performance PCIe 2.0 SSD by SanDisk	4XB0G88747	1
ThinkServer 3.2TB ioMemory SX350 Performance PCIe 2.0 SSD by SanDisk	4XB0G88748	1
Enterprise Mainstream		
ThinkServer 1.92TB NVMe Enterprise Mainstream Flash Adapter	4XB0K12394	1
ThinkServer 3.84TB NVMe Enterprise Mainstream Flash Adapter	4XB0K12395	1

GPU adapters

The RD650 server supports graphics processing units (GPUs) listed in the following table.

Table 22. GPU adapters

Description	Part number	Maximum supported
ThinkServer 16GB Tesla M60 GPU_A Adapter by NVIDIA	4X60G88212	1

Configuration notes:

- The NVIDIA GPU adapter can be installed only as a field upgrade option (not available as a factory-installed component).
- The NVIDIA GPU adapter is supported only in the PCIe slot 1 and requires a PCIe x16 riser card that is available only as a factory-installed component (not available as a field upgrade option; see "I/O expansion" for details).

Security

The RD650 server offers an optional hardware security module - Trusted Platform Module (TPM), and an optional chassis intrusion. These components are listed in the following table.

Table 23. Security options

Description	Part number	Maximum supported
Lenovo ThinkServer Gen 5 Trusted Platform Module v1.2 (Worldwide except China)	4XF0G45868	1
Lenovo ThinkServer Trusted Platform Module v2.0 (Worldwide except China)	4XF0G88938	1
Lenovo ThinkServer Gen 5 Trusted Cryptographic Module (China only)	4XF0G45869	1
Chassis Intrusion Cable for 2U	None*	1

* Comes with select relationship and TopSeller models; configurable for custom models (SBB0E69083).

Power supplies and cables

The RD650 server supports up to two redundant power supplies that are listed in the following table.

Table 24. Power supply options

Description	Part number	Maximum supported
ThinkServer Gen 5 550W Platinum Hot Swap Power Supply (100 - 240 V AC)	4X20F28579	2
ThinkServer Gen 5 750W Platinum Hot Swap Power Supply (100 - 240 V AC)	4X20F28575	2
ThinkServer Gen 5 750W Titanium Hot Swap Power Supply (200 - 240 V AC)	4X20F28576	2
ThinkServer Gen 5 1100W Platinum Hot Swap Power Supply (100 - 240 V AC)	4X20F28577	2
ThinkServer Gen 5 1600W Platinum Hot Swap Power Supply (100 - 240 V AC)*	4X20F28578	2

* If the power supply is connected to a 100 - 127 V AC power source, the maximum output power will be limited to 1100 W. Rated output power of 1600 W can be achieved only when the power supply is connected to a 200 - 240 V AC power source.

The following power supply rules apply:

- A minimum of one power supply and a maximum of two power supplies are needed per system.
- If two power supplies are installed, the power supplies must be identical.

Important: It is highly recommended to validate system configuration for specific power requirements by using the latest version of the ThinkServer Power Planner, which is available at this website: http://support.lenovo.com/us/en/downloads/ds101155

Completing this validation ensures that the correct power supply is chosen for optimal performance.

The RD650 models come with one or two line cords or one or two rack power cables. Other line cords and rack power cables that are listed in the following table can be ordered, if needed.

Table 25. Power cable options

Description	Part number	Maximum supported
Rack power cords		
ThinkServer C13-C14 WW 250V 10A 1.8m Jumper Cord	4X90F92964	2
Line cords		
ThinkServer C13-NEMA_5-15P US 125V 10A 1.8m Power Cord	4X90F92965	2
ThinkServer C13-BS_1363A UK 250V 10A 1.8m Power Cord	4X90F92970	2
ThinkServer C13-DK_2.5A Denmark 250V 10A 1.8m Power Cord	4X90F92971	2
ThinkServer C13-CEE_7.7 Europe 250V 10A 1.8m Power Cord	4X90F92974	2
ThinkServer C13-CE123_50 Italy 250V 10A 1.8m Power Cord	4X90F92975	2
ThinkServer C13-NRB_14136 Brazil 250V 10A 1.8m Power Cord	4X90F92976	2
ThinkServer C13-IRAM_2073 LA 250V 10A 1.8m Power Cord	4X90F92977	2
ThinkServer C13-GB1002 PRC 250V 10A 1.8m Power Cord	4X90F92981	2
ThinkServer C13-SI_32 Israel 250V 10A 1.8m Power Cord	4X90F92973	2
ThinkServer C13-SABS_164 South Africa 250V 6A 1.8m Power Cord	4X90F92978	2

Operating systems

The RD650 supports the following operating systems:

- Microsoft
  - Windows Server 2012 Foundation, Essentials, Standard, Datacenter, Hyper-V
  - Windows Storage Server 2012 Standard
  - Windows Server 2012 R2 Foundation, Essentials, Standard, Datacenter, Hyper-V
  - Windows Storage Server 2012 R2 Standard
  - Windows Server 2016 Essentials, Standard, Datacenter, Hyper-V
  - Windows Storage Server 2016 Standard, Workgroup
- SUSE
  - SUSE Linux Enterprise Server 11 for x86 SP4
  - SUSE Linux Enterprise Server 11 for AMD64/EM64T SP4
  - SUSE Linux Enterprise Server 12 SP1
  - SUSE Linux Enterprise Server 12 SP2
- Red Hat
  - Red Hat Enterprise Linux Server 6.7 (x86 and x64)
  - Red Hat Enterprise Linux Server 6.8 (x86 and x64)
  - Red Hat Enterprise Linux Server 7.2
  - Red Hat Enterprise Linux Server 7.3
- VMware
  - VMware ESXi 5.5 Update 3
  - VMware ESXi 6.0 Update 1
  - VMware ESXi 6.0 Update 2
  - VMware ESXi 6.0 Update 3
  - VMware ESXi 6.5
- Citrix
  - XenServer 6.5.1

Important:

- SD cards support installation and booting of the VMware ESXi hypervisor only; other operating systems and hypervisors cannot be installed on an SD card.
- VMware ESXi and other hypervisor support requires a RAID 510i/720i/720ix adapter. The onboard RAID 110i controller is not supported by VMware ESXi and other hypervisors.

For the latest information about the specific versions and service levels that are supported and any other prerequisites, see the Operating System Interoperability Guide: http://lenovopress.com/redposig.

Systems management

The RD650 server supports the following systems management tools:

- Lenovo ThinkServer System Manager
- Lenovo Software Tools
- Lenovo XClarity Administrator
- Lenovo XClarity Energy Manager

Lenovo ThinkServer System Manager

The RD650 server contains ThinkServer System Manager (TSM), which provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the TSM lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. Optionally, the TSM also provides a virtual presence capability for remote server management capabilities.

The TSM provides remote storage server management through the following industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3
- Data Center Management Interface (DCMI) Version 1.0
- Web browser

The optional TSM Premium is required for enabling remote presence and energy monitoring and management. The TSM Premium feature provides the following functions:

- Remotely viewing video with graphics resolutions up to 1920x1200 at 60 Hz with up to 24 bits per pixel colors
- Remotely accessing the system by using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the system
- Enabling support for Lenovo XClarity Energy Manager for power monitoring and management

The following table lists the Premium management option.

Table 26. Premium management option

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

Lenovo Software Tools

Lenovo offers the following software tools that can help customers set up, use, and maintain the server at no additional cost:

- ThinkServer Deployment Manager
  The ThinkServer Deployment Manager tool, a part of the server firmware, simplifies the process of updating firmware, configuring UEFI system settings, configuring RAID, and installing supported Microsoft Windows or Linux operating systems or VMware hypervisors and associated device drivers on a ThinkServer system.
- ThinkServer Operating System-based Platform Update Tool
  The ThinkServer Operating System-based Platform Update Tool firmware update tool runs in the server operating system and enables customers to maintain server firmware up-to-date to help avoid unnecessary server outages.
- ThinkServer Diagnostics
  The ThinkServer Diagnostics software speeds up troubleshooting tasks to reduce service time by diagnosing server problems, performing diagnostic tests, and collecting system information and logs. The diagnostics software resides in the server firmware (Embedded edition), on a bootable USB drive (Standalone edition), or in the operating system (Windows or Linux editions).
- ThinkServer Partner Pack for vSphere vCenter Server
  The ThinkServer Partner Pack for vSphere vCenter Server provides detailed system information about the ThinkServer systems in the VMware virtualized environment and enables users to receive and view alerts, deploy server firmware updates, and perform tasks such as launching a remote console and accessing web-based ThinkServer System Manager.
- ThinkServer Partner Packs for Microsoft System Center
  The ThinkServer Partner Pack for Microsoft System Center Operations Manager (SCOM) discovers ThinkServer systems and provides detailed system information about the managed servers. The software also enables users to perform management tasks, such as restarting the server or turning the server on or off, accessing the Remote Desktop Console through Remote Desktop Protocol (RDP), accessing web-based ThinkServer System Manager and capture the latest crash screen if the remote presence feature is enabled. The ThinkServer Partner Pack for Microsoft System Center Configuration Manager (SCCM) provides centralized firmware management of ThinkServer systems.

Lenovo XClarity Administrator

Lenovo XClarity is a centralized systems management solution that helps administrators deliver infrastructure faster. This solution integrates easily with Lenovo x86 rack servers, Flex System, and RackSwitch switches, providing automated agent-less discovery, monitoring, firmware updates, configuration management, and bare metal deployment of operating systems and hypervisors across multiple systems.

Lenovo XClarity Administrator is an optional software component for the RD650 which can be downloaded and used at no charge to discover and monitor the server.

If software support is required for Lenovo XClarity Administrator, Lenovo XClarity Pro software subscription should be ordered. Lenovo XClarity Pro is licensed on a per managed system basis, that is, each managed Lenovo system requires a license.

The following table lists the geo-specific Lenovo XClarity software license options.

Table 27. Lenovo XClarity software options

Description	Part number (NA, AP, Japan)*	Part number (EMEA, LA)**	Quantity
Lenovo XClarity Pro, per Mngd Server w/1 Yr SW S&S	00MT201	00MT207	1
Lenovo XClarity Pro, per Mngd Server w/3 Yr SW S&S	00MT202	00MT208	1
Lenovo XClarity Pro, per Mngd Server w/5 Yr SW S&S	00MT203	00MT209	1

* NA = North America; AP = Asia Pacific
** EMEA = Europe, Middle East, Africa; LA = Latin America

Lenovo XClarity Administrator offers the following standard features that are available at no charge for ThinkServer systems:

- Auto-discovery and monitoring of Lenovo x86 servers, RackSwitch switches, and Flex System chassis
- External alerts and notifications via SNMP traps, syslog remote logging, and e-mail
- Secure connections to managed endpoints
- NIST 800-131A or FIPS 140-2 compliant cryptographic standards between the management solution and managed endpoints
- Integration into existing higher level management systems such as cloud automation and orchestration tools through REST APIs, providing extensive external visibility and control over hardware resources
- An intuitive, easy-to-use GUI
- Scripting with Windows PowerShell, providing command-line visibility and control over hardware resources

For more information, refer to the Lenovo XClarity Administrator Product Guide: http://lenovopress.com/tips1200

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager provides a stand-alone, web-based agent-less power management console that provides real time data and enables you to observe, plan and manage power and cooling for Lenovo System x and ThinkServer x86 servers. Using built-in intelligence, it identifies server power consumption trends and ideal power settings and performs cooling analysis so that you can define and optimize power-saving policies.

Lenovo XClarity Energy Manager offers the following capabilities:

- Reports vital server information, such as power, temperature and resource utilization
- Monitors inlet temperature to locate hot spots, reducing the risk of data or device damage
- Provides finely-grained controls to limit platform power in compliance with IT policy
- Generates alerts when a user-defined threshold is reached

Lenovo XClarity Energy Manager is an optional software component for the ThinkServer RD650; the Energy Manager software license is included in the TSM Premium management option (part number 4XF0G45867).

Rack installation

Select models of the RD650 server ship without a rail kit and a cable management arm. The following table lists rack installation options that are available for the RD650 server.

Table 28. Rack installation options

Description	Part number	Maximum supported
Lenovo ThinkServer Gen 5 2U 4-Post Slide Rail Kit	4XF0G45872	1
Lenovo ThinkServer Gen 5 4-Post Static Rail Kit	4XF0G45873	1
Lenovo ThinkServer Gen 5 2U Cable Management Arm	4XF0G45875	1*
Lenovo ThinkServer Gen 5 Cable Management Bar	4XF0G45876	1**

* Optional for the 2U 4-Post Slide Rail Kit (4XF0G45872).
** Optional for the 4-Post Static Rail Kit (4XF0G45873).

The following table summarizes the rail kit features and specifications.

Table 29. Rail kit features and specifications summary

Feature	ThinkServer Gen 5 2U 4-Post Slide Rail Kit	ThinkServer Gen 5 4-Post Static Rail Kit
Part number	4XF0G45872	4XF0G45873
Rail type	Ball bearing slide rail with stop latches	Friction rail
Tool-less installation	Yes	No
CMA/CMB support	Yes (4XF0G45875)	Yes (4XF0G45876)
In-rack server maintenance	Yes	No
1U PDU support	Yes	Yes
0U PDU support	Limited*	Limited*
Rack type	Lenovo 4-post, IEC standard-compliant	Lenovo 4-post, IEC standard-compliant
Mounting holes	Square or round (unthreaded)	Square or round (unthreaded)
Mounting flange thickness	2 mm (0.08 in.) – 3.18 mm (0.125 in.)	2 mm (0.08 in.) – 3.18 mm (0.125 in.)
Distance between front and rear mounting flanges	460 mm (18.11 in.) – 900 mm (35.43 in.)	610 mm (24 in.) – 900 mm (35.43 in.)
Rail length**	840 mm (33.07 in.)	728.1 mm (28.66 in.)

* The rack must be at least 42U 1200 mm (47.24 in.) deep if a CMA/CMB is used.
** Measured when mounted on the rack, from the front surface of the front mounting flange to the rear most point of the rail.

Note: ThinkServer rail kits are not supported in rack cabinets with the threaded mounting holes.

Physical specifications

The RD650 server has the following dimensions and weight (approximate):

- Width
  - Without rack handles: 447 mm (17.6 inches)
  - With rack handles: 482 mm (19.0 inches)
- Depth
  - Without rack handles and power supply handles: 764 mm (29.4 inches)
  - With rack handles and power supply handles: 783 mm (30.8 inches)
- Height: 87 mm (3.4 inches)
- Weight
  - Without package: 16.0 kg (35.3 lb) to 32 kg (70.5 lb)
  - With package: 24.7 kg (54.5 lb) to 40.7 kg (89.7 lb)

Operating environment

The RD650 server complies with ASHRAE class A2 specifications. Depending on the hardware configuration, some server models comply with ASHRAE class A3 and class A4 specifications. To comply with ASHRAE class A3 and class A4 specifications, the server models must meet the following hardware configuration requirements at the same time:

- Lenovo-qualified processors except the following types:
  - 135-watt processors (4-core, 6-core, or 8-core)
  - 145-watt processors (14-core or 18-core)
- Two power supplies installed for redundancy
- No full-length, full-height PCIe cards are installed
- No ThinkServer ioMemory SX300 Performance PCIe 2.0 SSD by FusionIO is installed

Note: If the ThinkServer Qlogic QLE2560 (single-port 8 Gb FC) Host Bus Adapter or ThinkServer Qlogic QLE2562 (dual-port 8 Gb FC) Host Bus Adapter is installed in server models that meet the above hardware configuration requirements, the server models comply with ASHRAE class A3 specifications.

The RD650 server is supported in the following environment:

- Air temperature:
  - Operating:
    - ASHRAE Class A4: 5 °C - 45 °C (41 °F - 113 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 125-m (410-ft) increase in altitude
    - ASHRAE Class A3: 5 °C - 40 °C (41 °F - 104 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 175-m (574-ft) increase in altitude
    - ASHRAE Class A2: 10 °C - 35 °C (50 °F - 95 °F); for altitudes above 900 m (2,953 ft), decrease the maximum ambient temperature by 1 °C for every 300-m (984-ft) increase in altitude
  - Storage: -40 °C - +60 °C (-40 °F - 140 °F)
- Maximum altitude: 3,048 m (10,000 ft)
- Storage: -40 °C - +60 °C (-40 °F - 140 °F)
- Humidity:
  - Operating:
    - ASHRAE Class A4: 8% - 90% (non-condensing)
    - ASHRAE Class A3: 8% - 85% (non-condensing)
    - ASHRAE Class A2: 8% - 80% (non-condensing)
  - Storage: 8% - 90% (non-condensing)

- Electrical:
  - 100 - 127 (nominal) V AC; 50 Hz - 60 Hz
  - 200 - 240 (nominal) V AC; 50 Hz - 60 Hz
  - 240 V DC (supported in China only)
- Noise level:
  - 6.1 bels (operating)
  - 5.7 bels (idle)

Warranty

The RD650 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 30. 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 RD650 server conforms to the following regulations:

- Energy Star V2.0
- 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 following table lists the 6 Gbps SAS external drive enclosures that are offered by Lenovo that can be used with the RD650 for storage expansion.

Table 31. E1012 and E1024 external drive enclosure models

Description	Part number
Lenovo Storage E1012 LFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B1
Lenovo Storage E1012 LFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B2
Lenovo Storage E1024 SFF Disk Expansion Single SAS IO Module, Rail Kit, 9x5 NBD	64111B3
Lenovo Storage E1024 SFF Disk Expansion Dual SAS IO Module, Rail Kit, 9x5 NBD	64111B4

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

The following table lists the relationship models of the 12 Gbps SAS external drive enclosures that are offered by Lenovo that can be used with the RD650 for storage expansion.

Table 32. D1212 and D1224 relationship models

Description	Part number
LFF models	
D1212 LFF Chassis, Dual 3-port ESMs (US English documentation)	4587A11*
D1212 LFF Chassis, Dual 3-port ESMs (Simplified Chinese documentation)	4587A1C^
D1212 LFF Chassis, Dual 3-port ESMs (Japanese documentation)	4587A1J**
SFF models	
D1224 SFF Chassis, Dual 3-port ESMs (US English documentation)	4587A31*
D1224 SFF Chassis, Dual 3-port ESMs (Simplified Chinese documentation)	4587A3C^
D1224 SFF Chassis, Dual 3-port ESMs (Japanese documentation)	4587A3J**

* Available worldwide (except China and Japan)
^ Available only in China
** Available only in Japan

The following table lists the TopSeller models of the 12 Gbps SAS external drive enclosures that are offered by Lenovo that can be used with the RD650 for storage expansion.

Table 33. D1212 and D1224 TopSeller models

Description	Part number
LFF models - North America (NA) and Europe, Middle East, and Africa (EMEA)	
Lenovo Storage D1212 LFF Dual ESM Disk Expansion Enclosure (US English documentation)	4587E11
LFF models - Brazil and Latin America	
D1212 LFF Chassis, Dual 3-port ESMs, 4x 2TB 3.5" HDDs, 4x 0.5m SAS cables	4587EAU
D1212 LFF Chassis, Dual 3-port ESMs, 4x 4TB 3.5" HDDs, 4x 0.5m SAS cables	4587EBU
D1212 LFF Chassis, Dual 3-port ESMs, 4x 6TB 3.5" HDDs, 4x 0.5m SAS cables	4587ECU
D1212 LFF Chassis, Dual 3-port ESMs, 4x 8TB 3.5" HDDs, 4x 0.5m SAS cables	4587EDU
D1212 LFF Chassis, Dual 3-port ESMs, 8x 2TB 3.5" HDDs, 4x 0.5m SAS cables	4587EEU
D1212 LFF Chassis, Dual 3-port ESMs, 8x 4TB 3.5" HDDs, 4x 0.5m SAS cables	4587EFU
D1212 LFF Chassis, Dual 3-port ESMs, 8x 6TB 3.5" HDDs, 4x 0.5m SAS cables	4587EGU
D1212 LFF Chassis, Dual 3-port ESMs, 8x 8TB 3.5" HDDs, 4x 0.5m SAS cables	4587EHU
D1212 LFF Chassis, Dual 3-port ESMs, 12x 2TB 3.5" HDDs, 4x 0.5m SAS cables	4587EIU
D1212 LFF Chassis, Dual 3-port ESMs, 12x 4TB 3.5" HDDs, 4x 0.5m SAS cables	4587EJU
D1212 LFF Chassis, Dual 3-port ESMs, 12x 6TB 3.5" HDDs, 4x 0.5m SAS cables	4587EKU
D1212 LFF Chassis, Dual 3-port ESMs, 12x 8TB 3.5" HDDs, 4x 0.5m SAS cables	4587ELU
SFF models - North America (NA) and Europe, Middle East, and Africa (EMEA)	
Lenovo Storage D1224 SFF Dual ESM Disk Expansion Enclosure (US English documentation)	4587E31
SFF models - Brazil and Latin America	
D1224 SFF Chassis, Dual 3-port ESMs, 9x 1.2TB 10K HDDs, 4x 0.5m SAS cables	4587E6U
D1224 SFF Chassis, Dual 3-port ESMs, 9x 1.2TB 10K HDDs, 2x 400GB SSDs, 4x 0.5m SAS cables	4587E2U
D1224 SFF Chassis, Dual 3-port ESMs, 9x 1.2TB 10K HDDs, 4x 400GB SSDs, 4x 0.5m SAS cables	4587E4U
D1224 SFF Chassis, Dual 3-port ESMs, 18x 1.2TB 10K HDDs, 1x 0.5m SAS cable	4587E5U

Description	Part number
D1224 SFF Chassis, Dual 3-port ESMs, 18x 1.2TB 10K HDDs, 2x 400GB SSDs, 4x 0.5m SAS cables	4587E1U
D1224 SFF Chassis, Dual 3-port ESMs, 18x 1.2TB 10K HDDs, 4x 400GB SSDs, 4x 0.5m SAS cables	4587E3U

For details about supported drives, adapters, and cables for the Lenovo Storage D1212 and D1224, see the Lenovo Press Product Guide:
http://lenovopress.com/lp0512

External storage systems

The following table lists the external storage systems that are currently offered by Lenovo that can be used with the RD650 in IT solutions.

Table 34. External storage systems

Description	Part number
Lenovo ThinkSystem DS Series Storage (SAS connectivity)	
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (US English documentation)	4599A41*
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (Simplified Chinese documentation)	4599A4C^
Lenovo ThinkSystem DS2200 LFF SAS Dual Controller Unit (Japanese documentation)	4599A4J**
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (US English documentation)	4599A21*
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (Simplified Chinese documentation)	4599A2C^
Lenovo ThinkSystem DS2200 SFF SAS Dual Controller Unit (Japanese documentation)	4599A2J**
Lenovo ThinkSystem DS4200 LFF SAS Dual Controller Unit (US English documentation)	4617A41*
Lenovo ThinkSystem DS4200 LFF SAS Dual Controller Unit (Simplified Chinese documentation)	4617A4C^
Lenovo ThinkSystem DS4200 LFF SAS Dual Controller Unit (Japanese documentation)	4617A4J**
Lenovo ThinkSystem DS4200 SFF SAS Dual Controller Unit (US English documentation)	4617A21*
Lenovo ThinkSystem DS4200 SFF SAS Dual Controller Unit (Simplified Chinese documentation)	4617A2C^
Lenovo ThinkSystem DS4200 SFF SAS Dual Controller Unit (Japanese documentation)	4617A2J**
Lenovo ThinkSystem DS6200 SFF SAS Dual Controller Unit (US English documentation)	4619A21*
Lenovo ThinkSystem DS6200 SFF SAS Dual Controller Unit (Simplified Chinese documentation)	4619A2C^
Lenovo ThinkSystem DS6200 SFF SAS Dual Controller Unit (Japanese documentation)	4619A2J**
Lenovo ThinkSystem DS Series Storage (iSCSI or FC connectivity)	
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A31*
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A3C^
Lenovo ThinkSystem DS2200 LFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A3J**
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4599A11*
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4599A1C^
Lenovo ThinkSystem DS2200 SFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4599A1J**
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (US English documentation)	4617A31*
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4617A3C^
Lenovo ThinkSystem DS4200 LFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4617A3J**
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4617A11*
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4617A1C^

Description	Part number
Lenovo ThinkSystem DS4200 SFF FC/iSCSI Dual Controller Unit (Japanese documentation)	4617A1J**
Lenovo ThinkSystem DS6200 SFF FC/iSCSI Dual Controller Unit (US English documentation)	4619A11*
Lenovo ThinkSystem DS6200 SFF FC/iSCSI Dual Controller Unit (Simplified Chinese documentation)	4619A1C^
Lenovo Storage V Series (SAS [except V7000], iSCSI, or FC connectivity)	
Lenovo Storage V3700 V2 LFF Control Enclosure	6535C1D
Lenovo Storage V3700 V2 LFF Control Enclosure (TopSeller)	6535EC1
Lenovo Storage V3700 V2 SFF Control Enclosure	6535C2D
Lenovo Storage V3700 V2 SFF Control Enclosure (TopSeller)	6535EC2
Lenovo Storage V3700 V2 XP LFF Control Enclosure	6535C3D
Lenovo Storage V3700 V2 XP LFF Control Enclosure (TopSeller)	6535EC3
Lenovo Storage V3700 V2 XP SFF Control Enclosure	6535C4D
Lenovo Storage V3700 V2 XP SFF Control Enclosure (TopSeller)	6535EC4
Lenovo Storage V5030 LFF Control Enclosure 3Yr S&S	6536C12
Lenovo Storage V5030 LFF Control Enclosure 5Yr S&S	6536C32
Lenovo Storage V5030 SFF Control Enclosure 3Yr S&S	6536C22
Lenovo Storage V5030 SFF Control Enclosure 5Yr S&S	6536C42
Lenovo Storage V5030F SFF Control Enclosure 3Yr S&S	6536B1F
Lenovo Storage V5030F SFF Control Enclosure 5Yr S&S	6536B2F
Lenovo Storage V7000 SFF Control Enclosure 3Yr S&S PRC	6538R11^
Lenovo Storage V7000 SFF Control Enclosure 5Yr S&S PRC	6538R21^
Lenovo Storage V7000F SFF Control Enclosure 3Yr S&S PRC	6538R1G^
Lenovo Storage V7000F SFF Control Enclosure 5Yr S&S PRC	6538R2G^
IBM Storwize for Lenovo (SAS [except V7000], iSCSI, or FC connectivity)	
IBM Storwize V3500 3.5-inch Dual Control Storage Controller Unit	6096CU2^
IBM Storwize V3500 2.5-inch Dual Control Storage Controller Unit	6096CU3^
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA	6195C32†
IBM Storwize V7000 SFF Control Enclosure, 3YR SWMA, LA	6195C3L‡
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA	6195C52†
IBM Storwize V7000 SFF Control Enclosure, 5YR SWMA, LA	6195C5L‡
Lenovo Storage DX8200 Series (NAS or iSCSI connectivity; optional FC connectivity)	
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 3yr SW S&S	5135A3x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 4yr SW S&S	5135J3x#
Lenovo Storage DX8200D Storage Virtualization Entry, 4TB, 5yr SW S&S	51351Wx#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 3yr SW S&S	5135B3x#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 4yr SW S&S	5135L3x#
Lenovo Storage DX8200D Storage Virtualization Mid, 16TB, 5yr SW S&S	51352Wx#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 3yr SW S&S	5135C3x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 4yr SW S&S	5135M3x#
Lenovo Storage DX8200D Storage Virtualization High, 64TB, 5yr SW S&S	51353Wx#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 3yr SW S&S	5135D3x#

Description	Part number
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 4yr SW S&S	5135N3x#
Lenovo Storage DX8200D ServerSAN Entry, 8TB, 5yr SW S&S	51354Wx#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 3yr SW S&S	5135F3x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 4yr SW S&S	5135P3x#
Lenovo Storage DX8200D ServerSAN Mid, 16TB, 5yr SW S&S	51355Wx#
Lenovo Storage DX8200D ServerSAN High, 32TB, 3yr SW S&S	5135G3x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 4yr SW S&S	5135Q3x#
Lenovo Storage DX8200D ServerSAN High, 32TB, 5yr SW S&S	51356Wx#
Lenovo Storage DX8200N with 1x N2226 HBA (Requires a supported external drive enclosure)	5128C1x#
Lenovo Storage DX8200N with 2x N2226 HBAs (Requires a supported external drive enclosure)	5128C2x#
Lenovo Storage DX8200C Series (S3 cloud storage)	
Lenovo Storage DX8200C 56TB (14x 4TB HDDs) with Cloudian HyperStore - 3yr HW/SW S&S	5120D1x#
Lenovo Storage DX8200C 84TB (14x 6TB HDDs) with Cloudian HyperStore - 3yr HW/SW S&S	5120D2x#
Lenovo Storage DX8200C 112TB (14x 8TB HDDs) with Cloudian HyperStore - 3yr HW/SW S&S	5120D3x#
Lenovo Storage DX8200C 140TB (14x 10TB HDDs) with Cloudian HyperStore - 3yr HW/SW S&S	5120D4x#

* Available worldwide (except China and Japan).
^ Available only in China.
** Available only in Japan.
† Available worldwide except Latin America.
‡ Available only in Latin America.
# x represents a geo-specific letter (for example: U = North America, G = EMEA). Ask a Lenovo representative for specifics.

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

- Lenovo DS Series and V Series storage:
  http://lenovopress.com/storage/san/lenovo#rt=product-guide
- IBM Storwize for Lenovo storage:
  http://lenovopress.com/storage/san/ibm#rt=product-guide
- Lenovo Cloud storage:
  http://lenovopress.com/storage/cloud#rt=product-guide
- Lenovo NAS storage:
  http://lenovopress.com/storage/nas#rt=product-guide

External backup units

The following table lists the backup units that are offered by Lenovo that can be used in RD650 solutions.

Table 35. External backup unit options

Description	Part number
External RDX unit	
ThinkServer External RDX Tape Drive	4XF0G88929
RDX cartridges	
ThinkServer 1TB 3Gbps RDX Cartridge	4XB0F28660
ThinkServer 2TB SATA 3Gbps RDX Cartridge	4XB0G88711
External SAS tape backup drives	
IBM TS2250 Tape Drive Model H5S	6160S5E
IBM TS2260 Tape Drive Model H6S	6160S6E
IBM TS2270 Tape Drive Model H7S	6160S7E
External SAS tape backup autoloaders	
IBM TS2900 Tape Autoloader w/LTO5 HH SAS	6171S5R
IBM TS2900 Tape Autoloader w/LTO6 HH SAS	6171S6R
IBM TS2900 Tape Autoloader w/LTO7 HH SAS	6171S7R
External tape backup libraries	
IBM TS3100 Tape Library Model L2U	61732UL
IBM TS3200 Tape Library Model L4U	61734UL
Fibre Channel tape backup drives for TS3100 and TS3200 Tape Libraries	
6173 LTO Ultrium 5 Fibre Channel Drive	00NA107
6173 LTO Ultrium 5 Half High Fibre Drive Sled	00NA113
6173 LTO Ultrium 6 Fibre Channel Drive	00NA115
6173 LTO Ultrium 6 Half High Fibre Drive Sled	00NA119
6173 LTO Ultrium 7 Fibre Channel Drive	00WF765
6173 LTO Ultrium 7 Half High Fibre Drive Sled	00WF769
SAS tape backup drives for TS3100 and TS3200 Tape Libraries	
6173 LTO Ultrium 5 SAS Drive Sled	00NA109
6173 LTO Ultrium 5 Half High SAS Drive Sled	00NA111
6173 LTO Ultrium 6 Half High SAS Drive Sled	00NA117
6173 LTO Ultrium 7 Half High SAS Drive Sled	00WF767

For more information, see the list of Product Guides in the Backup Units category:
http://lenovopress.com/servers/options/backup

Ethernet LAN switches

The following table lists the Ethernet LAN switches that are offered by Lenovo that can be used with the RD650 server in IT solutions.

Table 36. Ethernet LAN switches

Description	Part number
1 Gb Ethernet switches	
Juniper EX2300-C PoE Switch	7165H1X
Juniper EX2300-24p PoE Switch	7165H2X
Lenovo RackSwitch G7028 (Rear to Front)	7159BAX
Lenovo RackSwitch G7052 (Rear to Front)	7159CAX
Lenovo RackSwitch G8052 (Rear to Front)	7159G52
10 Gb Ethernet switches	
Lenovo ThinkSystem NE1032 RackSwitch (Rear to Front)	7159A1X
Lenovo ThinkSystem NE1032T RackSwitch (Rear to Front)	7159B1X
Lenovo ThinkSystem NE1072T RackSwitch (Rear to Front)	7159C1X
Lenovo RackSwitch G8124E (Rear to Front)	7159BR6
Lenovo RackSwitch G8264 (Rear to Front)	7159G64
Lenovo RackSwitch G8264CS (Rear to Front)	7159DRX
Lenovo RackSwitch G8272 (Rear to Front)	7159CRW
Lenovo RackSwitch G8296 (Rear to Front)	7159GR6
25 Gb Ethernet switches	
Lenovo ThinkSystem NE2572 RackSwitch (Rear to Front)	7159E1X
40 Gb Ethernet switches	
Lenovo RackSwitch G8332 (Rear to Front)	7159BRX
100 Gb Ethernet switches	
Lenovo ThinkSystem NE10032 RackSwitch (Rear to Front)	7159D1X

For more information, see the list of Product Guides in the Top-of-rack Switches category:
http://lenovopress.com/servers/options/switches#rt=product-guide

Fibre Channel SAN switches

The following table lists currently available Fibre Channel SAN switches that are offered by Lenovo that can be used with the RD650 in IT solutions.

Table 37. Fibre Channel SAN switches

Description	Part number
8 Gb FC	
Lenovo B300, 8 ports activated, 8x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR3
Lenovo B6505, 12 ports activated, 12x 8Gb SWL SFPs, 1 PS, Rail Kit	3873AR4
Lenovo B6510, 24 ports activated, 24x 8Gb SWL SFPs, 2 PS, Rail Kit	3873BR2
16 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 8x 16Gb SWL SFPs, 1 PS, Rail Kit	6559D2Y
Lenovo ThinkSystem DB610S, 24 ports activated, 24x 16Gb SWL SFP, Enterprise SW, 1 PS, Rail Kit	6559D1Y
Lenovo B6505, 12 ports activated w/ 16Gb SWL SFPs, 1 PS, Rail Kit	3873AR5
Lenovo B6510, 24 ports activated w/ 16Gb SWL SFPs, 2 PS, Rail Kit	3873BR3
32 Gb FC	
Lenovo ThinkSystem DB610S, 8 ports activated, 1 PS, Rail Kit	6559D3Y
Lenovo ThinkSystem DB620S, 24 Ports Activated, 24x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G11
Lenovo ThinkSystem DB620S, 48 Ports Activated, 48x 32Gb SWL SFPs, 2 PS, Rail Kit	6415G2A
Lenovo ThinkSystem DB400D 32Gb FC Director, up to 192 ports, 8U, Enterprise SW	6684B2A
Lenovo ThinkSystem DB800D 32Gb FC Director, up to 384 ports, 14U, Enterprise SW	6682B1A

For more information, see the list of Product Guides in the Rack SAN Switches category:
http://lenovopress.com/storage/switches/rack#rt=product-guide

Rack cabinets

The following table lists the rack cabinets that are offered by Lenovo that can be used in RD650 solutions.

Table 38. Rack cabinets

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

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

KVM switches and consoles

The server supports the rack console switches, monitor kits, and management gateways that are listed in the following table.

Table 39. KVM switch and console options

Description	Part number
Consoles	
1U 18.5" Standard Console (without keyboard)	17238BX
Console keyboards	
Lenovo UltraNav Keyboard USB - US Eng	00MW310
Keyboard w/ Int. Pointing Device USB - Arabic 253 RoHS v2	46W6713
Keyboard w/ Int. Pointing Device USB - Belg/UK 120 RoHS v2	46W6714
Keyboard w/ Int. Pointing Device USB - Chinese/US 467 RoHS v2	46W6715
Keyboard w/ Int. Pointing Device USB - Czech 489 RoHS v2	46W6716
Keyboard w/ Int. Pointing Device USB - Danish 159 RoHS v2	46W6717
Keyboard w/ Int. Pointing Device USB - Dutch 143 RoHS v2	46W6718
Keyboard w/ Int. Pointing Device USB - French 189 RoHS v2	46W6719
Keyboard w/ Int. Pointing Device USB - Fr/Canada 445 RoHS v2	46W6720
Keyboard w/ Int. Pointing Device USB - German 129 RoHS v2	46W6721
Keyboard w/ Int. Pointing Device USB - Greek 219 RoHS v2	46W6722
Keyboard w/ Int. Pointing Device USB - Hebrew 212 RoHS v2	46W6723
Keyboard w/ Int. Pointing Device USB - Hungarian 208 RoHS v2	46W6724
Keyboard w/ Int. Pointing Device USB - Italian 141 RoHS v2	46W6725
Keyboard w/ Int. Pointing Device USB - Japanese 194 RoHS v2	46W6726
Keyboard w/ Int. Pointing Device USB - Korean 413 RoHS v2	46W6727
Keyboard w/ Int. Pointing Device USB - LA Span 171 RoHS v2	46W6728
Keyboard w/ Int. Pointing Device USB - Norwegian 155 RoHS v2	46W6729
Keyboard w/ Int. Pointing Device USB - Polish 214 RoHS v2	46W6730
Keyboard w/ Int. Pointing Device USB - Portugese 163 RoHS v2	46W6731
Keyboard w/ Int. Pointing Device USB - Russian 441 RoHS v2	46W6732
Keyboard w/ Int. Pointing Device USB - Slovak 245 RoHS v2	46W6733
Keyboard w/ Int. Pointing Device USB - Spanish 172 RoHS v2	46W6734
Keyboard w/ Int. Pointing Device USB - Swed/Finn 153 RoHS v2	46W6735
Keyboard w/ Int. Pointing Device USB - Swiss F/G 150 RoHS v2	46W6736
Keyboard w/ Int. Pointing Device USB - Thai 191 RoHS v2	46W6737
Keyboard w/ Int. Pointing Device USB - Turkish 179 RoHS v2	46W6738
Keyboard w/ Int. Pointing Device USB - UK Eng 166 RoHS v2	46W6739
Keyboard w/ Int. Pointing Device USB - US Euro 103P RoHS v2	46W6740
Keyboard w/ Int. Pointing Device USB - Slovenian 234 RoHS v2	46W6741
Console switches	
Global 4x2x32 Console Manager (GCM32)	1754D2X

Description	Part number
Global 2x2x16 Console Manager (GCM16)	1754D1X
Local 2x16 Console Manager (LCM16)	1754A2X
Local 1x8 Console Manager (LCM8)	1754A1X
Console cables	
Single Cable USB Conversion Option (UCO)	43V6147
USB Conversion Option (4 Pack UCO)	39M2895
Virtual Media Conversion Option Gen2 (VCO2)	46M5383
Serial Conversion Option (SCO)	46M5382

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

Power distribution units

The following table lists the power distribution units (PDUs) that are offered by Lenovo that can be used in RD650 solutions.

Table 40. Power distribution units

Description	Part number
0U Basic PDUs	
0U 36 C13/6 C19 24A/200-240V 1 Phase PDU with NEMA L6-30P line cord	00YJ776
0U 36 C13/6 C19 32A/200-240V 1 Phase PDU with IEC60309 332P6 line cord	00YJ777
0U 21 C13/12 C19 32A/200-240V/346-415V 3 Phase PDU with IEC60309 532P6 line cord	00YJ778
0U 21 C13/12 C19 48A/200-240V 3 Phase PDU with IEC60309 460P9 line cord	00YJ779
Switched and Monitored PDUs	
0U 20 C13/4 C19 Switched and Monitored 24A/200-240V/1Ph PDU w/ NEMA L6-30P line cord	00YJ781
0U 20 C13/4 C19 Switched and Monitored 32A/200-240V/1Ph PDU w/ IEC60309 332P6 line cord	00YJ780
0U 18 C13/6 C19 Switched / Monitored 32A/200-240V/346-415V/3Ph PDU w/ IEC60309 532P6 cord	00YJ782
0U 12 C13/12 C19 Switched and Monitored 48A/200-240V/3Ph PDU w/ IEC60309 460P9 line cord	00YJ783
1U 9 C19/3 C13 Switched and Monitored DPI PDU (without line cord)	46M4002
1U 9 C19/3 C13 Switched and Monitored 60A 3Ph PDU with IEC 309 3P+Gnd cord	46M4003
1U 12 C13 Switched and Monitored DPI PDU (without line cord)	46M4004
1U 12 C13 Switched and Monitored 60A 3 Phase PDU with IEC 309 3P+Gnd line cord	46M4005
Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)	
Ultra Density Enterprise C19/C13 PDU Module (without line cord)	71762NX
Ultra Density Enterprise C19/C13 PDU 60A/208V/3ph with IEC 309 3P+Gnd line cord	71763NU
C13 Enterprise PDUs (12x IEC 320 C13 outlets)	
DPI C13 Enterprise PDU+ (without line cord)	39M2816
DPI Single Phase C13 Enterprise PDU (without line cord)	39Y8941
C19 Enterprise PDUs (6x IEC 320 C19 outlets)	
DPI Single Phase C19 Enterprise PDU (without line cord)	39Y8948

Description	Part number
DPI 60A 3 Phase C19 Enterprise PDU with IEC 309 3P+G (208 V) fixed line cord	39Y8923
Front-end PDUs (3x IEC 320 C19 outlets)	
DPI 30amp/125V Front-end PDU with NEMA L5-30P line cord	39Y8938
DPI 30amp/250V Front-end PDU with NEMA L6-30P line cord	39Y8939
DPI 32amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8934
DPI 60amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8940
DPI 63amp/250V Front-end PDU with IEC 309 2P+Gnd line cord	39Y8935
Universal PDUs (7x IEC 320 C13 outlets)	
DPI Universal 7 C13 PDU (with 2 m IEC 320-C19 to C20 rack power cord)	00YE443
NEMA PDUs (6x NEMA 5-15R outlets)	
DPI 100-127V PDU with fixed NEMA L5-15P line cord	39Y8905
Line cords for PDUs that ship without a line cord	
DPI 30a Line Cord (NEMA L6-30P)	40K9614
DPI 32a Line Cord (IEC 309 P+N+G)	40K9612
DPI 32a Line Cord (IEC 309 3P+N+G)	40K9611
DPI 60a Cord (IEC 309 2P+G)	40K9615
DPI 63a Cord (IEC 309 P+N+G)	40K9613
DPI Australian/NZ 3112 Line Cord (32A)	40K9617
DPI Korean 8305 Line Cord (30A)	40K9618

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

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units that are listed in the following table.

Table 41. Uninterruptible power supply units

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

For more information, see the list of Lenovo Press Product Guides in the UPS category at this web page: http://lenovopress.com/servers/options/ups

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Related publications and links

For more information, see the following resources:

- ThinkServer RD650 Users Guide:
  http://download.lenovo.com/ibmdl/pub/pc/pccbbs/thinkservers/rd650ughmm_en.pdf
- Lenovo Support for ThinkServer RD650
  http://datacentersupport.lenovo.com/us/en/products/servers/thinkserver/rd650
- ThinkServer Power Planner
  http://support.lenovo.com/us/en/downloads/ds101155

Related product families

Product families related to this document are the following:

- 2-Socket Rack Servers

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