

Lenovo ThinkEdge SE450 Edge Server Product Guide

The Lenovo ThinkEdge SE450 is a single-socket server, with a 2U height and short depth case that can go almost anywhere. It can be mounted on a wall, placed on the floor like a tower server, or mounted in a rack. This rugged edge server can handle continuous operating temperatures from 5°C and 45°C; and some configurations are designed to meet NEBS Level-3 and ETSI requirements for 96 hours operating excursions from -5°C and 55°C as well as tolerance to locations with high-dust and vibration.

The ThinkEdge SE450 is based on the 3rd Gen Intel Xeon Scalable processor and is designed to virtualize traditional IT applications as well as new transformative AI systems, providing the processing power, storage, accelerator, and networking technologies required for today's edge workloads. Lenovo's innovation makes the ThinkEdge SE450 one of the most powerful, yet quiet servers on the market, allowing it to be deployed next to end users without disturbing the workplace.



Figure 1. Lenovo ThinkEdge SE450

Did you know?

Customers with remote locations have had to make a choice between underpowered IOT gateways and PCs, or overpowered and non-rugged data center servers. With the SE450, now they have an option: a compact edge server designed specifically to meet the needs of remote locations with the processing power to run AI workloads.

Key features

The ThinkEdge SE450 is a purpose-built server that is significantly shorter than a traditional server, making it ideal for deployment in tight spaces. It can be mounted on a wall, placed vertically in a floor stand, or mounted in a rack.

The ThinkEdge SE450 puts increased processing power, storage and network closer to where data is generated, allowing actions resulting from the analysis of that data to take place more quickly.

Since these edge servers are typically deployed outside of secure data centers, they include technology that encrypts the data stored on the device if it is tampered with, only enabling authorized users to access it.

Scalability and performance

The SE450 offers numerous features to boost performance, improve scalability and reduce costs:

- Support a single processor from the powerful Intel Xeon Scalable "Ice Lake" processor family.
 - Up to 36 cores
 - Core speeds of up to 3.0 GHz
 - TDP ratings of up to 205W
- Support for up to 8 TruDDR4 memory DIMMs and up to 1 TB of memory using 128 GB DIMMs
- DIMMs operate at up to 3200 MHz means you have the fastest available memory subsystem
- Supports the new Intel Optane Persistent Memory 200 Series for advanced in-memory database applications, dense-virtualization; up to 4 PMem Modules can be installed in conjunction with regular system memory.
- Supports up to four single-width GPUs or two double-wide GPUs, for substantial processing power in an edge system.
- Supports up to four Intel ACC100 Accelerator adapters to maximize the performance Network Function Virtualization (NFV) applications.
- Offers a choice of internal drive SSD bays supporting SATA or NVMe drives, or hot-swap front-accessible drive bays supporting SAS, SATA or NVMe drives.
- Supports M.2 drives for convenient operating system boot functions. Available M.2 adapters support either one M.2 drive or two M.2 drives, with optional RAID-1 with the use of VROC for performance and reliability.
- Supports 4x NVMe drives without oversubscription of PCIe lanes (1:1 connectivity). The use of NVMe drives maximizes drive I/O performance, in terms of throughput and latency.
- The server offers up to four PCIe 4.0 slots plus a slot dedicated to the OCP adapter.
- Support for up to four network adapters, up to 100 Gb Ethernet or HDR100 InfiniBand, for high-speed networking to back-end servers.

Availability and serviceability

The SE450 provides many features to simplify serviceability and increase system uptime:

- The server offers Single Device Data Correction (SDDC, also known as Chipkill), Adaptive Double-Device Data Correction (ADDDC, also known as Redundant Bit Steering or RBS), and memory mirroring for redundancy in the event of a non-correctable memory failure.
- The server offers hot-swap drives, supporting software RAID redundancy for data protection and greater system uptime.
- The M.2 adapter supports RAID-1 via Intel VROC which can enable two M.2 drives to be configured as a redundant pair.
- The server has up to two hot-swap redundant power supplies and up to six simple-swap N+1 redundant fans to provide availability for business-critical applications.
- Solid-state drives (SSDs) offer more reliability and performance than traditional mechanical HDDs for greater uptime.

- Proactive Platform Alerts (including PFA and SMART alerts): Processors, voltage regulators, memory, internal storage (HDDs and SSDs, M.2 storage), fans, power supplies, RAID controllers, server ambient and subcomponent temperatures. Alerts can be surfaced through the XClarity Controller to managers such as Lenovo XClarity Administrator, VMware vCenter, and Microsoft System Center. These proactive alerts let you take appropriate actions in advance of possible failure, thereby increasing server uptime and application availability.
- The built-in XClarity Controller continuously monitors system parameters, triggers alerts, and performs recovery actions in case of failures to minimize downtime.
- Built-in diagnostics in UEFI, using Lenovo XClarity Provisioning Manager, speed up troubleshooting tasks to reduce service time.
- Lenovo XClarity Provisioning Manager supports diagnostics and can save service data to a USB key drive or remote CIFS share folder for troubleshooting and reduce service time.
- Auto restart in the event of a momentary loss of AC power (based on power policy setting in the XClarity Controller service processor)
- Offers a diagnostics port on the front of the server to allow you to attach an external diagnostics handset for enhanced systems management capabilities.
- Support for the XClarity Administrator Mobile app running on a supported smartphone or tablet and connected to the server through the service-enabled USB port, enables additional local systems management functions.
- Three-year or one-year customer-replaceable unit and onsite limited warranty (varies by geography), 9 x 5 next business day. Optional service upgrades are available.

Manageability and security

Systems management features simplify local and remote management of the SE450:

- The server includes an XClarity Controller (XCC) to monitor server availability. Optional upgrade to XCC Advanced to provide remote control (keyboard video mouse) functions. Optional upgrade to XCC Enterprise enables the additional support for the mounting of remote media files (ISO and IMG image files), boot capture, and power capping.
- Lenovo XClarity Administrator offers comprehensive hardware management tools that help to increase uptime, reduce costs and improve productivity through advanced server management capabilities.
- IT Administrators can securely claim and activate the SE450 remotely through the ThinkShield Key Vault Portal, available on the web. They can also manage and unlock their global IoT edge fleet for initial operation and in case of tamper. The ThinkShield Edge Mobile Management app enables Edge Users to securely claim and activate the ThinkEdge SE450 in an easy to use Web UI.
- UEFI-based Lenovo XClarity Provisioning Manager, accessible from F1 during boot, provides system inventory information, graphical UEFI Setup, platform update function, RAID Setup wizard, operating system installation function, and diagnostic functions.
- Support for Lenovo XClarity Energy Manager, which captures real-time power and temperature data from the server and provides automated controls to lower energy costs.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Support for industry standard management protocols, IPMI 2.0, SNMP 3.0, Redfish REST API, serial console via IPMI
- An integrated hardware Trusted Platform Module (TPM) supporting TPM 2.0 enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Administrator and power-on passwords help protect from unauthorized access to the server.
- Supports Secure Boot to ensure only a digitally signed operating system can be used. Supported with HDDs and SSDs, as well as M.2 drives.
- Industry-standard Advanced Encryption Standard (AES) NI support for faster, stronger encryption.

- Intel Execute Disable Bit functionality can prevent certain classes of malicious buffer overflow attacks when combined with a supported operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing an application to run in its own isolated space, protected from all other software running on a system.
- Additional physical security features are an available chassis intrusion switch and available lockable front bezel and top cover.

Energy efficiency

The SE450 offers the following energy-efficiency features to save energy, reduce operational costs, and increase energy availability:

- Energy-efficient system board components help lower operational costs.
- High-efficiency power supplies with 80 PLUS Platinum and Titanium certifications
- Solid-state drives (SSDs) consume as much as 80% less power than traditional spinning 2.5-inch HDDs.
- Optional Lenovo XClarity Energy Manager provides 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 view of the ThinkEdge SE450 server.

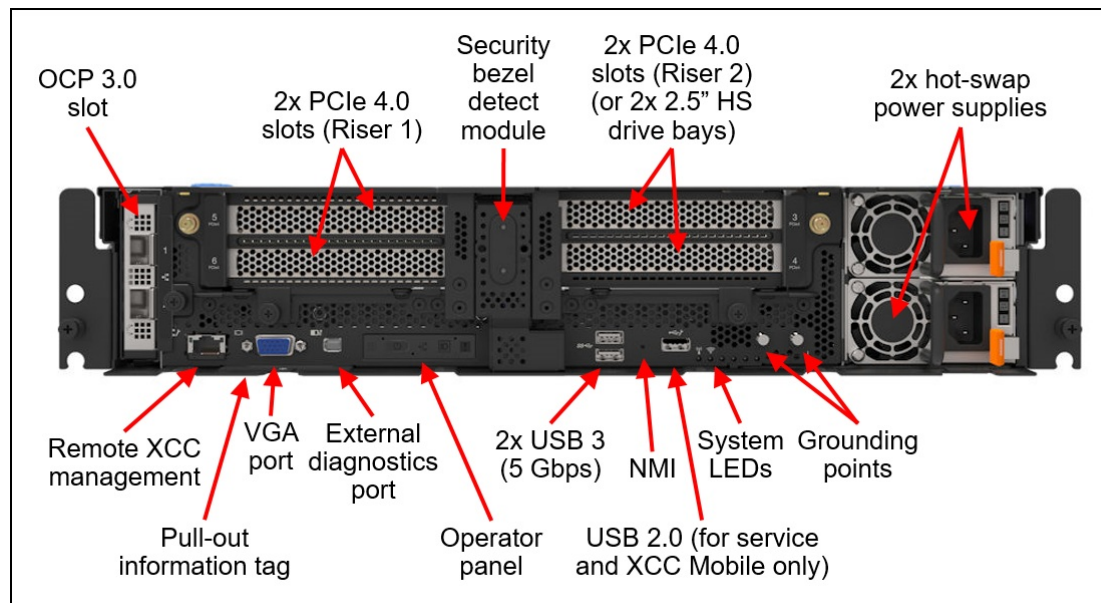


Figure 2. Front view of the ThinkEdge SE450

The following figure shows the rear of the SE450 server.

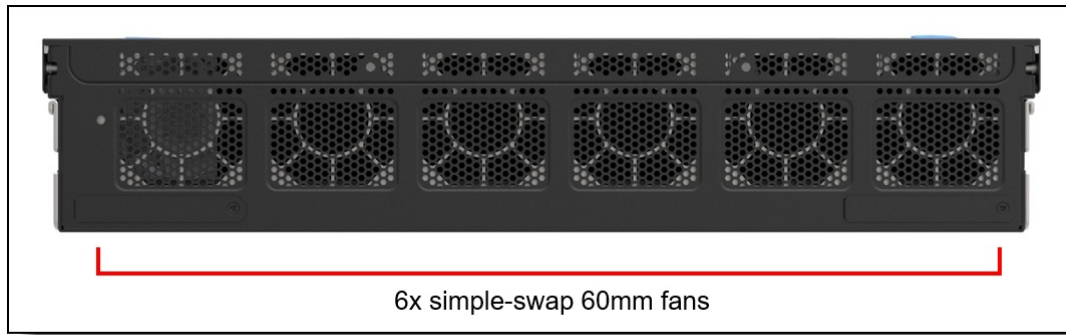


Figure 3. Rear view of the ThinkEdge SE450

The SE450 optionally supports a security bezel which helps restrict physical access to the front of the server while still allowing cables to be properly routed through side panels. The bezel also duplicates the system LEDs that would otherwise be covered up by the bezel. The following figure shows the server with the security bezel attached.

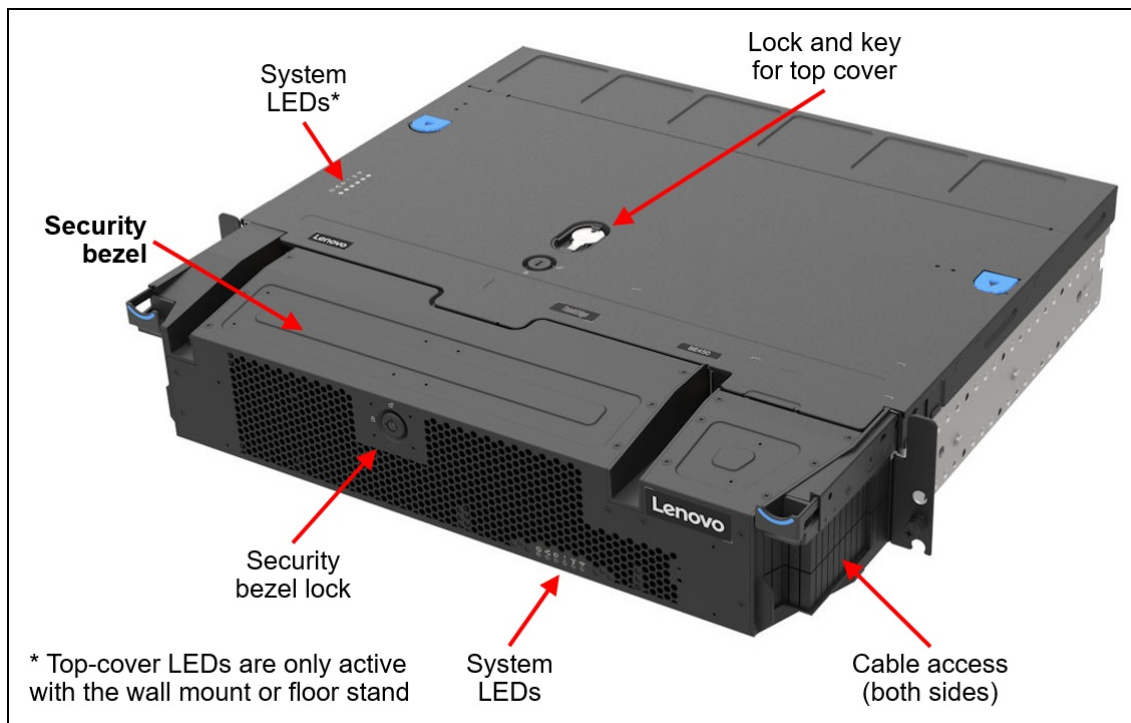


Figure 4. View of the ThinkEdge SE450 with security bezel attached

The following figure shows the locations of key components inside the server. The two riser cards and various brackets have been removed to show the components on the system board.

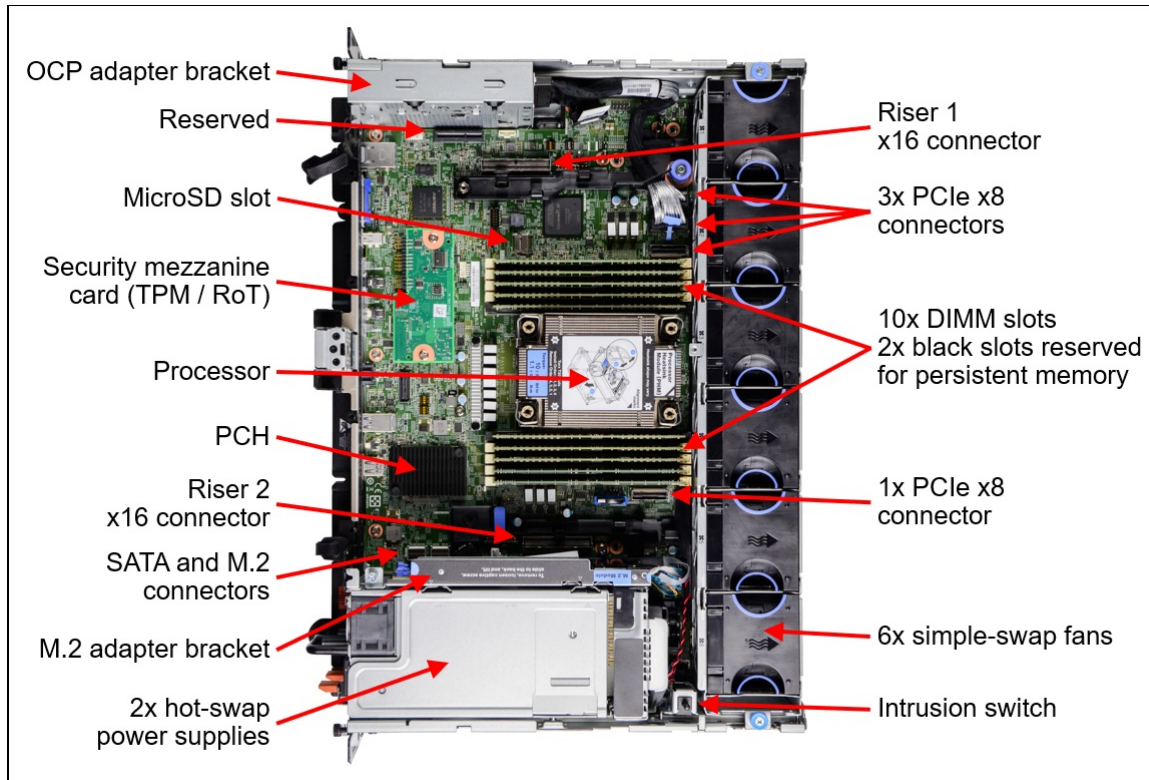


Figure 5. Internal view of the ThinkEdge SE450

System architecture

The following figure shows the architectural block diagram of the SE450 system, showing the major components and connections.

The processor offers 64 PCIe G4 lanes to devices and the SE450 presents those as a combination of PCIe slots, an OCP slot, and NVMe drives. As shown in the figure, PCIe lanes to slots 3 and 6 can instead be configured to be used with the OCP slot and/or NVMe drive connections. The specific combinations supported are listed in the [Configurations](#) section.

Tip: The wrench icons show where the local and remote management functions are enabled

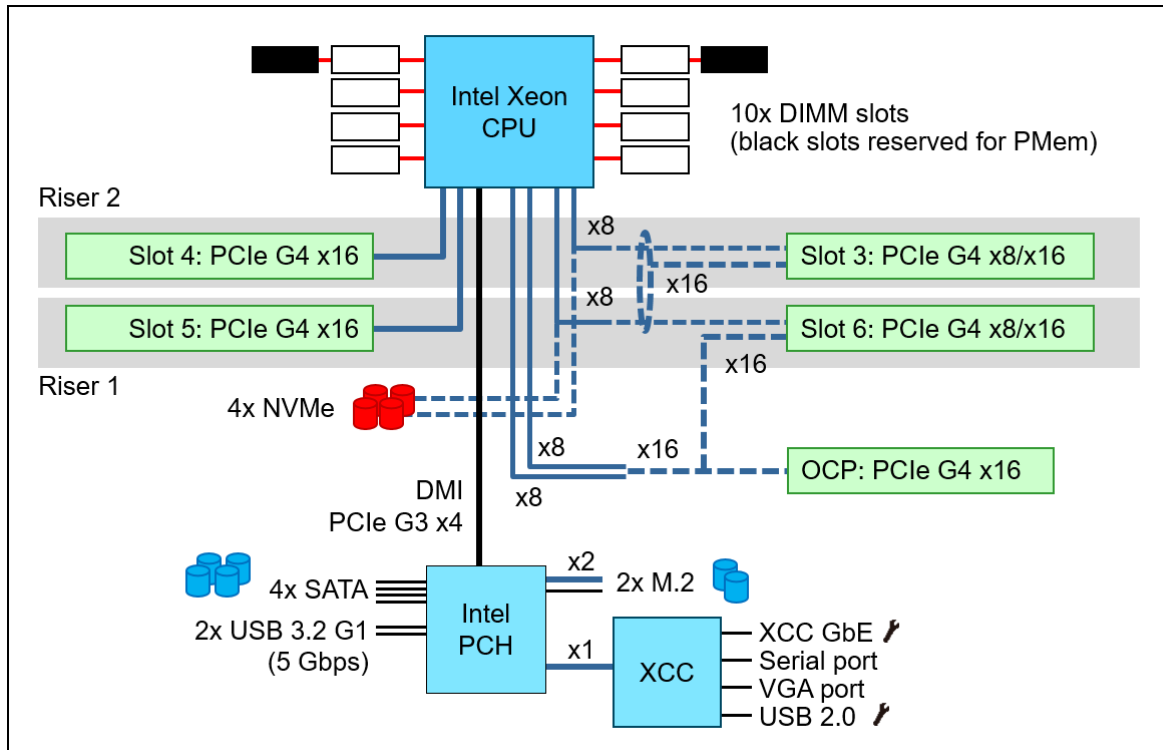


Figure 6. SE450 architectural block diagram

Standard specifications

The following table lists the standard specifications of the SE450.

Table 1. Standard specifications

Components	Specification
Machine types	7D8T - 3 year warranty
Form factor	2U rack server, 300mm or 360mm depth
Processor	1x 3rd Gen Intel Xeon Scalable processor (formerly codenamed "Ice Lake"). Supports Silver, Gold and Platinum processors up to 36 cores, core speeds of up to 3.0 GHz, and TDP ratings of up to 205W.
Accelerators	Supports up to 4x Intel ACC100 Accelerating NFV adapters
Memory	<p>10 DIMM slots, supporting the following combinations:</p> <ul style="list-style-type: none"> • 1, 2, 4, 6 or 8x RDIMMs (no Persistent Memory modules) • 6x RDIMMs and 1x Persistent Memory module • 8x RDIMMs and 1x Persistent Memory module • 4x RDIMMs and 4x Persistent Memory modules <p>The processor has 8 memory channels with 1 RDIMM per channel. In configurations with 8x RDIMMs + 1 PMem, the PMem is installed as a 2nd module on one of the channels. Lenovo TruDDR4 RDIMMs and 3DS RDIMMs are supported. DIMMs operate at up to 3200 MHz.</p>
Persistent memory	Supports up to 4x Intel Optane Persistent Memory 200 Series modules installed in the DIMM slots. Persistent memory (PMem) is installed in combination with system memory DIMMs.
Memory maximum	With RDIMMs only: Up to 1TB with 8x 128GB 3DS RDIMMs With PMem: Up to 1.5TB with 4x 128GB 3DS RDIMMs + 4x 256GB PMem modules
Memory protection	ECC, SDDC (for x4-based memory DIMMs), ADDDC (for x4-based memory DIMMs, requires Platinum or Gold processors), and memory mirroring.
Drive bays	<ul style="list-style-type: none"> • Up to 4x internal SSD drive bays supporting non-hot-swap trayless NVMe or SATA SSD drives • Up to 2x 2.5-inch hot-swap drive bays, front accessible, supporting SAS or SATA SSD drives (mutually exclusive with slots 3 and 4 in Riser 2) • Up to 2x M.2 drives for boot functions, supporting SATA drives
Maximum data storage	<ul style="list-style-type: none"> • 2.5-inch hot-swap drives: <ul style="list-style-type: none"> ◦ 30.72TB using 2x 15.36TB 2.5-inch SAS SSDs • 7mm internal (trayless) drives: <ul style="list-style-type: none"> ◦ 30.72TB using 4x 7.68TB 7mm SATA SSDs ◦ 15.36TB using 4x 3.84TB 7mm NVMe SSDs • 15mm internal (trayless) drives: <ul style="list-style-type: none"> ◦ 7.68TB using 2x 3.84TB 15mm NVMe SSDs • 15mm internal drives: <ul style="list-style-type: none"> ◦ 122.88TB using 2x 61.44TB NVMe SSDs
Storage controller	<ul style="list-style-type: none"> • 4x Onboard SATA ports (Intel VROC SATA RAID, formerly known as Intel RSTe RAID) • Up to 4x Onboard NVMe ports (includes Intel VROC NVMe RAID, with optional license for non-Intel NVMe SSDs) • RAID adapter and HBA support for SAS and SATA drive connectivity
Optical drive bays	No internal optical drive. Supports external DVD-RW.

Components	Specification
Tape drive bays	No support
Network interfaces	Dedicated OCP 3.0 SFF slot with PCIe 4.0 x16 host interface (not available in all configurations based on PCIe lane availability). OCP slot supports a variety of 2-port and 4-port adapters with 1GbE, 10GbE or 25GbE network connectivity. One port can optionally be shared with the XClarity Controller (XCC) management processor for Wake-on-LAN and NC-SI support. Additional network adapters supported in the PCIe slots.
PCI Expansion slots	Up to 4x PCIe 4.0 slots, x16 or x8, depending on the configuration selected. 300mm chassis supports half-length (FHHL) adapters, 360mm chassis supports full-length (FHFL) adapters.
GPU support	Supports up to 4x single-wide GPUs or up to 2x double-wide GPUs
Ports	Front: 2x USB 3.2 G1 (5 Gb/s) ports, VGA port, USB 2.0 port for XCC local management only (not visible to the operating system), dedicated RJ-45 1GbE remote systems management port, External diagnostics port for local systems management, NMI pinhole
Cooling	6x simple-swap 60 mm dual-rotor fans (all standard), N+1 redundant in most configurations.
Power supply	Up to two hot-swap redundant power supplies <ul style="list-style-type: none"> • 1100W Titanium or Platinum AC power supplies • 1800W Platinum AC power supply • 1100W -48V DC power supply Note: Power supplies are front-mounted so fan rotation is reversed compared to other ThinkSystem servers.
Video	G200 graphics with 16 MB memory with 2D hardware accelerator, integrated into the XClarity Controller. Maximum resolution is 1920x1200 32bpp at 60Hz.
Hot-swap parts	Drives (in hot-swap trays), power supplies
Systems management	Operator panel with status LEDs on the front of the server. Duplicate status LEDs on the top of the server. Optional External Diagnostics Handset with LCD display. XClarity Controller (XCC) embedded management based on ASPEED AST2600 management processor, XClarity Administrator centralized infrastructure delivery, XClarity Integrator plugins, and XClarity Energy Manager centralized server power management. Optional XClarity Controller Advanced and Enterprise to enable remote control functions. ThinkShield Edge Mobile Management mobile app and XClarity Mobile app for local onsite SE450 server management.
Security features	ThinkShield Key Vault Portal web site for security management. Trusted Platform Module, supporting TPM 2.0. Lockable top cover, optional front locking security bezel with duplicate status LEDs, intrusion detection, self-encrypting drive (SED) support, power-on password, administrator's password.
Operating systems supported	Microsoft Windows Server, Red Hat Enterprise Linux, SUSE Linux Enterprise Server, VMware ESXi. See the Operating system support section for specifics.
Mounting options	Horizontal or vertical orientation. Floor mount (vertical), wall mount, or 2U short-depth rack mount. Available locking security bezel with dust filter.
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5 next business day (NBD).
Service and support	Optional service upgrades are available through Lenovo Services: 4-hour or 2-hour response time, 6-hour fix time, 1-year or 2-year warranty extension, software support for Lenovo hardware and some third-party applications.

Components	Specification
Dimensions	300mm chassis: Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 323 mm (12.7 in.) 360mm chassis: Width: 445 mm (17.5 in.), height: 87 mm (3.4 in.), depth: 383 mm (15.1 in.) See Physical and electrical specifications for details.
Volume	300mm chassis: 11.6 liters 360mm chassis: 13.9 liters
Weight	300mm chassis: 14.8 kg (32.7 lb) 360mm chassis: 17.4 kg (38.4 lb)

Models

ThinkEdge SE450 models can be configured by using the [Lenovo Data Center Solution Configurator \(DCSC\)](#).

Controlled GPU models: The "Controlled GPU" base CTO models listed in the table are the only models that support high-performance GPUs and accelerators. These models are classified under US Government ECCN regulations and have limited market and customer availability. All other base models do not support high-performance GPUs.

Preconfigured server models may also be available for the SE450, however these are region-specific; that is, each region may define their own server models, and not all server models are available in every region.

The following table lists the base CTO models of the ThinkEdge SE450 server.

Table 2. Base CTO models

Machine Type/Model	Description
7D8TCTO1WW	ThinkEdge SE450 - 3yr Warranty
7D8TCTOAWW	ThinkEdge SE450 - 3yr Warranty with Controlled GPU

Models of the SE450 are defined based on the depth of the chassis:

- 300mm depth chassis - supports half-length adapters only
- 360mm depth chassis - supports full-length adapters or half-length adapters

The feature codes for these chassis choices are as listed in the following table.

Table 3. Chassis base feature codes

Feature code	Description
BMHB	ThinkEdge SE450 Edge Server Chassis, 300mm
BMHC	ThinkEdge SE450 Edge Server Chassis, 360mm

The following tables list the available models, grouped by region.

- [Models for Asia Pacific region](#)

Refer to the Specifications section for information about standard features of the server.

Models for Asia Pacific region

The following table lists the models for the Asia Pacific region: Australia, Bangladesh, Brunei, Hong Kong, India, Japan, Korea, Sri Lanka, Malaysia, New Zealand, Philippines, Singapore, Thailand, Taiwan, Vietnam

Table 4. Models for Asia Pacific markets

Model	Intel processor†	Memory	Drive Contr	Drive bays Drives	Add'l Cards	OCP	Power supply	Pwr cord	XCC2	Rail kit
Standard models with a 3-year warranty (machine type 7D8T)										
7D8T1001AP	Xeon Silver 4310T 10C 105W 2.3GHz	1x 32GB	OB SATA	2x 2.5-in NHS / Open bay	Opt	Yes	1x 1100W	Yes	Ent	Yes

† Processor detail: Model, number of cores, TDP, core frequency

Configurations

As shown in the [System architecture](#) section, PCIe lanes to slots 3 and 6 can instead be configured to be used with the OCP slot and/or NVMe drive connections. In addition, hot-swap drive bays are mutually exclusive with Riser 2 (slots 3 and 4). As a result, only certain combinations of slots, drive bays and drive types are supported.

The following table lists the supported combinations of server.

Serial port support: The serial port (COM port) installs in Slot 6 and is supported in any of the configurations listed that doesn't have Slot 6 enabled. The only exception to this is 360mm chassis configurations that have a double-wide GPU installed in Slot 5, since the GPU will also occupy Slot 6. For more information, see the [Serial port](#) section.

Table 5. Configurations

Config	Riser 1		Riser 2		OCP	Total NVMe drives	Hot-swap drive bays	Internal (non-hot-swap) drive bays	DW FL GPU	Description
	Slot 5	Slot 6	Slot 3	Slot 4						
Configurations using the 300mm chassis										
1	x16	x8	x8	x16	x16	None	No support	0 drives, or 2x 15mm SAS/SATA, or 4x 7mm SAS/SATA	No support	Standard config – 2x PCIe x16 slots + 2x PCIe x8 slots + OCP
2	x16	x16	x16	x16	No support	None	No support	0 drives, or 2x 15mm SAS/SATA, or 4x 7mm SAS/SATA	No support	Support for 4x PCI x16 slots
3	x16	No support	No support	x16	x16	4x NVMe	No support	0 drives, or 2x 15mm NVMe, or 4x 7mm NVMe	No support	Support for 4x 7mm internal NVMe drives
4	x16	x16	x8	x16	No support	2x NVMe	No support	0 drives, or 2x 15mm NVMe	No support	Support for 2x 15mm internal NVMe drives
5	x16	No support	No support	No support	x16	4x NVMe	2x AnyBay	0 drives, or 2x 15mm / 2x 7mm NVMe*, or 2x 15mm / 4x 7mm SATA	No support	Support for hot-swap drives using onboard controllers‡
6	x16	x16	No support	No support	No support	4x NVMe	2x AnyBay	0 drives, or 2x 15mm / 2x 7mm NVMe*, or 2x 15mm / 4x 7mm SAS/SATA	No support	Support for hot-swap drives using an HBA or RAID adapter‡
Configurations using the 360mm chassis										
1	x16	No support	No support	x16	x16	4x NVMe	No support	0 drives, or 4x 7mm NVMe/SATA, or 2x 15mm NVMe/SATA	2	GPU-rich config
2	x16	No support	No support	No support	x16	2x NVMe	2x AnyBay	0 drives, or 2x 15mm NVMe, or 2x 15mm / 4x 7mm SATA	1	GPU + hot-swap drives using onboard controllers‡
3	x16	x16	x8	x16	No support	4x NVMe	No support	0 drives, or 2x 15mm / 2x 7mm NVMe*, or 2x 15mm / 4x 7mm SATA	No support	4x PCIe slots (no DW GPU support)
4	x16	x16	No support	x16	No support	2x NVMe	No support	0 drives, or 2x 15mm NVMe, or 2x 15mm / 4x 7mm SATA	1	GPU-ready config with 3x PCIe slots

* For configurations with hot-swap drive bays, only 2x internal (non-hot-swap) NVMe drives are supported; 4x internal NVMe drives are not supported

† The 300mm configuration #6 does not currently support 2x internal NVMe drives + hot-swap drives using an HBA or RAID adapter

‡ No support for HBA or RAID adapter

Processors

The SE450 supports a single processor in the 3rd Gen Intel Xeon Scalable processor family (formerly codenamed "Ice Lake").

In this section:

- [Processor options](#)
- [Processor features](#)
- [Heatsink](#)
- [UEFI operating modes](#)

Processor options

The table below lists the processors that are supported.

Some processors include a suffix letter in the processor model number:

- M: Media Processing optimized
- N: NFV optimized
- P: High frequency-optimized for IaaS virtualization customers
- Q: Optimized for liquid cooling
- S: Large (512GB) SGX Enclave size
- T: High Tcase
- U: Single socket
- V: High density/low power-optimized for SaaS virtualization customers
- Y: Speed Select

Table 6. Processor options

Feature code	Description	Maximum quantity
BB34	Intel Xeon Silver 4310T 10C 105W 2.3GHz Processor	1
BB2Z	Intel Xeon Silver 4314 16C 135W 2.4GHz Processor	1
BB39	Intel Xeon Silver 4316 20C 150W 2.3GHz Processor	1
BB30	Intel Xeon Gold 5317 12C 150W 3.0GHz Processor	1
BB3E	Intel Xeon Gold 5318N 24C 150W 2.1GHz Processor	1
BB2Y	Intel Xeon Gold 5320T 20C 150W 2.3GHz Processor	1
BB4E	Intel Xeon Gold 6326 16C 185W 2.9GHz Processor	1
BB3H	Intel Xeon Gold 6330 28C 205W 2.0GHz Processor	1
BB3N	Intel Xeon Gold 6330N 28C 165W 2.2GHz Processor	1
BB3S	Intel Xeon Gold 6336Y 24C 185W 2.4GHz Processor	1
BB31	Intel Xeon Gold 6338N 32C 185W 2.2GHz Processor	1
BB33	Intel Xeon Gold 6338T 24C 165W 2.1GHz Processor	1
BB2U	Intel Xeon Gold 6354 18C 205W 3.0GHz Processor	1
BB2S	Intel Xeon Platinum 8352V 36C 195W 2.1GHz Processor	1
BB2V	Intel Xeon Platinum 8352Y 32C 205W 2.2GHz Processor	1

Processor features

Supported processors have the following features:

- Third-generation Intel Xeon Scalable processors (formerly codenamed "Ice Lake")
- 10 nm process technology
- 8x DDR4 memory channels
- 64x PCIe 4.0 I/O lanes available for PCIe and NVMe devices
- 1.25 MB L2 cache per core
- 1.5 MB or more L3 cache per core
- Intel Deep Learning Boost, which provides built-in Artificial Intelligence (AI) acceleration with the Vector Neural Network Instruction set (VNNI). DL Boost and VNNI are designed to deliver significant, more efficient Deep Learning (Inference) acceleration for high-performance AI workloads.
- Intel Hyper-Threading Technology, which boosts performance for multithreaded applications by enabling simultaneous multithreading within each processor core, up to two threads per core.
- Intel Turbo Boost Technology 2.0, which allows processor cores to run at maximum speeds during peak workloads by temporarily going beyond processor TDP.
- Intel Virtualization Technology (includes VT-x and VT-d), which integrates hardware-level virtualization hooks that allow operating system vendors to better use the hardware for virtualization workloads.
- Intel Speed Select Technology, supported on some processor models, enables increased core Turbo Boost frequency on specific individual cores to maximize application performance.
- Intel Advanced Vector Extensions 512 (AVX-512), to enable acceleration of enterprise-class workloads, including databases and enterprise resource planning (ERP).
- Up to two Intel AVX-512 Fused-Multiply Add (FMA) units
- Intel SGX (Software Guard Extensions) and Intel TME (Total Memory Encryption) security features

The following table compares the features of the supported third-generation Intel Xeon processors.

Abbreviations used in the table:

- TB: Turbo Boost 2.0
- UPI: Ultra Path Interconnect
- TDP: Thermal Design Power
- SGX: Software Guard Extensions
- PMem: Persistent Memory support

Table 7. Processor features

CPU model	Cores/ threads	Core speed (Base / TB max)	L3 cache*	Max memory speed	TDP	SGX Enclave Size	Pmem
4310T	10 / 20	2.3 GHz / 3.4 GHz	15 MB	2667 MHz	105W	8 GB	No
4314	16 / 32	2.4 GHz / 3.4 GHz	24 MB	2667 MHz	135W	8 GB	Yes
4316	20 / 40	2.3 GHz / 3.4 GHz	30 MB	2667 MHz	150W	8 GB	No
5317	12 / 24	3.0 GHz / 3.6 GHz	18 MB	2933 MHz	150W	64 GB	Yes
5318N	24 / 48	2.1 GHz / 3.4 GHz	36 MB	2667 MHz	150W	64 GB	Yes
5320T	20 / 40	2.3 GHz / 3.5 GHz	30 MB	2933 MHz	150W	64 GB	Yes
6326	16 / 32	2.9 GHz / 3.5 GHz	24 MB	3200 MHz	185W	64 GB	Yes
6330	28 / 56	2.0 GHz / 3.1 GHz	42 MB	2933 MHz	205W	64 GB	Yes
6330N	28 / 56	2.2 GHz / 3.4 GHz	42 MB	2667 MHz	165W	64 GB	Yes
6336Y	24 / 48	2.4 GHz / 3.6 GHz	36 MB	3200 MHz	185W	64 GB	Yes

CPU model	Cores/ threads	Core speed (Base / TB max)	L3 cache*	Max memory speed	TDP	SGX Enclave Size	Pmem
6338N	32 / 64	2.2 GHz / 3.5 GHz	48 MB	2667 MHz	185W	64 GB	Yes
6338T	24 / 48	2.1 GHz / 3.4 GHz	36 MB	3200 MHz	165W	64 GB	Yes
6354	18 / 36	3.0 GHz / 3.6 GHz	39 MB*	3200 MHz	205W	64 GB	Yes
8352V	36 / 72	2.1 GHz / 3.5 GHz	54 MB	2933 MHz	195W	8 GB	Yes
8352Y	32 / 64	2.2 GHz / 3.4 GHz	48 MB	3200 MHz	205W	64 GB	Yes

* L3 cache is 1.5 MB per core or larger. Processors with a larger L3 cache per core are marked with an *

Heatsink

For factory orders, the SE450 supports either a 1U or 2U processor heatsink, as listed in the following table. Field upgrades are not supported.

Table 8. Processor heatsink

Part number	Feature code	Description
CTO only	B978	ThinkSystem SR630/SR850/SR860 V2 Standard Heatsink (1U heatsink)
CTO only	B976	ThinkSystem SR650 V2 Standard Heatsink (2U heatsink)

Configuration rules:

- The 2U heatsink is recommended to maximize heat dissipation and minimize fan noise, and is the default selection in the DCSC configurator.
- The 1U heatsink is required for full-length adapters
- The following processors require the 2U heatsink:
 - Intel Xeon Gold 5320T 20C 150W 2.3GHz Processor (BB2Y)
 - Intel Xeon Gold 6338T 24C 165W 2.1GHz Processor (BB33)
 - All processors with TDP > 165W

UEFI operating modes

The SE450 offers preset operating modes that affect energy consumption and performance. These modes are a collection of predefined low-level UEFI settings that simplify the task of tuning the server to suit your business and workload requirements.

The following table lists the feature codes that allow you to specify the mode you wish to preset in the factory for CTO orders.

UK and EU customers: For compliance with the ERP Lot9 regulation, you should select feature BFYE. For some systems, you may not be able to make a selection, in which case, it will be automatically derived by the configurator.

Table 9. UEFI operating mode presets in DCSC

Feature code	Description
BFYB	Operating mode selection for: "Maximum Performance Mode"
BFYC	Operating mode selection for: "Minimal Power Mode"
BFYD	Operating mode selection for: "Efficiency Favoring Power Savings Mode"
BFYE	Operating mode selection for: "Efficiency - Favoring Performance Mode"

The preset modes for the SE450 are as follows:

- **Maximum Performance Mode** (feature BFYB): Achieves maximum performance but with higher power consumption and lower energy efficiency.
- **Minimal Power Mode** (feature BFYC): Minimize the absolute power consumption of the system.
- **Efficiency Favoring Power Savings Mode** (feature BFYD): Maximize the performance/watt efficiency with a bias towards power savings. This is the favored mode for SPECpower benchmark testing, for example.
- **Efficiency Favoring Performance Mode** (feature BFYE): Maximize the performance/watt efficiency with a bias towards performance. This is the favored mode for Energy Star certification, for example.

For details about these preset modes, and all other performance and power efficiency UEFI settings offered in the SE450, see the paper "Tuning UEFI Settings for Performance and Energy Efficiency on Intel Xeon Scalable Processor-Based ThinkSystem Servers", available from <https://lenovopress.lenovo.com/lp1477>.

Memory options

The SE450 has 10 DIMM slots, supporting the following memory and persistent memory combinations:

- 1, 2, 4, 6 or 8x RDIMMs (no persistent memory modules)
- 6x RDIMMs and 1x persistent memory module
- 8x RDIMMs and 1x persistent memory module
- 4x RDIMMs and 4x persistent memory modules

The processor has 4 memory controllers and 8 memory channels; with all-memory configurations (that is, without persistent memory), the DIMMs are installed 1 RDIMM per channel. This corresponds to all the white DIMM slots on the system board. See the [internal view](#) of the server for the location of the DIMM slots.

Lenovo TruDDR4 RDIMMs and 3DS RDIMMs are supported. With 8x 128 GB 3DS RDIMMs installed, the SE450 supports a total of 1 TB of system memory.

The use of persistent memory is described in the [Persistent Memory](#) section.

Memory operates at up to 3200 MHz, depending on the processor selected. If the processor selected has a lower memory bus speed, then all DIMMs will operate at that lower speed. See the [Processor features](#) section for details.

Lenovo TruDDR4 memory uses the highest quality components that are sourced from Tier 1 DRAM suppliers and only memory that meets the strict requirements of Lenovo is selected. It is compatibility tested and tuned to maximize performance and reliability. From a service and support standpoint, Lenovo TruDDR4 memory automatically assumes the system warranty, and Lenovo provides service and support worldwide.

The following table lists the memory options that are available for the server.

Table 10. Memory options

Part number	Feature code	Description	Maximum supported
RDIMMs			
4X77A08632	B963	ThinkSystem 16GB TruDDR4 3200MHz (2Rx8 1.2V) RDIMM	8
4X77A08633	B964	ThinkSystem 32GB TruDDR4 3200MHz (2Rx4 1.2V) RDIMM	8
4X77A08634	B965	ThinkSystem 32GB TruDDR4 3200MHz (2Rx8 1.2V) RDIMM	8
4X77A08635	B966	ThinkSystem 64GB TruDDR4 3200MHz (2Rx4 1.2V) RDIMM	8
3DS RDIMMs			
4X77A08636	BA62	ThinkSystem 128GB TruDDR4 3200 MHz (2S2Rx4 1.2V) 3DS RDIMM	8

The following rules apply when selecting the memory configuration:

- In the SE450, the following DIMM quantities are supported: 1, 2, 4, 6, and 8. Other quantities are not supported.
- The server supports RDIMMs and 3DS RDIMMs; UDIMMs and LRDIMMs are not supported
- Mixing RDIMMs and 3DS RDIMMs is not supported
- Mixing x4 and x8 DIMMs is supported

For best performance, consider the following:

- Install 8 memory DIMMs so that all memory channels are used.
- Populate memory channels so they all have the same total memory capacity.
- Ensure all memory controllers on a processor socket have the same DIMM configuration.

The following memory protection technologies are supported:

- ECC
- SDDC (for x4-based memory DIMMs; look for "x4" in the DIMM description)
- ADDDC (for x4-based memory DIMMs)
- Memory mirroring

Note: Memory sparing is not supported

If memory channel mirroring is used, then DIMMs must be installed in pairs or sets of three (minimum of one pair or set of three), and all DIMMs in the pair or set of three must be identical in type and size. 50% of the installed capacity is available to the operating system.

Persistent Memory

The SE450 server supports Intel Optane Persistent Memory 200 Series, a new class of memory and storage technology explicitly architected for server usage. Persistent memory is an innovative technology that delivers a unique combination of affordable large memory capacity and persistence (non-volatility). It offers significantly lower latency than fetching data from SSDs, even NVMe SSDs, and offers higher capacities than system memory.

Persistent memory technology can help boost the performance of data-intensive applications such as in-memory analytics, databases, content delivery networks, and high performance computing (HPC), as well as deliver consistent service levels at scale with higher virtual machine and container density. When data is stored closer to the processor on nonvolatile media, applications can see significant overall improvement in performance.

The following table lists the ordering information for the supported persistent memory modules.

Table 11. Persistent memory module part numbers

Part number	Feature code	Description	Maximum supported
4ZC7A08732	B98B	ThinkSystem 128GB TruDDR4 3200MHz (1.2V) Intel Optane Persistent Memory	4
4ZC7A08734	B98A	ThinkSystem 256GB TruDDR4 3200MHz (1.2V) Intel Optane Persistent Memory	4

App Direct Mode and Memory Mode are supported. Mixed Mode is not supported.

The following table lists the supported combinations of memory (RDIMMs) and PMem in App Direct mode. The supported RDIMMs to PMem ratio must be between 1:1 and 1:8.

Table 12. Supported combinations in App Direct mode

Total RDIMMs	Total PMem	Total Available Memory*	Ratio (RDIMM:Pmem)†	Quantity of RDIMMs				Quantity of PMem modules	
				16GB	32GB	64GB	128GB	128GB PMem	256GB PMem
96 GB	128 GB	224 GB	1:1.33	6				1	
128 GB	128 GB	256 GB	1:1	8				1	
64 GB	512 GB	576 GB	1:8	4				4	
128 GB	512 GB	640 GB	1:4		4			4	
256 GB	512 GB	768 GB	1:2			4		4	
512 GB	512 GB	1 TB	1:1				4	4	
96 GB	256 GB	352 GB	1:2.67	6					1
192 GB	256 GB	448 GB	1:1.33		6				1
128 GB	256 GB	384 GB	1:2	8					1
256 GB	256 GB	512 GB	1:1		8				1
128 GB	1 TB	1.125 TB	1:8		4				4
256 GB	1 TB	1.25 TB	1:4			4			4
512 GB	1 TB	1.5 TB	1:2				4		4

* In App Direct Mode, the available memory is the sum of the installed RDIMMs + PMem. The actual user capacity of PMem modules is less than the stated amount. For example, a 128GB PMem module has 126.7GB usable storage.

† Density ratio of system memory to persistent memory, RDIMM:PMem; 2-Socket-capable third-generation Intel Xeon Scalable processors only support RDIMM:Pmem density ratios of between 1:1 and 1:8

The following table lists the supported combinations of RDIMMs and PMem in Memory mode. The supported RDIMMs to PMem ratio must be between 1:4 and 1:16.

Table 13. Supported combinations in Memory Mode

Total RDIMMs	Total PMem	Total Available Memory*	Ratio (RDIMM:Pmem)†	Quantity of RDIMMs				Quantity of PMem modules	
				16GB	32GB	64GB	128GB	128GB PMem	256GB PMem
64 GB	512 GB	512 GB	1:8	4				4	
128 GB	512 GB	512 GB	1:4		4			4	
64 GB	1 TB	1 TB	1:16	4					4
128 GB	1 TB	1 TB	1:8		4				4
256 GB	1 TB	1 TB	1:4			4			4

* In Memory Mode, the available memory = persistent memory installed. The actual user capacity of PMem modules is less than the stated amount. For example, a 128GB PMem module has 126.7GB usable storage.

† Ratio of system memory to persistent memory, RDIMM:PMem; Memory Mode only supports DIMM:Pmem ratios of between 1:4 and 1:16

Persistent memory requirements:

- Some processors do not support PMem. See the [Processor features](#) section for details.
- App Direct Mode and Memory Mode are supported, however Mixed Mode is not supported.
- Only quantities of 1x or 4x PMem modules are supported as listed in the above tables. Other quantities are not supported.

- PMem modules operate at up to 3200 MHz, however if the processor selected has a lower memory bus speed, then PMem modules will operate at that lower speed.
- All installed PMem modules must be the same size. Mixing PMem modules of different capacities is not supported.
- Both interleaved and non-interleaved modes are supported.
- Memory mirroring is not supported with PMem modules installed

For additional details, see the Intel Optane Persistent Memory 200 Series product guide, <https://lenovopress.com/LP1380>.

Internal storage

The SE450 offers the following internal storage options:

- Up to 4x internal SSD drive bays supporting non-hot-swap trayless NVMe or SATA SSD drives
- Up to 2x 2.5-inch hot-swap drive bays, front accessible, supporting SAS or SATA SSD drives (mutually exclusive with slots 3 and 4 in Riser 2)
- Up to 2x M.2 drives for boot functions, supporting SATA or NVMe drives

In this section:

- [Internal drive cage](#)
- [Hot-swap drive bays](#)
- [Supported drive bay combinations](#)
- [M.2 drives](#)

Internal drive cage

The SE450 offers an internal drive cage which supports either of the following:

- Up to 4x 7mm trayless drives, either SATA or NVMe (zero drives also supported)
- Up to 2x 15mm trayless drives, either SATA or NVMe (zero drives also supported)

The internal drive cage is mounted at the front of the processor and DIMMs as shown in the following figure.

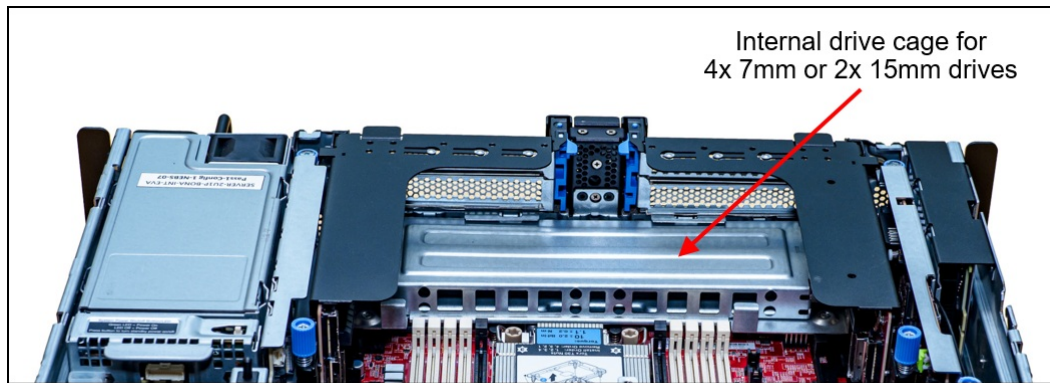


Figure 7. Location of the internal drive cage

The internal drive cage, feature BMGT, is a standard feature in all configurations, however the bays are only usable provided the cables are also installed, either CTO (NVMe or SATA cabling) or as a field upgrade (SATA cabling only).

Tip: 0, 1, 2, 3 or 4x internal trayless drives are supported.

Table 14. Internal drive cage

Feature code	Description
BMGT	ThinkEdge SE450 Internal HDD Cage

The SE450 supports field upgrades to enable SATA drives in the internal drive cage. The following part numbers are available for cables.

Note: NVMe drive bays are not supported as field upgrades, due to the complexity of the cabling required.

Table 15. Cables for SATA drive upgrades for the internal drive cage

Part number	Description	Purpose
4X97A90164	ThinkEdge SE450 Internal 2x2.5" SATA Cable	SATA signal and power cable to connect from system planar to 2x drives (7mm or 15mm), one in each bay. See SATA 2x1 cable flyer .
4X97A90165	ThinkEdge SE450 Internal 4x2.5" SATA Cable	SATA signal and power cable to connect from system planar to 4x drives (7mm), two in each bay. See SATA 2x2 cable flyer .
4X97A90161	ThinkEdge SE450 Internal RAID 2x2.5" SATA Cable	SATA signal and power cable to connect from RAID adapter or HBA to 2x drives (7mm or 15mm), one in each bay. See SATA RAID 1x2 cable flyer .
4X97A90162	ThinkEdge SE450 Internal RAID 4x2.5" SATA Cable	SATA signal and power cable to connect from RAID adapter or HBA to 4x drives (7mm), two in each bay. See SATA RAID 2x2 cable flyer .

Hot-swap drive bays

The SE450 supports 2x 2.5-inch hot-swap drive bays, mounted in place of Riser 2.

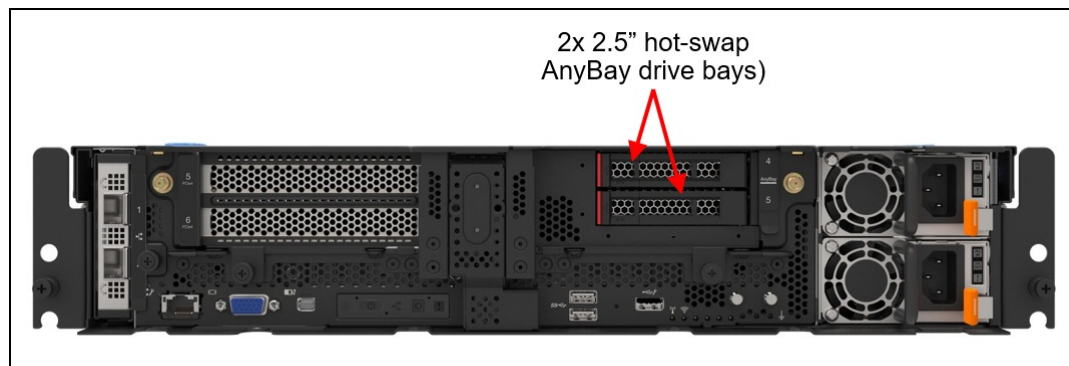


Figure 8. Location of the hot-swap drive bays

The drive cage is only available in preconfigured models or CTO. Field upgrades are not available.

Table 16. Hot-swap drive bays

Part number	Feature code	Description
CTO only	BMGN	ThinkEdge SE450 Front HDD Cage (includes 2-drive AnyBay backplane)

Configuration requirements:

- The hot-swap drive bays support 2.5-inch hot-swap drives, either SATA, NVMe or SAS. SAS drives require the use of a RAID adapter or SAS HBA.
- The hot-swap drive bays are mutually exclusive with Riser 2 (slots 3 and 4)
- The server supports a maximum of 4x NVMe drives, so if two NVMe drives are configured as hot-swap drives, then only two NVMe drives can be configured in the internal drive cage (trayless drives)
- The required cables are derived by the configurator; SATA and NVMe cables are configured based on the controller selected even if no drives are selected in DCSC.

DCSC tip: In order to select the hot-swap drive cage (feature BMGN), you must first select *two* controllers:

- The Onboard NVMe controller (BC4V); plus
- Either the onboard SATA controller (AVV0) or a RAID adapter/HBA.

You must select both NVMe and SATA/SAS controllers because the hot-swap drive bays have an AnyBay backplane. If you do not select one of each controller then BMGN will be unselectable. Once BMGN is selected, you will then need to deselect Riser 2 (feature BMGM) from the PCIe tab, since the hot-swap drive bays are installed in place of Riser 2.

For configurations with onboard SATA, it is supported to upgrade the controller to a RAID adapter or HBA. To do so, order the adapter as well as the RAID cable listed in the following table, 4X97A90160. Similarly, to remove a RAID adapter or HBA and reconfigure the server to use the onboard SATA controller instead, order the SATA cable listed, 4X97A90163.

Table 17. Cables for SATA hot-swap drive bay upgrades

Part number	Description	Purpose
4X97A90160	ThinkEdge SE450 RAID SATA Cable for Backplane	SATA cable to connect from RAID adapter or HBA to hot-swap drive backplane. See cable flyer .
4X97A90163	ThinkEdge SE450 SATA Cable for Backplane	SATA cable to connect from system planar to hot-swap drive backplane. See cable flyer .

Supported drive bay combinations

The following drive bay combinations are supported:

- Up to 4x internal SATA drives + optional M.2 (no hot-swap drives)
- Up to 4x internal NVMe drives + optional M.2 (no hot-swap drives)
- Up to 4x internal SATA drives + up to 2x hot-swap SATA drives + optional M.2
- Up to 4x internal SATA drives + up to 2x hot-swap NVMe drives + optional M.2
- Up to 2x internal NVMe drives + up to 2x hot-swap SATA drives + optional M.2
- Up to 2x internal NVMe drives + up to 2x hot-swap NVMe drives + optional M.2
- M.2 drives only (no hot-swap drives, no internal drives)
- Up to 2x hot-swap drives + M.2 drives (no internal drives)

Configurations rules:

- Zero internal (trayless) drives can be selected (M.2 drive is not required)
- Hot-swap drive bays are not available if Riser 2 is installed. NVMe drives are not supported in some adapter slot configurations. See the [Configurations](#) section for details.
- For configurations with hot-swap drive bays, only 2x internal (non-hot-swap) NVMe drives are supported; 4x internal NVMe drives are not supported

Tip: The SE450 now offers greater flexibility in storage configurations:

- Internal (trayless) drives: 0, 1, 2, 3 or 4 drives
- Hot-swap drives: 0, 1 or 2 drives
- M.2 drives: 0, 1, or 2 drives

M.2 drives

The SE450 supports one or two M.2 form-factor SATA or NVMe drives for use as an operating system boot solution. The M.2 drives install into an M.2 module which is mounted vertically in the SE450 in a bracket attached to the power supply cage. See the [internal view](#) of the server for the location.

Tip: It is supported to have a configuration with M.2 drives but without any other internal drives (trayless or hot-swap)

Table 18. M.2 bracket

Part number	Feature code	Description
CTO only	BMH3	ThinkEdge SE450 SBS M.2 Adapter Bracket

The M.2 module supported in the SE450 are listed in the following table.

Table 19. M.2 modules

Part number	Feature code	Description	SATA drives	NVMe drives	RAID	Maximum supported
4Y37A09738	B5XJ	ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit	Yes	Yes	Yes*	1

* RAID is supported via Intel VROC

Supported drives are listed in the [Internal drive options](#) section.

The M.2 SATA/NVMe 2-Bay Enablement Kit has the following features:

- Supports one or two M.2 drives, either SATA or NVMe
- When two drives installed, they must be either both SATA or both NVMe
- Support 42mm, 60mm, 80mm and 110mm drive form factors (2242, 2260, 2280 and 22110)
- JBOD native support; RAID can be enabled via Intel VROC
- Either 6Gbps SATA or PCIe 3.0 x1 interface to the drives depending on the drives installed
- Supports monitoring and reporting of events and temperature through I2C
- Firmware update via Lenovo firmware update tools

Field upgrades

The SE450 supports M.2 field upgrades provided the system already has the M.2 Adapter Bracket (feature BMH3) installed. As well as adding the above M.2 adapter, you will also need to order the M.2 Adapter Cable as listed in the following table.

Table 20. M.2 adapter cable

Part number	Feature code	Description
4X97A84822	BMFZ	ThinkEdge SE450 M.2 Adapter Cable

For further details about M.2 components, see the *ThinkSystem M.2 Drives and M.2 Adapters* product guide: <https://lenovopress.com/lp0769-thinksystem-m2-drives-adapters>

Controllers for internal storage

The drives of the SE450 are connected to controller on the system board:

- Onboard SATA ports with software RAID support (Intel VROC SATA RAID, formerly known as Intel RSTe)
- Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID)

The following table lists the adapters used for the internal storage of the server.

Table 21. Internal Storage adapter support

Part number	Feature code	Description
Onboard SATA - Intel VROC SATA RAID (Intel RSTe)		
None	AVV0	On Board SATA Software RAID Mode
Onboard NVMe - Intel VROC NVMe RAID for Internal and hot-swap drives		
None	B9X7	Intel VROC (VMD NVMe RAID) Intel SSD Only (Standard)
4L47A83669	BR9B	Intel VROC (VMD NVMe RAID) Standard (license upgrade - to enable RAID support for non-Intel NVMe SSDs)
4L47A39164	B96G	Intel VROC (VMD NVMe RAID) Premium (license upgrade - to enable RAID support for non-Intel NVMe SSDs)
Onboard NVMe - Intel VROC NVMe RAID for M.2 drives		
CTO only	BS7P	Intel VROC (VMD NVMe RAID) Intel SSD Only for M.2
CTO only	BS7M	Intel VROC (VMD NVMe RAID) Standard for M.2
CTO only	BS7N	Intel VROC (VMD NVMe RAID) Premium for M.2
SAS/SATA adapters		
CTO only	BJHH	ThinkSystem 4350-8i SAS/SATA 12Gb HBA
CTO only	BJHK	ThinkSystem RAID 5350-8i PCIe 12Gb Adapter

The onboard SATA controller has the following features:

- Controller integrated into the Intel PCH
- 6 Gbps SATA host interface
- Supports RAID-0, 1, 5, 10 (Intel VROC SATA RAID, previously known as RSTe)
- Supports JBOD

The onboard NVMe support has the following features:

- Controller integrated into the Intel processor
- Each drive has PCIe 4.0 x4 host interface
- Supports JBOD - Intel and non-Intel NVMe SSDs - no license required
- Supports RAID-0, 1, 5, 10 (Intel VROC NVMe RAID) - Intel NVMe SSDs only unless VROC Premium license is installed
- VROC Premium enabled RAID support on non-Intel drives

Intel VROC onboard RAID

Intel VROC (Virtual RAID on CPU) is a feature of the Intel processor that enables Integrated RAID support.

There are two separate functions of VROC in the SE450:

- Intel VROC SATA RAID, formerly known as Intel RSTe
- Intel VROC NVMe RAID

VROC SATA RAID (RSTe) is available and supported with all SATA drives. It offers a 6 Gb/s connection to each drive and on the SE450 implements RAID levels 0, 1, 5, and 10. RAID 1 is limited to 2 drives per array, and RAID 10 is limited to 4 drives per array. Hot-spare functionality is also supported.

VROC NVMe RAID offers RAID support for any NVMe drives directly connected to the ports on the server's system board. On the SE450, RAID levels implemented are based on the VROC feature selected as indicated in the following table. RAID 1 is limited to 2 drives per array, and RAID 10 is limited to 4 drives per array. Hot-spare functionality is also supported.

The SE450 supports the VROC NVMe RAID offerings listed in the following table. The VROC Intel SSD Only offering only supports RAID on Intel branded NVMe SSDs; non-Intel branded NVMe SSDs cannot be configured in a RAID array.

Tip: These feature codes and part numbers are only for VROC RAID using NVMe drives, not SATA drives

Table 22. Intel VROC NVMe RAID ordering information and feature support

Part number	Feature code	Description	Intel NVMe SSDs	Non-Intel NVMe SSDs	RAID 0	RAID 1	RAID 10	RAID 5
CTO only	B9X7	Intel VROC (VMD NVMe RAID) Intel SSD Only	Yes	No	Yes	Yes	Yes	Yes
4L47A83669	BR9B	Intel VROC (VMD NVMe RAID) Standard	Yes	Yes	Yes	Yes	Yes	No
4L47A39164	B96G	Intel VROC (VMD NVMe RAID) Premium	Yes	Yes	Yes	Yes	Yes	Yes

Configuration notes:

- If a feature code is ordered in a CTO build, the VROC functionality is enabled in the factory. For field upgrades, order a part number and it will be fulfilled as a Feature on Demand (FoD) license which can then be activated via the XCC management processor user interface.

Virtualization support: Virtualization support for Intel VROC is as follows:

- **VROC SATA RAID (RSTe)** : VROC SATA RAID is supported with Windows, RHEL and SLES, however it is not supported by virtualization hypervisors such as ESXi, KVM, Xen, and Hyper-V. Virtualization is only supported on the onboard SATA ports in AHCI (non-RAID) mode.
- **VROC (VMD) NVMe RAID** : VROC (VMD) NVMe RAID is supported by ESXi, KVM, Xen, and Hyper-V. ESXi support is limited to RAID 1 only; other RAID levels are not supported. Windows and Linux OSes support VROC RAID NVMe, both for host boot functions and for guest OS function, and RAID-0, 1, 5, and 10 are supported. On ESXi, VROC is supported with both boot and data drives.

Internal drive options

The following tables list the drive options for internal storage of the server.

2.5-inch hot-swap drives:

- [2.5-inch hot-swap 24 Gb SAS SSDs](#)
- [2.5-inch hot-swap 6 Gb SATA SSDs](#)
- [2.5-inch hot-swap PCIe 4.0 NVMe SSDs](#)

Trayless drives:

- [7mm 2.5-inch trayless 6 Gb SATA SSDs](#)
- [7mm 2.5-inch trayless PCIe 4.0 NVMe SSDs](#)
- [15mm 2.5-inch trayless PCIe 4.0 NVMe SSDs](#)

Field upgrades: Trayless drives can only be installed in the field by trained technicians who are certified by Lenovo Service.

M.2 drives:

- [M.2 SATA drives](#)
- [M.2 PCIe 4.0 NVMe drives](#)

M.2 drive support: The use of M.2 drives requires an additional adapter as described in the [M.2 drives](#) subsection.

SED support: The SE450 currently does not support SED functionality with NVMe drives. SED is supported with SATA drives as listed in the tables below, however with SED enabled, hot-add and hot-remove are not supported.

Table 23. 2.5-inch hot-swap 24 Gb SAS SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch hot-swap SSDs - 24 Gb SAS - Read Intensive/Entry/Capacity (<3 DWPD)				
4XB7A80319	BNWE	ThinkSystem 2.5" PM1653 1.92TB Read Intensive SAS 24Gb HS SSD	Support	2
4XB7A80321	BP3E	ThinkSystem 2.5" PM1653 7.68TB Read Intensive SAS 24Gb HS SSD	Support	2
4XB7A80322	BP3J	ThinkSystem 2.5" PM1653 15.36TB Read Intensive SAS 24Gb HS SSD	Support	2

Table 24. 2.5-inch hot-swap 6 Gb SATA SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch hot-swap SSDs - 6 Gb SATA - Mixed Use/Mainstream (3-5 DDPD)				
4XB7A90884	BYM2	ThinkSystem 2.5" Multi Vendor 480GB Mixed Use SATA 6Gb HS SSD v2	No	2
4XB7A90885	BYM4	ThinkSystem 2.5" Multi Vendor 960GB Mixed Use SATA 6Gb HS SSD v2	No	2
4XB7A90886	BYM5	ThinkSystem 2.5" Multi Vendor 1.92TB Mixed Use SATA 6Gb HS SSD v2	No	2
4XB7A90887	BYM6	ThinkSystem 2.5" Multi Vendor 3.84TB Mixed Use SATA 6Gb HS SSD v2	No	2
2.5-inch hot-swap SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DDPD)				
4XB7A90872	BYLQ	ThinkSystem 2.5" Multi Vendor 240GB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A90873	BYLR	ThinkSystem 2.5" Multi Vendor 480GB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A90874	BYLS	ThinkSystem 2.5" Multi Vendor 960GB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A90875	BYLT	ThinkSystem 2.5" Multi Vendor 1.92TB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A90876	BYLU	ThinkSystem 2.5" Multi Vendor 3.84TB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A90877	BYLV	ThinkSystem 2.5" Multi Vendor 7.68TB Read Intensive SATA 6Gb HS SSD v2	No	2
4XB7A87524	BWKN	ThinkSystem 2.5" PM893a 480GB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A87525	BWKM	ThinkSystem 2.5" PM893a 960GB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A87526	BWKL	ThinkSystem 2.5" PM893a 1.92TB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A87527	BWKK	ThinkSystem 2.5" PM893a 3.84TB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82258	BQ1Q	ThinkSystem 2.5" 5400 PRO 240GB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82259	BQ1P	ThinkSystem 2.5" 5400 PRO 480GB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82260	BQ1R	ThinkSystem 2.5" 5400 PRO 960GB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82261	BQ1X	ThinkSystem 2.5" 5400 PRO 1.92TB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82262	BQ1S	ThinkSystem 2.5" 5400 PRO 3.84TB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A82263	BQ1T	ThinkSystem 2.5" 5400 PRO 7.68TB Read Intensive SATA 6Gb HS SSD	Support	2
4XB7A17072	B99D	ThinkSystem 2.5" S4520 240GB Read Intensive SATA 6Gb HS SSD	No	2
4XB7A17101	BA7G	ThinkSystem 2.5" S4520 480GB Read Intensive SATA 6Gb HS SSD	No	2
4XB7A17102	BA7H	ThinkSystem 2.5" S4520 960GB Read Intensive SATA 6Gb HS SSD	No	2
4XB7A17103	BA7J	ThinkSystem 2.5" S4520 1.92TB Read Intensive SATA 6Gb HS SSD	No	2
4XB7A17104	BK77	ThinkSystem 2.5" S4520 3.84TB Read Intensive SATA 6Gb HS SSD	No	2
4XB7A17105	BK78	ThinkSystem 2.5" S4520 7.68TB Read Intensive SATA 6Gb HS SSD	No	2

Table 25. 2.5-inch hot-swap PCIe 4.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
2.5-inch SSDs - U.2 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DDPD)				

Part number	Feature code	Description	SED support	Max Qty
4XB7A93896	C18J	ThinkSystem 2.5" U.2 Multi Vendor 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93897	C18H	ThinkSystem 2.5" U.2 Multi Vendor 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93898	C18G	ThinkSystem 2.5" U.2 Multi Vendor 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93899	C18F	ThinkSystem 2.5" U.2 Multi Vendor 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A17129	BNEG	ThinkSystem 2.5" U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A17130	BNEH	ThinkSystem 2.5" U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A17133	BNEZ	ThinkSystem 2.5" U.2 P5620 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD)				
4XB7A13967	BNEJ	ThinkSystem 2.5" U.3 7450 MAX 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A13970	BNEY	ThinkSystem 2.5" U.3 7450 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A13971	BNEL	ThinkSystem 2.5" U.3 7450 MAX 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	No*	2
2.5-inch SSDs - U.2 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A93892	C18N	ThinkSystem 2.5" U.2 Multi Vendor 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93893	C18M	ThinkSystem 2.5" U.2 Multi Vendor 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A13941	BMGD	ThinkSystem 2.5" U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A13942	BMGE	ThinkSystem 2.5" U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93075	C1WJ	ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A93076	C1WK	ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A95049	C2BY	ThinkSystem 2.5" U.3 7500 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A95050	C2BR	ThinkSystem 2.5" U.3 7500 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A79647	BNF2	ThinkSystem 2.5" U.3 7450 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A95051	C2BS	ThinkSystem 2.5" U.3 7500 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A79648	BNF5	ThinkSystem 2.5" U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2
4XB7A95052	C2BT	ThinkSystem 2.5" U.3 7500 PRO 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2

Part number	Feature code	Description	SED support	Max Qty
4XB7A95053	C2BU	ThinkSystem 2.5" U.3 7500 PRO 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	No*	2

* In the SE450, the SED functionality of this NVMe drive is not supported.

Table 26. 7mm 2.5-inch trayless 6 Gb SATA SSDs

Part number	Feature code	Description	SED support	Max Qty
7mm 2.5-inch trayless SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DWPD)				
CTO only	BS2X	ThinkSystem 2.5" 7mm 5400 PRO 240GB Read Intensive SATA 6Gb Trayless SSD	Support	4
CTO only	BS2W	ThinkSystem 2.5" 7mm 5400 PRO 480GB Read Intensive SATA 6Gb Trayless SSD	Support	4
CTO only	BS2V	ThinkSystem 2.5" 7mm 5400 PRO 960GB Read Intensive SATA 6Gb Trayless SSD	Support	4
CTO only	BS2U	ThinkSystem 2.5" 7mm 5400 PRO 1.92TB Read Intensive SATA 6Gb Trayless SSD	Support	4
CTO only	BS2T	ThinkSystem 2.5" 7mm 5400 PRO 3.84TB Read Intensive SATA 6Gb Trayless SSD	Support	4
CTO only	BS2S	ThinkSystem 2.5" 7mm 5400 PRO 7.68TB Read Intensive SATA 6Gb Trayless SSD	Support	4
4XB7A77056	BKST	ThinkSystem Intel S4520 2.5" 7mm 240GB Entry SATA 6Gb Non-Hot Swap SSD Trayless	No	4
4XB7A77057	BKSU	ThinkSystem Intel S4520 2.5" 7mm 480GB Entry SATA 6Gb Non-Hot Swap SSD Trayless	No	4
4XB7A77058	BKSV	ThinkSystem 2.5" 7mm S4520 960GB Read Intensive SATA 6Gb Trayless SSD	No	4
4XB7A77059	BKSW	ThinkSystem 2.5" 7mm S4520 1.92TB Read Intensive SATA 6Gb Trayless SSD	No	4
4XB7A78627	BM1D	ThinkSystem 2.5" 7mm S4520 3.84TB Read Intensive SATA 6Gb Trayless SSD	No	4
4XB7A78628	BM1E	ThinkSystem 2.5" 7mm S4520 7.68TB Read Intensive SATA 6Gb Trayless SSD	No	4

Table 27. 7mm 2.5-inch trayless PCIe 4.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
7mm 2.5-inch SSDs - U.3 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A90115	BXME	ThinkSystem 2.5" U.2 7mm PM9A3 960GB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4
4XB7A90116	BXMD	ThinkSystem 2.5" U.2 7mm PM9A3 1.92TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4
4XB7A90117	BXMC	ThinkSystem 2.5" U.2 7mm PM9A3 3.84TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4
4XB7A13975	BKSQ	ThinkSystem 2.5" 7mm U.3 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4
4XB7A13976	BKWR	ThinkSystem 2.5" 7mm U.3 7450 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4
4XB7A13977	BKWS	ThinkSystem 2.5" 7mm U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	4

* In the SE450, the SED functionality of this NVMe drive is not supported.

Table 28. 15mm 2.5-inch trayless PCIe 4.0 NVMe SSDs

Part number	Feature code	Description	SED support	Max Qty
15mm 2.5-inch SSDs - U.2 PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD)				
4XB7A76781	BKT5	ThinkSystem 2.5" 15mm U.2 P5620 1.6TB Mixed Use NVMe PCIe 4.0 x4 Trayless SSD	No*	2
4XB7A76782	BKT6	ThinkSystem 2.5" 15mm U.2 P5620 3.2TB Mixed Use NVMe PCIe 4.0 x4 Trayless SSD	No*	2
15mm 2.5-inch SSDs - U.2 PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A76780	BKT4	ThinkSystem 2.5" 15mm U.2 P5520 1.92TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	2
4XB7A17124	BA7P	ThinkSystem 2.5" 15mm U.2 P5520 3.84TB Read Intensive NVMe PCIe 4.0 x4 Trayless SSD	No*	2

* In the SE450, the SED functionality of this NVMe drive is not supported.

Table 29. M.2 SATA drives

Part number	Feature code	Description	SED support	Max Qty
M.2 SSDs - 6 Gb SATA - Read Intensive/Entry (<3 DWPD)				
4XB7A89422	BYF7	ThinkSystem M.2 ER3 240GB Read Intensive SATA 6Gb NHS SSD	Support	2
4XB7A90049	BYF8	ThinkSystem M.2 ER3 480GB Read Intensive SATA 6Gb NHS SSD	Support	2
4XB7A90230	BYF9	ThinkSystem M.2 ER3 960GB Read Intensive SATA 6Gb NHS SSD	Support	2
4XB7A82286	BQ1Z	ThinkSystem M.2 5400 PRO 240GB Read Intensive SATA 6Gb NHS SSD	Support	2
4XB7A82287	BQ1Y	ThinkSystem M.2 5400 PRO 480GB Read Intensive SATA 6Gb NHS SSD	Support	2
4XB7A82288	BQ20	ThinkSystem M.2 5400 PRO 960GB Read Intensive SATA 6Gb NHS SSD	Support	2
7N47A00130	AUUV	ThinkSystem M.2 128GB SATA 6Gbps Non-Hot Swap SSD	No	2

Table 30. M.2 PCIe 4.0 NVMe drives

Part number	Feature code	Description	SED support	Max Qty
M.2 SSDs - PCIe 4.0 NVMe - Mixed Use/Mainstream (3-5 DWPD)				
4XB7A84603	BS2Q	ThinkSystem M.2 7450 MAX 800GB Mixed Use NVMe PCIe 4.0 x4 NHS SSD	No*	2
M.2 SSDs - PCIe 4.0 NVMe - Read Intensive/Entry (<3 DWPD)				
4XB7A90102	BXMH	ThinkSystem M.2 PM9A3 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A90103	BXMG	ThinkSystem M.2 PM9A3 1.92TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A90104	BXMF	ThinkSystem M.2 PM9A3 3.84TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A82636	BS2P	ThinkSystem M.2 7450 PRO 480GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A13999	BKSR	ThinkSystem M.2 7450 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A14000	BKSS	ThinkSystem M.2 7450 PRO 1.92TB Read Intensive Entry NVMe PCIe 4.0 x4 NHS SSD	No*	2
4XB7A84604	BS2R	ThinkSystem M.2 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 NHS SSD	No*	2

* In the SE450, the SED functionality of this NVMe drive is not supported.

Optical drive

The server supports the external USB optical drive listed in the following table.

Table 31. External optical drive

Part number	Feature code	Description
7XA7A05926	AVV8	ThinkSystem External USB DVD RW Optical Disk Drive

The drive is based on the Lenovo Slim DVD Burner DB65 drive and supports the following formats: DVD-RAM, DVD-RW, DVD+RW, DVD+R, DVD-R, DVD-ROM, DVD-R DL, CD-RW, CD-R, CD-ROM.

I/O expansion

The SE450 has PCIe slots for adapters:

- Riser 1:
 - Slot 5: PCIe G4 x16
 - Slot 6: PCIe G4 x16 (PCIe x8 or not connected in some configurations)
- Riser 2:
 - Slot 3: PCIe G4 x16 (PCIe x8 or not connected in some configurations)
 - Slot 4: PCIe G4 x16
- OCP slot 7: PCIe G4 x16 (not connected in some configurations)

Specific support for these slots is listed in the [Configurations](#) section.

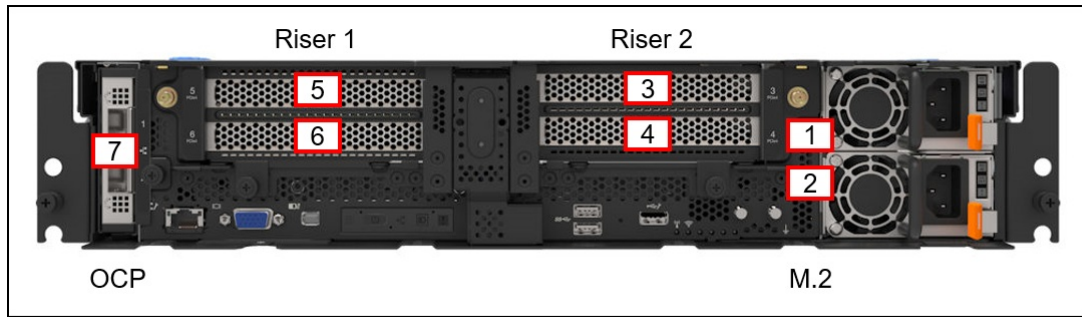


Figure 9. Slot numbering

Ordering information for the Risers and OCP bracket are listed in the following table. For M.2, see the [M.2 drives](#) section.

Table 32. I/O expansion

Part number	Feature code	Description
CTO only	BMGR	ThinkEdge SE450 OCP Cage
CTO only	BMGL	ThinkEdge SE450 Riser 1 (slots 5 & 6)
CTO only	BMGM	ThinkEdge SE450 Riser 2 (slots 3 & 4)

As described in the [Models](#) section, there are two chassis depths available with the SE450:

- 360mm chassis: Supports all adapters
- 300mm chassis: Supports all adapters except full-length adapters like double-wide GPUs

Serial port

The SE450 optionally supports a RS-232 serial port by adding a COM port bracket to a PCIe slot. The bracket is only supported in slot 6. Ordering information is shown in the following table.

Table 33. Serial port

Part number	Feature code	Description	Maximum supported	Slots supported
4Z17A80446	BMNJ	ThinkSystem COM Port Upgrade Kit v2	1	6

The bracket is shown in the following figure.

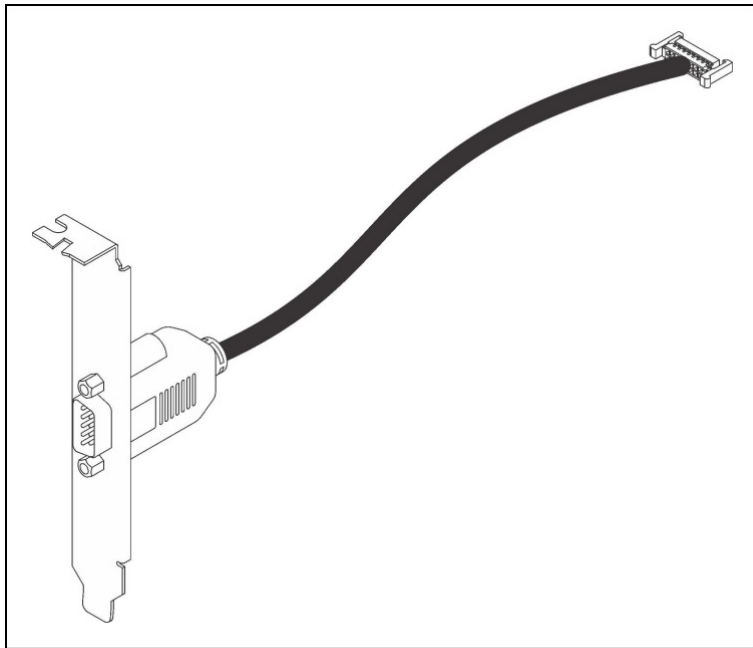


Figure 10. ThinkSystem COM Port Upgrade Kit v2

Accelerators

The SE450 supports the FPGA accelerator listed in the following table.

Limited configuration access: The ACC100 accelerator is primarily for telecom customers and requires special considerations. To enable this adapter in the DCSC configurator, you will need access to the "Telecom Specific" mode. Contact the DCSC support team at salesconfig@lenovo.com for information.

Table 34. Accelerators

Part number	Feature code	Description	Maximum supported	300mm chassis	360mm chassis
4XC7A81119	BMHJ	Lenovo ThinkSystem Intel ACC100 Accelerating NFV PCIe Gen3	4	Yes	Yes

The use of these adapters also requires power cables which are included in the option part numbers or are derived by the configurator for CTO orders. When two adapters are installed in the same Riser, use the included Y-cable which provides power to both adapters.

Network adapters

The server has a dedicated OCP 3.0 SFF slot with PCIe 4.0 x16 host interface. See [Figure 3](#) for the location of the OCP slot. One port can optionally be shared with the XCC management processor for Wake-on-LAN and NC-SI support.

The following table lists the supported OCP adapters. These adapters are CTO only and not available as field upgrades.

Internal lock mechanism: The OCP adapters used in the SE450 use the OCP internal lock mechanism instead of the pull-tab and thumbscrew combination used with other ThinkSystem OCP adapters.

Table 35. OCP network adapters

Part number	Feature code	Description	Maximum supported
1 Gb Ethernet			
CTO only	BMHE	ThinkEdge Intel I350 1GbE RJ45 4-port Internal Lock OCP Ethernet Adapter	1
10 Gb Ethernet			
CTO only	BMHF	ThinkEdge Intel X710-T2L 10GBASE-T 2-port Internal Lock OCP Ethernet Adapter	1
25 Gb Ethernet			
CTO only	BMHG	ThinkEdge Intel E810-DA2 10/25GbE SFP28 2-Port Internal Lock OCP Ethernet Adapter	1
CTO only	BMHD	ThinkEdge Mellanox CX6 Lx 10/25GbE SFP28 2-Port Internal Lock OCP Ethernet Adapter	1

If the server ships with an OCP slot but you do not have an OCP adapter installed, then a filler should be installed in place of the adapter. Ordering information is shown in the following table.

Table 36. Filler for OCP adapter slot

Part number	Description
4XF7A90167	ThinkEdge SE450 OCP Filler

The following table lists additional supported network adapters that can be installed in the regular PCIe slots. All adapters are supported in both 300mm and 360mm chassis.

Table 37. PCIe network adapters

Part number	Feature code	Description	Maximum supported
1 Gb Ethernet			
7ZT7A00484	AUZV	ThinkSystem Broadcom 5719 1GbE RJ45 4-Port PCIe Ethernet Adapter	4
7ZT7A00535	AUZW	ThinkSystem I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter	4
10 Gb Ethernet			
7ZT7A00496	AUKP	ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter	4
4XC7A08245	B5SU	ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter	4
25 Gb Ethernet			
4XC7A08295	BCD6	ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
7XC7A05523	B0WY	ThinkSystem Intel XXV710-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
4XC7A62580	BE4U	ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter	4
100 Gb Ethernet / InfiniBand			
4XC7A08248	B8PP	ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter	4
4C57A14178	B4RA	ThinkSystem Mellanox ConnectX-6 HDR100/100GbE QSFP56 2-port PCIe VPI Adapter	4
4C57A81478	BN37	Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-Port x16 PCIe 3.0 HCA Adapter	4

For more information, including the transceivers and cables that each adapter supports, see the list of Lenovo Press Product Guides in the Networking adapters category:

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

GPU adapters

The following table lists the supported GPUs. The use of full-length GPUs requires the 360mm chassis - see [Models](#) for ordering information.

Table 38. Supported GPUs

Part number	Feature code	Description	Controlled GPU	Form factor	Maximum supported	300mm chassis	360mm chassis
4X67A84823	BT87	ThinkSystem NVIDIA L40 48GB PCIe Gen4 Passive GPU	Yes	DW	2	No	Yes
4X67A72593	BQZQ	ThinkSystem NVIDIA A40 48GB PCIe Gen4 Passive GPU w/o CEC	Yes	DW	2	No	Yes
4X67A76581	BQZR	ThinkSystem NVIDIA A30 24GB PCIe Gen4 Passive GPU w/o CEC	Yes	DW	2	No	Yes
4X67A86131	BU01	ThinkSystem Intel Flex 170 16GB Gen4 Passive GPU	No	SW FHFL	1	No	Yes*
4X67A84824	BS2C	ThinkSystem NVIDIA L4 24GB PCIe Gen4 Passive GPU	Yes	SW	4	Yes	Yes
4X67A81547	BQZT	ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC	No	SW	4	Yes	Yes
4X67A84009	BS49	ThinkSystem Qualcomm Cloud AI 100	Yes	SW	4	Yes	Yes

* See Flex 170 configuration requirements below

Configuration notes:

- The Controlled GPU column indicates the required CTO model. See the [Models](#) section for information.
 - Controlled GPUs require CTO model 7D8TCTOAWW. This CTO model is not available in some markets.
 - GPUs that are not controlled require CTO model 7D8TCTO1WW.
- GPUs that require the 360mm chassis must use Base feature code BMHC. See the [Models](#) section for information.
- Installed GPUs must be identical
- Full-length GPUs such as the Intel Flex 170, NVIDIA L40, A30, and A40 are only supported with the following processors, and only with a 1U heatsink:
 - Intel Xeon Gold 6330N
 - Intel Xeon Gold 5318N
 - Intel Xeon Gold 5317
 - Intel Xeon Silver 4316
 - Intel Xeon Silver 4314
 - Intel Xeon Silver 4310T
- Configuration requirements when selecting the Intel Flex 170 GPU:
 - The Flex 170 is only supported in 360mm configuration #3, as described in the [Configurations](#) section
 - The Flex 170 is only supported in slot 3, and only with a PCIe x8 host interface
 - The Flex 170 is not supported with an OCP adapter
 - A maximum of 2x internal NVMe drives is supported
- When the NVIDIA A40 GPU is installed, the maximum ambient temperature is 40°C (104°F).
- The use of the double-wide GPUs requires an auxiliary power cable as listed in the following table. For CTO orders, power cables are automatically derived by the configurator.
- Some NVIDIA A Series GPUs are available as two feature codes, one with a CEC chip and one without a CEC chip (ones without the CEC chip have "w/o CEC" in the name). The CEC is a secondary Hardware Root of Trust (RoT) module that provides an additional layer of security, which can be used by customers who have high regulatory requirements or high security standards. NVIDIA uses a multi-layered security model and hence the protection offered by the primary Root of Trust embedded in the GPU is expected to be sufficient for most customers. The CEC defeatured products still offer Secure Boot, Secure Firmware Update, Firmware Rollback Protection, and In-Band Firmware Update Disable. Specifically, without the CEC chip, the GPU does not support Key Revocation or Firmware Attestation. CEC and non-CEC GPUs of the same type of GPU can be mixed in field upgrades.

Table 39. GPU Auxiliary power cable

Part number	Feature code	Description	Maximum supported	GPUs supported
4X97A89288	BVVG	ThinkEdge NVIDIA L40 GPU Power Cable Kit	2*	NVIDIA L40
4X97A81810	BMHY	ThinkEdge SE450 GPU Power Cable	2	NVIDIA A30, A40
4X97A90159	BYBK	ThinkEdge SE450 Intel Flex 170 GPU Power Cable	2	Intel Flex 170

* For field upgrades, the option part number contains two power cables, so only one needs to be ordered for two GPUs

For information about the GPU, see the ThinkSystem GPU Summary, available at: <https://lenovopress.com/lp0768-thinksystem-thinkagile-gpu-summary>

Cooling

The SE450 server has six 60 mm dual-rotor simple-swap fans.

All six are standard and support N+1 rotor redundancy.

Power supplies

The SE450 supports one or two hot-swap power supplies, installed at the front of the server. When two are installed, they are redundant in most configurations. Ordering information is listed in the following table.

Table 40. Power options

Part number	Feature code	Description	Maximum supported
AC power supply units			
4P57A78281	BMH8	ThinkEdge 1100W 230V/115V Platinum Hot-Swap Power Supply	2
4P57A78358	BRH9	ThinkEdge 1100W 230V Titanium Hot-Swap Power Supply	2
4P57A78282	BMH9	ThinkEdge 1800W 230V Platinum Hot-Swap Power Supply	2
DC power supply unit			
4P57A78283	BMHA	ThinkEdge 1100W -48V DC Hot-Swap Power Supply	2

Configuration requirements:

- If two power supplies are installed, they must be identical.
- To determine the power supply needed for your configuration, use Lenovo Capacity Planner as described in the [Capacity Planner](#) section.
- Power supplies from other ThinkSystem servers have fans that operate in the opposite direction and are not supported.

Power supply LEDs

The supported hot-swap power supplies have the following LEDs:

- Power input LED:
 - Green: The power supply is connected to the AC power source
 - Off: The power supply is disconnected from the AC power source or a power problem has occurred
- Power output LED:
 - Green: The server is on and the power supply is working normally
 - Blinking green: The power supply is in Zero-output/Standby mode (see below)
 - Off: The server is powered off, or the power supply is not working properly
- Power supply error LED:
 - Off: The power supply is working normally
 - Yellow: The power supply has failed

Zero-output mode: When Zero-output mode (also known as Standby mode or Cold Redundancy mode) is configured in XCC and the server power load is sufficiently low, one of the installed power supplies enters into the Standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to Active state to provide sufficient power to the server. Zero-output mode can be enabled or disabled in the XClarity Controller web interface, Server Configuration > Power Policy. If you select Disable, then both power supplies will be in the Active state.

Power cords

Line cords and rack power cables with C13 connectors can be ordered as listed in the following table.

110V customers: If you plan to use the 1100W power supply with a 110V power source, select a power cable that is rated above 10A. Power cables that are rated at 10A or below are not supported with 110V power.

Table 41. Power cords

Part number	Feature code	Description
Rack cables - C13 to C14		
SL67B08593	BPHZ	0.5m, 10A/100-250V, C13 to C14 Jumper Cord
00Y3043	A4VP	1.0m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08367	B0N5	1.0m, 13A/100-250V, C13 to C14 Jumper Cord
39Y7937	6201	1.5m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08368	B0N6	1.5m, 13A/100-250V, C13 to C14 Jumper Cord
4L67A08365	B0N4	2.0m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
4L67A08369	6570	2.0m, 13A/100-250V, C13 to C14 Jumper Cord
4L67A08366	6311	2.8m, 10A/100-250V, C13 to C14 Jumper Cord
4L67A08370	6400	2.8m, 13A/100-250V, C13 to C14 Jumper Cord
39Y7932	6263	4.3m, 10A/100-250V, C13 to IEC 320-C14 Rack Power Cable
4L67A08371	6583	4.3m, 13A/100-250V, C13 to C14 Rack Power Cable
Rack cables - C13 to C14 (Y-cable)		
00Y3046	A4VQ	1.345m, 2X C13 to C14 Jumper Cord, Rack Power Cable
00Y3047	A4VR	2.054m, 2X C13 to C14 Jumper Cord, Rack Power Cable
Rack cables - C13 to C20		
39Y7938	6204	2.8m, 10A/100-250V, C13 to IEC 320-C20 Rack Power Cable
Rack cables - C13 to C20 (Y-cable)		
47C2491	A3SW	1.2m, 16A/100-250V, 2 Short C13s to Short C20 Rack Power Cable
47C2492	A3SX	2.5m, 16A/100-250V, 2 Long C13s to Short C20 Rack Power Cable
47C2493	A3SY	2.8m, 16A/100-250V, 2 Short C13s to Long C20 Rack Power Cable
47C2494	A3SZ	4.1m, 16A/100-250V, 2 Long C13s to Long C20 Rack Power Cable
Line cords		
39Y7930	6222	2.8m, 10A/250V, C13 to IRAM 2073 (Argentina) Line Cord
81Y2384	6492	4.3m 10A/220V, C13 to IRAM 2073 (Argentina) Line Cord
39Y7924	6211	2.8m, 10A/250V, C13 to AS/NZ 3112 (Australia/NZ) Line Cord
81Y2383	6574	4.3m, 10A/230V, C13 to AS/NZS 3112 (Aus/NZ) Line Cord
69Y1988	6532	2.8m, 10A/250V, C13 to NBR 14136 (Brazil) Line Cord
81Y2387	6404	4.3m, 10A/250V, C13 - 2P+Gnd (Brazil) Line Cord
39Y7928	6210	2.8m, 220-240V, C13 to GB 2099.1 (China) Line Cord
81Y2378	6580	4.3m, 10A/220V, C13 to GB 2099.1 (China) Line Cord
39Y7918	6213	2.8m, 10A/250V, C13 to DK2-5a (Denmark) Line Cord
81Y2382	6575	4.3m, 10A/230V, C13 to DK2-5a (Denmark) Line Cord
39Y7917	6212	2.8m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord
81Y2376	6572	4.3m, 10A/230V, C13 to CEE7-VII (Europe) Line Cord

Part number	Feature code	Description
39Y7927	6269	2.8m, 10A/250V, C13(2P+Gnd) (India) Line Cord
81Y2386	6567	4.3m, 10A/240V, C13 to IS 6538 (India) Line Cord
39Y7920	6218	2.8m, 10A/250V, C13 to SI 32 (Israel) Line Cord
81Y2381	6579	4.3m, 10A/230V, C13 to SI 32 (Israel) Line Cord
39Y7921	6217	2.8m, 220-240V, C13 to CEI 23-16 (Italy/Chile) Line Cord
81Y2380	6493	4.3m, 10A/230V, C13 to CEI 23-16 (Italy/Chile) Line Cord
46M2593	A1RE	2.8m, 12A/125V, C13 to JIS C-8303 (Japan) Line Cord
4L67A08362	6495	4.3m, 12A/200V, C13 to JIS C-8303 (Japan) Line Cord
39Y7926	6335	4.3m, 12A/100V, C13 to JIS C-8303 (Japan) Line Cord
39Y7922	6214	2.8m, 10A/250V, C13 to SABS 164 (S Africa) Line Cord
81Y2379	6576	4.3m, 10A/230V, C13 to SABS 164 (South Africa) Line Cord
39Y7925	6219	2.8m, 220-240V, C13 to KETI (S Korea) Line Cord
81Y2385	6494	4.3m, 12A/220V, C13 to KSC 8305 (S. Korea) Line Cord
39Y7919	6216	2.8m, 10A/250V, C13 to SEV 1011-S24507 (Swiss) Line Cord
81Y2390	6578	4.3m, 10A/230V, C13 to SEV 1011-S24507 (Sws) Line Cord
23R7158	6386	2.8m, 10A/125V, C13 to CNS 10917-3 (Taiwan) Line Cord
81Y2375	6317	2.8m, 10A/240V, C13 to CNS 10917-3 (Taiwan) Line Cord
81Y2374	6402	2.8m, 13A/125V, C13 to CNS 60799 (Taiwan) Line Cord
4L67A08363	AX8B	4.3m, 10A 125V, C13 to CNS 10917 (Taiwan) Line Cord
81Y2389	6531	4.3m, 10A/250V, C13 to 76 CNS 10917-3 (Taiwan) Line Cord
81Y2388	6530	4.3m, 13A/125V, C13 to CNS 10917 (Taiwan) Line Cord
39Y7923	6215	2.8m, 10A/250V, C13 to BS 1363/A (UK) Line Cord
81Y2377	6577	4.3m, 10A/230V, C13 to BS 1363/A (UK) Line Cord
90Y3016	6313	2.8m, 10A/120V, C13 to NEMA 5-15P (US) Line Cord
46M2592	A1RF	2.8m, 10A/250V, C13 to NEMA 6-15P Line Cord
00WH545	6401	2.8m, 13A/120V, C13 to NEMA 5-15P (US) Line Cord
4L67A08359	6370	4.3m, 10A/125V, C13 to NEMA 5-15P (US) Line Cord
4L67A08361	6373	4.3m, 10A/250V, C13 to NEMA 6-15P (US) Line Cord
4L67A08360	AX8A	4.3m, 13A/120V, C13 to NEMA 5-15P (US) Line Cord

-48V DC power cord

For the -48V DC Power Supply, the following power cable is supported.

Table 42. -48V DC power cable

Part number	Feature code	Description
4X97A59831	BE4V	2.5m, -48VDC Interconnecting Cable

Systems management

The SE450 contains an integrated service processor, XClarity Controller (XCC), which provides advanced control, monitoring, and alerting functions. The XCC is based on the ASPEED AST2600 baseboard management controller (BMC).

Topics in this section:

- [Activation](#)
- [Local management](#)
- [External Diagnostics Handset](#)
- [System status with XClarity Mobile](#)
- [Remote management](#)
- [MicroSD for XCC local storage](#)
- [Lenovo XClarity Provisioning Manager](#)
- [Lenovo XClarity Administrator](#)
- [Lenovo XClarity Integrators](#)
- [Lenovo XClarity Essentials](#)
- [Lenovo XClarity Energy Manager](#)
- [Lenovo Capacity Planner](#)

Activation

Activation is an optional security feature of the ThinkEdge SE450 that ensures that the system delivered from the factory is only used by its intended recipient and that all data and applications remains secure. Activation is enabled on a factory order when the Security Pack Enabled feature code (feature BLZ2) is selected as described in the [Security Pack](#) section.

Enabled by default: Activation is enabled by default for new CTO orders. Activation can be disabled in the factory order as described in the [Security Pack](#) section.

If Activation is enabled, the system is delivered in system lockdown and will require activation before operation. There are three ways the server can be activated:

- Using a mobile device (iOS or Android) connect to the server to the USB management port on the front of the server and running the [ThinkShield Edge Mobile Management app](#).
- Connecting the system to the Internet via the XCC management port on the front of the server and accessing the [ThinkShield Key Vault Portal](#) from a web browser on another system.
- In a disconnected mode, where neither a mobile device or an internet connection to the ThinkEdge SE450 are available.

Details of the activation process are described in the following documents:

- Activation Guide (2-page flyer that is included with the server)
- SE450 Setup Guide, Chapter 5

These documents are available from:

https://thinksystem.lenovofiles.com/help/topic/se450/pdf_files.html?cp=2_1_0

For further information on activation and the use of the ThinkShield Edge Mobile Management app, including videos and tours, see this support page:

<https://support.lenovo.com/us/en/solutions/ht509033>

Local management

The SE450 offers a front operator panel with key controls and status indicators, as shown in the following figure.

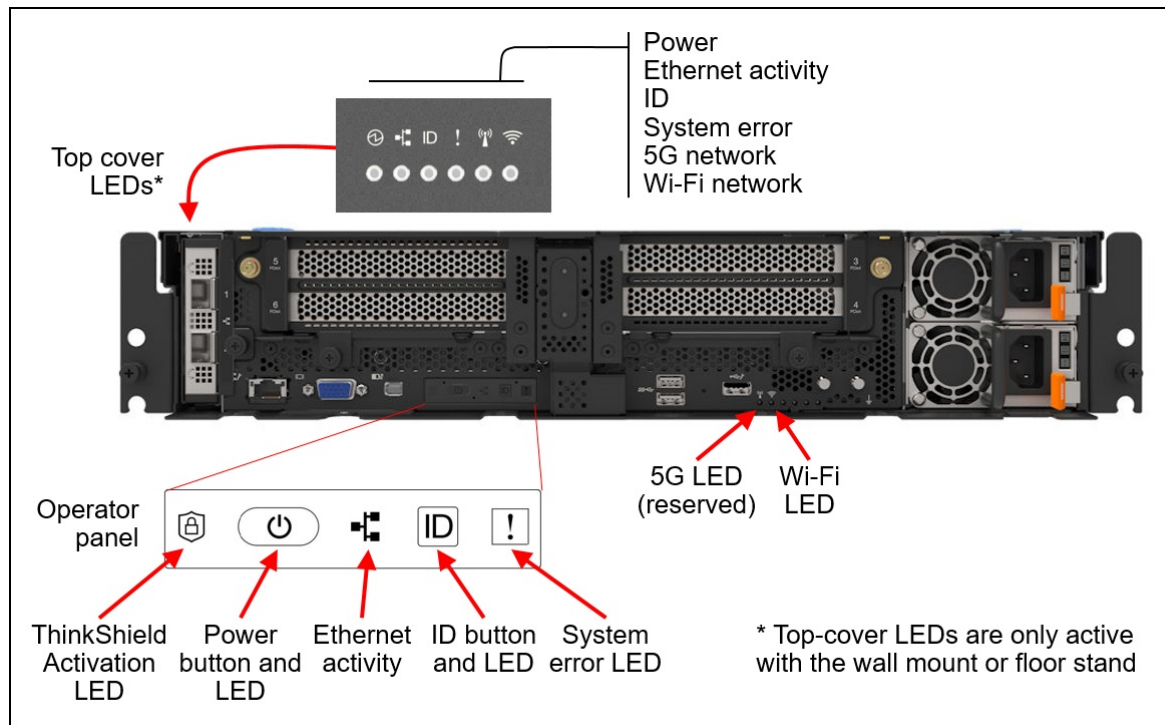


Figure 11. Front operator panel and system LEDs

No support for 5G as a client: The SE450 does not offer any 5G or LTE Wireless client support. The 5G network LEDs are non-operational.

The buttons on the front of the server:

- Power button
- ID (identification) button - turns on the LED housed within the button as well as passing the signal to the XCC for display remotely in XClarity Administrator

The LEDs on the front of the server are as follows:

- ThinkShield Activation LED (green) - indicates the state of server activation
 - On - Activation process has been completed
 - Blinking - Activation is required before the server can be used
 - Off - Activation is disabled on this system
- Power LED (green) - indicates power status, as follows:
 - Off - Server does not have power applied
 - Fast flash (4 times per second) - The server has just had power applied and is not ready to be powered on yet
 - Slow flash (once per second) - Server is ready to be powered on
 - On solid - Server is powered on
- Ethernet network activity - indicates when the Ethernet adapter installed in the OCP slot has activity
- Identification LED (blue) - lights when the button is pressed or when the function is activated remotely in XClarity Controller.
- System error LED (yellow)

- 5G network LED - not used (no support for 5G or LTE as a client)
- Wireless LAN (WLAN) network LED (green) - not used (no support for WLAN)

The system LEDs are duplicated on the top of the server. The same LEDs are also duplicated on the front of the security bezel as shown in the [Security](#) section.

External Diagnostics Handset

The SE450 also has a port to connect an External Diagnostics Handset as shown in the following figure. The External Diagnostics Handset has the same functions as the Integrated Diagnostics Panel but has the advantages of not consuming space on the front of the server plus it can be shared amongst many servers in your data center. The handset has a magnet on the back of it to allow you to easily mount it on a convenient place on any rack cabinet.

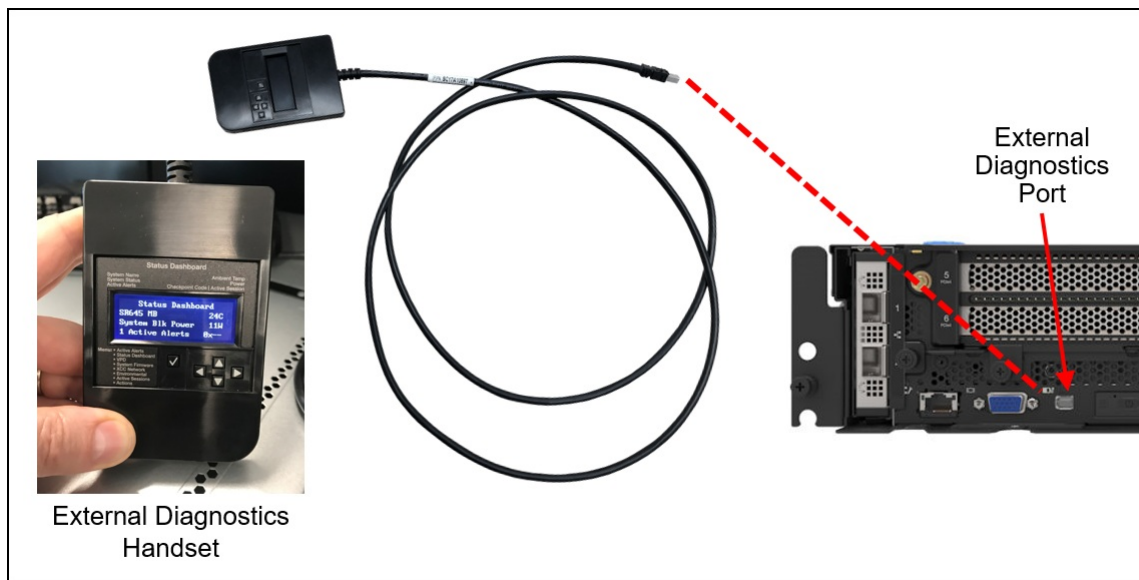


Figure 12. External Diagnostics Handset

Ordering information for the External Diagnostics Handset with is listed in the following table.

Field upgrade only: The External Diagnostics Handset is only available as an option for field upgrades. Not available in CTO orders.

Table 43. External Diagnostics Handset ordering information

Part number	Feature code	Description
4TA7A64874	BEUX	ThinkSystem External Diagnostics Handset

System status with XClarity Mobile

The XClarity Mobile app includes a tethering function where you can connect your Android or iOS device to the server via USB to see the status of the server.

The steps to connect the mobile device are as follows:

1. Enable USB Management on the server, by holding down the ID button for 3 seconds (or pressing the dedicated USB management button if one is present)
2. Connect the mobile device via a USB cable to the server's USB port with the management symbol



3. In iOS or Android settings, enable Personal Hotspot or USB Tethering
4. Launch the Lenovo XClarity Mobile app

Once connected you can see the following information:

- Server status including error logs (read only, no login required)
- Server management functions (XClarity login credentials required)

Remote management

Remote server management is provided through industry-standard interfaces:

- Intelligent Platform Management Interface (IPMI) Version 2.0
- Simple Network Management Protocol (SNMP) Version 3 (no SET commands; no SNMP v1)
- Common Information Model (CIM-XML)
- Representational State Transfer (REST) support
- Redfish support (DMTF compliant)
- Web browser - HTML 5-based browser interface (Java and ActiveX not required) using a responsive design (content optimized for device being used - laptop, tablet, phone) with NLS support

Remote management is available via the following connections:

- Via the dedicated Ethernet port for management. See the [Components and connectors](#) section for the location of these ports.
- Via Port 1 of the OCP adapter (if installed), which supports NC-SI to allow sharing of the Ethernet port between the operating system and remote management.

The front of the server houses an pull-out information tab (also known as the network access tag). A label on the tab shows the network information (MAC address and other data) to remotely access the service processor. See the [Components and connectors](#) section for the location of this pull-out tab.

There are two XClarity Controller upgrades available for the server, Advanced and Enterprise.

XCC Advanced Upgrade adds the following functions:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- International keyboard mapping support
- Syslog alerting
- Redirecting serial console via SSH
- Component replacement log (Maintenance History log)
- Access restriction (IP address blocking)
- Lenovo SED security key management
- Displaying graphics for real-time and historical power usage data and temperature

XCC Enterprise Upgrade enables the following additional features:

- Boot video capture and crash video capture
- Virtual console collaboration - Ability for up to 6 remote users to be log into the remote session simultaneously
- Remote console Java client
- Mapping the ISO and image files located on the local client as virtual drives for use by the server
- Mounting the remote ISO and image files via HTTPS, SFTP, CIFS, and NFS
- Power capping
- System utilization data and graphic view
- Single sign on with Lenovo XClarity Administrator
- Update firmware from a repository

- License for XClarity Energy Manager

For configure-to-order (CTO), you can enable the required XCC functionality by selecting the appropriate XCC feature codes listed in the following table:

- XCC Standard - select neither feature listed in the table
- XCC Advanced - select feature AVUT
- XCC Enterprise - select feature AUPW

Table 44. XClarity Controller upgrades for configure-to-order

Feature code	Description
AVUT	ThinkSystem XClarity Controller Standard to Advanced Upgrade
AUPW	ThinkSystem XClarity Controller Standard to Enterprise Upgrade

For systems with XCC Standard or XCC Advanced installed, field upgrades are available as listed in the following table.

Table 45. XClarity Controller field upgrades

Part number	Description
4L47A09132	ThinkSystem XClarity Controller Standard to Advanced Upgrade (for servers that have XCC Standard)
4L47A09133	ThinkSystem XClarity Controller Advanced to Enterprise Upgrade (for servers that have XCC Advanced)

MicroSD for XCC local storage

The server includes a MicroSD card port to enable the use of a MicroSD card for additional storage for use with the XCC controller. XCC can use the storage as a Remote Disc on Card (RDOC) device (up to 4GB of storage). It can also be used to store firmware updates (including N-1 firmware history) for ease of deployment.

Tip: Without a MicroSD card installed, the XCC controller will have 100MB of available RDOC storage.

Ordering information for the supported Micro SD cards is listed in the following table.

Table 46. Media for use with the MicroSD card port

Part number	Feature code	Description
4X77A92672	C0BC	ThinkSystem MicroSD 64GB Class 10 Flash Memory Card

Lenovo XClarity Provisioning Manager

Lenovo XClarity Provisioning Manager (LXPM) is a UEFI-based application embedded in ThinkSystem servers and accessible via the F1 key during system boot.

LXPM provides the following functions:

- Graphical UEFI Setup
- System inventory information and VPD update
- System firmware updates (UEFI and XCC)
- RAID setup wizard
- OS installation wizard (including unattended OS installation)
- Diagnostics functions

Lenovo XClarity Administrator

Lenovo XClarity Administrator is a centralized resource management solution designed to reduce complexity, speed response, and enhance the availability of Lenovo systems and solutions. It provides agent-free hardware management for ThinkSystem servers, in addition to ThinkServer, System x, and Flex System servers. The administration dashboard is based on HTML 5 and allows fast location of resources so tasks can be run quickly.

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

Lenovo XClarity Administrator is an optional software component for the SE450. The software can be downloaded and used at no charge to discover and monitor the SE450 and to manage firmware upgrades.

If software support is required for Lenovo XClarity Administrator, or premium features such as configuration management and operating system deployment are required, 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 Lenovo XClarity software license options.

Table 47. Lenovo XClarity Pro ordering information

Part number	Feature code	Description
00MT201	1339	Lenovo XClarity Pro, per Managed Endpoint w/1 Yr SW S&S
00MT202	1340	Lenovo XClarity Pro, per Managed Endpoint w/3 Yr SW S&S
00MT203	1341	Lenovo XClarity Pro, per Managed Endpoint w/5 Yr SW S&S
7S0X000HWW	SAYV	Lenovo XClarity Pro, per Managed Endpoint w/6 Yr SW S&S
7S0X000JWW	SAYW	Lenovo XClarity Pro, per Managed Endpoint w/7 Yr SW S&S

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

- Auto-discovery and monitoring of Lenovo systems
- Firmware updates and compliance enforcement
- 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

Lenovo XClarity Administrator offers the following premium features that require an optional Pro license:

- Pattern-based configuration management that allows to define configurations once and apply repeatedly without errors when deploying new servers or redeploying existing servers without disrupting the fabric
- Bare-metal deployment of operating systems and hypervisors to streamline infrastructure provisioning

For more information, refer to the Lenovo XClarity Administrator Product Guide:

<http://lenovopress.com/tips1200>

Lenovo XClarity Integrators

Lenovo also offers software plug-in modules, Lenovo XClarity Integrators, to manage physical infrastructure from leading external virtualization management software tools including those from Microsoft and VMware.

These integrators are offered at no charge, however if software support is required, a Lenovo XClarity Pro software subscription license should be ordered.

Lenovo XClarity Integrators offer the following additional features:

- Ability to discover, manage, and monitor Lenovo server hardware from VMware vCenter or Microsoft System Center
- Deployment of firmware updates and configuration patterns to Lenovo x86 [rack servers](#) and Flex System from the virtualization management tool
- Non-disruptive server maintenance in clustered environments that reduces workload downtime by dynamically migrating workloads from affected hosts during rolling server updates or reboots
- Greater service level uptime and assurance in clustered environments during unplanned hardware events by dynamically triggering workload migration from impacted hosts when impending hardware failures are predicted

For more information about all the available Lenovo XClarity Integrators, see the Lenovo XClarity Administrator Product Guide: <https://lenovopress.com/tips1200-lenovo-xclarity-administrator>

Lenovo XClarity Essentials

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

- **Lenovo Essentials OneCLI**
OneCLI is a collection of server management tools that uses a command line interface program to manage firmware, hardware, and operating systems. It provides functions to collect full system health information (including health status), configure system settings, and update system firmware and drivers.
- **Lenovo Essentials UpdateXpress**
The UpdateXpress tool is a standalone GUI application for firmware and device driver updates that enables you to maintain your server firmware and device drivers up-to-date and help you avoid unnecessary server outages. The tool acquires and deploys individual updates and UpdateXpress System Packs (UXSPs) which are integration-tested bundles.
- **Lenovo Essentials Bootable Media Creator**
The Bootable Media Creator (BOMC) tool is used to create bootable media for offline firmware update.

For more information and downloads, visit the Lenovo XClarity Essentials web page: <http://support.lenovo.com/us/en/documents/LNVO-center>

Lenovo XClarity Energy Manager

Lenovo XClarity Energy Manager (LXEM) is a power and temperature management solution for data centers. It is an agent-free, web-based console that enables you to monitor and manage power consumption and temperature in your data center through the management console. It enables server density and data center capacity to be increased through the use of power capping.

LXEM is a licensed product. A single-node LXEM license is included with the XClarity Controller Enterprise upgrade as described in the [Remote Management](#) section. If your server does not have the XCC Enterprise upgrade, Energy Manager licenses can be ordered as shown in the following table.

Table 48. Lenovo XClarity Energy Manager

Part number	Description
4L40E51621	Lenovo XClarity Energy Manager Node License (1 license needed per server)

For more information about XClarity Energy Manager, see the following resources:

- Lenovo Support page:
<https://datacentersupport.lenovo.com/us/en/solutions/Invo-lxem>
- User Guide for XClarity Energy Manager:
<https://pubs.lenovo.com/lxem/>

Lenovo Capacity Planner

Lenovo Capacity Planner is a power consumption evaluation tool that enhances data center planning by enabling IT administrators and pre-sales professionals to understand various power characteristics of racks, servers, and other devices. Capacity Planner can dynamically calculate the power consumption, current, British Thermal Unit (BTU), and volt-ampere (VA) rating at the rack level, improving the planning efficiency for large scale deployments.

For more information, refer to the Capacity Planner web page:

<http://datacentersupport.lenovo.com/us/en/solutions/Invo-lcp>

Security

Topics in this section:

- [Security features](#)
- [Intrusion switch](#)
- [Firmware and TPM 2.0 Security Module](#)
- [Security bezel](#)
- [Security Pack](#)

Security features

The SE450 offers a number of security features, both electronic and physical.

Physical security features:

- Intrusion detection (optional, CTO only).
- Front security bezel with key lock (optional, available as a field upgrade, but requires the bezel detect module added in the factory)
- EIA mounting flange with security key (optional, CTO only)
Available EIA bracket that uses a security screw to attach the server to the front flange of the rack cabinet. See [EIA bracket with security screw](#) for more information.

Electronic security features include:

- Automatic actions on tamper detection
In the event of an intrusion or movement, the server can be configured in XCC to perform actions, including server shutdown and disabling remote access to the XCC from the network ports (referred to as the BMC network bridge).
- Self-encrypting (SED) drives that ensure data is secured when the drives are powered off
- Administrator password and a power-on password in UEFI
- Trusted Platform Module (TPM) supporting TPM 2.0, implemented on a mezzanine card, enables

advanced cryptographic functionality in the operating system and applications. (not available for customers in PRC)

- Optional support for a secure manufacturing supply chain using Intel Transparent Supply Chain

The server is NIST SP 800-147B compliant.

Intrusion switch

The server supports an intrusion switch that rests against the top cover. In the event that the cover is removed, a Warning event is recorded in XClarity Controller and actions can be taken to secure the server. In addition, if you have configured the server with the Security Pack enabled (feature BLZ2), then the system will automatically lock down the system if top cover removed. See the [Security Pack](#) section for information.

The intrusion switch is optional but is only available via CTO orders, not as a field upgrade. See the [Internal view](#) of the server for the location of this component.

Table 49. Intrusion switch

Part number	Feature code	Description
CTO only	BMGW	ThinkEdge SE450 Intrusion Switch

Firmware and TPM 2.0 Security Module

The SE450 includes a security mezzanine card that plugs into the system board as shown in the [Internal view](#) of the server. The module has the following functions:

- Contains the following components:
 - Trusted Platform Module 2.0 (TPM 2.0) chip
 - Non-volatile storage for configuration data
- Allows field recovery of a firmware-corrupted system without requiring planar replacement
- Allows field replacement of system planar while maintaining customer code levels and configuration settings

Ordering information is listed in the following table.

No RoT support: This module does not support Root of Trust and Platform Firmware Resiliency (PFR) functionality. RoT and PFR are planned to be supported in a future version of this module.

Ordering information is listed in the following table.

Table 50. Firmware and TPM 2.0 Security Module

Part number	Feature code	Description	Markets
CTO only	BMGY	ThinkEdge SE450 Firmware and TPM 2.0 Security Module	All markets except China
CTO only	BN21	ThinkEdge SE450 Firmware Module for PRC (Does not contain the TPM functionality)	China only

Security bezel

The security bezel is an optional component that mounts on the front of the server that restricts access to networking connectors on the front of the server.

The following figure shows the SE450 with security bezel installed.

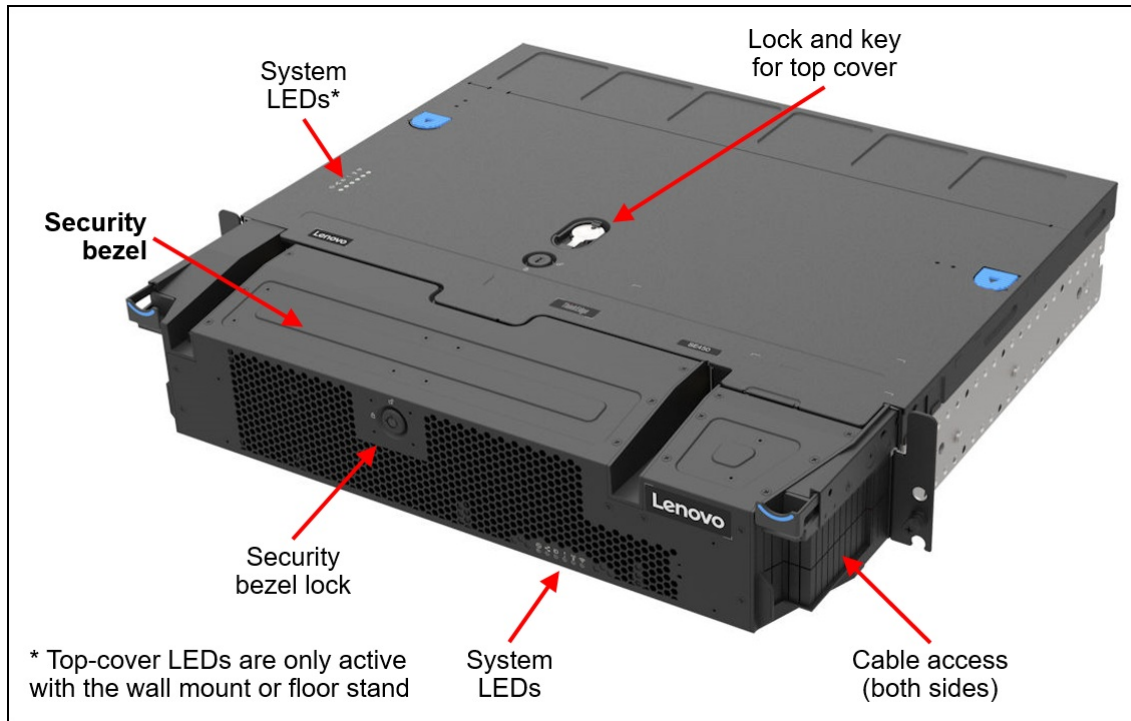


Figure 13. SE450 with security bezel installed

The security bezel is only available as an option part number and cannot be ordered as part of a CTO order, however the security bezel requires the security bezel detect module in order for the bezel to be recognized as installed by the server and for the LEDs on the security bezel to function. The security bezel detect module is only available CTO by selecting feature BR1K in DCSC.

Tip: It is not possible to install the security bezel without first having the bezel detect module installed.

Table 51. Security bezel ordering information

Part number	Feature code	Description	Purpose
CTO only	BR1K	Security-Bezel-ready Chassis	Ensures that the security bezel detect module is installed and enabled in the factory. See the Front view for the location of the security bezel detect module.
4B37A81735	Option only	ThinkEdge SE450 Security Bezel	Includes a key for the lock and a dust filter. See the Operating environment section. For full functionality, requires the bezel detect module be installed.

The security bezel also duplicates the system LEDs. The layout of the LEDs is identical to the LED grouping on top of the server. See the [Local management](#) section for information about the LEDs.

The security bezel also supports the installation of a dust filter as described in the [Operating environment](#) section.

Security Pack

The Security Pack is the collection of security and activation features of the SE450:

- Enablement of local Self-encrypting (SED) authentication key (AK) management
- Mandatory claiming and activation process to identify the owner of SE450 when the server is first

delivered/powered on

To enable the Security Pack features, select feature BLZ2. If you do not wish to have the features of the Security Pack enabled in the SE450, it can be physically removed from the system board by using feature BU0C.

Table 52. Security Pack ordering information

Feature code	Description
BLZ2	ThinkEdge Security Pack Enabled
BU0C	ThinkEdge Security Pack Depopulated

Notes:

- The Security Pack features setting cannot be changed after the system leaves the factory. For example, if you select feature BLZ2 to enable the Security Pack features, then the system will *require* activation before it can be first used. Similarly, if your system was configured with the Security Pack depopulated (physically removed from the system board), it cannot later be added.
- Customers can use the ThinkShield Portal to determine which of their systems have Security Pack enabled or disabled (you will see "Standard" if the system has Security Pack disabled).

Rack installation

The SE450 server can be installed in a rack cabinet, either 2-post, 4-post long, or 4-post short.

In this section:

- [Rail kits](#)
- [EIA bracket with security screw](#)
- [EIA bracket adjustment](#)

Rail kits

The following table lists the available rail kits. Each kit includes the left and right rails plus mounting hardware.

Table 53. Rail kits

Part number	Feature code	Description	300mm chassis	360mm chassis
4XF7A81940	BMH0*	ThinkEdge 1000mm Friction Rail Kit	Yes	Yes
4XF7A81942	BMH2	ThinkEdge 600mm Ball Bearing Rail Kit	Yes	Yes
4XF7A81943	BMH5	ThinkEdge SE450 550mm Ball Bearing Rail Kit	Yes	No
4XF7A81941	BMH1	ThinkEdge 2-Post Friction Rail Kit	Yes	Yes

*** 1000mm rail kit and CTO orders:** The 1000mm rail kit can only be included in CTO orders provided that the server is installed and shipped in a rack cabinet from the factory. If the order does not include factory installation into a rack cabinet, then the rail kit will need to be ordered separately using the option part number.

The following table summarizes the specifications of the available rail kits

Table 54. Specifications of the SE450 rail kits

Specification	ThinkEdge 1000mm Friction Rail Kit	ThinkEdge 600mm Ball Bearing Rail Kit	ThinkEdge SE450 550mm Ball Bearing Rail Kit	ThinkEdge 2-Post Friction Rail Kit
Part number	4XF7A81940	4XF7A81942	4XF7A81943	4XF7A81941
SE450 chassis support	300 mm, 360 mm	300 mm, 360 mm	300 mm only	300 mm, 360 mm
CMA	No	No	No	No
Rail length	751 mm (29.56 in)	454 mm (17.87 in)	315 mm (14.40 in)	484 mm (19.06 in)
Rail type	Full-out slide rail (friction)	Full-out slide rail (ball bearing)	Full-out slide rail (ball bearing)	Half-out slide rail (friction)
Slide travel	480 mm (18.9 in)	485 mm (19.1 in)	375 mm (14.8 in)	270 mm (10.6 in)
Tool-less installation	Yes	Yes	Yes	No (screw-in)
In-rack server maintenance	Yes	Yes	Yes	No
1U PDU support	Yes	Yes	Yes	Yes
0U PDU support	Yes	Not applicable	Not applicable	Not applicable
Rack type	Four-post IBM and Lenovo standard rack	Four-post 600 mm depth standard rack	Four-post custom cabinet	2-post rack
Mounting holes	Square or round	Square or round	Square or round	Square, round, or threaded
Mounting flange thickness	2 - 3.3 mm (0.08 - 0.13 in)	2 - 3.3 mm (0.08 - 0.13 in)	2 - 3.3 mm (0.08 - 0.13 in)	76 - 279 mm (3 - 11 in)
Supported distance between front and rear mounting flanges	610 - 864 mm (24 - 34 in)	400 - 500mm (15.7 - 19.7 in)	270 - 310 mm (10.6 - 12.2 in)	Not applicable

For details on the installation of these kits, see each of the ThinkEdge SE450 rack installation guides, available from the Information Center, <https://thinksystem.lenovofiles.com/help/index.jsp>

For information on supported rack cabinets, see the [Rack cabinets](#) section.

EIA bracket with security screw

The SE450 offers two types of EIA brackets (also known as ear brackets or ears):

- Standard EIA bracket - uses thumbscrews to secure the server to the front flange of the cabinet
- Security EIA bracket - uses security screws and key to secure the server to the front flange of the cabinet

The use of the security bracket and key (the key is included with the brackets) aids in preventing unauthorized personnel from removing the server from the rack.

The following figure shows the two EIA bracket types.

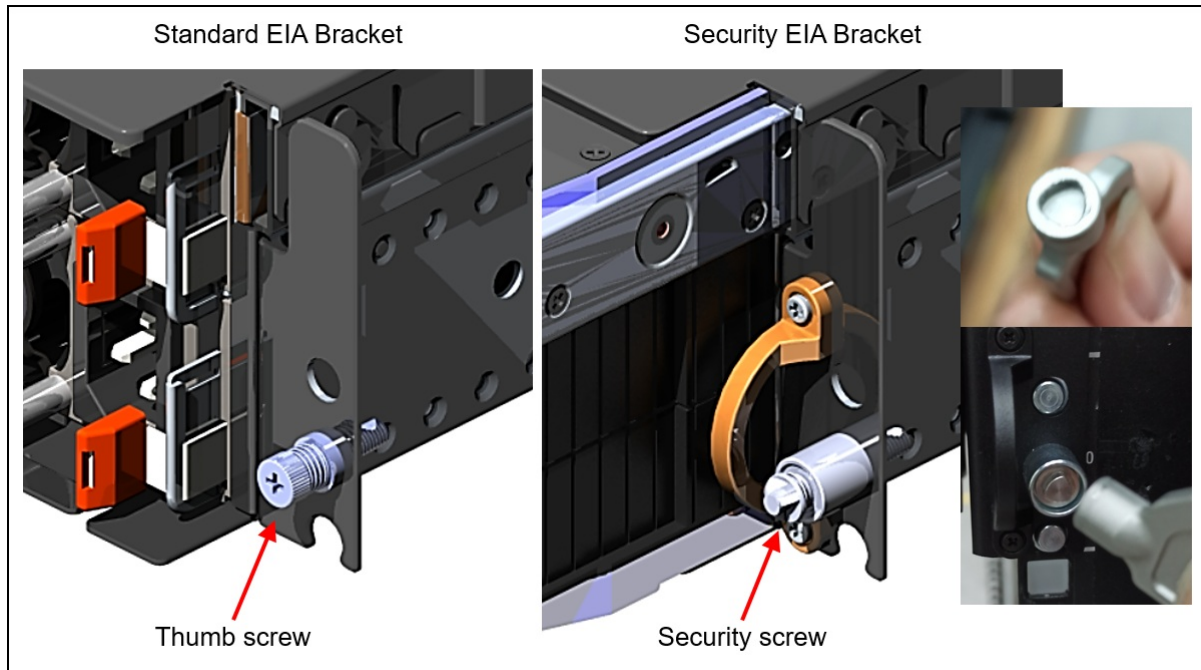


Figure 14. EIA brackets for the SE450

Ordering information is listed in the following table.

Table 55. EIA bracket choices

Part number	Feature code	Description
4XF7A97240	BMGV	ThinkEdge SE450 EIA - Security
4XF7A97239	BMGU	ThinkEdge SE450 EIA - Standard

EIA bracket adjustment

When installed in a rack cabinet, the EIA brackets on either side of the SE450 chassis can be adjusted to best fit the front cabling and clearance needs of your environment. The EIA brackets can be in one of six different positions as shown in the following figure.

Position 1 locates the server as far back into the rack cabinet as possible, such that the front of the security bezel is flush with the front flange of the cabinet. The distance between positions 1, 2, 3, 4, and 5 is 12.5 mm. Position 6 positions the server as far forward as possible, and is an additional 37.5 mm from position 5, for a total of 100 mm difference between positions 1 and 6.

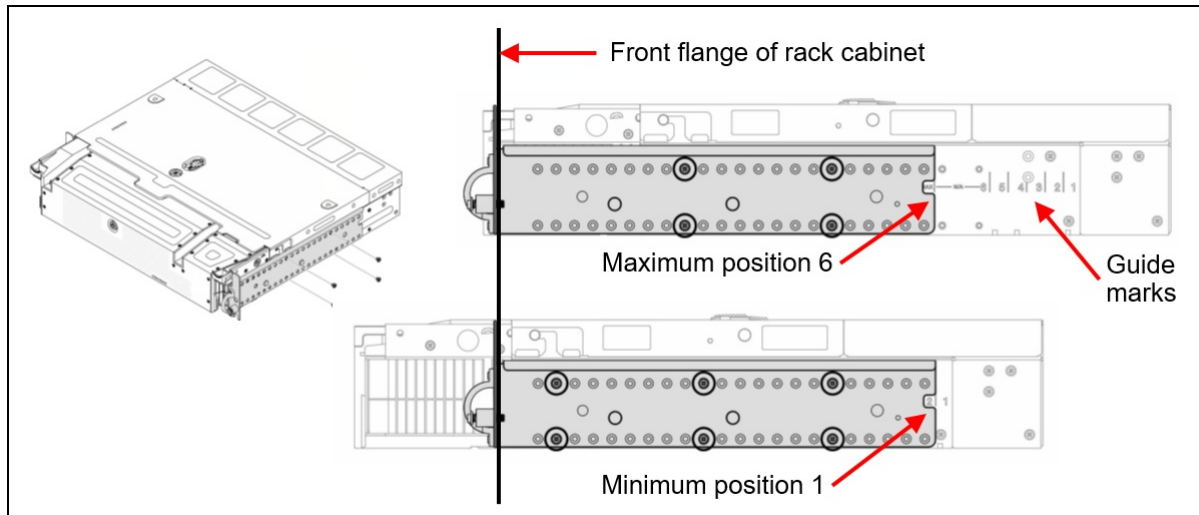


Figure 15. Adjusting the locations of the EIA brackets on the sides of the server

Floor stand

The SE450 supports being installed in a floor stand in a vertical orientation, as shown in the following figure. The floor stand supports both the 300mm or 360mm chassis, and with or without the security bezel.

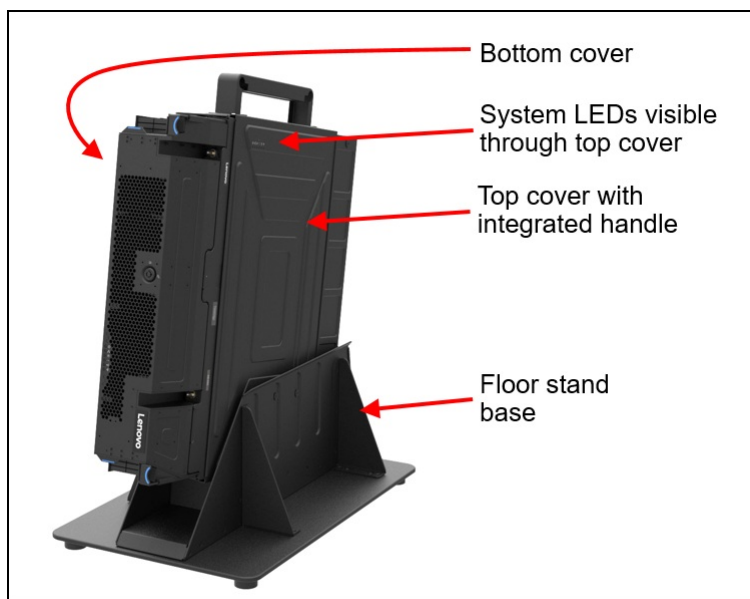


Figure 16. SE450 installed in the floor stand kit

The dimensions of the floor stand base are as follows:

- Width: 305 mm (12 inches)
- Depth: 488 mm (19.2 inches)
- Height of the floor stand base: 303 mm (11.9 inches)
- Height of the server installed in the floor stand (to the top of the handle):
 - 300 mm chassis: 584 mm (23 inches)
 - 360 mm chassis: 594 mm (23.4 inches)

Ordering information for the floor stand kit is listed in the following table. The floor stand kit is only available as an option part number and cannot be included in a CTO factory order.

Table 56. Floor stand

Part number	Feature code	Description
4XF7A81739	Option only	ThinkEdge SE450 Floor Stand Kit , contains: <ul style="list-style-type: none"> • Floor stand base • Top cover, with integrated handle and lightpipes to surface the system LEDs • Bottom cover • Mounting hardware

The contents of the floor stand kit is shown in the following figure.

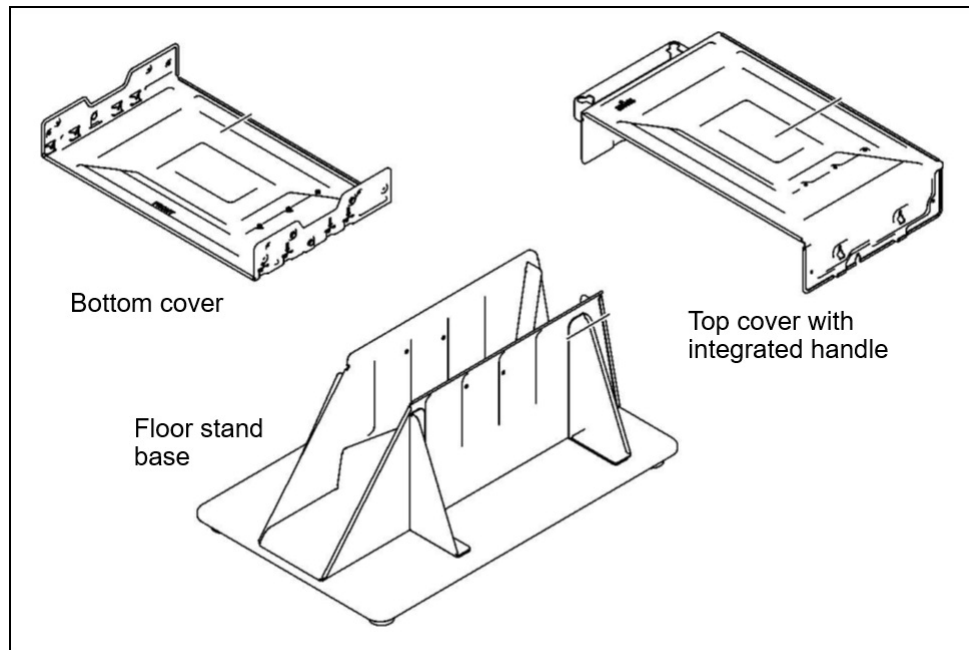


Figure 17. Contents of the SE450 floor stand kit

For details on the components in the kit and the installation process, see the ThinkEdge SE450 Floor-standing Configuration Guide, available from the Information Center, <https://thinksystem.lenovofiles.com/help/index.jsp>

Wall mount installation

The SE450 can be mounted on a wall in a vertical orientation. The server can face either left or right, and supports both the 300mm or 360mm chassis, with and without the security bezel.

The wall mount kit includes a base plate. The base plate is mounted to the wall and then the server is attached to the base plate using the top cover, bottom brackets, and side brackets. The dimensions of the base plate are:

- Width: 693 mm (27.3 inches)
- Height: 532 mm (20.9 inches)

The width of the base plate is to allow the support of the standard wall stud spacing in Europe (600mm, 23.6 inches) and in USA (16 inches, 406mm).

Note: The maximum weight of the server and wall mount assembly is 30 Kg (66 lbs).

The following figure shows the SE450 installed on a wall in a manufacturing environment.



Figure 18. SE450 installed on a wall in a manufacturing environment

Ordering information for the Wall Mount Kit is listed in the following table.

The wall mount kit is only available as an option part number and cannot be included in a CTO factory order.

Table 57. Wall mount

Part number	Feature code	Description
4XF7A81738	Option only	ThinkEdge SE450 Wall Mount Kit , contains: <ul style="list-style-type: none"> ● Wall-mount base plate ● Top cover, with four integrated handles and lightpipes to surface the system LEDs ● Two bottom brackets to enable mounting the server to the base plate ● Two L-shaped brackets for left and right sides of the server ● Mounting hardware

The contents of the wall mount kit is shown in the following figure.

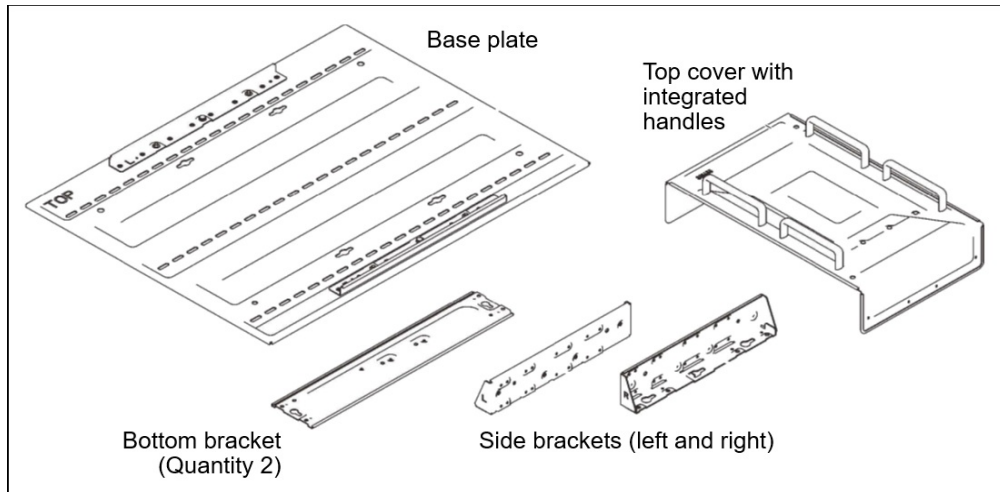


Figure 19. ThinkEdge SE450 Wall Mount Kit

The brackets are attached to the server and then the unit is then mounted to the wall plate, as shown in the following figure.

Tip: The integrated handles cannot be removed.

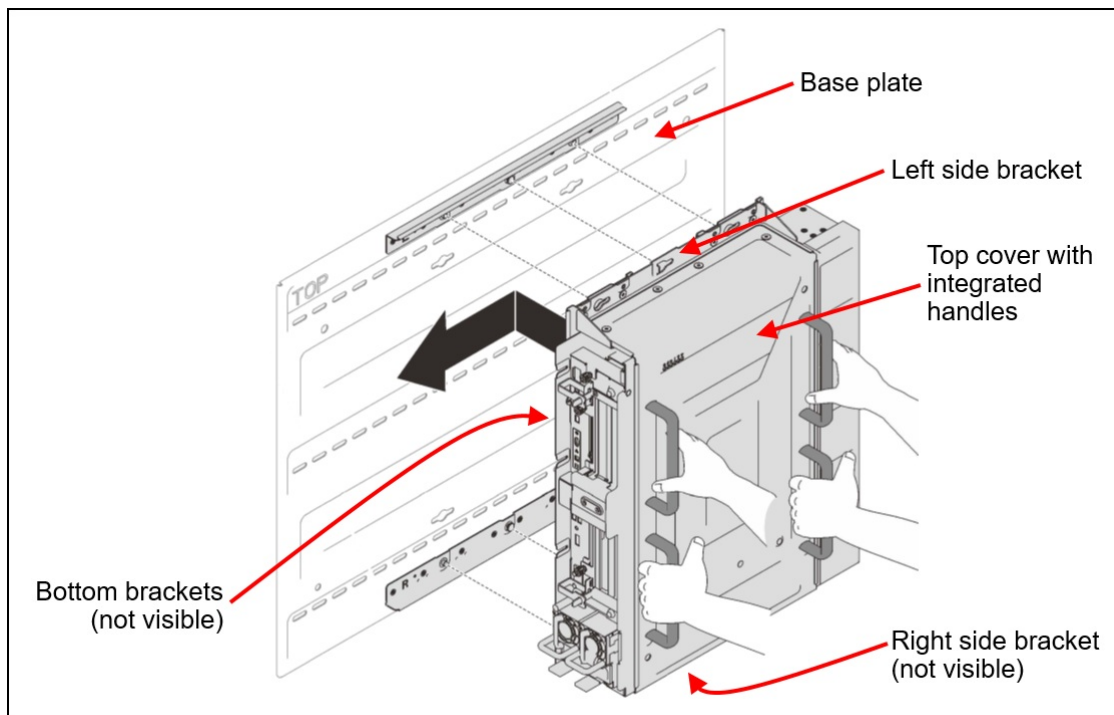


Figure 20. Using the ThinkEdge SE450 Wall Mount Kit

For details on the components in the kit and the installation process, see the ThinkEdge SE450 Wall-mounting Configuration Guide, available from the Information Center, <https://thinksystem.lenovofiles.com/help/index.jsp>

Operating system support

The SE450 supports the following operating systems:

- Microsoft Windows Server 2019
- Microsoft Windows Server 2022
- Microsoft Windows Server 2025
- Red Hat Enterprise Linux 7.9
- Red Hat Enterprise Linux 8.4
- Red Hat Enterprise Linux 8.5
- Red Hat Enterprise Linux 8.6
- Red Hat Enterprise Linux 8.7
- Red Hat Enterprise Linux 8.8
- Red Hat Enterprise Linux 8.9
- Red Hat Enterprise Linux 8.10
- Red Hat Enterprise Linux 9.0
- Red Hat Enterprise Linux 9.1
- Red Hat Enterprise Linux 9.2
- Red Hat Enterprise Linux 9.3
- Red Hat Enterprise Linux 9.4
- Red Hat Enterprise Linux 9.5
- SUSE Linux Enterprise Server 15 SP4
- SUSE Linux Enterprise Server 15 SP5
- SUSE Linux Enterprise Server 15 SP6
- SUSE Linux Enterprise Server 15 Xen SP4
- SUSE Linux Enterprise Server 15 Xen SP5
- Ubuntu 18.04 LTS 64-bit
- Ubuntu 20.04 LTS 64-bit
- Ubuntu 22.04 LTS 64-bit
- Ubuntu 24.04 LTS 64-bit
- VMware ESXi 7.0 U3
- VMware ESXi 8.0
- VMware ESXi 8.0 U1
- VMware ESXi 8.0 U2
- VMware ESXi 8.0 U3

For a complete list of supported, certified and tested operating systems, plus additional details and links to relevant web sites, see the Operating System Interoperability Guide:

<https://lenovopress.com/osig#servers=se450-7d8t>

For configure-to-order configurations, the SE450 can be preloaded with VMware ESXi. Ordering information is listed in the following table.

Table 58. VMware ESXi preload

Part number	Feature code	Description
CTO only	BMEY	VMware ESXi 7.0 U3 (Factory Installed)
CTO only	BYC7	VMware ESXi 8.0 U2 (Factory Installed)
CTO only	BZ97	VMware ESXi 8.0 U3 (Factory Installed)

Configuration rule:

- An ESXi preload cannot be selected if the configuration includes an NVIDIA GPU (ESXi preload cannot include the NVIDIA driver)

You can download supported VMware vSphere hypervisor images from the following web page and install it using the instructions provided:

https://vmware.lenovo.com/content/custom_iso/

Hyperconverged infrastructure support

Lenovo ThinkEdge systems can be used in hyperconverged solutions either as part of a Lenovo configured and optimized Lenovo ThinkAgile solution, or as a user-configured system.

Refer to the following links for full details.

VMware vSAN

SE450 supports vSAN OSA. For more information refer to this page:
[vSAN Original Storage Architecture \(OSA\)](#)

SE450 supports vSAN ESA. For more information refer to this page:
[vSAN Express Storage Architecture \(ESA\) ReadyNode Configurator](#)

Microsoft Azure Stack HCI

SE450 is the base hardware for the ThinkAgile MX450 Edge Integrated System. For more information refer to the product guide:

<https://lenovopress.lenovo.com/lp1875-thinkagile-mx450-edge-integrated-system>

SE450 supports Azure Stack HCI solution. For more information refer to the following Solution Brief:
<https://lenovopress.lenovo.com/lp1597-microsoft-azure-stack-hci-solutions-on-lenovo-thinkedge-se450-edge-servers>.

SE450 is listed in Microsoft Azure Stack HCI catalog. For more information refer to this page:
<https://azurestackhcisolutions.azure.microsoft.com/#/catalog/details/7e93eff8-2d45-492d-a180-bebc75f8fad3>

Physical and electrical specifications

The SE450 has the following overall physical dimensions, excluding components that extend outside the standard chassis, such as EIA flanges, front security bezel (if any), and power supply handles:

300mm chassis:

- Width: 445 mm (17.5 inches)
- Height: 87 mm (3.4 inches)
- Depth: 323 mm (12.7 inches)

360mm chassis:

- Width: 445 mm (17.5 inches)
- Height: 87 mm (3.4 inches)
- Depth: 383 mm (15.1 inches)

The following table lists the detailed dimensions.

For dimensions of the wall mount plate and the floor stand kit, see the following sections:

- [Floor stand](#)
- [Wall mount installation](#)

Table 59. Detailed dimensions

300mm chassis	360mm chassis	Description
481 mm	481 mm	X_a = Width, to the outsides of the front EIA flanges
435 mm	435 mm	X_b = Width, to the rack rail mating surfaces
445 mm	445 mm	X_c = Width, to the outer most chassis body feature
87 mm	87 mm	Y_a = Height, from the bottom of chassis to the top of the chassis
299 mm	359 mm	Z_a = Depth, from the rack flange mating surface to the rearmost I/O port surface
299 mm	359 mm	Z_b = Depth, from the rack flange mating surface to the rearmost feature of the chassis body
299 mm	359 mm	Z_c = Depth, from the rack flange mating surface to the rearmost feature
25 mm	25 mm	Z_d = Depth, from the forwardmost feature on front of EIA flange to the rack flange mating surface
109 mm	109 mm	Z_e = Depth, from the front of security bezel (if applicable) or forwardmost feature to the rack flange mating surface

The figure below shows the definition of each dimension.

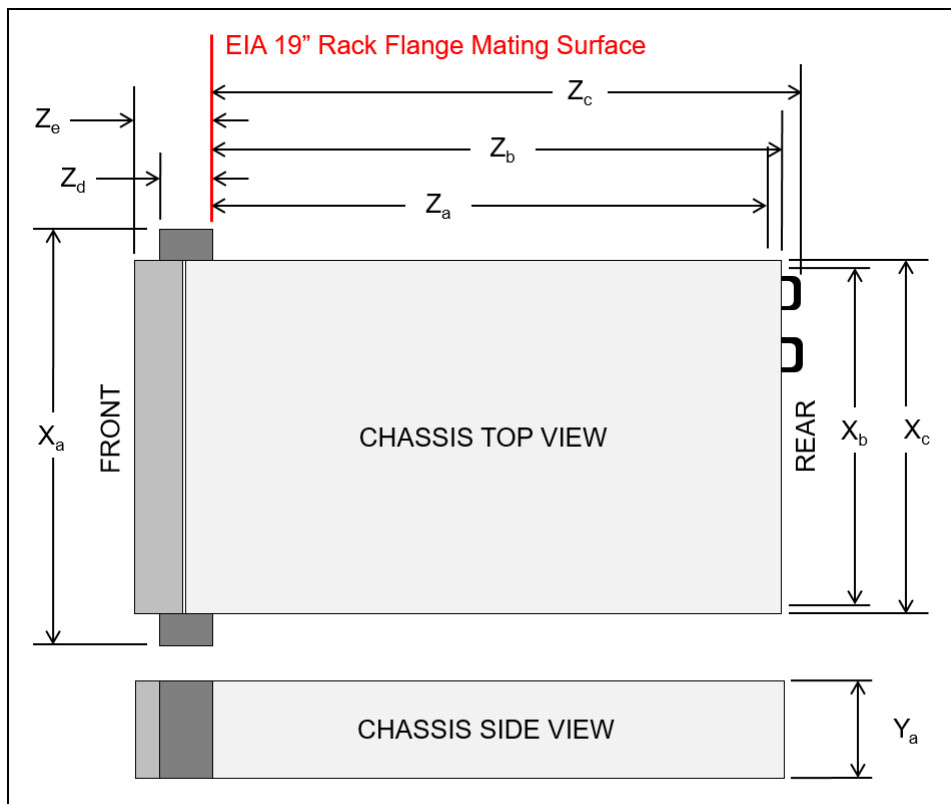


Figure 21. Server dimensions

The shipping (cardboard packaging) dimensions of the SE450 are as follows:

- Width: 586 mm (23.1 inches)
- Height: 257 mm (10.1 inches)
- Depth: 555 mm (21.9 inches)

The server has the following maximum weight:

- 300mm chassis: 14.8 kg (32.7 lb)
- 360mm chassis: 17.4 kg (38.4 lb)

Electrical specifications for AC input power supplies:

- Input voltage:
 - 100 to 127 (nominal) Vac, 50 Hz or 60 Hz
 - 200 to 240 (nominal) Vac, 50 Hz or 60 Hz
 - 240 Vdc (input range: 180-300 V dc) (China only)
- Inlet current:
 - 100-127 V:
 - 1100W power supply: 12 A*
 - 1800W power supply: Not supported
 - 200-240 V:
 - 1100W power supply: 6.0 A
 - 1800W power supply: 10 A

* In China, this power supply cannot exceed 10 A current.

Electrical specifications for DC input power supply:

- Input voltage: -44 to -54 Vdc
- Inlet current (1100W power supply): 26 A

Grounding cable

The SE450 includes two grounding lugs on the front of the server to enable the connection of a grounding cable. The table below lists the ordering information for the supported cable.

Field upgrade only: The Grounding Cable is only available as an option for field upgrades. Not available in CTO orders.

Table 60. Grounding cable

Part number	Feature code	Description	Maximum supported
4X97A84041	BMG0	ThinkEdge Grounding Cable with Lug (2500mm, 6 AWG)	1

The following figure shows the cable.

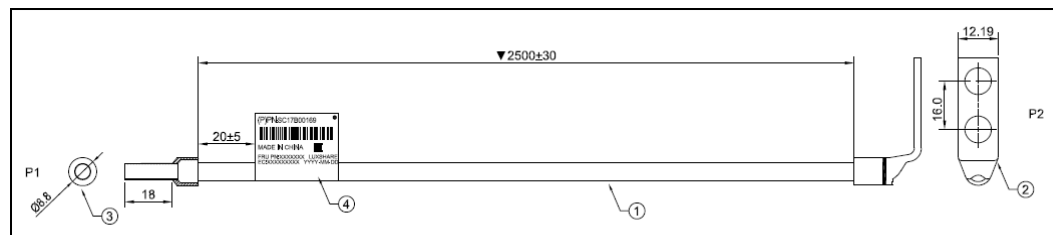


Figure 22. SE450 grounding cable

Operating environment

The SE450 server complies with ASHRAE Class A3 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A4 specifications.

Topics in this section:

- [Configuration requirements](#)
- [Temperature and humidity](#)
- [NEBS support](#)
- [Acoustical noise emissions](#)
- [Environment](#)
- [Shock and vibration](#)
- [Particulate contamination](#)
- [Dust filter](#)
- [Replacement port dust covers](#)
- [Coin battery](#)

Configuration requirements

Components installed in the SE450 have the following ambient temperature requirements:

- Keep the ambient temperature to 35°C or lower when:
 - One or more 2.5-inch U.3 7400 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed
 - One or more 2.5-inch U.3 7450 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed
- Keep the ambient temperature to 40°C or lower when:
 - NVIDIA A40 or L40 GPU is installed
 - One or more Persistent memory modules are installed
 - One of the following 2.5-inch drives is installed in Riser 2:
 - U.3 7400 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive
 - U.3 7450 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive
 - U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive
 - U.2 Multi Vendor 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive
 - The system comes in the following configuration:
 - 360mm chassis
 - Two risers installed with 0, 1, 2 or 3 half-length adapters installed
 - Eight 128GB DIMMs are installed

Note: When four half length adapters are installed in this configuration, ambient temperature requirement is 45°C or lower.

Temperature and humidity

The server is supported in the following environment:

- Air temperature:
 - Operating:
 - ASHRAE A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
 - ASHRAE A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft).
 - ASHRAE A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft).
 - Server off: -5°C to 55°C (23°F to 131°F)
 - Shipment/storage: -40°C to 70°C (-40°F to 158°F)
- Maximum altitude: 3,050 m (10,000 ft)

- Relative Humidity (non-condensing):
 - Operating
 - ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
 - ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F)
 - ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F)
 - Shipment/storage: 8% to 90%

NEBS support

The server supports NEBS Level 3:

- Operating temperature: 5°C to 40°C.
- High altitude operating temperature (1829m to 3960m, 6000ft to 13,000ft): 5°C to 35°C
- Short term operating temp*: -5°C to 55°C
- Humidity: 5% to 85% RH, Non-condensing.
- Maximum rate of change(°C /hr) should ≤ 20 Humidity transition rate should ≤10%/hr.

* Short-term conditions: A period of no more than 96 consecutive hours and a total of not more than 15 days in 1 year. A total of 360 hours in any given year, but no more than 15 occurrences during a 1-year period.

NEBS configuration supported:

- Chassis: 300mm chassis
- Processor: 28-core 165W with standard 2U heat sink
- Memory: 8x 64GB 3200MHz RDIMMs
- M.2: Two 480GB M.2 drives with SATA-RAID M.2 adapter
- Internal storage: 4x 960GB SATA drives
- PCIe adapters: Intel E810-DA2 (Slot 5), Intel ACC100 (Slot 3, 4, 6)
- No OCP
- 2x 1100W -48VDC power supplies

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound pressure level (L_{pAm}):
 - Idling: 43.3 dBA (Minimal), 47.4 dBA (Typical), 47.4 dBA (GPU rich)
 - Operating: 55.3 dBA (Minimal), 55.3 dBA (Typical), 65.2 dBA (GPU rich)

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- The declared acoustic sound levels are based on the following configurations, which may change depending on configuration/conditions
 - Minimal: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 4x 960G SATA SSD, 2x M.2 5300 480GB SATA, 2x Intel E810-DA2, 2 x 1100W PSU
 - Typical: 300mm Chassis, 185W/32 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 480GB SATA, 2x NVIDIA A2 16GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2x 1100W PSU
 - GPU rich: 360mm Chassis, 165W/28 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 480GB SATA, 2x NVIDIA A30 24GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2x 1800W PSU

Environment

The following table indicates what environmental conditions (ambient temperature) are supported with supported options.

Table 61. Drives support based on environmental selections (ambient temperature)

Part number	Description	5°C to 35°C	36°C to 40°C	41°C to 45°C
15mm NVMe SSD - Micron 7500				
4XB7A95054	ThinkSystem 2.5" U.3 7500 MAX 800GB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95049	ThinkSystem 2.5" U.3 7500 PRO 960GB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95055	ThinkSystem 2.5" U.3 7500 MAX 1.6TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95050	ThinkSystem 2.5" U.3 7500 PRO 1.92TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95056	ThinkSystem 2.5" U.3 7500 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95051	ThinkSystem 2.5" U.3 7500 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95057	ThinkSystem 2.5" U.3 7500 MAX 6.4TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95052	ThinkSystem 2.5" U.3 7500 PRO 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95058	ThinkSystem 2.5" U.3 7500 MAX 12.8TB Mixed Use NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A95053	ThinkSystem 2.5" U.3 7500 PRO 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
15mm NVMe SSD - Solidigm P5336				
4XB7A93075	ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes
4XB7A93076	ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD	Yes	Yes	Yes

Shock and vibration

The server has the following vibration and shock limits:

- Vibration:
 - Operating: 0.21 G rms at 5 Hz to 500 Hz for 15 minutes across 3 axes
 - Non-operating (in packaging): 1.04 G rms at 2 Hz to 200 Hz for 15 minutes across 6 surfaces
- Shock:
 - Operating: 15 G for 3 milliseconds in each direction (positive and negative X, Y, and Z axes)
 - Non-operating (12 kg to 23 kg, in packaging): 762mm drop height for 1 corner 3 edge 6 surface
- NEBS GR-63:
 - Office vibration: 0.21 G rms at 5 Hz to 100 Hz for 30 minutes across 3 axes
 - Earthquake test: GR63 earthquake zone 4

Particulate contamination

Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might damage the system that might cause the system to malfunction or stop working altogether.

The following specifications indicate the limits of particulates that the system can tolerate:

- Reactive gases:
 - The copper reactivity level shall be less than 200 Angstroms per month (Å/month)
 - The silver reactivity level shall be less than 200 Å/month
- Airborne particulates:
 - The deliquescent relative humidity of the particulate contamination should be more than 60% RH
 - Environment must be free of zinc whiskers

For additional information, see the Specifications section of the documentation for the server, available from the Lenovo Documents site, <https://pubs.lenovo.com/>

Dust filter

The SE450 supports the use of a dust filter which is installed inside the security bezel. The dust filter has a Minimum Efficiency Rating Value (MERV) of 2, per ASHRAE Standard 52.2-2017.

A single dust filter is included with the security bezel as described in the [Security](#) section.

Ordering information for additional dust filters is listed in the following table.

Table 62. Replacement dust filter

Part number	Description
4XF7A90166	ThinkEdge SE450 Bezel Dust Filter with Frame (dust filter)

The dust filter is installed inside the security bezel as shown in the following figure.

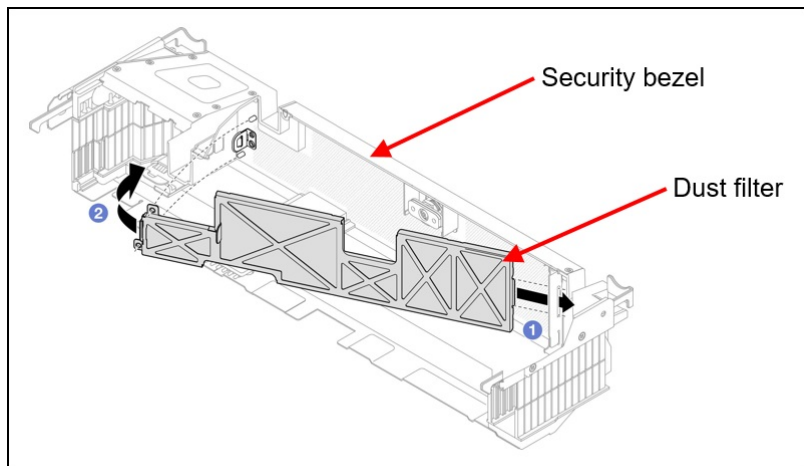


Figure 23. Dust filter

Replacement port dust covers

By default, the server includes dust covers for all front I/O ports, to reduce the impact of dust in your environment. If needed, you can order replacement covers. Ordering information is listed in the following table.

Table 63. Replacement port dust covers

Part number	Description	Contents
4XF7A95477	ThinkEdge SE450 Port Dust Cover Kit	<ul style="list-style-type: none">• 1x RJ-45 filler• 6x antenna port fillers• 2x antenna covers• 1x external diagnostic handset connector filler• 2x security bezel fillers• 3x USB Type-A fillers• 1x VGA cover

Coin battery

Ordering information for coin battery field upgrades are listed in the following table.

Tip: The server ships with the necessary coin batteries.

Table 64. Field upgrade options

Part number	Description
4X57A87776*	ThinkEdge CR2032 3V High Temperature (-40C to 125C) Coin Battery

* This option allows customers to stock additional batteries as spare parts should they be needed

Warranty upgrades and post-warranty support

The ThinkEdge SE450 has a 3-year warranty:

- 7D8T - 3 year warranty

Our global network of regional support centers offers consistent, local-language support enabling you to vary response times and level of service to match the criticality of your support needs:

- **Standard Next Business Day** – Best choice for non-essential systems requiring simple maintenance.
- **Premier Next Business Day** – Best choice for essential systems requiring technical expertise from senior-level Lenovo engineers.
- **Premier 24x7 4-Hour Response** – Best choice for systems where maximum uptime is critical.
- **Premier Enhanced Storage Support 24x7 4-Hour Response** – Best choice for storage systems where maximum uptime is critical.

For more information, consult the brochure [Lenovo Operational Support Services for Data Centers Services](#).

Services

Lenovo Data Center Services empower you at every stage of your IT lifecycle. From expert advisory and strategic planning to seamless deployment and ongoing support, we ensure your infrastructure is built for success. Our comprehensive services accelerate time to value, minimize downtime, and free your IT staff to focus on driving innovation and business growth.

Note: Some service options may not be available in all markets or regions. For more information, go to <https://lenovocator.com/>. For information about Lenovo service upgrade offerings that are available in your region, contact your local Lenovo sales representative or business partner.

In this section:

- [Lenovo Advisory Services](#)
- [Lenovo Plan & Design Services](#)
- [Lenovo Deployment, Migration, and Configuration Services](#)
- [Lenovo Support Services](#)
- [Lenovo Managed Services](#)
- [Lenovo Sustainability Services](#)

Lenovo Advisory Services

Lenovo Advisory Services simplify the planning process, enabling customers to build future-proofed strategies in as little as six weeks. Consultants provide guidance on projects including VM migration, storage, backup and recovery, and cost management to accelerate time to value, improve cost efficiency, and build a flexibly scalable foundation.

- **Assessment Services**

An Assessment helps solve your IT challenges through an onsite, multi-day session with a Lenovo technology expert. We perform a tools-based assessment which provides a comprehensive and thorough review of a company's environment and technology systems. In addition to the technology based functional requirements, the consultant also discusses and records the non-functional business requirements, challenges, and constraints. Assessments help organizations like yours, no matter how large or small, get a better return on your IT investment and overcome challenges in the ever-changing technology landscape.

- **Design Services**

Professional Services consultants perform infrastructure design and implementation planning to support your strategy. The high-level architectures provided by the assessment service are turned into low level designs and wiring diagrams, which are reviewed and approved prior to implementation. The implementation plan will demonstrate an outcome-based proposal to provide business capabilities through infrastructure with a risk-mitigated project plan.

Lenovo Plan & Design Services

Unlock faster time to market with our tailored, strategic design workshops to align solution approaches with your business goals and technical requirements. Leverage our deep solution expertise and end-to-end delivery partnership to meet your goals efficiently and effectively.

Lenovo Deployment, Migration, and Configuration Services

Optimize your IT operations by shifting labor-intensive functions to Lenovo's skilled technicians for seamless on-site or remote deployment, configuration, and migration. Enjoy peace of mind, faster time to value, and comprehensive knowledge sharing with your IT staff, backed by our best-practice methodology.

- **Deployment Services for Storage and ThinkAgile**

A comprehensive range of remote and onsite options tailored specifically for your business needs to ensure your storage and ThinkAgile hardware are fully operational from the start.

- **Hardware Installation Services**

A full-range, comprehensive setup for your hardware, including unpacking, inspecting, and positioning components to ensure your equipment is operational and error-free for the most seamless and efficient installation experience, so you can quickly benefit from your investments.

- **DM/DG File Migration Services**

Take the burden of file migration from your IT's shoulders. Our experts will align your requirements and business objectives to the migration plans while coordinating with your team to plan and safely execute the data migration to your storage platforms.

- **DM/DG/DE Health Check Services**

Our experts perform proactive checks of your Firmware and system health to ensure your machines are operating at peak and optimal efficiency to maximize up-time, avoid system failures, ensure the security of IT solutions and simplify maintenance.

- **Factory Integrated Services**

A suite of value-added offerings provided during the manufacturing phase of a server or storage system that reduces time to value. These services aim at improving your hardware deployment experience and enhance the quality of a standard configuration before it arrives at your facility.

Lenovo Support Services

In addition to response time options for hardware parts, repairs, and labor, Lenovo offers a wide array of additional support services to ensure your business is positioned for success and longevity. Our goal is to reduce your capital outlays, mitigate your IT risks, and accelerate your time to productivity.

- **Premier Support for Data Centers**

Your direct line to the solution that promises the best, most comprehensive level of support to help you fully unlock the potential of your data center.

- **Premier Enhanced Storage Support (PESS)**

Gain all the benefits of Premier Support for Data Centers, adding dedicated storage specialists and resources to elevate your storage support experience to the next level.

- **Committed Service Repair (CSR)**

Our commitment to ensuring the fastest, most seamless resolution times for mission-critical systems that require immediate attention to ensure minimal downtime and risk for your business. This service is only available for machines under the Premier 4-Hour Response SLA.

- **Multivendor Support Services (MVS)**

Your single point of accountability for resolution support across vast range of leading Server, Storage, and Networking OEMs, allowing you to manage all your supported infrastructure devices seamlessly from a single source.

- **Keep Your Drive (KYD)**

Protect sensitive data and maintain compliance with corporate retention and disposal policies to ensure your data is always under your control, regardless of the number of drives that are installed in your Lenovo server.

- **Technical Account Manager (TAM)**

Your single point of contact to expedite service requests, provide status updates, and furnish reports to track incidents over time, ensuring smooth operations and optimized performance as your business grows.

- **Enterprise Software Support (ESS)**

Gain comprehensive, single-source, and global support for a wide range of server operating systems and Microsoft server applications.

For more information, consult the brochure [Lenovo Operational Support Services for Data Centers](#).

Lenovo Managed Services

Achieve peak efficiency, high security, and minimal disruption with Lenovo's always-on Managed Services. Our real-time monitoring, 24x7 incident response, and problem resolution ensure your infrastructure operates seamlessly. With quarterly health checks for ongoing optimization and innovation, Lenovo's remote active monitoring boosts end-user experience and productivity by keeping your data center's hardware performing at its best.

Lenovo Managed Services provides continuous 24x7 remote monitoring (plus 24x7 call center availability) and proactive management of your data center using state-of-the-art tools, systems, and practices by a team of highly skilled and experienced Lenovo services professionals.

Quarterly reviews check error logs, verify firmware & OS device driver levels, and software as needed. We'll also maintain records of latest patches, critical updates, and firmware levels, to ensure your systems are providing business value through optimized performance.

Lenovo Sustainability Services

- **Asset Recovery Services**

Lenovo Asset Recovery Services (ARS) provides a secure, seamless solution for managing end-of-life IT assets, ensuring data is safely sanitized while contributing to a more circular IT lifecycle. By maximizing the reuse or responsible recycling of devices, ARS helps businesses meet sustainability goals while recovering potential value from their retired equipment. For more information, see the [Asset Recovery Services offering page](#).

- **CO2 Offset Services**

Lenovo's CO2 Offset Services offer a simple and transparent way for businesses to take tangible action on their IT footprint. By integrating CO2 offsets directly into device purchases, customers can easily support verified climate projects and track their contributions, making meaningful progress toward their sustainability goals without added complexity.

- **Lenovo Certified Refurbished**

Lenovo Certified Refurbished offers a cost-effective way to support IT circularity without compromising on quality and performance. Each device undergoes rigorous testing and certification, ensuring reliable performance and extending its lifecycle. With Lenovo's trusted certification, you gain peace of mind while making a more sustainable IT choice.

Lenovo TruScale

Lenovo TruScale XaaS is your set of flexible IT services that makes everything easier. Streamline IT procurement, simplify infrastructure and device management, and pay only for what you use – so your business is free to grow and go anywhere.

Lenovo TruScale is the unified solution that gives you simplified access to:

- The industry's broadest portfolio – from pocket to cloud – all delivered as a service
- A single-contract framework for full visibility and accountability
- The global scale to rapidly and securely build teams from anywhere
- Flexible fixed and metered pay-as-you-go models with minimal upfront cost
- The growth-driving combination of hardware, software, infrastructure, and solutions – all from one single provider with one point of accountability.

For information about Lenovo TruScale offerings that are available in your region, contact your local Lenovo sales representative or business partner.

Regulatory compliance

The SE450 conforms to the following standards:

- ANSI/UL62368-1
- IEC 62368-1 (CB Certificate and CB Test Report)
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 7, Class A
- CSA C22.2 No. 62368-1
- CISPR 32, Class A, CISPR 35
- Argentina IEC 62368-1: 2018
- Japan VCCI, Class A
- Taiwan BSMI CNS15936, Class A; CNS15598-1; Section 5 of CNS15663
- CE, UKCA Mark (EN55032 Class A, EN62368-1, EN55024, EN55035, EN61000-3-2, EN61000-3-3, (EU) 2019/424, and EN IEC 63000 (RoHS))
- Korea KN32, Class A, KN35
- Russia, Belorussia and Kazakhstan, TP EAC 037/2016 (for RoHS)
- Russia, Belorussia and Kazakhstan, EAC: TP TC 004/2011 (for Safety); TP TC 020/2011 (for EMC)
- EAC Russia, Belorussia and Kazakhstan, TR CU 020/2011 and TR CU 004/2011
- Australia/New Zealand AS/NZS CISPR 32, Class A; AS/NZS 62368.1
- UL Green Guard, UL2819
- [Energy Star 4.0](#)
- EPEAT (NSF/ ANSI 426) Bronze
- China CCC certificate, GB17625.1; GB4943.1; GB/T9254.1
- China CECP certificate, CQC3135
- China CELP certificate, HJ 2507-2011
- Japanese Energy-Saving Act
- Mexico NOM-019
- TUV-GS (EN62368-1, and EK1-ITB2000)
- India BIS 13252 (Part 1)
- Germany GS
- Brazil INMETRO
- South Africa NRCS LOA
- Ukraine UkrCEPRO
- Morocco CMIM Certification (CM)
- EU2019/424 Energy Related Product (ErP Lot9)
- NEBS 3

Uninterruptible power supply units

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

Table 65. Uninterruptible power supply units

Part number	Description
Rack-mounted or tower UPS units - 100-125VAC	
7DD5A001WW	RT1.5kVA 2U Rack or Tower UPS-G2 (100-125VAC)
7DD5A003WW	RT3kVA 2U Rack or Tower UPS-G2 (100-125VAC)
Rack-mounted or tower UPS units - 200-240VAC	
7DD5A002WW	RT1.5kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A005WW	RT3kVA 2U Rack or Tower UPS-G2 (200-240VAC)
7DD5A007WW	RT5kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A008WW	RT6kVA 3U Rack or Tower UPS-G2 (200-240VAC)
7DD5A00AWW	RT11kVA 6U Rack or Tower UPS-G2 (200-240VAC)

† Only available in China and the Asia Pacific market.

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

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

Power distribution units

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

Table 66. Power distribution units

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
0U Basic PDUs															
4PU7A93176	C0QH	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93169	C0DA	0U 36 C13 and 6 C19 Basic 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93177	C0QJ	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93170	C0D9	0U 24 C13/C15 and 24 C13/C15/C19 Basic 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
0U Switched and Monitored PDUs															
4PU7A93181	C0QN	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU v2 (60A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93174	C0D5	0U 21 C13/C15 and 21 C13/C15/C19 Switched and Monitored 48A 3 Phase Delta PDU (60A derated)	N	Y	N	Y	N	N	Y	Y	N	N	N	Y	N
4PU7A93178	C0QK	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93171	C0D8	0U 20 C13 and 4 C19 Switched and Monitored 32A 1 Phase PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93182	C0QP	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93175	C0CS	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 63A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93180	C0QM	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU v2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A93173	C0D6	0U 18 C13/C15 and 18 C13/C15/C19 Switched and Monitored 32A 3 Phase WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
4PU7A93179	C0QL	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU v2 (30A derated)	N	Y	N	N	N	N	N	Y	N	Y	N	Y	N
4PU7A93172	C0D7	0U 16 C13/C15 and 16 C13/C15/C19 Switched and Monitored 24A 1 Phase PDU(30A derated)	N	Y	N	Y	N	N	Y	Y	N	N	N	Y	N
1U Switched and Monitored PDUs															
4PU7A90808	C0D4	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 ETL	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A81117	BNDV	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - ETL	N	N	N	N	N	N	N	N	N	N	N	Y	N
4PU7A90809	C0DE	1U 18 C19/C13 Switched and monitored 48A 3P WYE PDU V2 CE	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A81118	BNDW	1U 18 C19/C13 switched and monitored 48A 3P WYE PDU - CE	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
4PU7A90810	C0DD	1U 18 C19/C13 Switched and monitored 80A 3P Delta PDU V2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A77467	BLC4	1U 18 C19/C13 Switched and Monitored 80A 3P Delta PDU	N	N	N	N	N	N	N	N	N	Y	N	Y	N
4PU7A90811	C0DC	1U 12 C19/C13 Switched and monitored 32A 3P WYE PDU V2	N	N	N	N	N	Y	Y	N	N	N	N	N	N
4PU7A77468	BLC5	1U 12 C19/C13 switched and monitored 32A 3P WYE PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
4PU7A90812	C0DB	1U 12 C19/C13 Switched and monitored 60A 3P Delta PDU V2	N	N	N	N	N	N	N	N	N	Y	N	N	N
4PU7A77469	BLC6	1U 12 C19/C13 switched and monitored 60A 3P Delta PDU	N	N	N	N	N	N	N	N	N	N	N	Y	N
1U Ultra Density Enterprise PDUs (9x IEC 320 C13 + 3x IEC 320 C19 outlets)															
71763NU	6051	Ultra Density Enterprise C19/C13 PDU 60A/208V/3PH	N	N	Y	N	N	N	N	N	N	Y	Y	Y	N
71762NX	6091	Ultra Density Enterprise C19/C13 PDU Module	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U C13 Enterprise PDUs (12x IEC 320 C13 outlets)															
39Y8941	6010	DPI C13 Enterprise PDU Module (WW)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U Front-end PDUs (3x IEC 320 C19 outlets)															
39Y8938	6002	DPI Single-phase 30A/120V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8939	6003	DPI Single-phase 30A/208V Front-end PDU (US)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8934	6005	DPI Single-phase 32A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
39Y8940	6004	DPI Single-phase 60A/208V Front-end PDU (US)	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N
39Y8935	6006	DPI Single-phase 63A/230V Front-end PDU (International)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
1U NEMA PDUs (6x NEMA 5-15R outlets)															
39Y8905	5900	DPI 100-127V NEMA PDU	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Line cords for 1U PDUs that ship without a line cord															
40K9611	6504	4.3m, 32A/380-415V, EPDU/IEC 309 3P+N+G 3ph wye (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9612	6502	4.3m, 32A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9613	6503	4.3m, 63A/230V, EPDU to IEC 309 P+N+G (non-US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9614	6500	4.3m, 30A/208V, EPDU to NEMA L6-30P (US) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
40K9615	6501	4.3m, 60A/208V, EPDU to IEC 309 2P+G (US) Line Cord	N	N	Y	N	N	N	Y	N	N	Y	Y	Y	N
40K9617	6505	4.3m, 32A/230V, Souriau UTG Female to AS/NZ 3112 (Aus/NZ) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part number	Feature code	Description	ANZ	ASEAN	Brazil	EET	MEA	RUCIS	WE	HTK	INDIA	JAPAN	LA	NA	PRC
40K9618	6506	4.3m, 32A/250V, Souriau UTG Female to KSC 8305 (S. Korea) Line Cord	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

For more information, see the Lenovo Press documents in the PDU category:

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

Rack cabinets

The following table lists the supported Lenovo rack cabinets. The 300mm and 360mm SE450 chassis are both supported, with and without the security bezel.

Table 67. Supported Lenovo rack cabinets

MTM	Description	Qty of SE450	Comment
9363-4PX, 4EX, RC4, LC4	42U 1100mm Enterprise V2 Dynamic Rack	21	Require Extension kit (L1 00YE457) and Rail kit (SBB7A50505)
1410-PRB, ERB, HPB, HEB1	Intelligent Cluster 42U 1100mm Enterprise V2 Rack Family	21	Require Extension kit (L1 00YE457) and Rail kit (SBB7A50505)
9307-4RX	S2 42U Static Standard Rack (1000mm depth)	21	The front door may need to be removed to support some cabling configurations of the SE450
9307-2RX	S2 25U Dynamic Standard Rack (1000mm depth)	12	The front door may need to be removed to support some cabling configurations of the SE450

For information about these rack cabinets, see the Lenovo Rack Cabinet Reference:

<https://lenovopress.com/lp1287-lenovo-rack-cabinet-reference>

The SE450 is also supported in 3rd-party rack cabinets, as listed in the following table. Note that some of mounting position may interfere with the front door latch of the cabinet.

Table 68. Third-party rack cabinets

Rack cabinet:	nVent 600mm rack	2 post rack	Delta racks**	Barcelona 550mm
Rail kit:	600mm rail kit	2-post rail kit	600mm rail kit	550mm rail kit
300mm chassis	Supported	Supported	Supported	Supported†
300mm chassis+Bezel	Supported	Supported	Supported	No
360mm chassis	Supported	Supported	Supported	No
360mm chassis+Bezel	Supported*	Supported	No	No

* For use in the nVent 600mm rack cabinet, you may need to adjust the placement of the front posts of the cabinet

† Security bezel not supported in Barcelona 550mm rack

** Supported Delta racks are the following:

- Delta Type 3798100778 ODPS 3000-48-5 1.8M HVA/C 3/1 PH ES.
- Delta Type 3799515500 ODPS 2900-48-3 1.8M HVA/C [VF ES]
- Delta Type 3798100727 ODPS 3000-48-5 1.5M HVA/C 3/1 PH ES

For more information about rail kits, see the [Rack installation](#) section.

KVM console options

The following table lists the supported KVM consoles.

Table 69. KVM console

Part number	Description
4XF7A84188	ThinkSystem 18.5" LCD Console (with US English keyboard)

The following table lists the available KVM switches and the options that are supported with them.

Table 71. KVM switches and options

Part number	Description
KVM Console switches	
1754D1X	Global 2x2x16 Console Manager (GCM16)
1754A2X	Local 2x16 Console Manager (LCM16)
1754A1X	Local 1x8 Console Manager (LCM8)
Cables for GCM and LCM Console switches	
46M5383	Virtual Media Conversion Option Gen2 (VCO2)
46M5382	Serial Conversion Option (SCO)

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

Lenovo Financial Services

Why wait to obtain the technology you need now? No payments for 90 days and predictable, low monthly payments make it easy to budget for your Lenovo solution.

- **Flexible**

Our in-depth knowledge of the products, services and various market segments allows us to offer greater flexibility in structures, documentation and end of lease options.

- **100% Solution Financing**

Financing your entire solution including hardware, software, and services, ensures more predictability in your project planning with fixed, manageable payments and low monthly payments.

- **Device as a Service (DaaS)**

Leverage latest technology to advance your business. Customized solutions aligned to your needs. Flexibility to add equipment to support growth. Protect your technology with Lenovo's Premier Support service.

- **24/7 Asset management**

Manage your financed solutions with electronic access to your lease documents, payment histories, invoices and asset information.

- **Fair Market Value (FMV) and \$1 Purchase Option Leases**

Maximize your purchasing power with our lowest cost option. An FMV lease offers lower monthly payments than loans or lease-to-own financing. Think of an FMV lease as a rental. You have the flexibility at the end of the lease term to return the equipment, continue leasing it, or purchase it for the fair market value. In a \$1 Out Purchase Option lease, you own the equipment. It is a good option when you are confident you will use the equipment for an extended period beyond the finance term. Both lease types have merits depending on your needs. We can help you determine which option will best meet your technological and budgetary goals.

Ask your Lenovo Financial Services representative about this promotion and how to submit a credit application. For the majority of credit applicants, we have enough information to deliver an instant decision and send a notification within minutes.

Seller training courses

The following sales training courses are offered for employees and partners (login required). Courses are listed in date order.

1. **Think AI Weekly: Lenovo Solution for Smart Manufacturing at the Edge**

2024-11-04 | 60 minutes | Employees Only

Join Dr. Marcelo Parada and Chris Laffey as they introduce the Lenovo Validated Design for Smart Manufacturing.

- Components of the solution
- Solving for the manufacturing process
- Benefits for the customer

Published: 2024-11-04

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DTAIW124

2. **Partner Technical Webinar - SE350 Migration Strategy**

2024-11-04 | 60 minutes | Employees and Partners

In this 60-minute webinar Chris Laffy, our Senior Product Line Manager, shares his extensive insights and ideas on migration strategies from the original SE350 to its successors.

Published: 2024-11-04

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: 102524

3. **VTT: Edge - Solution Design for Smart Manufacturing at the Edge October 2024**

2024-10-15 | 60 minutes | Employees Only

Lenovo continues to innovate at the Edge! Join Dr. Marcelo Parada as he discusses the solution design for Smart Manufacturing developed by Lenovo Research and Development in Brazil. In this solution preview Marcelo will cover the AI/Edge architecture designs to enhance manufacturing processes and resolve challenges for tasks such as automated memory and CPU insertion, and automated quality inspection. Topics to include:

- Components of the solution
- Design considerations and schematics
- Infrastructure Platform and Tools Overview
- Benefits to the manufacturing process

Published: 2024-10-15

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG216

4. **VTT: Edge - The SE350 EOL is Coming, Prepare Yourself and Your Customer September 2024**

2024-09-10 | 60 minutes | Employees Only

As of March 2025, the Lenovo ThinkEdge SE350 will be EOL. Join Geoff Hunt and Chris Laffey as they discuss how to help your ThinkEdge SE350 customers transition to other offerings, with a special focus on ThinkEdge SE350 V2 and SE360 V2. Topics will include:

- Positioning the SE350 V2 and SE360 V2 as alternates for the EOL SE350
- A technical view of the generational differences

Published: 2024-09-10

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG215

5. **Think AI Weekly: Lenovo Validated Design for Public Safety and Security Edge AI**
2024-09-05 | 60 minutes | Employees Only

In this session a panel from the Lenovo ISG/IDG ThinkEdge Team discuss vertical solutions enabled by edge computing. Alejandro Perez, Trent Richardson, and Chris Arenas focus on the Lenovo Validated Design for Public Safety and Security while reviewing the process and importance of Lenovo Validated Designs for the Edge

Published: 2024-09-05
Length: 60 minutes

Start the training:
Employee link: [Grow@Lenovo](#)

Course code: DTAIW117

6. **VTT Edge: Lenovo Validated Design for Public Safety and Security Edge & AI July 2024**
2024-08-05 | 60 minutes | Employees Only

The Lenovo ThinkEdge Team is collaborating with eco-system partners to design and validate Edge AI solutions across verticals. Join this session to learn about these efforts and the architecture of the first Lenovo Validated Design for Public Sector Safety and Security. The session will cover the following topics:

- Overview of the Lenovo Validated Designs (LVD) for Vertical Edge
- Public Sector Safety and Security LVD
- Business Key drivers and solution benefits
- Architecture and Technology Overview
- Relevant use cases
- Components and sizing details
- Validation results and pricing model

Published: 2024-08-05
Length: 60 minutes

Start the training:
Employee link: [Grow@Lenovo](#)

Course code: DVEDG214

7. **Partner Technical Webinar - ThinkEdge Portfolio**
2024-08-02 | 60 minutes | Employees and Partners

July 26, 2024 - Lenovo SA's (Alex Docherty, Marcus White, and Eugene Grandberry) discuss strategy around the Thinkedge Portfolio.

Published: 2024-08-02
Length: 60 minutes

Start the training:
Employee link: [Grow@Lenovo](#)
Partner link: [Lenovo Partner Learning](#)

Course code: 072624

8. **VTT Edge: Lenovo Customer Solution for ENOC Filling Stations and Retail June 2024**
2024-06-10 | 45 minutes | Employees Only

Join Massimo (Max) Angelucci, Lenovo Solution Architect, and Abdlkareem (AK) Alhawajreh, Lenovo Client Account Manager, as they discuss the journey of the sale, the customer business, and their challenges. They cover the considerations and decision points when architecting the solution and why the customer chose Lenovo Edge.

Published: 2024-06-10
Length: 45 minutes

Start the training:
Employee link: [Grow@Lenovo](#)

Course code: DVEDG213

9. **Lenovo Data Center Product Portfolio**
2024-05-29 | 20 minutes | Employees and Partners

This course introduces the Lenovo data center portfolio, and covers servers, storage, storage networking, and software-defined infrastructure products. After completing this course about Lenovo data center products, you will be able to identify product types within each data center family, describe Lenovo innovations that this product family or category uses, and recognize when a specific product should be selected.

Published: 2024-05-29
Length: 20 minutes

Start the training:
Employee link: [Grow@Lenovo](#)
Partner link: [Lenovo Partner Learning](#)

Course code: SXXW1110r7

10. **Think AI Weekly: School Safety at the Edge**
2024-05-13 | 60 minutes | Employees Only

Join Alejandro Perez, ISG/IDG Edge Business Development, Allen Holmes with ISG AI Business Development, and Lauren Allen ISG/IDG Go To Market Strategist as they discuss school security, AI computer vision and Lenovo ThinkEdge School solutions.

- AI solution capabilities for campus safety
- Safety solutions with ThinkEdge SE70 and SE450
- Walkthrough of La Jolla and other use cases

Published: 2024-05-13
Length: 60 minutes

Start the training:
Employee link: [Grow@Lenovo](#)

Course code: DTAIW103

11. **VTT: HCI at the Edge and Dick's Sporting Goods_May 2024**

2024-05-08 | 60 minutes | Employees Only

Join Adam Mandlebloom, ISG SDI Technical Product Manager, and Bryan Maskrey, ISG Technical Sales, as they explore Lenovo HCI solutions at the Edge and how one such solution is being positioned to resolve business challenges at a national retail company, Dick's Sporting Goods. Topics covered will include

- Hyperconverged Edge to Cloud today, and looking forward
- ThinkAgile for AI/ML - Cost effective GPU utilization
- Local Cluster Management integration
- Decision points and architecting the solution for Dick's Sporting Goods

Published: 2024-05-08

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG212

12. **VTT: Management of Low-End Edge - March 2024**

2024-03-13 | 64 minutes | Employees Only

XClarity Orchestrator supports the management of both ISG XCC-based servers and IDG low-end edge devices. This session will cover the architecture of the current solution, along with a demo. In addition, a proposed new architecture for future support of low-end edge devices will be covered

Published: 2024-03-13

Length: 64 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVSYS207

13. **Business Problems Addressed with Lenovo Data & Analytics Solutions**

2024-01-31 | 20 minutes | Employees and Partners

Data is the quantities, characters, or symbols on which operations are performed by a computer, which is then stored and transmitted in the form of electrical signals and recorded on magnetic, optical, solid state, or mechanical recording media. All different types of organizations rely more and more on their data to gain valuable insights and improve their business. As expected, they will have challenges with gaining this insight. In this course we will discuss those challenges and problems our customers face and describe how Lenovo Data and Analytics Solutions can help customers solve each problem.

After completing this training, you will be able to define the following common problems for databases and big data and describe how Lenovo can help customers solve each problem: scalability, management, performance, protection, security, knowledge/skill, and technology evolution.

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Published: 2024-01-31

Length: 20 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: DSOLP200

14. **Family Introduction: Edge Servers**

2024-01-22 | 18 minutes | Employees and Partners

This course introduces the concept of edge servers. Edge servers are used at the edge of an IoT environment, where they perform pre-processing of data, and data forwarding to core environments.

Course Objectives:

- Describe the Internet of Things (IoT)
- Define an edge server
- Discuss edge server features

Published: 2024-01-22

Length: 18 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW1105

15. **Partner Technical Webinar - Tech World 23 Review**

2023-12-22 | 60 minutes | Employees and Partners

In this 60-minute replay, Kenny James, Lenovo Channel Sales Engineering Director, joined us to give a Channel CTO's perspective on this year's Tech World 2023 conference where the theme was AI for All.

Published: 2023-12-22

Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: 121523

16. **Basics of the Edge Ecosystem for Sellers**
2023-12-15 | 20 minutes | Employees and Partners

The purpose of this learning module is to familiarize Lenovo field sales, inside sales and partners with the Edge ecosystem and how Lenovo fits into the Edge space.

- Explain the basics of an Edge Ecosystem
- Articulate the inherent challenges of Edge Computing
- Present how Lenovo fits in the Edge Ecosystem

Published: 2023-12-15
Length: 20 minutes

Start the training:

Employee link: Grow@Lenovo
Partner link: [Lenovo Partner Learning](#)

Course code: DTEF101

17. **The 10-minute Edge conversation for Lenovo Sellers**
2023-12-14 | 20 minutes | Employees and Partners

The purpose of this course is to enable sellers to have a 10 to 15-minute customer conversation addressing the relevancy of Edge solutions to the customer business.

Learning Objectives:

- Prepare for the initial customer conversation
- Hold a 10-minute Edge Operational Technology (OT) conversation
- Take the appropriate steps to progress the sale

Published: 2023-12-14
Length: 20 minutes

Start the training:

Employee link: Grow@Lenovo
Partner link: [Lenovo Partner Learning](#)

Course code: DTEF103

18. **Intel and Lenovo Bringing AI Everywhere**
2023-12-13 | 50 minutes | Employees Only

Join Patrick Cassleman of Intel as he discusses how Lenovo and Intel can partner to help customers develop and deploy sustainable AI hardware and software from the edge to the cloud. Patrick will discuss Intel's full AI portfolio, plus available features and tools to help your customers attain sustainable AI.

Published: 2023-12-13
Length: 50 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG209

19. **VTT: Lenovo in the Era of the Edge-June 2023**
2023-12-04 | 60 minutes | Employees and Partners

Join Richard Jenkins from the Lenovo Edge Computing Business Development group as he discusses how Lenovo fits in the era of the Edge. Topics covered in this VTT session include:

- customer use cases at the Edge
- the needed consortium to build an Edge Solution
- Lenovo edge portfolio
- The advantages of LOC-A and XClarity at the Edge

Published: 2023-12-04
Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo
Partner link: [Lenovo Partner Learning](#)

Course code: DVEDG201

20. **VTT: Edge Product Innovation, ISVs, and Market trends - AP & PRC, Oct. 2023**
2023-10-12 | 60 minutes | Employees Only

Join Richard Jenkins from the AP Edge solutions group as he discusses the difference between Industrial Internet of things (IoT) and Operational Technology (OT). Richard takes a look at how both are relevant to combining edge servers with hybrid cloud architecture. Topics include:

- Integration of ISV Concepts
- Edge serving clusters and megaclusters
- Container designs for SE10, SE30 & SE50

Published: 2023-10-12
Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG206

21. **VTT: Edge Product Innovation, ISVs, and Market trends - EMEA, LA & NA, Oct. 2023**
2023-10-11 | 60 minutes | Employees Only

Join Per Ljungstrom and Anthony Sayers as they discuss the difference between Industrial Internet of things (IoT) and Operational Technology (OT). They look at how both are relevant to combining edge servers with hybrid cloud architecture. Topics include:

- Integration of ISV Concepts
- Edge serving clusters and megaclusters
- Container designs for SE10, SE30 & SE50

Published: 2023-10-11
Length: 60 minutes

Start the training:

Employee link: Grow@Lenovo

Course code: DVEDG205

22. **Intro to Edge: 3Ws of Edge Computing for Lenovo Sellers**

2023-09-14 | 13 minutes | Employees and Partners

This course provides fundamental concepts and a learning foundation for those who are new to the data center and to computing at the Edge. It defines where is the Edge, identifies what are the business drivers for edge computing, and discusses why is edge computing important to Lenovo. September 2023

Published: 2023-09-14

Length: 13 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DTEF100

23. **Lenovo Solutions for the Edge - Who Are the Customers?**

2023-09-14 | 25 minutes | Employees and Partners

This course is focused on enabling sellers to identify opportunities for Lenovo Edge and Edge AI Solutions. Topics include a general overview of the Lenovo Edge portfolio and recognizing how edge computing can benefit customers.

Course Objectives:

- Identify Lenovo Edge Opportunities
- Recognize how an Edge solution would benefit your customer
- Provide a general overview of Lenovo solutions at the Edge
- Identify key points for your customer Edge conversation

Published: 2023-09-14

Length: 25 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DTEF102

24. **Family Portfolio: Edge**

2023-09-12 | 15 minutes | Employees and Partners

This course introduces edge environments, and the roles played by Lenovo edge servers and edge clients in those environments. It looks briefly at use cases for these edge devices.

When you have completed this course, you should be able to list the edge solutions in the Lenovo portfolio, describe the features of each solution, and determine which solution is best suited to a specific environment.

Published: 2023-09-12

Length: 15 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW2513r2

25. **VTT: VMware Edge Compute Stack, August 2023**

2023-08-17 | 60 minutes | Employees Only

Edge Compute drives business transformation in sectors like retail, manufacturing & utilities. It intersects with IoT sensors, robotics & AI, and supports use cases requiring computing closer to operations. Implementing Edge Compute at scale requires a platform supporting verticalized applications, manageability, reliability & security. Join Josh David from VMware and Alejandro Perez from Lenovo as they discuss how the VMware Edge Stack enables real-time intelligence & immersive experiences at the Edge.

Published: 2023-08-17

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVEDG203

26. **VTT: SAP HANA Transition and Refresh Opportunity - July 2023**

2023-07-14 | 60 minutes | Employees Only

In this session, we cover:

- What Next for SAP Clients?
- Lenovo Opportunity
- Lenovo Portfolio for SAP Solutions
- RISE with SAP

Published: 2023-07-14

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DVDAT202

27. **Lenovo XClarity Management Hub for Edge Server Devices**

2023-06-08 | 50 minutes | Employees and Partners

This course offers a comprehensive overview and demonstration of the enhanced capability to manage ThinkEdge Server Devices through Lenovo XClarity Management Hub in Lenovo XClarity Orchestrator (LXCO).

Published: 2023-06-08

Length: 50 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DXCO201

28. **Lenovo XClarity Management Hub for Edge Client Devices**

2023-06-08 | 50 minutes | Employees and Partners

This course offers a comprehensive overview and demonstration of the enhanced capability to manage ThinkEdge Client Devices through Lenovo XClarity Management Hub in Lenovo XClarity Orchestrator (LXCO).

Published: 2023-06-08

Length: 50 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DXCO202

29. **Family Portfolio: Intel Edge Servers**

2023-06-07 | 15 minutes | Employees and Partners

This course introduces two new Lenovo ThinkEdge servers: the ThinkEdge SE350 V2 and ThinkEdge SE360 V2.

After completing this course, you will be able to list the Intel edge servers in the Lenovo portfolio, describe the features of each server and determine which server is best suited to a specific environment.

Published: 2023-06-07

Length: 15 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW2510r2

30. **Partner Technical Webinar - Smart Cities with ThinkEdge**

2022-12-13 | 60 minutes | Partners Only

In this 60-minute replay, Alejandro Perez, Lenovo Americas Edge Solutions Leader, discussed the Edge applications of Smart Cities, specifically the City of Barcelona. Alejandro reviewed the key uses of the solution and the underlying architecture including the Lenovo SE350, SE450 and Lenovo Open Cloud Automation software.

Published: 2022-12-13

Length: 60 minutes

Start the training:

Partner link: [Lenovo Partner Learning](#)

Course code: 120922

31. **Technical Champions Webinar: Edge Computing Enables New Possibilities**

2022-12-09 | 64 minutes | Employees Only

The Lenovo launch of both ThinkEdge SE350 and SE450 helps to resolve edge computing requirements and enables new possibilities for a variety of verticals. Join Aaron Shao, Lenovo Edge Product Manager, as he discusses the big picture of edge computing and positioning of the Lenovo ThinkEdge portfolio. Aaron will take a deep dive into the latest news from the most GPU rich edge server in the industry, the Lenovo ThinkEdge SE450. Two outstanding customer stories and their application of Edge computing will also be featured as well.

Published: 2022-12-09

Length: 64 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Course code: DTEO101

32. **Family Portfolio: Edge Solutions**

2022-12-06 | 10 minutes | Employees and Partners

This course describes the Lenovo edge solutions. Edge servers, such as the Lenovo ThinkSystem SE350 and ThinkEdge SE450, are used at the edge of an IoT environment, and may be part of an edge solution. Solutions such as those using software from Scale Computing typically use more traditional Lenovo servers.

After completing this course, you will be able to list the edge solutions in the Lenovo portfolio, describe the features of each solution and determine which solution is best suited to a specific environment.

Published: 2022-12-06

Length: 10 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW1108r4

33. **Technical Champions Webinar: Lenovo Edge Solutions: Unleash the Power of AI Solutions at the Edge**

2022-10-13 | 60 minutes | Employees and Partners

View this Technical Champions Webinar (recorded October 10, 2022) to learn about Lenovo's Edge solutions. Join Alejandro Perez Quintero as he discusses the elements of Edge computing, the growth of the Edge and the connection with AI.

This webinar covers:

- Drivers for Edge Technology
- Lenovo Edge Solutions
- Customer use cases

Published: 2022-10-13

Length: 60 minutes

Start the training:

Employee link: [Grow@Lenovo](#)

Partner link: [Lenovo Partner Learning](#)

Course code: DEDGP100

34. **Partner Technical Webinar - SE450 Overview**

2022-04-11 | 60 minutes | Partners Only

In this 60-minute replay, Benoit Robert of Lenovo Edge Computing, presented a detailed description of the new ThinkEdge SE450 Edge Server. He compared it to the SE350 and described several customer use cases of the SE450.

Published: 2022-04-11

Length: 60 minutes

Start the training:

Partner link: [Lenovo Partner Learning](#)

Course code: 040822

35. **Family Portfolio Edge Solutions - SE450 Quick Hit - Video**

2022-02-11 | 3 minutes | Employees and Partners

This video Quick Hit introduces the Lenovo ThinkEdge SE450, an edge server ideally suited to AI at the edge because of its processing power and support for GPUs.

Published: 2022-02-11

Length: 3 minutes

Start the training:

Employee link: Grow@Lenovo

Partner link: [Lenovo Partner Learning](#)

Course code: SXXW1108r3v

Related publications and links

For more information, see these resources:

- Lenovo ThinkEdge SE450 product page:
<https://www.lenovo.com/us/en/p/data-center/servers/edge/thinkedge-se450-edge-server/len21te0002>
- Interactive 3D Tour of the ThinkEdge SE450:
<https://lenovopress.com/lp1550>
- ThinkEdge SE450 drivers and support
<https://datacentersupport.lenovo.com/products/servers/thinksystem/se450/7d8t/downloads>
- Lenovo ThinkEdge SE450 product publications:
<https://pubs.lenovo.com/se450/>
 - Quick Start Guide
 - Setup Guide
 - Maintenance Manual
 - Messages and Codes Reference
 - UEFI Manual
 - Rack installation guide (standard 1200mm rack)
 - Rack installation guide (550/600mm rack)
 - Rack installation guide (Two-post rack)
 - Wall-mounting configuration guide
 - Floor-standing configuration guide
- ServerProven hardware compatibility:
<http://www.lenovo.com/us/en/serverproven>

Related product families

Product families related to this document are the following:

- [Edge Computing and Internet of Things \(IoT\)](#)
- [Edge Servers](#)
- [ThinkEdge SE450 Edge Server](#)

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